STAFF REPORT

File No.: PLRZ20240110 (Bigham)

DATE OF MEETING:	November 21, 2025
TO:	North Pender Island Local Trust Committee
FROM:	Southern Team
COPY:	Robert Kojima, Regional Planning Manager
SUBJECT:	Rezoning Application – Contractor and aggregate storage/sales yard Applicant: Braedon Bigham - Big Digem Contracting Location: 3334 Port Washington Road, Pender Island

RECOMMENDATIONS

1. **That the North Pender Island Local Trust Committee directs staff to prepare a draft bylaw for rezoning application PL-RZ-2024-0110 (Bigham).**

REPORT SUMMARY

The purpose of this staff report is to provide an update on rezoning application PL-RZ-2024-0110 (Bigham) including the submission of professional reports from the applicant, and to seek direction from the North Pender Island Local Trust Committee (LTC) to prepare a draft bylaw.

The above recommendation is supported as:

- Professional reports demonstrate adequate proof of water and conclude that there would be minimal further environmental impacts from future proposed uses over the existing conditions;
- The area proposed for rezoning is designated as Industrial and the proposed use is consistent with the Industrial land use policies of the North Pender Island Official Community Plan No. 171 (OCP); and,
- Having a draft bylaw will facilitate First Nations and agency referrals and enable further public input.

BACKGROUND

The applicant has submitted a rezoning application to permit the continued operation of aggregate storage, sales and associated uses on a portion of the subject property located at 3334 Port Washington Road, which is currently zoned Rural (R) and does not permit industrial uses.

At the November 29, 2024 meeting, staff presented the LTC with a preliminary report on the application, seeking direction on how to proceed. At that meeting, the LTC passed the following resolutions:

NP-2024-062
It was MOVED and SECONDED,
that North Pender Island Local Trust Committee directs applicant to provide an ecological assessment report in respect to the rezoning application NP-PLR20240110 (Bigham) for impact on adjacent properties.

NP-2024-063
It was MOVED and SECONDED,
that North Pender Island Local Trust Committee directs staff to proceed with application PLRZ20240110 (Bigham) and to provide terms of reference to the applicant.

NP-2024-064
It was MOVED and SECONDED,
that North Pender Island Local Trust Committee permits the current industrial land use to continue during consideration of application PLRZ20240110 in accordance with standing resolution 2020-010 policy option 15.1(b); and directs that bylaw enforcement actions, including the issuing of notices, to cease.

A terms of reference (TOR) was subsequently issued to the applicant in December 2024 (Attachment 1). The TOR requires the submission of a professional hydrogeological report demonstrating proof of water for both the proposed industrial and future residential uses, an industrial wastewater/stormwater management plan to address movement of water at the site and minimize impacts on the environment and adjacent properties, and an ecological assessment report that includes conclusions and recommendations with respect to suitability and impact of the proposed industrial uses on the subject property.

With the submission of hydrogeological and ecological assessment reports, staff are now seeking direction on how to proceed, including whether to prepare an amending draft bylaw for further consideration by the LTC and the community.

The November 2024 preliminary staff report provides a detailed description of historical and proposed future uses, sites plans, policy and regulatory analysis and other important baseline information regarding the proposed rezoning.

The proposed uses remain the same as in November 2024 except that the applicant has removed the wash pad from the proposal. An updated site plan is still required from the applicant that shows the wash pad removed.

Issues and Opportunities

Hydrogeology Report

A well was drilled on the property in October 2023, intended to service both the future residential use on the upper portion of the lot and the industrial use below. Well yield by air lifting was assumed to be an estimated 16353 litres/day.

To service the residential use, the LUB standard for domestic potable water at time of subdivision is 2000 litres/day. It is typical to apply these standards at the time of rezoning. The applicant is also proposing commercial groundwater use via a bathroom facility in the proposed shop building.

The TOR requires the following in respect of proof of water:

> A groundwater report, prepared by a professional hydrogeologist (an engineer or geoscientist licensed under the Professional Governance Act or any legislation which may be enacted in substitution; and has competency in the field of hydrogeology), demonstrating standards for potable water supply for **both** the future residential use on the lot based on the domestic potable water supply standard of 2000 litres/day, **plus** the amount conservatively estimated by the professional hydrogeologist to service all proposed future industrial groundwater uses.

The applicant has submitted a professional hydrogeological report that provides the results of a 15 hour pump test completed on June 24, 2025 (Attachment 2). The report finds that the well tested at a rate of 3.0 L/s (4,370 L/day) which would meet a minimum standard of 2000 l/day for both a residential and industrial use, and further concludes:

> A rezoning application has been submitted for the property at 3334 Port Washington Road, on Pender Island, BC, to become industrially zoned. One water well with Well ID: 65548 is located on site and was inspected and tested for the purpose of becoming the property's potable water source. It is confirmed that:
>
> - The well has sufficient available groundwater to provide the daily required volume of potable water for the proposed buildings and use.
> - The well has been constructed in accordance with the Groundwater Protection Regulation.
> - The extraction of groundwater for the proposed buildings and use will not adversely affect the quantity or quality of any existing groundwater well or surface water used as a source of potable water.
>
> Samples taken at the time of the pump test yielded no coliform bacteria, no fecal contamination, and no E. coli; however, elevated non-coliform bacteria, high plate counts, and elevated levels of lead and manganese suggest treatment is required to provide potable water. It is also recommended to disinfect the well prior to use. The treatment methods described in this report are recommended to remove lead and manganese and to mitigate against future potential bacteriological issues. With the water samples obtained, it is confirmed that:
>
> - The water quality analysis was completed by an accredited laboratory.
> - The proposed water supply source can be made potable with a treatment system that is customarily used in a dwelling unit.
> - The well is not affected by the intrusion of saline groundwater or sea water and has a low risk of becoming affected.

The Senior Freshwater Specialist has reviewed the professional report and has determined that the methodology meets Islands Trust and provincial standards and that the findings are reasonable and valid.

For other commercial water use requirements to service the business, the applicant is proposing to install a rainwater catchment system for rainwater harvesting off the proposed new shop building. Water captured, to be stored in a 3000-gallon cistern, will be used for all equipment washing as well as fire suppression.

Given the proposal to use rainwater catchment, the LTC could require that no groundwater be used for any other commercial water use other than the workshop as a condition of a s. 219 covenant.

As the groundwater used for servicing the proposed shop bathroom will be for a commercial use, the applicant will also be required to obtain a commercial water license consistent with the *Water Sustainability Act*. This would be obtained through the province.

Ecological Assessment Report

The TOR requires that the ecological assessment report consider the following:

> An Ecological Assessment Report that includes at a minimum:
>
> a. Property location and description including background and history of use of subject parcel and adjacent properties;
> b. Identification of existing structures, roadways and other development features;
> c. Desktop review of ecological, landform and other relevant spatial data layers;
> d. Site inventory including identification of significant sensitive terrestrial and aquatic ecosystem features and species on subject parcel and adjacent properties;
> e. Review and assessment of the concerns expressed in the letter from the Pender Islands Conservancy to the LTC, dated November 25, 2024 (Attachment 2); and,
> f. Conclusions and recommendations with respect to suitability and impact of proposed industrial uses including potential cumulative impacts, siting of development infrastructure and driveway/parking areas, measures to reduce impacts to neighbouring properties and ecosystems during construction and operation, and future site monitoring requirements.

A professional ecological assessment report has been submitted by the applicant from Aquaparian Environmental Consulting, dated November 5, 2025 (Attachment 3). As excerpted below, the ecological assessment report concludes that in the opinion of the professional biologist "*the current proposed rezoning is appropriate for the site and is not expected to result in further environmental impacts over the existing conditions*."

> It is Aquaparian's opinion that continued use of the southern portion of the subject parcel for industrial use is consistent with the adjacent industrial parcels along both sides of Port Washington Road frontage in this area and that concentrating similar industrial operations to one small area of the island is preferable to spreading industrial uses throughout the island or to other areas that may cause habitat fragmentation or have existing sensitive environmental attributes that may be lost to new development. There is currently no plan to expand the work yard of the site which is limited to a very small portion of the property (6%). The work yard is separated and downslope of the environmentally sensitive portion of the parcel. The conservation lands identified in the report are located over 300m away from the Big Digem work yard and two of the three parcels are on the opposite side of the ridge from the subject parcel. The nearest known eagle nest tree is over 200m away from the works yard, one of which is on the opposite side of the ridge and the other is separated by a forest stand. It is Aquaparian's opinion that the current proposed rezoning is appropriate for the site and it is not expected to result in further environmental impacts over the existing conditions. If other parcels in this area are rezoned for additional industrial use in the future, increased heavy equipment traffic would be expected to occur along Port Washington Road over current use.

Staff conclude that the ecological assessment report meets the reporting requirements of the TOR and that the findings of the professional are reasonably considered and valid.

A draft version of the professional report was reviewed by staff in August 2025 including the in-house registered professional biologist, and comments were provided by the Islands Trust R.P. Bio to the applicant (included as Attachment 4). These comments have been addressed through edits to the report.

The report also includes a number of recommendations in respect of invasive species management, protection of bird species and sharp-tailed snakes, and site management including managing dust and air quality, road maintenance and workshop construction. Where appropriate, these recommendations could be included as s. 219 covenant conditions.

If there are concerns or questions with the findings or the scope of the ecological assessment, the LTC could direct the applicant to provide additional information through their professional.

Wastewater/Stormwater Management Plan

The TOR requires that the Wastewater/Stormwater Management Plan consider the following:

> An Industrial Wastewater/Stormwater Management Plan, prepared by a qualified professional engineer, which includes requirements to minimize impacts on the environment and adjacent properties, based on site conditions and proposed industrial uses for:
>
> a. The safe storage and disposal of all industrial wastewater produced on the site;
> b. Effective management of all stormwater; and,
> c. Compliance monitoring and reporting.

The applicant has provided a draft Industrial Wastewater/Stormwater Management Plan by a qualified professional engineer to staff for preliminary review. The draft report concludes that an on-site stormwater attenuation system is feasible.

Staff are currently in the process of reviewing the draft document with the applicant and their professional engineer in regards to a number of technical aspects of the proposed plan. The expectation is that a more finalized plan document will be ready to bring the LTC in time for the January 30, 2025 meeting.

Section 219 Covenant

The LTC could require that the applicant grant a s. 219 *Land Title Act* covenant to the LTC for any additional restrictions not included in the LUB amendments including any relevant aspects and recommendations of the professional reports in respect of groundwater use, storm and wastewater management, and mitigation of ecological impacts.

Consultation

Should the LTC direct staff to prepare amending bylaws, staff will bring it back to the LTC at the January 30, 2025 meeting for further consideration. Following receipt by the LTC in January, the draft amending bylaw would be sent to potentially affected government agencies and First Nations for referral and used to garner additional community input prior to consideration of first reading.

In this case, as there is no required OCP amendment, the LTC could choose whether to hold a public hearing or not. If the LTC chooses to not hold a public hearing, then staff would need to provide notice of first reading.

If a public hearing is held, public hearing notice would be posted as per statutory and bylaw requirements in advance of a public hearing, including notification of the proposed rezoning to all properties located within 100 metres of the subject property.

Typically, a Community Information Meeting (CIM) is also held prior to a public hearing. With direction from LTC, these would be scheduled either separately or concurrently after draft bylaws are complete, reviewed and have received at least First Reading. If no public hearing is held, the LTC could still choose to hold a CIM.

Rationale for Recommendation

The recommendation on page 1 is supported as:

- Professional reports demonstrate adequate proof of water and conclude that there would be minimal further environmental impacts;
- The area proposed for rezoning is designated as Industrial and the proposed use consistent with the Industrial land use policies of the North Pender Island Official Community Plan No. 171 (OCP); and,
- Having a draft bylaw will facilitate First Nations and agency referrals and enable further public input.

ALTERNATIVES

The LTC may consider the following alternatives to the staff recommendation:

1. **Request further information**

   The LTC may refer back to staff requesting further information prior to making a decision. Recommended wording for a resolution is as follows:

   That the North Pender Island Local Trust Committee request that staff report back with….

2. **Deny the application**

   The LTC may deny the application. Recommended wording for the resolution is as follows:

   That the North Pender Island Local Trust Committee proceed no further with application NP-PLRZ20240110 (Bigham).

3. **Hold the application in abeyance**

   The LTC may choose to hold the application in abeyance.

4. **Receive for information**

   The LTC may receive the report for information

NEXT STEPS

Based on direction from the LTC, staff will initiate the drafting of an amending bylaw.

Submitted By:	Brad Smith, Island Planner	November 13, 2025

Concurrence:	Robert Kojima, Regional Planning Manager	November 13, 2025

ATTACHMENTS

1. December 2024 Terms of Reference w Letter from Pender Conservancy
2. Hydrogeologist Pump Test Report, November 2025
3. Ecological Assessment Report, November 2025
4. Islands Trust RP Bio comments, August 2025

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December 18, 2024 File Number: PLRZ20240110 (Bigham)

Attn: Braedon Bigham
Via email:

Dear Braedon,

Re: Terms of Reference for Rezoning Application PLRZ20240110 (Bigham) - 3334 Port Washington Road, North Pender Island (PID 005-837-693)

The North Pender Island Local Trust Committee (LTC) received a preliminary report for rezoning application PLRZ20240110 (Bigham) at the November 29, 2024 LTC meeting. At that meeting, the LTC passed a resolution to proceed with the application, including the issuance of a Terms of Reference (TOR).

Consistent with the North Pender Island Development Approval Information Bylaw No. 134 (DAI Bylaw), the objective of this TOR is to identify and request any anticipated information from the applicant in a timely manner, and as early as possible in the process.

The information received by Islands Trust to date includes:

1. Completed application form
2. Letter of intent and proposed future uses
3. Survey plan depicting area proposed for rezoning
4. Preliminary site plan drawings
5. Statement of Title Certificate
6. Site Disclosure Statement
7. Septic Authorization Report
8. Well Drilling Log
9. Highway Access Permit
10. Legal Easement Documents

Additional information required to proceed with your application includes:

1) Hydrogeological Report

A groundwater report, prepared by a professional hydrogeologist (an engineer or geoscientist licensed under the Professional Governance Act or any legislation which may be enacted in substitution; and has competency in the field of hydrogeology), demonstrating standards for potable water supply for **both** the future residential use on the lot based on the domestic potable water supply standard of 2000 litres/day, **plus** the amount conservatively estimated by the professional hydrogeologist to service all proposed future industrial groundwater uses.

Attachment 1 provides further technical guidance for demonstrating potable water.

The applicant should also be aware that a provincial water licence would be required for all industrial groundwater uses in accordance with the *Water Sustainability Act*.

2) Industrial Wastewater/Stormwater Management Plan

An Industrial Wastewater/Stormwater Management Plan, prepared by a qualified professional engineer, which includes requirements to minimize impacts on the environment and adjacent properties, based on site conditions and proposed industrial uses for:

a. The safe storage and disposal of all industrial wastewater produced on the site;
b. Effective management of all stormwater; and,
c. Compliance monitoring and reporting.

3) **Ecological Assessment Report**

An Ecological Assessment Report that includes at a minimum:

a. Property location and description including background and history of use of subject parcel and adjacent properties;
b. Identification of existing structures, roadways and other development features;
c. Desktop review of ecological, landform and other relevant spatial data layers;
d. Site inventory including identification of significant sensitive terrestrial and aquatic ecosystem features and species on subject parcel and adjacent properties;
e. Review and assessment of the concerns expressed in the letter from the Pender Islands Conservancy to the LTC, dated November 25, 2024 (Attachment 2); and,
f. Conclusions and recommendations with respect to suitability and impact of proposed industrial uses including potential cumulative impacts, siting of development infrastructure and driveway/parking areas, measures to reduce impacts to neighbouring properties and ecosystems during construction and operation, and future site monitoring requirements.

4) **Site Plans –** there are no further site planning reporting requirements at this time.
5) **Septic Servicing** – there are no further septic servicing reporting requirements at this time.
6) **Geotechnical** – there are no further geotechnical reporting requirements at this time.

7) **Development Permit Areas** (DPAs) – Although there are areas of DPA 1 -Woodland and DPA 2 - Herbaceous located in the upper portion of the subject parcel, there are no DPAs affecting the area proposed for rezoning.

However, the applicant should be aware that if a portion of the property is rezoned to a Light Industrial zone, the requirements of **DPA 9 - Commercial and Industrial Form and Character** will apply and a Development Permit may be required for any new work requiring a building permit. DPA 9 guidelines start on p. 85 of the OCP.

8) ***Land Title Act* s. 219 covenant -** The applicant should be aware that the LTC may seek further conditions of rezoning to be established as part of a s.219 covenant. A s.219 covenant is a charge secured against the title to a property in favour of the LTC to impose an obligation on the property owner, as per the provisions of s.219 of the *Land Title Act.*

In this case, a s. 219 covenant could include conditions not captured through rezoning in the LUB such as the inclusion of a detailed site plan, specific construction requirements, groundwater use restrictions, industrial wastewater and stormwater management plan obligations, environmental monitoring and reporting obligations, and other limits on the proposed land use and development.

9) **Archaeological Material -** Islands Trust reviews all applications/permits using Remote Access to Archaeological Data (RAAD) mapping to ensure the preservation and protection of cultural heritage, archaeological sites, and ancestral places. A review of the subject property indicates archaeological potential exists. Further to that review, staff direct the applicant to contact the BC Archaeology Branch to determine if an archaeological permit would be required prior to commencing any future development. Attached are the Islands Trust Chance Find Protocol and Provincial Archaeological Branch *Heritage Act* guidelines (Attachments 3 and 4).

Reporting Requirements

With respect to any reporting requirements listed above, the applicant and/or professional must, in accordance with generally accepted impact assessment methodology, ensure the reports:

(a) identify relevant baseline information and document the nature of the resource or other matter on which the proposed activity or development may have an impact;
(b) identify and describe the potential and likely impacts of the activity or development including any cumulative effects when combined with other projects proposed or under development;
(c) evaluate the impacts in terms of their significance and the extent to which and how they might be mitigated; and
(d) make recommendations as to conditions of approval that may be appropriate to ensure that undesirable impacts are minimized or avoided, and
(e) make recommendations as to measures that may restore or enhance natural functions or features that have been damaged or degraded prior to development or that would be impacted by the proposed development.

This information must be prepared by a professional or professionals in good standing with his/her professional organization within British Columbia, acting within his/her area of expertise, and with demonstrated and pertinent experience and/or training.

Please also note that the Islands Trust reserves the right to require additional information or clarification in response to the project reports. Any additional requirements will be provided in writing and will identify the additional information required in as clear and specific manner as possible.

If you have any questions concerning the application or TOR requirements stated above, please do not hesitate to contact me.

Sincerely,

BSmith

Brad Smith
Island Planner, North Pender Island Local Trust Area

Attachment 1. Potable Water Standards Guidance
Attachment 2. Pender Islands Conservancy Letter, dated November 25, 2024
Attachment 3. Islands Trust Chance Find Protocol
Attachment 4. Provincial Archaeological Branch *Heritage Act* guidelines

pc: Robert Kojima, Regional Planning Manager

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[DATE]

File Number: Click here to enter text.
MoTI File Number: Click here to enter text.

Click here to enter text.
Via email: Click here to enter text.

Dear Click here to enter text.

Re: Terms of Reference – Supply of Potable Water – [File] – [Civic or legal]

The terms of reference described below are bylaw requirements or recommended best practices for the purposes of Proof of Water for Subdivision. Deviations from the best practices may result in delays in processing and additional consultant costs. The applicant shall retain a "hydrogeologist" an engineer or geoscientist licensed under the Professional Governance Act or any legislation which may be enacted in substitution; and has competency in the field of hydrogeology to satisfy proof of water requirements under Section Click here to enter text. ("Standards for Potable Water Supply") of the Click here to enter text.Island Land Use Bylaw No.Click here to enter text. (LUB) for the proposed application.

The *hydrogeologist's* written certification must be submitted under a professional engineer or geoscientist seal and include, but not be limited to, a Technical Assessment Report (Report) with the following terms:

1) Where *potable* water is to be supplied by a drilled well the Report shall provide that:

   a) Each well has sufficient available groundwater to provide the daily required volume of *potable* water for each permitted building, structure or use;
   b) Each well has been constructed in accordance with the *Groundwater Protection Regulation* or any legislation which may be enacted in substitution; and,
   c) The extraction of groundwater in respect of each permitted building, structure or use will not adversely affect the quantity or quality of any existing groundwater well or surface water used as a source of potable water.

2) Where the *potable* water supply is provided through a drilled well or water licence, the Report shall provide:

   a) Results of a water quality analysis, completed by an accredited laboratory;
   b) Certification, based on the accredited laboratory water quality analysis, that the proposed water supply source is *potable,* or can be made *potable,* with a treatment system that is customarily used in a *dwelling unit*;
   c) Certification, based on the accredited laboratory water quality analysis of chloride concentrations, that each well is not likely to be affected by the intrusion of saline groundwater or sea water in accordance with Government of British Columbia guidance documents;
   d) A plan of the proposed *subdivision* indicating the location where each water sample was taken; and

e) A statement that the water samples upon which the water quality analysis was performed were unadulterated samples taken from the locations indicated on the plan.

3) Where *potable* water is to be supplied by a drilled well, a *pumping test*[1] *should* be carried out on each well in a proposed subdivision under the direct supervision of a *hydrogeologist* by:

a) pumping groundwater, at a constant rate, for a minimum period of 12 hours; and
b) withdrawing the daily required volume in accordance with Section Click here to enter text.of the LUB within a period of 24 hours; and
c) monitoring the recovery phase for each well recovered to 90 percent of static water level within a period no longer than the duration of the pumping test. If 90 percent recovery is not achieved the hydrogeologist must provide reason for the lack of recovery to 90 percent and must analytically demonstrate the efficacy of the well in the absence of 90% recovery.

4) The Report shall address all applicable guidelines for subdivision for [*Development Permit Areas]* that are designated on the subject property in the Click here to enter text.Island Official Community Plan Click here to enter text.(OCP). Specifically, impacts of individual drilled wells and the feasibility of a community water supply should be assessed in accordance with the following guideline Click here to enter text.:

i) Click here to enter text..

Groundwater wells under, or at risk of, saline water intrusion are not permitted sources of potable water.

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Click here to enter text.
Click here to enter text.

pc: William Shulba, Senior Freshwater Specialist
Click here to enter text., Development Officer, MoTI

Pender Islands Conservancy

#1-4301 Bedwell Harbour Road
Pender Island BC V0N 2M1

25 Nov 2024

Dear North Pender Island Trustees Maude, Campbell and Morrison:

We are writing on behalf of the Pender Islands Conservancy Board of Directors, with respect to file No. PLRZ20240110 (Bigham). As the owner of a Nature Reserve bordering the Subject Property (see Figure 1 below), we believe rezoning to allow continued and expanded industrial activity on the lower portion of the Subject Property has a high potential to adversely impact ecological integrity and habitat quality for species at risk on adjacent properties, including our Nature Reserve for which we have a duty of care. According to the North Pender OCP (Section 2.5.1), "industrial development and activity which may have a deleterious impact on adjacent land uses will not be permitted". We therefore request that Trustees do not advance this application for Industrial zoning, but rather explore more appropriate locations for the proposed industrial activity.

Comments on the Staff Report

The list of existing uses of land on *adjacent properties* (P. 134) curiously excludes the adjacent Nature Reserve *owned by the Islands Trust itself* (Lisa Baile Nature Reserve, held by Islands Trust Conservancy), though this property is peripherally acknowledged on P. 139 ("Site Influences"). The additional 10-acre Forest Wetland Nature Reserve is currently being established as a result of a generous land donation by community donors and is now owned by the Pender Islands Conservancy; this Nature Reserve also borders the Subject Property to the north. Vulture Ridge Nature Reserve (36 acres), secured by the Pender Islands Conservancy in 2024 with the support of community donors, the Province of BC, and Environment and Climate Change Canada, is located ~85m from the eastern border of the subject property. All three of these properties (shown in Figure 1) have been secured in part to protect critical habitat for species at risk such as sharp-tailed snakes, common nighthawks and olive-sided flycatchers.

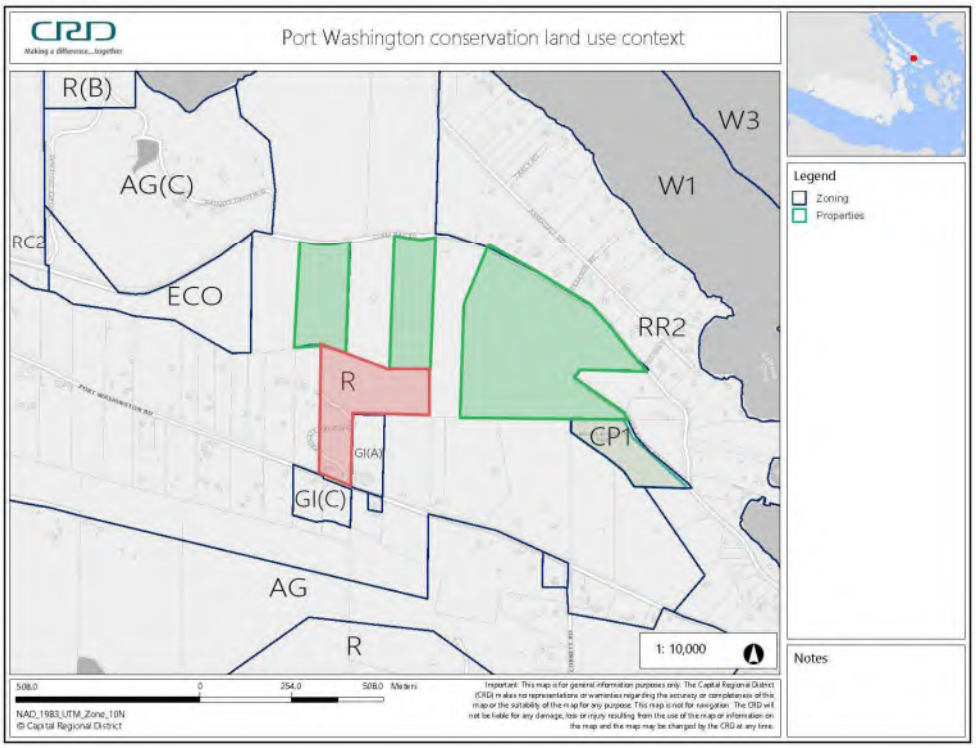


Figure 1. Subject Property (red) with adjacent Nature Reserves (green). From west to east: Lisa Baile Nature Reserve (10 acres; owned by Islands Trust Conservancy), Forest Wetland Nature Reserve (10 acres; Pender Islands Conservancy) and Vulture Ridge Nature Reserve (36 acres; Pender Islands Conservancy).

The statement on P. 139 of the Staff Report that no species at risk are present on the Lisa Baile Nature Reserve (LINR) is misleading. Sharp-tailed snakes have been visually detected on 3330 Port Washington Road, immediately adjacent to both the Subject Property and LINR, and hence there is a very high likelihood that they similarly occupy the Nature Reserve and even the Subject Property itself. Moreover, olive-sided flycatchers and common nighthawks are regularly detected using the adjacent properties, including the Nature Reserves; both are also species at risk, listed provincially and federally. Threaded vertigo (*Nearctula* sp.), a federally listed species of terrestrial snail, was identified on Vulture Ridge Nature Reserve in 2024 and is highly likely to be present on LINR as well. The LINR Management Plan identified a high likelihood of the presence of at-risk vascular plants, birds, amphibians and reptiles on LINR, and recommended ongoing monitoring to document species at risk (Lisa Baile Nature Reserve Management Plan 2022; P. 42).

We request that staff include the two Nature Reserves that border the subject property in the list of *existing uses of land on adjacent properties* (uses: conservation) and acknowledge that species at risk are, or are highly likely to be, present on these adjacent properties. We further request an assessment by Islands Trust Conservancy ecologists with respect to the potential impacts of the proposed permanent and expanded industrial activity associated with the Subject Property on the Lisa Baile Nature Reserve, which the Islands Trust has a responsibility to steward and protect as the recipient of this generous donation of ecologically valuable land.

The staff report states that the applicant's business "*provides an important community service*"; we note that Nature Reserves similarly provide important community services, by protecting groundwater quality and recharge capacity, buffering extreme weather events and associated impacts (flooding, drought, wildfire - becoming increasingly common in the context of climate change), enhancing surrounding property value and aesthetics, and maintaining biodiversity that in turn enhances recreational experiences and supports agriculture (pollination services) and hence local food security.

We do not dispute that the service provided by the applicant is important to the community; however, given the Industrial Land Use Objectives in the OCP, "*to ensure any industry is sited to minimize adverse effects upon neighbouring properties*", we argue the Subject Property is not an appropriate location for the ongoing and intended future industrial use, as it has a high probability of adversely affecting ecological integrity, habitat quality and ecosystem services on adjacent Nature Reserves.

Potential ecological impacts

Raptor nests
Two newly identified bald eagle nest trees are located east of the Subject Property, with one potentially located within 200 m of the proposed rezoning area (see P.168 of Staff Report – distance estimated from map scale). According to Provincial "Breeding Season Quiet Buffer Requirements" in rural areas and depending on the outcome of the reassessment of the Heron and Raptor Nest DPA currently underway by the North Pender Island LTC to align this DPA with Provincial standards (which have already been widely adopted by local governments across BC), no industrial activity, including heavy equipment operation, may ultimately be permitted on the Subject Property between Feb 5 – August 31 (see P. 165 of Staff Report). We suspect this would negatively impact the applicant's business. We again suggest that the proposed location is inappropriate for current and future intended industrial activity, given adjacent land uses – in this case, by nesting bald eagles.

Groundwater
The Subject Property and adjacent Nature Reserves have been identified by the Islands Trust Area Groundwater Recharge Mapping Project (2022) as high groundwater recharge areas (Appendix A). This ecosystem service is one of the reasons the adjacent Pender Conservancy Nature Reserves were assessed as high priority for securement. We welcome the attention given to the significant impacts to groundwater supply of the anticipated commercial and residential groundwater use on the Subject Property in the Staff Report; however, application of standards for domestic use only (2000 L/day, P. 135) is inappropriate for an industrial rezoning application, and we trust this application would be held to a higher standard. Rainwater catchment can be a reasonable offset to reduce groundwater use; however, given that precipitation inputs were by far the most sensitive input parameter in the Southern Gulf Islands Water Balance Model sensitivity analysis (Islands Trust Area Groundwater Availability Assessment, 2021; P. 19, Figure 9), intercepting rainwater in our region can in fact reduce local groundwater recharge and hence indirectly still reduce groundwater availability.

Species at risk
Sharp-tailed snakes are known to be present on adjacent properties. Recent studies have shown that this species moves over relatively long distances into forests from the open bluff habitats that

they are typically associated with (up to 80 m; Christian Engelstoft, pers. comm.). Hence, undisturbed forest habitat adjacent to bluffs is of potentially high value for this species at risk. Continued and expanded industrial activity within the lower portion of the Subject Property may therefore limit movement of this species across the landscape. As noted in the Lisa Baile Nature Reserve Management Plan (2022), the ridge and adjoining forest provides habitat suitable for many other species at risk, including vascular and nonvascular plants, birds (e.g. olive-sided flycatcher, common nighthawk, purple martins), and amphibians such as red-legged frogs. Our knowledge of the distribution and abundance of species at risk on Pender Island is extremely deficient, and so in the absence of appropriate survey efforts, it cannot be responsibly stated that species at risk are not present and will not be adversely affected by continued and expanded heavy industrial activity on the Subject Property. Indeed, similar habitat suitable for these species at risk occurs on the Subject Property itself.

OCP policy

*2.5.1 Industrial development which **may have** a deleterious impact on adjacent land uses **will not** be permitted*.
We argue that a TUP should not have been issued according to the above OCP policy, and in doing so the LTC is in violation of the North Pender Island OCP. Constant, daily heavy equipment operation and aggregate hauling *along the length of Port Washington Road*, adjacent to land used for residential and agricultural purposes, as well as the acoustic and physical habitat disturbance caused by the industrial operation on the Subject Property which directly borders two Nature Reserves, most certainly has a deleterious impact on these adjacent land uses, and so the application to rezone for *permanent* industrial operation on the subject property cannot be advanced, as it directly violates the above OCP policy. We understand that directing staff to proceed with the application will enable public consultation and input, to "identify any issues or concerns with the proposed rezoning". However, if the application clearly violates an OCP policy, public input to that effect should not be required for you to make the assessment that the application should not be advanced.

We are aware that in recent LTC meetings, Trustees have discussed that other possible locations for the applicant's operation are being explored which would require some imagination and cooperation with other land holders. We urge you to work with the applicant and broader community to identify an alternate location for this operation that appropriately balances the community benefit provided by the applicant's business with maintenance of ecological integrity and 'rural character and lifestyle', as our North Pender Island OCP and the Islands Trust mandate require.

Respectfully signed,

[redacted]

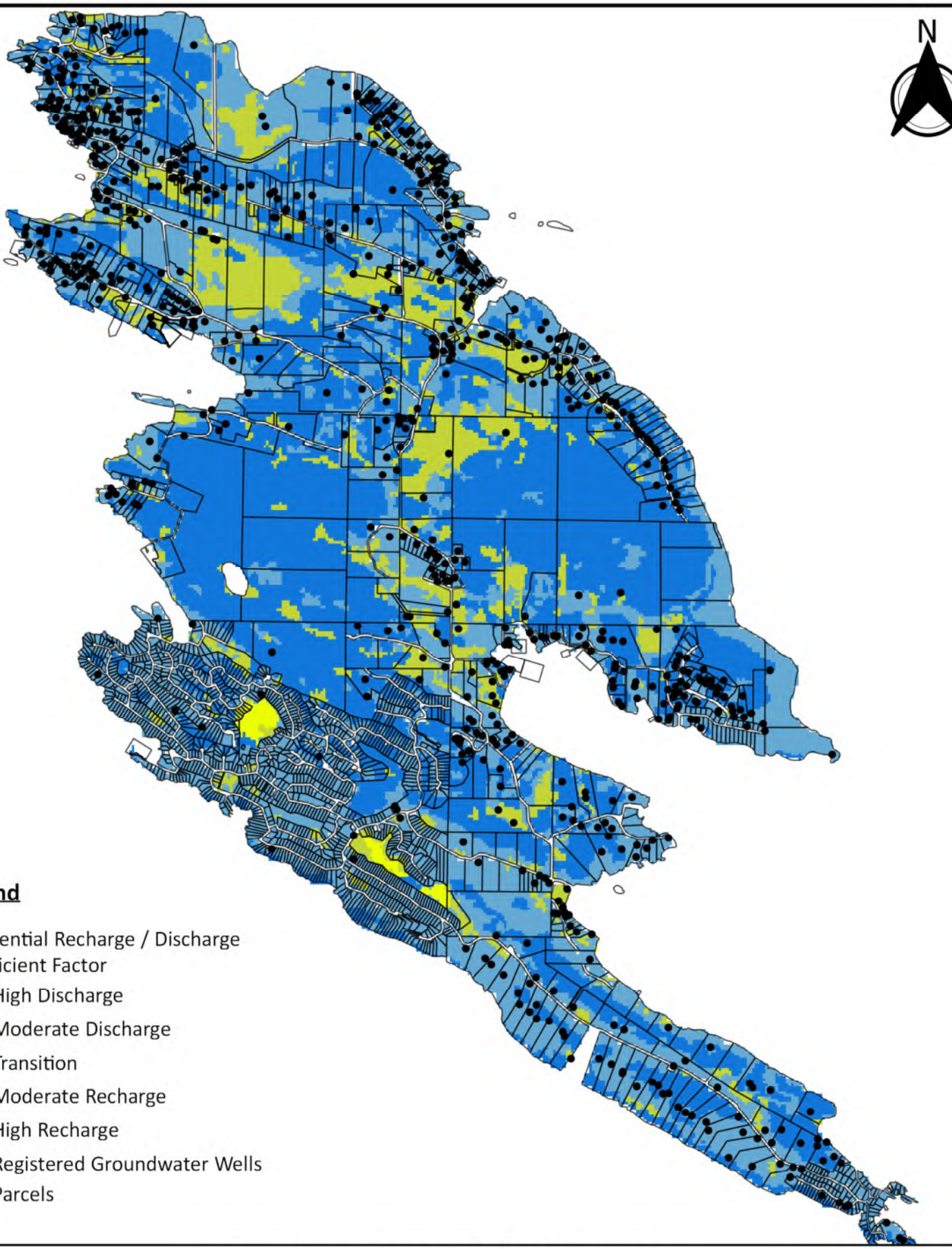
Elizabeth Miles
Board President
Pender Islands Conservancy

[redacted]

Dr. Pamela Wright
Stewardship Committee Chair
Pender Islands Conservancy

Appendix A

North Pender Island Groundwater Recharge and Discharge Zones



Groundwater Sustainability Science Program
North Pender - Preferential Recharge and Discharge Zones

Notes:
Drawn by: William Shulba, P.Geo
Drawn on: October 2022
Data Source: Islands Trust Area Groundwater Recharge Mapping Project

0 1 2 3 4 km

Cultural Protocol for Chance Finds and Ancestral Remains within Islands Trust Area

Purpose:

The purpose of this protocol is to provide culturally relevant guidelines to the Islands Trust in cooperation with the Province of British Columbia, the Archaeology Branch, archaeologists (academic, cultural resource management or otherwise), and other agencies or individuals and the public as to the procedures for handling human remains within First Nations treaty and traditional territories. This is to facilitate the culturally appropriate and respectful treatment of these remains.

Mandate:

Islands Trust Area is located within British Columbia and Canada, and anyone undertaking land altering activities in areas of known and recorded archaeological or variable archaeological potential should be adhering to the Heritage Act, Island Trust by-laws, other agency and government permitting and all legal requirements related to land alteration. Chance finds outside of archaeological sites require work to stop to allow for assessment and protection of the area.

Authority:

First Nations within the Islands Trust Area represent the cultural and heritage interests throughout the Trust area.

Procedures:

The following steps will apply in cases where ancestral remains are found in unexpected situations (e.g. construction of buildings or renovations, building of roads, natural erosion, ground disturbance or alteration) or during archaeological projects or studies under or not under a First Nation cultural and heritage permit.

A. Unexpected Discoveries

In cases where the First Nation is notified that ancestral remains are discovered by chance; the following should apply:

1. The First Nation Lands and Resources Department or Council or Band Manager/Administrator must be notified immediately.

2. The coroner's office and local policing authority must be notified.

3. Representatives from the First Nation (contact determined by First Nation) and the coroner's office will determine whether the find is contemporary forensic concern. The Archaeological Branch and or archaeologists can offer advice on such matters.

4. If the remains are of First Nation/Indigenous ancestry, and under no immediate threat or further disturbance, they will not be excavated or removed, unless determined otherwise by the First Nation.

5. It the remains have been partially or completed removed, the First Nation will facilitate their removal or mediate the situation.

6. If the remains are under threat, removal under the authority of the coroner, police authority and First Nation will coordinate removal.

7. If desired the First Nation may allow for a qualified physical anthropologist or archaeologists with training in human osteology and First Nation handling of ancestral remains to assess the found remains in order to implement conservation measures.

8. Any analysis of ancestral remains must be limited to basic recording and in field observation until representatives of the First Nation arrive at the site.

B. Permitted Archaeological Projects

In cases where ancestral remains encountered in the course of project under a First Nation cultural and heritage permit, the First Nation must be contacted immediately.

1. Extreme care and respect for ancestral remains is required. If uncovered, they must not be removed, but left in place. For any reason they are removed, they must be placed in a clean handkerchief or blanket, placed in a solid box with cedar boughs.

2. The field director or permit holder must contact the First Nation and seek advice on how the ancestral remains should be handled.

3. The First Nation will determine the disposition of the ancestral remains.

4. Any analysis of ancestral remains must be limited to basic recording and in field observation until representatives of the First Nation arrive at the site.

Contacts at Islands Trust include Local Trustee and Senior Intergovernmental Policy Advisor, Victoria Office lwilcox@islandstrust.bc.ca or (604) 348-6885.

PROTECTED ARCHAEOLOGICAL SITES IN BRITISH COLUMBIA

Archaeological sites are the physical remains of past human activity. There are over 50,000 known archaeological sites in British Columbia representing thousands of years of human history. The ***Heritage Conservation Act*** **(HCA)** recognizes the historical, cultural, scientific, spiritual, and educational value of archaeological sites to First Nations, local communities, and the public. Archaeological sites on both public and private land are protected under the HCA and must not be altered or damaged without a permit issued by the Province of British Columbia's Archaeology Branch.

Receipt of this form indicates that your local government has reviewed the records of the Archaeology Branch to determine whether your proposed activities are likely to impact a protected archaeological site. By identifying overlaps with archaeological sites early in the planning and development process, appropriate and timely steps can be taken that support an efficient development process. You should be aware that there are limitations concerning this review; please read the Provincial disclaimer[1] below.

Your property or project area falls into the selected category:

☐ Direct overlap with protected archaeological site: _____

Provincial records indicate that an archaeological site protected under the HCA is recorded within your property or project area.

- Your proposed activities may impact the protected archaeological site.
- You must obtain a site alteration permit issued by the Archaeology Branch before impacting the site.
- Completing an application for alteration permit usually requires archaeological expertise. You may consider engaging an eligible consulting archaeologist (see page 2) to confirm the results of this review and assist you in establishing permit requirements with the Archaeology Branch.
- Disturbance of a protected archaeological site without an alteration permit is a contravention of the HCA and may result in substantial fines and development delays.
- The archaeological site impact management and permit process is summarized on page 2. If you have questions about the process, contact the Archaeology Branch.

☐ Direct overlap with an area of high archaeological potential

Provincial records indicate your property or project area has high potential to contain an archaeological site protected under the HCA, either because the area has been previously assessed for potential or there is a known archaeological site within 50 m that may extend beyond its recorded boundaries.

- Your proposed activities may impact an unrecorded archaeological site. Archaeological sites are protected under the HCA, even if they have not yet been identified and recorded.
- Disturbance of a protected archaeological site without a permit is a contravention of the HCA. Accidental discovery of an unknown archaeological site during development requires activities to be halted until permit requirements have been established; this may result in significant development delays.
- To avoid the possibility of unauthorized archaeological site impacts and development delays, you may wish to engage an eligible consulting archaeologist (see page 2) to determine in advance whether your activities are likely to impact an unrecorded protected archaeological site.
- The archaeological site impact management and permit process that you will need to follow if an archaeological site is encountered before or during development activities is summarized on page 2. If you have questions about the process, contact the Archaeology Branch.

☐ No identified overlap with archaeological sites or areas of high archaeological potential

Provincial records do not indicate known archaeological sites or areas of high archaeological potential within your property or project area.

- Provincial records may be incomplete with regard to archaeological potential in your area.
- There is always a possibility for unrecorded archaeological sites to exist. Archaeological sites are protected under the *HCA,* even if they have not yet been identified and recorded.
- If an archaeological site is encountered, development activities must be halted and the Archaeology Branch contacted for direction (250-953-3334).

[1] **Provincial Disclaimer**: The Archaeology Branch of the Province of BC is responsible for the administration of the *Heritage Conservation Act*. It is not administered by municipal or regional governments. In completing this form, municipal and regional government staff rely on information provided by the Province of BC. Any questions regarding this document should be directed to the Archaeology Branch or to an eligible consulting archaeologist. The information in this document is based on a search of Provincial records. There are archaeological sites in BC that are unknown and not recorded in these records. The Province makes no representations or warranties with respect to the accuracy or completeness of this information. Persons relying upon it do so at their own risk.

Archaeological Site Impact Management and Permit Process

Archaeological sites are protected under the *Heritage Conservation Act* (HCA) and must not be altered or damaged without a permit issued by the Province of British Columbia's Archaeology Branch. The archaeological site impact management and permit process is summarized below. This summary applies to the majority of situations where small-scale development plans are in conflict with protected archaeological sites. There are always exceptions that can be explained to you by an archaeologist or the Archaeology Branch as you proceed through the steps. Major development projects may be subject to additional requirements that are beyond the scope of the basic process described below.

What do I do if my property or project area contains a protected archaeological site?
You must obtain a site alteration permit issued by the Archaeology Branch before conducting activities that will impact a protected archaeological site. Permit applications are available on the Archaeology Branch website. However, completing a permit application usually requires archaeological expertise. Most applicants will therefore engage a professional archaeologist to review development plans, verify archaeological records, confirm that an alteration permit is required, complete the permit application, and work with the Archaeology Branch on the applicant's behalf to ensure all HCA permit requirements are met. **Note that the application process for all Archaeology Branch permits takes 8-12 weeks from the date the application is submitted**. Contact an eligible consulting archaeologist for time and cost estimates.

After discussing your project, a desktop review, and/or a preliminary reconnaissance, the archaeologist may conclude that your activities will not impact the archaeological site. The archaeologist should send a letter stating their professional opinion to the Archaeology Branch. You may no longer require an alteration permit to proceed with your activities. In other cases the Archaeology Branch may conclude that an alteration permit cannot be issued based on the information available.

What is an archaeological impact assessment?
An archaeological impact assessment (AIA) is conducted by an archaeologist under an inspection permit. The permit allows the archaeologist to conduct subsurface tests to collect information about the archaeological site. The AIA results in recommendations for managing impacts to the archaeological site. The archaeologist's recommendations and their feasibility should be discussed with you before they are submitted to the Archaeology Branch. Common recommendations include:

- Changing building plans or construction techniques to reduce or avoid archaeological site impacts.
- Proceeding with an alteration permit with or without concurrent archaeological studies, depending on the expected degree of impact to the site.
- No further archaeological study or permits required.

Contact an eligible consulting archaeologist
An eligible consulting archaeologist is able to hold a Provincial heritage permit that authorizes archaeological studies. Ask an archaeologist if he or she can hold a permit. Contact the Archaeology Branch (250-953-3334) to verify an archaeologist's eligibility. Find an archaeologist through the BC Association of Professional Archaeologists (www.bcapa.ca) or through business directories.

Contact the BC Archaeology Branch
BC Archaeology Branch
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: 250-953-3334
Web: www.for.gov.bc.ca/archaeology/property_owners_and_developers
Data Request Form (to inquire about archaeological sites within your property or project area): www.archdatarequest.nrs.gov.bc.ca

Date: July 23, 2025

Submit To: Islands Trust
200-1627 Fort Street
Victoria, BC, V8R 1H8
information@islandstrust.bc.ca

Attn: Brad Smith

Prepared By: MSR Solutions Inc.

Subject: 3334 Port Washington Road - Hydrogeological Report

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1. Introduction

A rezoning application has been submitted for the property at 3334 Port Washington Road, on Pender Island, BC. The legal description of the property is Lot 7, Plan, VIP6294, Section 18&22, Cowichan Land District, Portion Pender Island, with the PID: 005-837-693. The file number for the rezoning application is: PLRZ20240110. The North Pender Island Local Trust Committee had received a preliminary report and passed a resolution to proceed with the application on November 29, 2024. With the issuance of a Terms of Reference, it is required that a hydrogeological report is submitted.

2. Background

MSR Solutions Inc. (MSR) has been retained to develop a hydrogeological report for the rezoning application. The hydrogeological report is requiring an assessment of the quantity and quality of the potable water on site. One well has previously been drilled on site in October 2023. This well has a Well Tag No.: 129423, and Well ID: 65548, and is proposed to provide the potable water supply for the property. According to the letter from Islands Trust, regarding the "Terms of Reference for Rezoning Application PLRZ20240110 (Bigham) - 3334 Port Washington Road, North Pender Island (PID 005-837-693)" and dated December 18, 2024, the water supply standard for residential use is 2,000 L/day, plus the amount to service all proposed future industrial groundwater uses. A shop and an office are proposed on site, which are assumed to have a comparable water demand to a dwelling. No additional industrial groundwater uses are proposed. The water well and potable water supply is also to be in accordance with the North Pender Land Use Bylaw No. 224 (2022) and North Pender Island Official Community Plan Bylaw No. 171 (2007).

The terms of reference provide in the attachments and document for Potable Water Standards Guidance, which appends a map of the North Pender Island Groundwater Recharge and Discharge Zones. According to the map, the well is in a high recharge zone.

3. Water Supply

Potable water is to be supplied by the water well on site (Well ID: 65548). The drillers estimated well yield is 11.3 L/min (3 USgpm), which equates to an estimated 16,350 L/day, which exceeds the water supply standard for residential use of 2,000 L/day. To confirm the well yield, a pump test was completed by, and under the supervision of MSR (refer to Section 5 for more details).

The well was constructed in accordance with the Groundwater Protection Regulation to a total depth of 74.7 m (245 ft), recorded as being drilled in sandstone from top to bottom. With the well located over 100 m away from the next nearest well according to the BC Wells Database and located in a high recharge zone, the extraction of groundwater in respect of each permitted building, structure, or use, will not adversely affect the quantity or quality of any existing groundwater well or surface water used as a source of potable water. Regional mapping does not show any surface water in the nearby vicinity of the well.

4. Water Quality

Water samples were collected from the water well on site for further testing, to determine the drinking water quality. Refer to the attached site plan in Appendix A for the location of the well and obtained samples. The samples were sealed on site and delivered to the laboratory in accordance with their best practices of cool storage and a timely delivery.

A water quality analysis was completed by an accredited laboratory, obtaining the results provided in Tables 1-3. The water quality results are compared to the Maximum Allowable Concentrations (MACs) and Aesthetic Objectives (AO) determined by the Guidelines for Canadian Drinking Water Quality (2020). Refer to Appendix B for the water quality results provided by the laboratory for more information.

Table 1: Water Quality Analysis – Bacterial Testing

Parameter	Result	Guideline	Interpretation
Total Coliforms (TC)	0 CFU/100 mL	0 CFU/100 mL	**Safe** – No coliform bacteria
Fecal Coliforms (FC)	0 CFU/100 mL	0 CFU/100 mL	**Safe** – No fecal contamination
E. coli	0 CFU/100 mL	0 CFU/100 mL	**Safe** – No E. coli present
Total Non-coliforms (T-NC)	27,600 CFU/100 mL	≤ 200 CFU/100 mL	Result of stagnant well – shock disinfection treatment recommended.
Fermenters (F-NC)	200 CFU/100 mL	≤ 200 CFU/100 mL	
Lactose Fermenters	276 CFU/mL	≤ 200 CFU/mL	
Iron Bacteria	Present	Not a health risk	
Yeast/Fungi	Not Detected	Not specified	
Aeromonas	0.18 CFU/mL	No guideline	
Total Plate Count (TPC)	22,272 CFU/mL	≤ 500 CFU/mL	

Based on the water quality test results showing no coliform bacteria, no fecal contamination, and no E. coli, the water meets criteria outlined by the Canadian Drinking Water Quality Guidelines and the British Columbia Drinking Water Quality Guidelines. High measurements for Total Non-coliforms, Fermenters, Lactose Fermenters, and Total Plate Count suggest that there is some bacteriological activity occurring in the well, which is common for wells that are stagnant for an extended period. It is recommended to disinfect and flush the well thoroughly and retest the water again prior to finalizing the proposed treatment system.

For use in a dwelling unit, a baseline recommendation is to treat the water through filtration plus UV disinfection for safer and cleaner water and to mitigate against any potential bacteriological changes in the future.

Table 2: Water Quality Analysis – Metals Testing

Parameter	Result	Guideline	Interpretation
Lead	6.32 µg/L	5.00 µg/L MAC	**High** – Treatment recommended
Manganese	0.184 mg/L	0.120 mg/L MAC (0.020 AO)	**High** – Treatment recommended
Iron	0.155 mg/L	0.300 mg/L	**Safe** – Within limits
All Other Metals	-	-	**Safe** – No exceedances

Water quality analysis for metal elements in the well water yielded high lead and manganese. Lead can be toxic at trace amounts and should be removed. Manganese is generally considered safe within low levels, though an exceedance of the MAC indicates that treatment is required.

The water can be made safe for potable uses with the appropriate treatment provisions. The use of filter media such as Katalox Light, Metsorb, or Granular Activated Carbon (GAC) contained in a Clack canister is a common strategy effective in reducing both lead and manganese levels. Reverse Osmosis can also be considered but has high energy demands and high water consumption.

Table 3: Water Quality Analysis – Saltwater Intrusion Indicators

Parameter	Result	Guideline	Interpretation
Chloride	8.12 mg/L	≤ 250 mg/L (AO)	**Safe** – Within aesthetic objectives
Sodium	34.4 mg/L	≤ 200 mg/L (AO)	**Safe** – Within aesthetic objectives
Electrical Conductivity (EC)	425 µS/cm	Not specified	**Safe** – Freshwater is generally < 1,000 µS/cm
Total Dissolved Solids (TDS)	246 mg/L	≤ 500 mg/L (AO)	**Safe** – Within aesthetic objectives
Sulfate	6.86 mg/L	≤ 500 mg/L	**Safe** – Far below limit
Hardness	140 mg/L	75–150 mg/L	**Safe** – Moderately hard water within normal levels
pH	7.51	7.0 – 10.5	**Safe** – Neutral pH

Based on the water quality results, it is determined that the well does not experience high saline levels and is therefore safe for potable uses. According to the BC Water Resources Atlas, the subject well is not likely to be affected by the intrusion of saline groundwater or sea water as it is classified as moderately low seawater intrusion vulnerability. The well draws from Aquifer No. 711, a bedrock aquifer covering the northern area of North Pender Island.

Taking the current water quality results into account, it is recommended to install a 5-micron cartridge filter, 1-micron absolute cartridge filter, Clack canister filter with Katalox Light media, and a UV disinfection unit. Treatment with appropriately sized equipment of this nature will allow the existing well to function as a potable water source. As noted previously, it is recommended to disinfect and purge the well prior to taking a new sample to confirm requirements for treatment.

5. Pump Test

A pump test was started on the morning of June 24th, 2025, running for about 15 hours, before stopping the pump and monitoring the water level until the morning of June 26th, 2025. The two-day test allowed for the pumping of groundwater at a constant rate, exceeding the minimum pumping period of 12 hours according to the Terms of Reference and Land Use Bylaw No. 224. The pump was running at a rate of about 3.0 L/min (0.8 US gpm), which exceeds the water supply standard and provides a conservative margin for future groundwater uses. The pump test withdrew more than double the daily required volume in the span of 15 hours, which satisfies the requirements for the domestic potable water supply for one primary and one additional dwelling under the Land Use Bylaw No. 224 Section 8.12. Refer to Table 4 for a flow rate comparison.

Table 4: Flow Rate Comparison

	Flow Rate (L/day)	Flow Rate (L/min)	Flow Rate (US gpm)
Water Supply Standard [A]	2,000	1.4	0.4
Drillers Estimate [B]	16,350	11.4	3.0
Pump Test	4,370	3.0	0.8

[A] *From Terms of Reference and Land Use Bylaw No. 224*
[B] *From BC Wells Database*

Figure 1 demonstrates the results of the pump test at a flow rate of 3.0 L/min. The water rose shortly after the test started and was quickly drawn back down to the initial level within about the first two hours of pumping. An initial spike in the data may be indicative of a plugged screen, which was released with the draw of water through pumping.

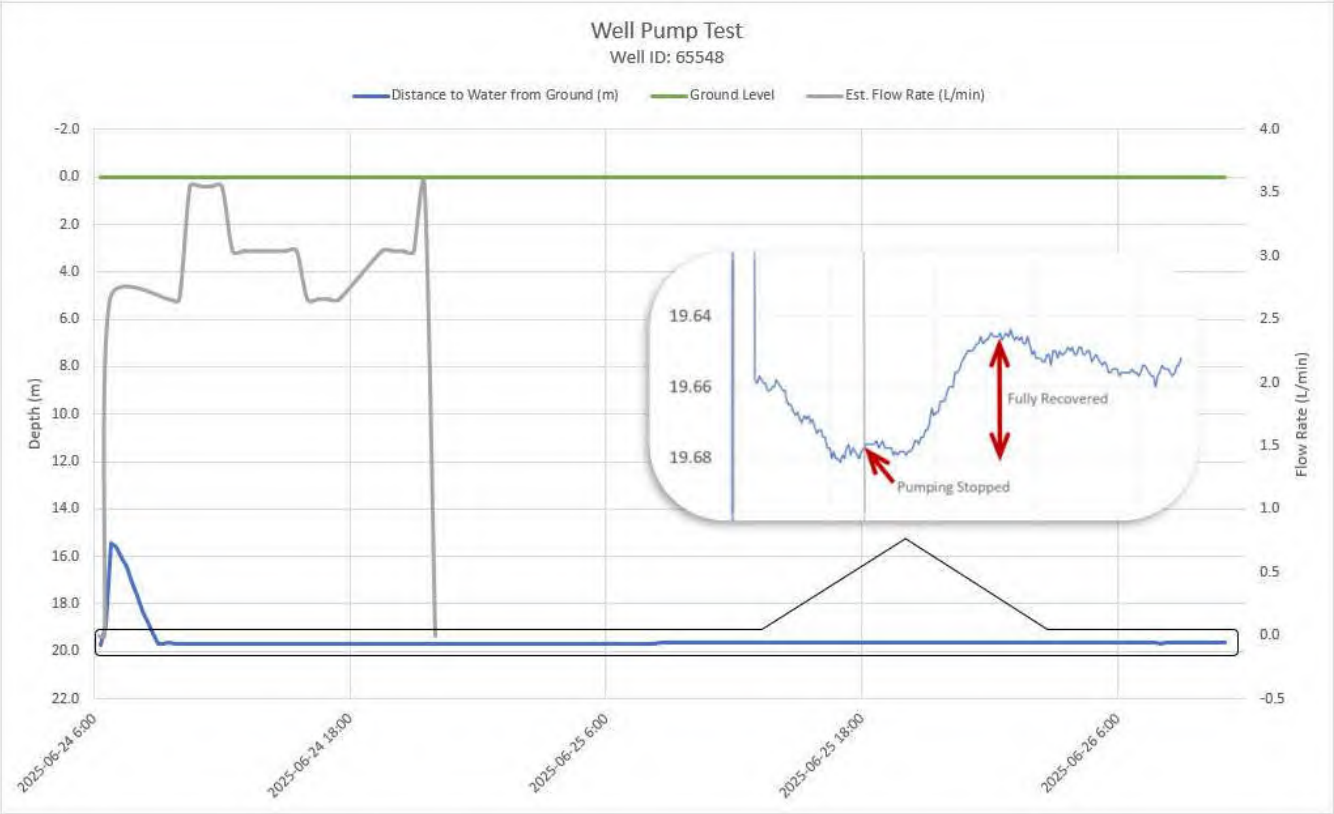

Figure 1: Pump Test and Well Drawdown

As seen in Figure 1, the water level rose nearly 4 cm within 12 hours after the pumping had stopped, fully recovering within a period no longer than the duration of the pumping test. The pump test did not show any signs of negative effects. The well was monitored for 36 hours after the completion of the pump test which generally remained above the initial water level observed prior to the pump test. The theoretical well yield is therefore greater than the 3.0 L/min at which it was tested.

Based on the rate of drawdown during the pump test, a 120-day projection can be extrapolated by forecasting the data obtained by the water data logger. By obtaining a logarithmic trendline equation for the data obtained by the data logger, the equation was used to project the trend over 120 days. Figure 2 shows the forecasted water drawdown through 24 hours per day, at 3.0 L/min.

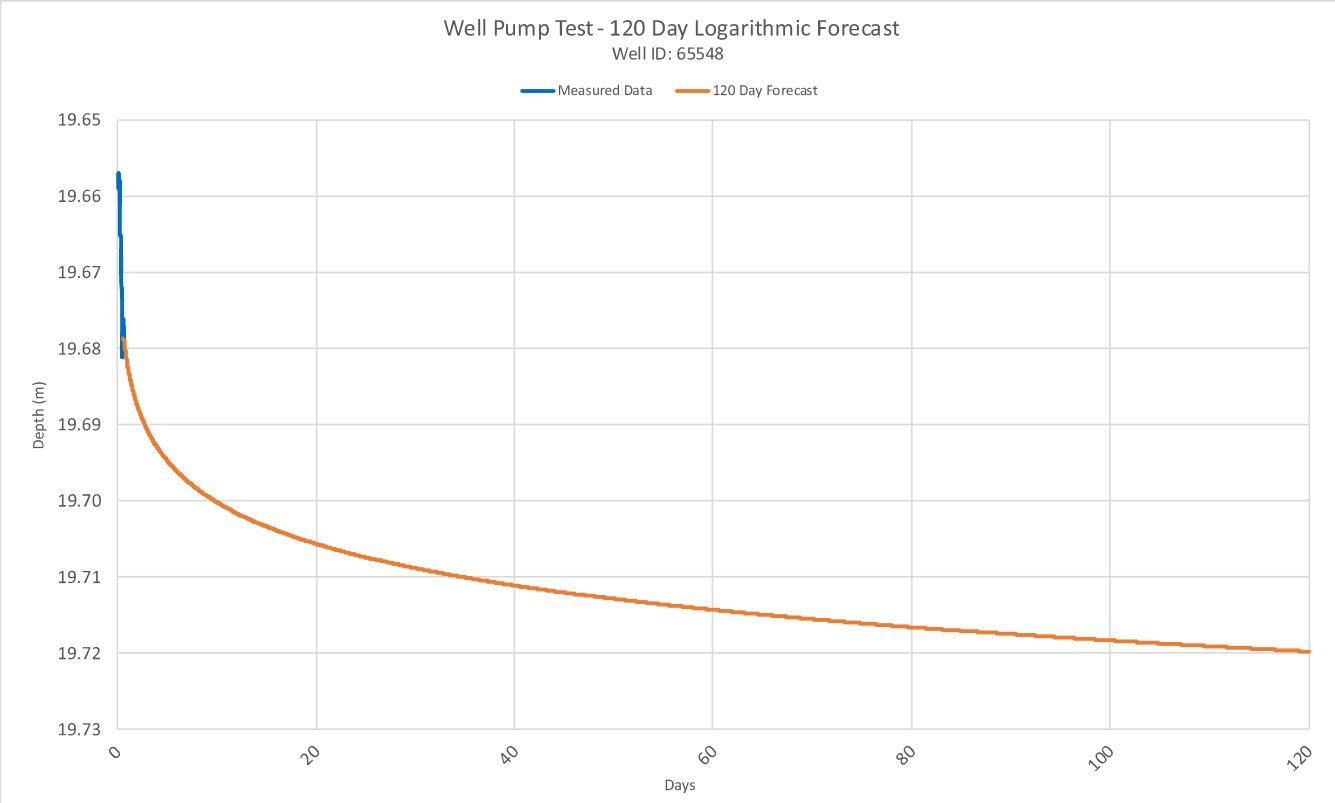

Figure 2: Pump Test 120 Day Projection

With the well drilled to a depth of 74.7 m, the water drawdown over the 120-day projection does not indicate any concern, as the expected drawdown will bring the water level down to 19.72 m below grade, for a total drop of approximately 0.06 m.

6. Guidelines for Subdivision

Development permit areas are outlined in the North Pender Island Official Community Plan (OCP) Bylaw No. 171, 2007. According to the OCP Development Permit Areas Compilation Map, the subject property is partially located in Development Permit Area (DPA) 1 for Woodland areas, with a small portion in DPA 2 for Herbaceous Sensitive Ecosystems. The DPA is located on the north side of the site and does not encompass the water well. The water well is not expected to have any impact on the DPA and while there may be an adequate capacity for a community system, the well will not serve as such.

The Terms of Reference acknowledge the presence of DPA 1 and DPA 2 areas, noting that they exist in the upper portion of the subject parcel only, and there are no DPAs affecting the area proposed for rezoning.

7. Conclusion

A rezoning application has been submitted for the property at 3334 Port Washington Road, on Pender Island, BC, to become industrially zoned. One water well with Well ID: 65548 is located on site and was inspected and tested for the purpose of becoming the property's potable water source. It is confirmed that:

- The well has sufficient available groundwater to provide the daily required volume of potable water for the proposed buildings and use.
- The well has been constructed in accordance with the Groundwater Protection Regulation.
- The extraction of groundwater for the proposed buildings and use will not adversely affect the quantity or quality of any existing groundwater well or surface water used as a source of potable water.

Samples taken at the time of the pump test yielded no coliform bacteria, no fecal contamination, and no E. coli; however, elevated non-coliform bacteria, high plate counts, and elevated levels of lead and manganese suggest treatment is required to provide potable water. It is also recommended to disinfect the well prior to use. The treatment methods described in this report are recommended to remove lead and manganese and to mitigate against future potential bacteriological issues. With the water samples obtained, it is confirmed that:

- The water quality analysis was completed by an accredited laboratory.
- The proposed water supply source can be made potable with a treatment system that is customarily used in a dwelling unit.
- The well is not affected by the intrusion of saline groundwater or sea water and has a low risk of becoming affected.
- A plan of the property is attached, indicating the location where the water samples were taken.
- The water samples upon which the water quality analysis was performed were unadulterated samples taken from the location indicated on the plan.

A pump test verified the adequacy of the quantity and quality of water from a well drilled on site, tested at a rate of 3.0 L/s (4,370 L/day), more than double the minimum water supply standard for a dwelling. The well showed a high recovery rate and over a projection of 120-days there no anticipated impacts to the quantity of groundwater available. The pump test completed confirms that:

- Groundwater was pumped at a constant rate for a period of more than 12 hours.
- A volume greater than the daily required volume in the North Pender Land Use Bylaw No. 224 was extracted within a period of 24 hours.
- The recovery phase was monitored for the well, and it was observed to recover more than 90 percent of the static water level within a period no longer than the duration of the pumping test.

Prepared By:	Reviewed By:	Approved By:

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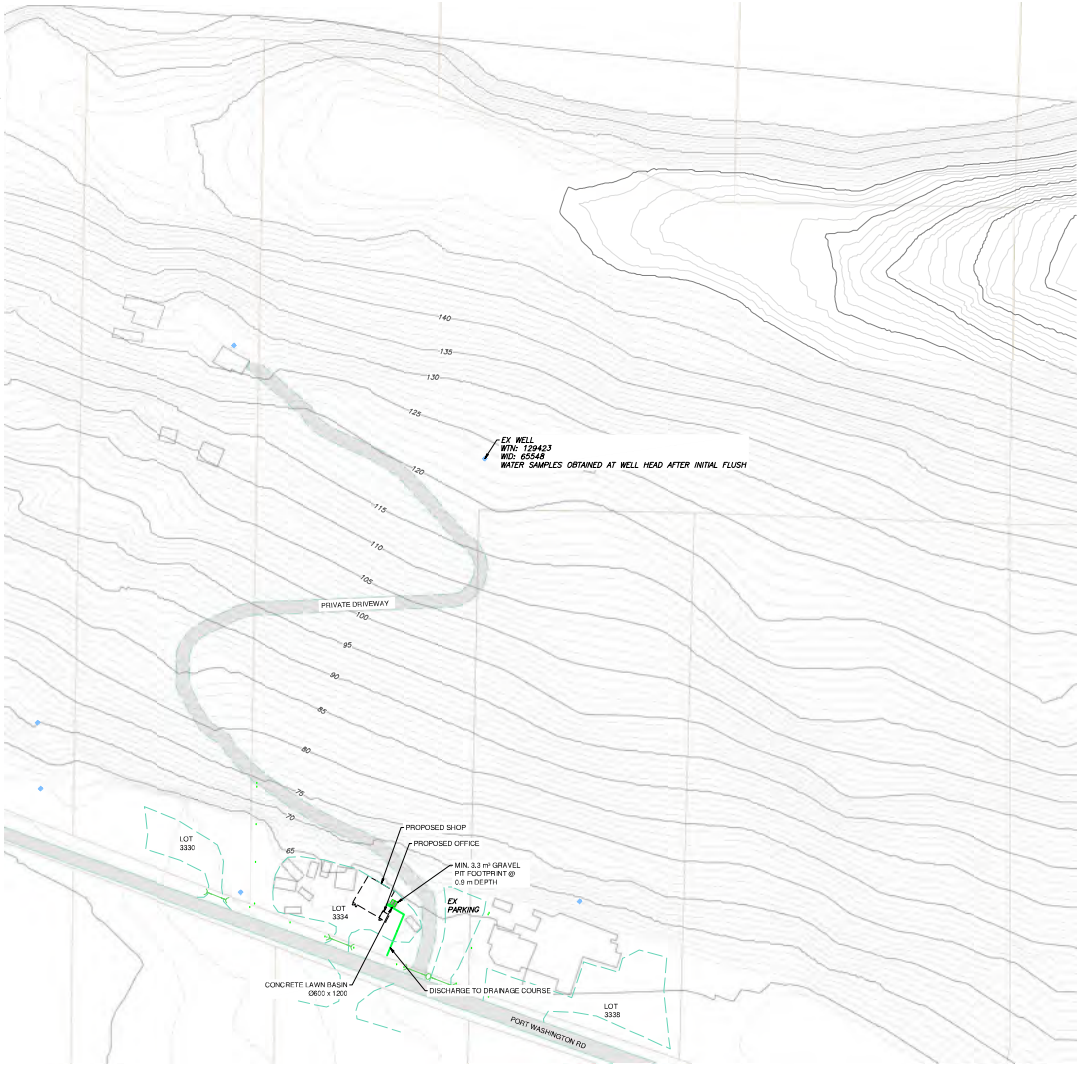
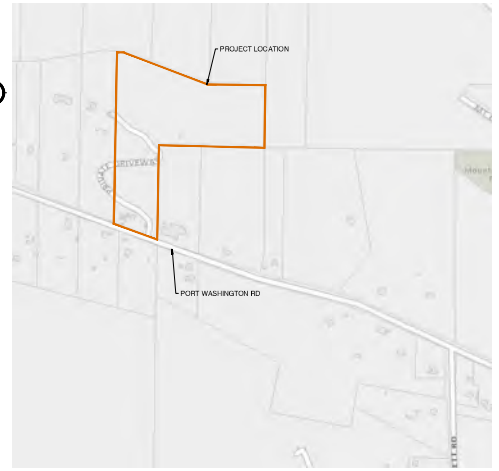
Appendix A: Site Plan



SITE PLAN
SCALE: 1:1000



LOCATION PLAN
SCALE: 1:10000

GENERAL NOTES

1. WORK TO BE COMPLETED DURING DRY WEATHER ONLY.
2. ALL WORKS TO BE COMPLETED AS PER CURRENT STANDARDS AND LATEST EDITION OF THE BC BUILDING CODE.
3. ALL CONSTRUCTION AND MATERIALS TO BE IN ACCORDANCE WITH THE LATEST REVISION OF THE MASTER MUNICIPAL CONSTRUCTION DOCUMENTS (MMCD), AND THE BC BUILDING CODE 2024, UNLESS OTHERWISE NOTED.
4. IF A CONFLICT BETWEEN THE SPECIFICATIONS ARISES, THE MOST STRINGENT SPECIFICATION SHALL APPLY.
5. ANY CONFLICTS BETWEEN THESE DRAWINGS AND SITE CONDITIONS TO BE REPORTED TO ENGINEER PRIOR TO CONSTRUCTION.
6. CONFIRM LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTION. CONTACT BC1 CALL FOR UNDERGROUND UTILITY LOCATIONS.
7. LOCATE STORMWATER COLLECTION AND CONVEYANCE WORKS ACCORDINGLY WITH SITE GRADING TO CAPTURE SURFACE RUNOFF.
8. CONTRACTOR TO ENSURE ALL PERMITS AND APPROVALS ARE ACQUIRED PRIOR TO CONSTRUCTION.
9. CONTRACTOR NOT TO COMMENCE BACKFILL OPERATION UNTIL THE EXCAVATION AND WORKS HAVE BEEN APPROVED BY THE ENGINEER.
10. CONTRACTOR TO OBTAIN PERMIT FROM CRD PRIOR TO DEPOSIT OR REMOVAL OF SOILS ON THIS SITE.
11. EQUIPMENT TO BE IN ACCORDANCE WITH THE MANUFACTURER'S LITERATURE ON BACKFILL AND COMPACTION.
12. ALL PIPE BEDDING AND BACKFILL AS PER MMCD SPECIFICATIONS.
13. EXCAVATE TO LINES AND LEVELS NECESSARY TO COMPLETE THE WORKS. MINIMUM SIDE SLOPES OF EXCAVATIONS SHALL NOT EXCEED 1:1 IN SOIL AND 1:0.25 IN ROCK, UNLESS NOTED OTHERWISE BY GEOTECHNICAL CONSULTANT.
14. BACKFILL TO GRADES INDICATED IN LAYERS NOT TO EXCEED 300mm. ALL BACKFILL SHALL BE COMPACTED TO 98% STANDARD PROCTOR DENSITY AT OPTIMUM MOISTURE CONTEXT.
15. IF ARCHEOLOGICAL MATERIAL IS ENCOUNTERED, STOP ALL EXCAVATION AND CONSULT A QUALIFIED ARCHEOLOGIST PRIOR TO THE CONTINUATION OF WORKS.

DESIGN NOTES

1. LENGTH, WIDTH, AND DEPTH OF GRAVEL PIT TO BE CONFIRMED ON SITE. FIELD FIT AS REQUIRED, MAINTAIN A MINIMUM CUBIC VOLUME OF 3.3 m³ AND MINIMUM 0.3 m OF COVER SOIL OVER THE GRAVEL.
2. MAINTAIN A MINIMUM OF 1.2 m NATIVE SOIL FROM BOTTOM OF GRAVEL PIT TO BEDROCK.
3. DIRECT STORMWATER RESTRICTING OUTLET AND OVERFLOW DISCHARGE TO DRAINAGE COURSE.
4. LOCATE STORM WATER WORKS OUTSIDE OF DRIVEWAY AND PROTECT FROM VEHICULAR TRAFFIC.

EROSION AND SEDIMENT CONTROL

1. TO PROTECT THE SOIL, WATER, AND VEGETATIVE RESOURCES OF THE DEVELOPMENT, ONLY THOSE AREAS NECESSARY TO CONSTRUCT THE WORKS AND SERVICES CONTAINED IN THE ENGINEERING DRAWINGS ARE TO BE DISTURBED.
2. PRIOR TO AND DURING CONSTRUCTION, THE CONTRACTOR SHALL TAKE FULL RESPONSIBILITY FOR CONTROLLING EROSION AND SEDIMENT TRANSFER BY UTILIZING SUCH MEASURES AS CONSTRUCTION OF INTERCEPTOR DITCHES, SILT FENCES, HAY BALE STRUCTURES, SEDIMENT CONTROL PONDS, SEDIMENT TRAPS, STAGED GRAVEL FILTERS, OR OTHER METHODS HE MAY DEEM NECESSARY TO PREVENT DISCHARGE OF SEDIMENT TO WATERCOURSES.
3. THE CONSULTANT ASSUMES NO RESPONSIBILITY FOR DAMAGES RESULTING FROM IMPROPER EROSION AND SEDIMENT CONTROL MEASURES UNDERTAKEN BY THE CONTRACTOR.
4. PRIOR TO SUBSTANTIAL COMPLETION THE CONTRACTOR SHALL PREPARE AND REVIEW WITH THE OWNER A PLAN WHEREBY THE OWNER WILL UPON FINAL COMPLETION ASSUME RESPONSIBILITY FOR ONGOING EROSION AND SEDIMENT CONTROL MEASURES ON THIS SITE.

1:1000 0 20 60m
1:10,000 0 200 600m

PRELIMINARY – FOR DISCUSSION PURPOSES ONLY
JULY 2025

ISLANDS TRUST

BC 1C
CALL BEFORE YOU DIG!
1-800-474-6886
THE CONTRACTOR IS TO CALL BC ONE CALL AND HAVE EXISTING UTILITIES STAKED PRIOR TO ANY CONSTRUCTION

ISSUED

REV.	DESCRIPTION	DATE	DRAWN	CHECKED	APPR
1	PRELIMINARY	2025.07.22.	AM	LN	-

MSR SOLUTIONS INC.
INNOVATIVE ENGINEERING SOLUTIONS
125 - 662 GOLDSTREAM AVENUE, LANGFORD
B.C. V9B 0N8
OFFICE: (250) 479 - 5164
admin@msrsolutions.ca
PERMIT TO PRACTICE #1001876

STAMP

SCALE:	AS SHOWN
DESIGN:	LN
DRAWN:	AM
CHECKED:	JA
APPROVED:	-

CLIENT: BIG DIG'EM EXCAVATING LTD
PROJECT: 3334 PORT WASHINGTON RD
SITE PLAN

PROJECT NO.	SHEET NO.	DRAWING NO.	REVISION NO.
25-970	1 OF 2	C01	1

Appendix B: Water Quality Testing Results

MSR Solutions
*B Inv admin@msrsolutions.ca
#125-662 Goldstream Ave
Victoria, BC
V9B 0N8
TEL: 250 479-5164
cole@msrsolutions.ca

26Jun25 2:51p W188128
Source: Well
Type of Sample: Water
No. of Samples: 1

Arrival temp.: 9.3C
PD B1227B 2606U

	Site Code	Date	Time	CFU/100 ml TC	T-NC	CFU/100 ml FC	F-NC	CFU/100 mL E.coli
1	Well Sample	26Jun25	11:00	0	27600	0	200	0

WATER DISTRICT SCREEN

	Sample	Date	Time	Lactose Fermentors	Coliforms Total	Fecal	E.coli	Total Aeromonas
1	Well Sample	26Jun25	11:00	276	ND	ND	ND	0.18

	Sample	Date	Time	Sulfur Reducing/ Iron Bacteria	Yeast/Fungi	TPC*
1	Well Sample	26Jun25	11:00	ND/ present	ND / ND	22272

* All counts are colony forming units per milli-litre

TC = total coliform bacteria FC = fecal coliform bacteria (aka Thermotolerant Coliforms)
NC = non-coliform bacteria ND = none detected
TPC = total plate count- spread plate method - 35C/48hr TGEA FDA/BAM 9th ed, Oct 2020
CFU = colony forming units

Results may be adversely affected if samples are submitted to the laboratory more than 24 to 30 hours after collection.

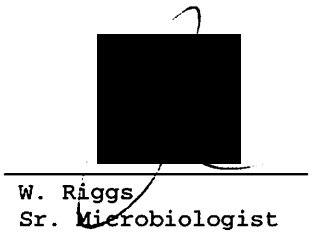
E. coli = Escherichia coli, FDA/BAM 9th ed, Oct 2020
Bergy's Manual of Systematic Bacteriology vol 1, AOAC 1984; J.Clin.Micro., J.Intern.Systm.Bact.

Comments:
For Interpretation of Results:
Total, Fecal Coliforms or E.coli present greater than 0 CFU/100mL (0 CFU/mL):
IF Coliform numbers exceed safe limits for drinking water- water is not suitable for drinking without treatment.

Total Non-coliform bacteria (=Lactose Fermentors) equal to or greater than 200 CFU/100mL (2.0 CFU/mL):
IF the number organisms present exceed recommended guidelines for drinking water; treatment is strongly recommended.

If Total Plate Count bacteria are -
A) greater than 100 CFU/mL:
high numbers of microbial organisms indicate that this water supply should be monitored on a seasonal basis.
B) greater than 500 CFU/mL:
the number of organisms present exceed recommended guidelines for drinking water; treatment is strongly recommended.

- See following page for chemistry results -



W. Riggs
Sr. Microbiologist

EMAILED
JUL 03 2025
8:58PS

MSR Solutions
*B Inv admin@msrsolutions.ca
#125-662 Goldstream Ave
Victoria, BC
V9B 0N8
TEL: 250 479-5164
cole@msrsolutions.ca

26Jun25 2:51p
Source: Well
Type of Sample: Water
No. of Samples: 1

Arrival temp.: 9.3C
PD B1227B 2606U

Sample: Well Sample - 26Jun25 11:00

ELEMENTS		SAMPLE	UNITS	Maximum Limits In Drinking Water*
1) Aluminium	Al	0.097	mg/L	no limit listed
2) Antimony	Sb	<0.500	ug/L	6.00 ug/L
3) Arsenic	As	2.50	ug/L	10.0 ug/L
4) Barium	Ba	0.014	mg/L	2.00 mg/L
5) Beryllium	Be	<0.003	mg/L	no limit listed
6) Boron	B	0.258	mg/L	5.00 mg/L
7) Cadmium	Cd	<0.010	ug/L	7.00 ug/L
8) Calcium	Ca	40.1	mg/L	200 mg/L
9) Chromium	Cr	0.003	mg/L	0.050 mg/L
10) Cobalt	Co	<0.005	mg/L	no limit listed
11) Copper	Cu	<0.008	mg/L	1.00 mg/L
12) Gold	Au	<0.040	mg/L	no limit listed
13) Iron	Fe	0.155	mg/L	0.300 mg/L
14) Lanthanum	La	<0.020	mg/L	no limit listed
15) Lead	Pb	6.32	ug/L	5.00 ug/L
16) Magnesium	Mg	9.79	mg/L	50.0 mg/L
17) Manganese	Mn	0.184	mg/L	0.120 MAC 0.020 AO
18) Mercury	Hg	<0.010	ug/L	1.00 ug/L
19) Molybdenum	Mo	<0.005	mg/L	no limit listed
20) Nickel	Ni	<0.004	mg/L	no limit listed
21) Phosphorus	P	<0.010	mg/L	no limit listed
22) Potassium	K	0.560	mg/L	no limit listed
23) Scandium	Sc	<0.050	mg/L	no limit listed
24) Selenium	Se	<0.500	ug/L	5.0 ug/L
25) Silicon	Si	16.7	mg/L	no limit listed
26) Silver	Ag	<0.010	mg/L	no limit listed
27) Sodium	Na	34.4	mg/L	200 mg/L
28) Strontium	Sr	0.560	mg/L	no limit listed
29) Tin	Sn	<0.020	mg/L	no limit listed
30) Titanium	Ti	<0.010	mg/L	no limit listed
31) Tungsten	W	<0.050	mg/L	no limit listed
32) Vanadium	V	<0.010	mg/L	no limit listed
33) Zinc	Zn	0.006	mg/L	5.00 mg/L
Hardness (mg/L $CaCO_3$)		140	mg/L	75-150 mg/L = moderately hard
pH		7.51	units	7.0 to 10.5

* As per Canadian or B.C. Health Act Safe Drinking Water Regulation BC Reg 230/92, & 390 Sch 120, 2001. Task Force of the Canadian Council of Resource and Environment Ministers - Guidelines for Canadian Drinking Water Quality, 2020.

Comments:
Lead: toxic and accumulates in body tissues; Lead may come from old lead pipes, solders, or industrial discharges. Even small amounts can contribute to learning disability in children.
Manganese: high amounts can cause staining of laundry, porcelain & plumbing fixtures & an undesirable tastes. Not considered toxic-caution children under 6 months

R. Bilodeau
Analytical Chemist

[redacted]
H. Hartmann
Sr.Analytical Chemist

MSR Solutions
*B Inv admin@msrsolutions.ca
#125-662 Goldstream Ave
Victoria, BC
V9B 0N8
TEL: 250 479-5164
cole@msrsolutions.ca

26Jun25 2:51p
Source: Well
Type of Sample: Water
No. of Samples: 1
Arrival temp.: 9.3C
PD B1227B 2606U

SAMPLE	DATE	TIME	Alkalinity (mg/L)	NH_3-N (ug/L)	Cl^- (mg/L)	Colour (TCU)	E.C. (uS/cm)
Well Sample	26Jun25	11:00	225	ND	8.12	2.01	425
Lab Blank			ND	ND	ND	ND	ND
So			0.100	0.254	0.015	0.300	0.300
REF. VALUE			100	10.0	10.0	10.0	147
STD ± 2SD			103 ± 6.22	9.66 ± 0.560	10.8 ± 0.811	9.78 ± 0.744	143 ± 11.2

SAMPLE	DATE	TIME	CORROSIVITY (Is @20C)	F^- (mg/L)	S^{2-} (ug/L)	TKN (mg/L)	NO_3-N (ug/L)
Well Sample	26Jun25	11:00	0.078	ND	ND	ND	4.00
Lab Blank				ND	ND	ND	ND
So				0.007	0.007	0.012	0.160
REF. VALUE				1.00	50.0	1.00	10.0
STD ± 2SD				1.06 ± 0.057	50.6 ± 4.12	1.04 ± 0.056	9.85 ± 0.660

SAMPLE	DATE	TIME	NO_2-N (ug/L)	SO_4^{2-} (mg/L)	T.O.C. (mg/L)	T&L (mg/L)	TDS (mg/L)
Well Sample	26Jun25	11:00	1.80	6.86	ND	ND	246
Lab Blank			ND	ND	ND	ND	ND
So			0.300	0.075	0.300	0.070	0.010
REF. VALUE			10.0	10.0	10.0	1.00	200
STD ± 2SD			9.77 ± 0.497	10.6 ± 0.622	9.55 ± 0.560	1.03 ± 0.067	206 ± 13.3

SAMPLE	DATE	TIME	Turbidity (NTU)	UVT (%)
Well Sample	26Jun25	11:00	5.78	97.3
Lab Blank			ND	ND
So			0.015	0.003
REF. VALUE			10.0	90.0
STD ± 2SD			9.55 ± 0.623	90.2 ± 0.022

SD = standard deviation; REF VALUE = primary or secondary reference material
STD = secondary standard calibrated to primary standard reference material
So = standard deviation at zero analyte concentration; method detection limit is generally considered to be 3x So value
ND = none detected n/a = not applicable

R. Bilodeau
Analytical Chemist

[redacted]
H. Hartmann
Sr.Analytical Chemist

AQUAPARIAN
Environmental Consulting Ltd.

ENVIRONMENTAL IMPACT ASSESSMENT
REZONING APPLICATION
3334 PORT WASHINGTON ROAD, PENDER ISLAND, BC

July 22, 2025;
Rev 01: November 5, 2025

Completed for:
Braedon Bigham
Big Digem Excavating
3334 Port Washington Road
Pender Island, BC

Via Email: bdeltd@shaw.ca

203 – 321 Wallace Street Road Nanaimo, BC V9R 5B6, 250-591-2258
Cell SARAH BONAR 250-714-8446 CHRIS ZAMORA 250-714-8864

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Attachments:

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Figure 2:	Site Plan (Polaris Land Surveying Inc.)
Figure 3:	Biophysical Map
Figure 4:	Wildlife Tree Stewardship Map
Figure 5:	SEI Map
Figure 6:	North Pender Island Sensitive Ecosystems Map
Appendix A:	Site Photographs
Appendix B:	Site Assessment Vegetation Plot Data
Appendix C:	BC Conservation Data Centre Search Results
Appendix D:	Invasive Species Council of BC Fact Sheets (Scotch broom & Himalayan blackberry)

DISCLAMER AND LIMITATIONS OF USE:

This report has been prepared exclusively for the 3334 Port Washington Road re-zoning application for a portion of the parcel to have permanent zoning compatibility with the established land use. The findings and recommendations documented in this report are based on information available at the time of assessment.

LIMITATIONS:

1. **Scope of Work**: This report is limited to the scope of work agreed upon between Braedon Bigham and Aquaparian Environmental Consulting Ltd (Aquaparian). This document is not to be considered the sole document required by permitting agencies for this project. Any additional investigations or assessments beyond this scope are not included. Aquaparian exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this document but makes no guarantees or warrantees as to the accuracy or completeness of this information.
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1.0 INTRODUCTION

Aquaparian Environmental Consulting Ltd (Aquaparian) was retained by Braedon Bigham, owner of Big Digem Excavating Inc. (Big Digem), to complete an Environmental Impact Assessment (EIA) as supplementary documentation for a rezoning application (file No. PLRZ20240110 (Bigham)) required by the Islands Trust for continued industrial land use of the south portion of 3334 Port Washington Road, Pender Island, BC.

The subject parcel is approximately 6.1 ha in area and is legally identified as follows:

- Lot 7, Sections 18 and 22, Pender Island, Cowichan District, Plan 6294 (PID 005-837-693).

A review of the North Pender Island Land Use Bylaw No. 224, 2022 (LUB) identifies that the parcel is currently zoned Rural. The North Pender Island Official Community Plan No. 171, 2007 (OCP) identifies that the land use is split designated as Rural (R) and Industrial (I). As understood, the portion designated as Industrial is 0.56 ha and has been used as designated since 2011 under Temporary Use Permits (TUPs). Big Digem includes aggregate storage, retail sales, and associated activities and is recognized by the Islands Trust as providing important community services to Pender Island. As further understood, the business operator is planning to rezone the property to come into compliance with the North Pender Island LUB for continued industrial use of the property.

The OCP identifies that there are two Development Permit Areas (DPAs) located in the north portion of the property: DPA 1 – Woodland, and DPA 2 - Herbaceous. There are no DPAs in the industrial portion.

Site location maps of the study area have been included in this report as Figure 1a & 1b. A site plan prepared by Polaris Land Surveying Inc. identifies the industrial use area and is included as Figure 2. A selection of site photographs taken during the site surveys have been included as Appendix A.

1.1. SCOPE OF WORK

The scope of work for this assessment included the following:

- Background review of available information from government databases and maps, and documents available within the Rezoning Application online file.
- Field assessment to document environmental attributes within the site and current site conditions.
- Produce an EIA report to document findings and to identify potential impacts and

recommendations to protect environmental assets of the property if industrial use continues within the designated portion of the property.

Findings of the assessment include a review of relevant background information for the study area which included a review of mapped information within 500m of the site, site information including current land use, historical land use and surrounding land use, an inventory of environmental features identified within the parcel, current applicable *Acts* and Regulations, a biophysical site map showing environmental attributes, and photo documentation. The information is provided to facilitate the North Pender Island Local Trust Committee (LTC) decision on the re-zoning application. This report was reviewed by Patricia Woodruff (Islands Trust Biologist) and comments were provided. This report has been revised on November 5, 2025 to address these comments.

2.0 REGULATORY FRAMEWORK

The following is a list of federal, provincial and municipal environmental *Acts*, Regulations and Bylaws current at the date of preparing this report, that *may* apply to development of the subject parcel:

Federal *Species-at-Risk Act* is a key federal government commitment to prevent wildlife species from becoming extinct and secure the necessary actions for their recovery. It provides for the legal protection of wildlife species and the conservation of their biological diversity. SARA contains prohibitions against the killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of endangered, threatened and extirpated species listed in Schedule 1 of the Act. The Act also contains a prohibition against the damage or destruction of their residences (e.g. nest or den). The *Species at Risk Act* (SARA) applies automatically on federal lands as well as:

- all endangered, threatened and extirpated migratory birds listed in Schedule 1 of SARA and protected by the *Migratory Birds Convention Act*, 1994, anywhere they occur, including private lands, provincial lands and lands within a territory; and
- all endangered, threatened and extirpated aquatic species as defined by the *Fisheries Act* listed in Schedule 1 of SARA, anywhere they occur, including private lands, provincial lands and lands within a territory.

In certain circumstances, SARA prohibitions may be applied to protect any other species listed in Schedule 1 of SARA when found on non-federal lands, if provincial/territorial laws do not effectively protect the species or its residence. On the recommendation of the Minister of the Environment, the Governor in Council, by Order can provide that sections 32 and 33, or either of

them, apply on non-federal lands with respect to individuals of a listed wildlife species that is not an aquatic species or protected by the *Migratory Birds Convention Act, 1994*.

Federal *Migratory Birds Convention Act, 1994*. Most species of birds in Canada are protected under this act. "Migratory birds" are defined by Article I of the Convention which names the families and sub-families of birds protected and provides some clarification of the species included. In general, birds not falling under federal jurisdiction within Canada include grouse, quail, pheasants, ptarmigan, hawks, owls, eagles, falcons, cormorants, pelicans, crows, jays, kingfishers, and some species of blackbirds.

Federal Migratory Birds Regulations, 2022 (MBR), provides protection to migratory bird nests when they are considered to have a high conservation value for migratory birds. The MBR prohibits the damage, destruction, removal or disturbance of nests of all migratory birds when there is a live bird or viable egg, or if the nest was built by a species that is listed in Schedule 1 of the regulation. Schedule 1 lists 18 species which are protected year-round unless they are shown to have been abandoned for a designated period of time depending on the species. In BC there are two Schedule 1 species; Great blue heron are protected for 24 months after reporting the nest is unoccupied, and Pileated woodpecker are protected for 36 months after reporting unoccupied.

Provincial *Wildlife Act* Section 34*,*** states that a person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys:

(a) a bird or its egg,
(b) the nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl, or
(c) the nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.

Provincial Heritage Conservation Act. All archaeological sites, recorded or not, are protected under the *Heritage Conservation Act* and must not be altered or damaged without a site alteration permit from the Archaeology Branch. As understood, municipalities have access to provincial records that show recorded sites and sites with high potential for archaeological resources. If a known site is located on the parcel, an archaeological consultant will need to be retained to provide advice. If the site has a high potential, it is recommended to retain and archeological consultant to provide recommendations. Archaeology is outside the scope of this report.

3.0 SITE DESCRIPTION

The parcel is approximately 6.1 ha in area and located on the north side of Port Washington Road and primarily sloping with a southern aspect. The parcel extends north upslope to the top of a ridge and extends to the east; the parcel is shaped like an upside-down "L". To the west is a rural parcel (3330 Port Washington Road) developed for industrial use within the south portion which is leased to Eco-Source Septic as a contractor yard for two septic pump trucks, screening equipment and a dump truck. The driveway to the residential upslope area of 3330 Port Washington Road cuts across the subject parcel as a shared driveway. To the east is a rural parcel and the Pender Island Home Building Centre (commercial/retail) with another excavation contractor east of that parcel. To the north, past the crest of the ridge are rural parcels that are sloping with a northern aspect; two of the parcels are nature reserves including the Lisa Baile Nature Reserve located 320m from the Big Digem yard (4 ha; owned by Islands Trust Land Conservancy), and Forest Wetland Nature Reserve located 300m from the Big Digem yard (4 ha; owned by Pender Island Land Conservancy). There is another 14.5 ha parcel identified as Vulture Ridge Nature Reserve that is also owned by the Pender Island Land Conservancy located 356m to the northeast from the Big Digem yard. Other surrounding parcels are developed for industrial use include the Pender Island Yard, ENCOM, and BC Hydro across the street to the south, Southridge Country store to the southeast, and other rural residential lots.

The lower/south portion of the parcel fronting Port Washington Road includes a flat gravel yard for storage of all equipment related to Big Digem operations (heavy equipment, bins etc.) on the east side of the shared gravel driveway, and the remaining portion of the Big Digem operation on the west side which is a cleared gravel work yard that is understood to include the following:

- Contractor yard, spill kits up to 200L & small kits on all heavy machines;
- Storage, handling and wholesale of aggregates, soils and mulches – maximum 460m^2 (550 yards). Gravels are stockpiled in the southwest corner of the yard and sols are contained in lock-block storage bins;
- Six sea cans for storage of equipment and materials;
- Small heavy equipment including compactors, a digger, and a bulldozer;
- Soil screens;
- Tarp-tent awning under which a front-loader is parked;
- Superior Propane Tank storage, drainage and sewer culvert/pipe and septic tank storage – maximum 15 tanks for island emergencies;
- Storage of 10,000L of diesel for company use on off road equipment in a double-lined fuel tank; and,
- Water wagon (500 Gal) for fire suppression/mitigation.

As understood, the only additional proposed works at the time of writing this report is the construction of a 40ft x 40ft workshop within the existing gravel yard area to replace some of the sea cans for maintaining and servicing company-owned vehicles and equipment. The workshop is proposed to include a bathroom and a kitchen. As understood, the workshop is a future plan that will depend on whether the rezoning is accepted so no design drawings were available at the time of preparing this report.

The perimeter of the work yard is mostly planted with a tall cedar hedge with a chain link fence along the inside of it. The work yard is flat and backs onto the toe of a steep slope extending north into the larger portion of the parcel. The toe of slope is cleared approximately to the limit of the industrial use area confined below the access road. The area between the edge of the work yard at the toe of the slope and the Industrial Designation Boundary is bisected by a shared driveway and to either side is vegetated with grass and invasive Himalayan blackberry (*Rubus armeniacus*), and Scotch broom (*Cytisus scoparius*). As understood, there are no plans to expand the footprint of the industrial work yard area further to the north due to the slope.

The remainder of the parcel is forested and undeveloped. The shared access driveway extends northwest across the parcel behind the work yard. The driveway is shared to access the upslope portions of the adjacent property to the west and the upper portion of the subject parcel. One flat benched area above the access road has recently been cleared (2023) and there are some dirt roads that switch back up the slope through the parcel extending to the top of the ridge. Woodland forest extends from the lower slope up to the north side of the parcel with some patches of second growth Douglas-fir (*Pseudotsuga menziesii*) habitat in the south portion of the forest. There is a sloped ridge that extends west to east across the parcel with a band of open, south-facing terrestrial herbaceous habitat below it. The ridge extends along the north property boundary and is forested with more woodland habitat. From the highest point in the northeast corner the ocean is visible to the northeast and southwest through the trees.

Aquaparian traversed the site by foot on April 16, 2025 to document site conditions. The site assessment included documentation of seven vegetation plots in representative areas throughout the parcel to further classify the habitat present. Appendix B is a detailed inventory of species identified within each plot. A Biophysical map of the property has been included as Figure 3 and identifies the ecosystem types found within the property and vegetation plot locations. Physical and biological features of the parcel are summarized in Section 4.0 below.

4.0 ENVIRONMENTAL SETTING

4.1. Physical Resources

The following section provides a general overview of biophysical attributes and land use of the site documented by government databases, crown publications and from Aquaparian's reconnaissance of the property.

4.1.1. Topography

The terrain within the study area is flat adjacent to Port Washington Road where the work yard is situated, then it slopes up to the north with steep terrain throughout. The elevation is 70m above sea level at the south side and the highest point is 170m above sea level at the northeast corner of the parcel. The overall slope of the parcel is 28% but some sections were as steep as ~50% in gradient.

4.1.2. *Climate*

The property is located within the Moist Maritime Coastal Douglas-fir Subzone (CDFmm). The CDFmm is restricted to low elevations along southeast Vancouver Island from Bowser to Victoria, the Gulf Islands south of Cortes Island, and a narrow strip along the Sunshine Coast near Halfmoon Bay. Elevational limits typically range from sea level to approximately 150m.

The CDFmm lies in the rain shadow of the Vancouver Island and Olympic Mountains resulting in warm, dry summers and mild, wet winters. Growing seasons are very long, and feature pronounced water deficits on zonal and drier sites. The CDFmm represents the mildest climate in Canada. (Green and Klinka).

4.1.3. *Land/Soil*

A review of the provincial map "Soils of the Gulf Islands of British Columbia" (1988) indicate that the parcel is dominated by the Saturna Soil Association (ST), with Rock (RO) comprising the northernmost portion of the parcel. The lower industrial portion of the parcel is mapped as MD – Made Land. Made Land refers to soils that have been "artificially altered or disturbed by the activities of man to such a degree that they cannot be identified or classified" (Kenney *et. al*, 1988).

Saturna soils are well-drained soils that have developed on shallow deposits of channery sandy loam textured colluvial and glacial drift over sandstone bedrock within 100cm of the surface. Coarse fragment content varies between 20 and 50%. These soils are

associated with gently to strongly sloping (6-30%) topography in subdued to hummocky terrain or on very strongly to steeply sloping (31-100%) side slopes of rock ridges. (Kenney *et al.* 1988). Soil phases within the study area are identified as Very Shallow Lithic. Slope classes include predominantly moderate to strong slopes (10-30% gradient) with a lesser representation of very strong slopes (31-45%). These soils are likely supporting the woodland habitat within the parcel.

The Rock portion is identified as undifferentiated bedrock exposed or covered by moss or mineral soil less than 10cm thick. Slope classes include very strong slopes (31-45%) to extreme slopes (46-70%). This classification is represented by the terrestrial herbaceous habitat within the north portion of the parcel which was observed to have very thin soils and moss over bedrock and was observed to be steeply sloping and south-facing aspect.

4.1.4. Surface Water

A review of municipal maps and the provincial Habitat Wizard did not identify any mapped watercourses or wetlands within or adjacent to the subject parcel. No watercourses or wetlands were observed within the subject parcel. The parcel is dominated by sloping woodland or terrestrial herbaceous habitat with no flat receiving environments for water to accumulate. No seeps or vernal pools were identified in the terrestrial herbaceous or woodland habitat.

There is a shallow roadside ditch fronting the property that terminates to the west fronting 3330 Port Washington Road; no culvert was identified underneath the driveway. The property does not contain any storm drains.

4.1.5. Groundwater

A review of the provincial Groundwater Wells and Aquifers mapping tool identifies that the parcel is within Aquifer 711 - North Pender (northern area), a highly vulnerable fractured sedimentary bedrock aquifer 11.3km^2 in size. The map identifies the presence of one well (#129423) located centrally within the parcel.

4.1.6. Land Use

The property is 6.1 ha. The site plan shows the Industrial Designation boundary is a short distance upslope of the constructed shared driveway and Right of Way Plan 2942 line for the driveway and encompasses an area of approximately 5487m^2 (0.55ha) (9% of parcel). However, the south, flat portion of the parcel that has been used for Big Digem operations since 2011 is approximately 3400m^2 in area (0.34 ha), which is 6% of

the property. Prior to that, it is understood that the land was used 50-60 years ago for gravel and sand extraction and potentially a concrete batch plant was located there at one point (*pers. comm. Braedon Bigham*). As further understood, a transfer site (waste collection, sorting, consolidation and transportation) was operated in this location prior to Big Digem being established. The two properties across the street from the subject parcel (Lot 8 & Lot 9, Plan 6294; commonly known as the highways works yard) were rezoned in the past; these properties have also been used for light industrial operations for since the 1950's with the current owners, Mainroad Properties, taking ownership in 2006 (*pers. comm. Braedon Bigham*).

4.2. Biological Resources

4.2.1. Flora

Forests on zonal sites within the CDFmm are typically dominated by Douglas fir (*Pseudotsuga menziesii*), western red cedar (*Thuja plicata*) and grand fir (*Abies grandis*). The understory is dominated by salal (*Gaultheria shallon*), dull Oregon grape (*Mahonia nervosa*), oceanspray (*Holodiscus discolor*) and Oregon beaked moss (*Kindbergia oregana*). Less prominent species include baldhip rose (*Rosa gymnocarpa*), snowberry (*Symphoricarpos albus*), western trumpet honeysuckle (*Lonicera ciliosa*), vanilla leaf (*Achlys triphylla*), and electrified cat's-tail moss (*Rhytidiadelphus triquetrus*). Drier sites are characterized by the presence of Garry oak (*Quercus garryana*) and arbutus (*Arbutus menziesii*) and several members of the lily family.

In general, the parcel is comprised of a small industrial zone which is completely disturbed/impacted with the remainder of the parcel comprised of woodland habitat, a band of terrestrial herbaceous habitat, and a small strip of dry second growth Douglas-fir forest. Disturbed areas also include a small, flat area off the driveway that was recently cleared and a strip of the lower slope above the work yard that was historically cleared and is now dominated by invasive species and grasses; the treeline above the clearing appears to correspond with the Industrial Designation Boundary (Fig. 2). Refer to Figure 3 for mapping of these areas and Appendix B for detailed vegetation plot inventories. Below is a summary of the canopy and understory species that were observed to comprise each habitat type within the subject parcel. This is not a detailed species study; some of the wildflowers may not have emerged or it was too early in the growing season to identify them to species. Because no development is proposed in these areas at this time, a detailed species survey is beyond the scope of this application and further studies may be required if development plans are proposed in the future.

Terrestrial herbaceous and woodland ecosystems have the potential to support rare plant species. Note that no specialized ephemeral microhabitats such as vernal pools or seeps were identified.

4.2.1.1. Industrial Zone

This area is fully developed for use as a work yard. A flat gravel pad comprises most of the industrial use area within the subject parcel. The only vegetation is an ornamental cedar hedge row (*Thuja* sp.) along most of the perimeter. The cleared slope behind the work yard is vegetated with grasses, invasive Himalayan blackberry thicket and patches of invasive Scotch broom.

4.2.1.2. Woodland Habitat

Woodland habitat comprises most of the parcel and includes a partial canopy (~30-45%) dominated by Douglas-fir with up to 50% representation of arbutus (*Arbutus menziesii*) and minor amounts of Garry oak (*Quercus garryana*) and bigleaf maple (*Acer macrophyllum*). The understory is open, dominated by grasses & mosses (mixed spp.), red columbine (*Aquilegia canadensis*), fairy slipper (*Calypso bulbosa*), little western bittercress (*Cardamine oligosperma*), miner's lettuce (*Claytonia perfoliata*), yerba buena (*Clinopodium douglasii*), fragile fern (*Cystopteris fragilis*), woodland strawberry (*Fragaria vesca*), sweet-scented bedstraw (*Galium triflorum*), dove's-foot crane's-bill (*Geranium molle*), rattlesnake plantain (*Goodyera oblongifolia*), nipplewort (*Lapsana communis*), purple peavine (*Lathyrus nevadensis*), hairy honeysuckle (*Lonicera hispidula*), western honeysuckle (*Lonicera ciliosa*), rose campion (*Lychnis coronaria*), dull Oregon-grape (*Mahonia nervosa*), Alaska oniongrass (*Melics subulata*), largeleaf sandwort (*Moehringia macrophylla*), wood forget-me-not (*Myosotis sylvatica*), frog's pelt (*Peltigera neopolydactyla*), goldback fern (*Pentagramma triangularis*), licorice fern (*Polypodium glycyrrhiza*), western buttercup (*Ranunculus occidentalis*), baldhip rose (*Rosa gymnocarpa*), Pacific sanicle (*Sanicula crassicaulis*), rein orchid (*unidentified, not flowering*), black cap raspberry (*Rubus occidentalis*), and a minor amount of sword fern (*Polystichum munitum*). The following invasive species were identified in woodland habitat throughout the parcel: common chickweed (*Stellaria media*), common

dandelion (*Taraxacum officinale*), Scotch broom (*Cytisus scoparius*), common thistle (*Cirsium arvense*), foxglove (*Digitalis purpurea*), Himalayan blackberry (*Rubus armeniacus*), and white hawkweed (*Hieracium albiflorum*). This ecosystem is represented by Site Series 03 Fd – Oniongrass within the CDFmm biogeoclimatic classification which indicates a rich to very rich soil nutrient regime and very dry soils (Green & Klinka, 1994).

4.2.1.3. Terrestrial Herbaceous Habitat

This habitat is open with minimal canopy (<10%) comprised of scattered trees including predominantly Douglas-fir, arbutus, and minor amounts (several trees) of Garry oak (*Quercus garryana*). The groundcover is carpeted by a layer of mixed moss species (~95%) with the remaining ~5% comprised of exposed bedrock. Some of the moss species identified include juniper hair cap moss (*Polytrichum juniperinum*), rough goose neck moss (*Rhytidiadelphus triquetrus*), and Wallace's spikemoss (*Selaginella wallacei*). Native grasses observed include sweet vernal grass (*Anthoxanthum odoratum*) and Alaska oniongrass.

Forbs emerging from the moss at the time of the site visit include fairy slipper, giant blue-eyed Mary, miner's lettuce, fragile fern, wingstem monkeyflower (*Erythranthe alsinoides*), sweet-scented bedstraw (*Galium triflorum*), wholeleaf saxifrage (*Micranthes integrifolia*), western saxifrage (*Micranthes occidentalis*), Pacific sanicle (*Sanicula crassicaulis*), rein orchid (*unidentified, not flowering*), and corn speedwell (*Veronica arvensis*). Invasive species include dense thickets of Scotch broom (*Cytisus scoparius*) and sheep sorrel (*Rumex acetosella*). Scotch broom commonly invades open meadow habitat and was observed to be growing in thickets with an average of 30-40% cover, but some dense patches had over 60% coverage. This ecosystem is represented by Site Series 02 FdPl – Arbutus within the CDFmm biogeoclimatic classification which indicates a very poor to medium soil nutrient regime and very dry soils (Green & Klinka, 1994).

4.2.1.4. Dry Second Growth Douglas-fir Forest Habitat

Second growth Douglas-fir forest comprises a small portion of the

parcel near the inside elbow of the 90° bend of the property boundaries. The forest habitat is bisected by an upper section of the shared access road. The canopy is mostly closed and comprised of 90% young Douglas-fir trees ranging between 20 and 40cm diameter-at-breast-height (dbh), 5% arbutus ranging between 20 and 25cm dbh, and 5% western redcedar (*Thuja plicata*) ranging between 20 and 25cm dbh. The understory is nearly fully shrubbed, dominated by dull Oregon-grape with lesser amounts of salal (*Gaultheria shallon*). Other species include cleavers (*Galium aparine*), western honeysuckle, moss (mixed spp.), bracken fern (*Pteridium aquilinum*), trailing blackberry (*Rubus ursinus*), Pacific sanicle, and starflower (*Trientalis borealis*). This ecosystem is represented by Site Series 01 Fd – salal within the CDFmm biogeoclimatic classification which indicates a very poor to medium soil nutrient regime and medium soil moisture (Green & Klinka, 1994).

4.2.2. Fauna

No records were found indicating that large carnivorous mammals including black bear (*Ursus americanus*), cougar (*Puma concolor*), and wolf (*Canis lupis*) are present on Pender Island, though occasionally individuals are known to swim over to southern gulf islands from adjacent lands. Black-tailed deer (*Odocoileus hemionus*) are abundant and expected to utlize the parcel. Racoon (*Procyon lotor*) and rodents such as mice may also be found in the study area. There have been occasional reports of Roosevelt elk (*Cervus canadensis roosevelti*) sightings on Pender Island (*Country Life in BC*). It is unknown if elk would be found within the subject property; there does not appear to be an established population on Pender Island. It does not appear that rabbits or squirrels are found on Pender Island. Though semi-aquatic mammals such as beaver (*Castor canadensis*), river otter (*Lontra canadensis*), American mink (*Neogale vison*), and muskrat (*Ondatra zibethicus*) are found on Pender Island, no aquatic habitat was identified within the subject parcel to support them. Snags were observed and may provide cavity roosting habitat for a variety of bat species.

The terrestrial herbaceous ecosystems within the site have rocky outcrops and sunny forest openings providing good habitat for reptiles including northern alligator lizards (*Elgaria coerulea*), garter snakes (*Thamnophis elegans*), and potentially sharp-tailed snakes (*Contia tenuis*). One northern alligator lizard was observed under a bedrock overhang in the terrestrial herbaceous habitat. A letter to the Islands Trust from the Pender Island Conservancy (Nov 25, 2024) regarding the proposed rezoning application included an anecdotal visual siting of a sharp-tailed snake (provincially red-listed, SARA

1-Endangered 2003) on 3330 Port Washington Road; this is the parcel developed for industrial use immediately next the Big Digem yard. No further documentation was provided to verify this species sighting or locate the sighting within the parcel.

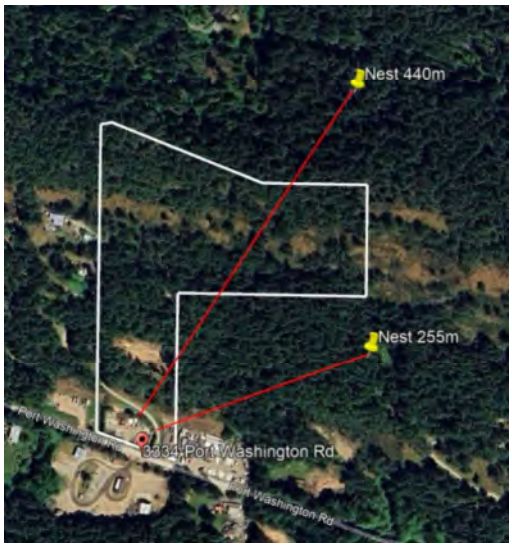
A comprehensive list of amphibian species confirmed on Pender Island was not available. Semi-terrestrial amphibians such as Pacific tree frog (*Pseudacris regilla*), rough-skinned newt (*Taricha granulosa*) and northern red-legged frog (*Rana aurora*) have been documented through iNaturalist recorded sightings and may be found within the parcel, but no aquatic breeding habitat is available to support their lifecycles. Two Pacific tree frog were observed during the site visit sheltered from the sun in rock crevices within the terrestrial herbaceous habitat. Some woody debris was observed on the woodland forest floor, but the parcel does not have shaded, moist forest habitat or abundant large, rotted logs for fully terrestrial salamanders to use for breeding, cover and forage. A detailed survey to confirm wildlife species presence was not completed as part of this assessment.

4.2.3. Birds

A variety of resident and migratory bird species are likely to inhabit and utilize the study area. Intact woodland canopy within the property is continuous with surrounding forests to the north, west and east of the subject parcel. The site offers excellent forage (acorns, berries, seeds, cones, insects etc.) and a layered canopy of mature trees for nesting. Forest-meadow interfaces provide suitable habitat for songbirds. Dead standing (wildlife) trees and snags throughout the site provide insect forage and cavity nesting opportunity for birds. Woodpeckers were heard excavating deadwood during the survey. As understood, there are bird nesting boxes throughout the Lisa Baile Nature Reserve that are part of an Avian Bioindicator Monitoring Project on the Pender Islands that examines violet-green swallows (*Tachycineta thalassina*) and chestnut-backed chickadees (*Poecile rufescens*) as bioindicators of ecosystem health (Schaefer, 2022). One bird nest box was observed just outside of the northern boundary of the subject parcel and many violet-green swallows were observed feeding on insects above the work yard during the site visit. The Pender Island Conservancy included anecdotal observations of olive-sided flycatchers (BC Yellow list; SARA1-Special Concern 2023) and common nighthawks (BC Blue-list; SARA 1-Special Concern 2023) within the adjacent nature reserve parcels.

A review of the provincial Wildlife Tree Stewardship Atlas (WiTS) identifies that the nearest mapped bald eagle (*Haliaeetus leucocephalus*) nest (BAEA-101-104 Clam Bay Road) is located approximately 150m northeast of the subject parcel and approximately 570m away from the industrial portion of the lot. The nest tree was recorded as Tree

Standing in 2022. No eagle nests were identified during site reconnaissance of the property, but some large trees capable of supporting a bald eagle nest are present throughout the site. The WiTS eagle nest map is included as Figure 4. A letter from the Pender Islands Conservancy dated November 25, 2024 regarding the subject rezoning application reports that there are two newly identified bald eagle nests, one located more than 200m away from the industrial portion of the subject parcel with a dense forest



stand between the yard and the nest. The nest to the north is on the other side of the ridge and downslope over 400m away from the Big Digem yard. Eagles are well known to adapt to regular activities and sounds within their chosen nest tree locations. As the land use has not changed, the eagles are apparently adapted to local land uses. The following figure shows the approximate location of the eagle nests reported by the Pender Island Conservancy in relation to the parcel boundaries and the industrial use area. No GPS coordinates or photographs were provided in the letter. Note, the north parcel boundary runs along the top of the ridge.

A review of the Great Blue Heron Atlas identified that there are no mapped great blue heron (*Ardea Herodias fannini*) nest trees located within or nearby the study area. No heron nests were identified within or nearby the subject parcel during the site assessment.

No raptor nests, whitewash against trees, feathers, prey remains or plucking stations were detected during the site assessment. However, observations of forest habitat within the site identified that the site has abundant suitable nesting habitat for several smaller raptors such as hawks and owls.

Bird species observations were recorded during the site survey and are listed in Table 1 below:

Table 1: Incidental bird species observed at 3334 Port Washington Rd (April 16, 2025)

Common name	Scientific name
Anna's hummingbird	*Calypte anna*
Song sparrow	*Melospiza melodia*
Turkey vulture	*Cathartes aura*
Purple finch	*Haemorhous purpureus*
Red-breasted nuthatch	*Sitta canadensis*
Dark-eyed junco	*Junco hyemalis*
Common raven	*Corvus corax*
White-crowned sparrow	*Zonotrichia leucophrys*
Orange-crowned warbler	*Leiothlypis celata*
Yellow-rumped warbler	*Setophaga coronata*
Chestnut-backed chickadee	*Poecile rufescens*
Bald eagle	*Haliaeetus leucocephalus*
Northern flicker	*Colaptes auratus*
Brown creeper	*Certhia americana*
Ruby-crowned kinglet	*Regulus calendula*
Violet-green swallow	*Tachycineta thalassina*

A detailed bird survey was not conducted as part of this assessment. Species presence will change seasonally throughout the year.

Federal guidelines indicate the songbird nesting season in this area extends from March 1st to August 15th of a given year. Raptors tend to begin nesting earlier in the year, as early as February. Bald eagle nesting season generally starts in January and extends until August 15th of a given year. Great blue heron nesting seasons occurs between April and May with chicks fledging the nest late August and sometimes into September. Nesting habitat within the industrial portion of the parcel is limited to the cedar perimeter hedge which may support small songbird nests such as hummingbirds. It would be expected that birds choosing to nest in this location would be adapted to the noise and activities occurring from the daily operation of the Big Digem work yard and surrounding industrial operations. Certain species such as barn swallows (*Hirundo rustica*) or dark-eyed juncos (*Junco hyemalis*) may choose to nest in man-made structures. If nesting is observed amongst the industrial operation or on equipment, the nest is to be left undisturbed until fledging is confirmed by a Qualified Environmental Professional (QEP). As understood, no clearing of vegetation is proposed as part of the rezoning application.

4.2.4. *Fisheries*

A review of the Provincial database Habitat Wizard and municipal mapping does not

identify any mapped watercourses or wetlands within or adjacent to the subject parcel. No fish habitat or fish habitat supportive watercourses were identified during the assessment.

4.2.5. Sensitive Ecosystems Inventory Mapping

The Sensitive Ecosystem Inventory of southeast Vancouver Island and the Gulf Islands (SEI) 1993-1997 systematically identified and mapped specific rare and fragile ecosystems. The purpose of the SEI project was to identify remnants of rare and fragile terrestrial ecosystems and to encourage land-use decisions that will ensure the continued integrity of these ecosystems.

Seven sensitive ecosystem types were described and mapped in the east coast of Vancouver Island study area as follows: Wetland, Woodland, Riparian, Older Forest (>100yrs), Terrestrial Herbaceous, Sparsely Vegetated and Coastal Bluff. Two other important ecosystems were mapped for their general biodiversity and wildlife habitat values: Older Second Growth Forest (60-100yrs) and Seasonally Flooded Agricultural Fields.

A review of the 2004 SEI map covering the study site (092B.084) identified that there are three mapped polygons within the study area identified as follows:

1. T0802/WD (Woodland). Located along the central north portion of the parcel. Aquaparian's site reconnaissance verified woodland habitat over a larger portion of the parcel than indicated.

2. T0804/HT:ro (Terrestrial Herbaceous: rocky outcrop). A narrow band located in the north central portion of the parcel within the woodland polygon. Site reconnaissance confirmed that the mapping is accurate.

3. T0801*/SG:mx (Second Growth: mixed conifer and deciduous). Mapped at the northern extent potentially just outside of the parcel boundaries. This may be accurate north of the parcel. Woodland habitat was observed to extend to the northern limits of the parcel which is the crest of the slope then the topography slopes down to the north. Deeper soils downslope may result in a transition to second growth forest. Second growth forest observed elsewhere within the parcel appeared to be conifer-dominant.

The SEI map is included with this report as Figure 5. The Sensitive Ecosystems of North Pender map (2004), which is available through the Islands Trust and included with

this report as Figure 6, shows similar mapping with a wide woodland ecosystem polygon along the north side of the parcel that overlaps with a terrestrial herbaceous band in the north central region of the property. Terrestrial herbaceous habitat was verified within the parcel and includes a sloping, south-facing open meadow but no special microhabitat features such as vernal pools or seeps were observed.

4.2.6. Species At Risk

4.2.6.1. Species at Risk Act

The Species at Risk Act (SARA), Schedule 1 lists species that are legally protected due to their risk status. Sections 32 and 33 contains prohibitions against the killing, harming, harassing, capturing, taking, possessing, collecting, buying, selling or trading of individuals of endangered, threatened and extirpated species listed in Schedule 1 of the *Act*. (Note, this *Act* does not include Special Concern listed species). This *Act* applies to:

- all endangered, threatened and extirpated migratory birds listed in Schedule 1 of SARA and protected by the *Migratory Birds Convention Act*, 1994, anywhere they occur, including private lands, provincial lands and lands within a territory.
- all endangered, threatened and extirpated aquatic species as defined by the *Fisheries Act* listed in Schedule 1 of SARA, anywhere they occur, including private lands, provincial lands and lands within a territory.
- With respect to individuals of a listed wildlife species that is not an aquatic species or a species of birds that are migratory birds protected by the MBCA, sections 32 and 33 of SARA do not apply in lands in a province that are not federal lands unless an Order is made under subsection (2) to provide that they apply.
- The Governor in Council may, on the recommendation of the Minister, by Order, provide that sections 32 and 33, or either of them, apply in lands in a province that are not federal lands with respect to individuals of a listed wildlife species that is not an aquatic species or a species of birds that are migratory birds protected by the *Migratory Birds Convention Act, 1994*.

When a Recovery Strategy or Action Plan is created for specific species listed on the SARA Public Registry, critical habitat is identified which is the habitat necessary for the survival or recovery of a listed species. Sometimes critical habitat is identified for groups of species occurring in specific habitat. Critical habitat identification alone is not an automatic protection designation. Federal or non-federal laws or bylaws may be in place to provide protection. At the provincial level, BC does not have specific

legislation in place for the protection of vascular plants at risk. The province of BC considers recovery planning documents, including the identification of critical habitat by the federal government, science advice only. The intent of the *Act* is to "protect critical habitat as much as possible through "voluntary actions and stewardship measures" and "prohibitions against the destruction of that particular critical habitat may come into play" (Government of Canada). If the critical habitat of a listed species is identified on private land, landowners may be required to take measures to protect it such as modifying land use to avoid habitat destruction.

4.2.6.2. Provincial Species Ranking

The British Columbia Conservation Data Centre (BC CDC) assists in conservation of biodiversity in the province by collecting and sharing information about wildlife, plants and ecosystems in the province. Species and ecosystems are placed on a Red, Blue or Yellow list to rank them according to their provincial conservation status. Provincially Red-Listed species includes any native species or ecological communities that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Extirpated species no longer exist in the wild in British Columbia but do occur elsewhere. Endangered species and ecological communities are facing imminent extirpation or extinction. Threatened species and ecological communities are likely to become endangered if limiting factors are not reversed. Blue-Listed species includes any native species or ecological community considered to be of Special Concern (formerly Vulnerable) in British Columbia. Species or ecological communities of Special Concern have characteristics that make them particularly sensitive or vulnerable to human activities or natural events. Yellow-Listed Species includes species or ecological communities that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies. The BC CDC also identifies ecological communities at risk based on species composition and habitat condition.

4.2.6.3. At-risk Species Screening

A review of BC CDC iMap identified that there is a mapped occurrence of a Red-listed Douglas-fir / Alaska oniongrass ecosystem (CDC Occurrence #65752). This ecosystem occurs on southeastern Vancouver Island and the Southwestern Gulf Islands on dry sites with shallow (<1m) soils over bedrock, typically south-facing. It is characterized by a moderately open canopy of Douglas-fir with interspersed Garry oak and occasionally arbutus, a sparse to absent shrub layer and a diverse and well-developed herb layer often dominated by Alaska oniongrass and may also include long-stoloned sedge (*Carex inops*), Pacific sanicle and yerba Buena, as well as

some other associated forbs. (BC CDC). Within the CDFmm subzone, this ecosystem is identified as site series 03 Fd – Oniongrass and is associated with a Very Dry soil moisture regime and Rich to Very Rich soil nutrient regime (Green & Klinka, 1994). Species and conditions identified in the northern portion of the parcel appear consistent with this site series classification. Appendix C includes a copy of the BC CDC iMap and the mapped ecosystem occurrence report. In addition, the BC CDC identifies masked occurrences over the study area. The BC CDC was contacted, and it has been determined that details regarding the masked occurrence are not relevant for the project due to distance from the occurrence. Notable mapped occurrences nearby include historical (1951) observations of sharp-tailed snake (*Contia tenuis*; #4054) located approximately 700m to the southeast, and more recent (2002, 2007 & 2021) observations of Western screech-owl, *kennicottii* subspecies (*Megascops kennicottii kennicottii*; #134959) located approximately 815m to the southeast. The BC CDC reports for these occurrences are included in Appendix C.

There are a number of "at-risk" species listed by the BC CDC Ecosystems Explorer search tool which are considered to have some potential to occur at the study area. The search parameters used include animals or plants; BC Conservation Status Red or Blue; North Pender Island Local Trust Area; Habitat subtypes Conifer Forest – Dry, Conifer Forest – Mesic, Garry Oak Woodland, Rock/Sparsely Vegetated Rock; BGC Zone, Subzone CDFmm. A list of 34 Blue-listed and 40 Red-listed species were generated and summarized into a table which has been included with this report in Appendix C. The list was assessed and species that have no potential to be found within the parcel were removed from the list. In consideration of the habitat characteristics observed in the site including intact second growth forest, south-facing terrestrial herbaceous meadow, and woodland habitat, the overall site has the potential to support a number of the listed species. Aquaparian rated the potential for the remaining species listed to be found within the subject parcel as Low, Moderate or High. Species were rated as having a Low potential because many key habitat elements were absent within the study site. A Moderate potential ranking was designated for species where many of the habitat elements were present including some key elements but not all of them. A High potential ranking was given to species where most of or all of the habitat elements identified in the species descriptions were present within the site including key elements, or because the species was previously documented in similar habitats nearby.

A detailed species-at-risk survey was not completed as part of this assessment because no development is planned within the second growth forest habitat,

woodland habitat or the terrestrial herbaceous habitat. There are no plans to expand the work yard or extend the area of the proposed industrial zone. None of the species listed have a high likelihood of finding suitable habitat within the industrial portion of the parcel which has been completely impacted and actively used for light industrial use for over a decade. The species-at-risk considered have potential to be found within the remaining rural portion of the parcel. However, highly specialized micro-habitats that support niche-dependent rare species, such as vernal pools, vernal seeps, vernal swales, or seasonally wetted wetland margins that are considered to be critical habitat for many rare plant species, were not identified within the study area. A review of the databases iMap BC and Esri Canada did not identify any mapped SARA critical habitat within the parcel.

5.0 IMPACT ASESSMENT

In general, the subject parcel contains sensitive woodland and terrestrial herbaceous habitat within the rural zoned northern portion of the parcel north of the shared driveway which comprises 5.54 ha (90%) of the parcel area. Thin, dry soils with varying nutrient regimes have the potential to support a number of flowering plants, amphibians, reptiles, insects, birds and some mammal species within the site. The site also has the potential to support a number of species-at-risk that have been listed within this report and ranked as having a Low, Moderate, or High potential to be found within the site, including sharp-tailed snake. The site assessment included an inventory of species observed but detailed species presence surveys were outside of the scope of this study.

Approximately 2/3rds (0.34 ha) of the 0.56 ha area of the parcel that is shown on the site plan as Designated for Industrial use has been used as such for the past decade. It is consistent with other industrial activities along this section of Port Washington Road including industrial use of Lots 8 and 9 directly across the street. The Islands Trust Staff Report No. PLRZ20240110 (Bigham) identifies that Big Digem is recognized as providing important community services and appears to be well operated. The industrial operation is confined to a small flat gravel area that is adjacent to Port Washington Road and there are no plans to expand the industrial area north which is limited y a steep slope. There are no watercourses or wetlands within the parcel and the roadside ditch is a grassy swale that was observed to terminate without connectivity to any natural watercourses downstream. All of the sensitive ecological features that were identified within the parcel are located upslope from the industrial use portion of the parcel which precludes the potential for hydrocarbon or sediment contamination of soils from runoff or rainfall.

The industrial portion of the parcel does not appear to pose any risk to the integrity of adjacent

land reserves due to the steep topography and intact forest which is expected to provide a buffer for sound and a barrier for visual disturbance to wildlife that is using the upper portion of the parcel or the adjacent land reserves. Intact mature forest habitat is continuous with adjacent forest habitat including nature reserves on the north side of the ridge. There will be no fragmentation of the intact forested habitat that occupies most of the parcel and it will maintain its function as a wildlife corridor for a variety of species, notably migratory birds.

At the time of writing this report, it is understood that there are no development plans within the rural portion of the parcel so no impact over existing conditions is expected. The rural portion of the parcel includes approximately 200m of forested buffer between high-value potential sharp-tailed snake habitat comprised of south-facing rocky outcrops and exposed fractured bedrock (terrestrial herbaceous habitat). The forested buffer provides connectivity to other valuable potential sharp-tailed snake habitat on adjacent sites including nature reserve lands and provides leaf litter and decaying logs which are identified as important habitat features found in wooded areas that may be used by the snakes (Ministry of Environment and Climate Change Strategy, 2014). Recommendations provided in the document “Guidelines for Amphibian and Reptile Conservation” include preserving these important features and removing invasive species, in particular, Scotch broom and Himalayan blackberry (Ministry of Environment and Climate Change Strategy, 2014). Removal of invasive species which are densely established adjacent to the work yard will reduce the potential for them to spread into the sensitive rocky meadow habitat upslope that may support sharp-tailed snakes, while removal of invasive species from meadow and woodland habitat will directly improve the integrity of these areas. Expansion of the footprint of the industrial work yard is not proposed for the future so there is no reduction in viable sharp-tailed snake habitat or the habitat buffer.

Exclusion fencing was proposed in the review comments as a potential mechanism to keep sharp-tailed snakes from incidentally entering the work yard; however, fencing poses the risk of directing wildlife towards driveways crossing the site or towards the road. Exclusion fencing has not been incorporated in the measures because the site does not appear to be a major travel or migration corridor for this species; the woodland forest and meadow habitat upslope would be more likely to be used as a dispersal corridor. The Guidelines for Amphibian and Reptile Conservation During Road Building and Management Activities in British Columbia states that reptile fencing should be limited to mortality hotspots and areas between key habitats (Ministry of Environment and Climate Change Strategy, 2020, p. 54). Fencing also poses the risk of having detrimental effects on non-target species and should only be installed if these risks are outweighed by potential benefit to the target species.

Additionally, sharp-tailed snake activity is restricted to evenings and night when the work yard is not active, reducing potential for harm to this species from movement of equipment if snakes

are passing through the site. Their seasonal activity is highest in spring (February to June) and fall (September to October) so timing invasive plant management outside of these periods may help to reduce the chance of encounters (Ministry of Environment and Climate Change Strategy, 2014). It should also be considered that there are no features attracting the snakes to the work yard such as prey availability (primarily slugs), basking sites, leaf litter and/or decaying wood.

Other species-at-risk identified in adjacent nature reserve lands (e.g. common nighthawk) are not expected to be negatively impacted by rezoning for continued use of the industrial portion for the same reasons as sharp-tailed snake, namely because no expansion of the work yard into higher-value habitat upslope is proposed and because there is an ample forested buffer to provide visual and noise barriers and maintain connectivity between adjacent habitat.

Eagle or heron nests were not observed within or adjacent to the parcel. One eagle nest is mapped by WiTS to be nearby but is approximately 570m from the industrial area (Fig 4). The Pender Island Conservancy has reported a new eagle nest located approximately 200m from the industrial portion of the subject property and has expressed concerns regarding potential impacts to the nest from operation of the business during the bald eagle nesting season. Eagles are considered to have a "moderate-high" tolerance to activity near the nest site (BC Ministry of Environment, 2013). The provincial Guidelines for Raptor Conservation (2013) recommend a 100m nest tree buffer in a rural setting with an additional 100m 'quiet' buffer during the breeding season (see below):

Ability to co-exist*	Undeveloped	Rural	Urban	Breeding season 'quiet' buffer (additional)
"High" and "moderate-high"	200 m	100 m	1.5 tree lengths or 50 m from cliff	100 m
"Moderate"	500 m	200 m	1.5 tree lengths or 50 m from cliff	100 m
"Low-moderate" and "low"	500m	As advised by Professional Biologist**	As advised by Professional Biologist**	As advised by Professional Biologist**

A breeding season quiet buffer is recommended for sudden and unusual activities such as land contouring, tree falling, chain saws, large trucks, whistles, fireworks or banging devices (BC Ministry of Environment, 2013). It should be noted that the industrial operation at 3334 Port Washington Road is continuous through the year and includes regular operation of heavy

machinery. If a new nest has been constructed at this location it indicates that the eagles have accepted the location as suitable despite regular noise from the work yard. It is also important to consider sight lines between eagles and disturbances as they have high visual acuity; it is assumed that the visual activities of the work yard are not perceived as threatening by the eagles if they are within sight of the operations, or else there is a sufficient visual barrier between the nest and the work yard. Note that the buffer measurements stated above are recommendations and each situation may be unique based on ambient noise, visual barriers, and nest location. If eagles are noted to be flushing from the nest during the nesting season, a biologist may need to be retained to assess if the industrial works appear to be negatively impacting the nesting eagles. No nests have been identified within 200m of the Big Digem yard.

Future development within the industrial portion of the parcel, if rezoning is approved, may include construction of a workshop which will introduce a new area of impermeable surface. A hydrogeological report was prepared by MSR Solutions Inc. (3334 Port Washington Road – Industrial Wastewater/Stormwater Management Plan; July 23, 2025) to support the proposed rezoning application. The report confirms that stormwater runoff from the roof of the workshop can be captured in roof leaders and directed to a catch basin with stormwater storage capacity, overflow, and a restrictive outlet. The stormwater would be directed through a perforated pipe to the south end of the parcel. The report confirmed that post-development flows will not exceed pre-development flows. As no significant changes to the operation of the Big Digem work yard are expected, rezoning is expected have little to no impact over existing and historical conditions.

The provincial Cumulative Effects Framework defines Cumulative Effects (CE) as: “changes to environmental, social, and economic values caused by the combined effect of past, present and future human activities and natural processes” (Government of British Columbia, 2021). The CE Framework includes an assessment of ‘values’ which are defined as: “the things that the people and government of British Columbia care about and see as important for assuring the integrity and well-being of the province’s people and communities, economies and ecological systems, defined in policy, legislation or agreements with First Nations.” Values found within the site may include woodland forest, terrestrial herbaceous meadows, species-at-risk and their associated habitat features, air quality, and water quality. The site has been used the same way for many years, and the proposed rezoning is not expected to significantly change the land use. No increase of emissions, stormwater discharge, or noise are anticipated over existing and past land use that would be expected to have a significant cumulative effect on values identified within the parcel. As discussed in this report, the rural-zoned portion of the parcel contains high-value ecological resources and is not proposed to be developed because of the rezoning. The parcel is zoned for residential use, and if future plans include residential development (outside of the scope of the rezoning application), it is highly recommended that

measures are in place to maintain the ecological integrity and connectivity of the sensitive habitat located at the north portion of the property while planning changes to this portion of the parcel and to prevent cumulative effects that would be expected from combined industrial and residential use of the property. The Rural-zoned portion of the property has ample viable building space to be developed for residential use without encroaching into sensitive habitat or creating significant pressure on ecologically sensitive habitats within or adjacent to the property. If high-value ecological habitat is maintained and protected for its connectivity between habitat, then there is not expected to be any significant impacts on adjacent nature reserve lands if residential development is proposed in the future. At the time of writing this report, there are no plans to develop the Rural portion of the property.

6.0 RECOMMENDATIONS

The following are recommendations to preserve the identified ecological values of the property if the rezoning for the southern portion is accepted.

- The slope above the work yard and the terrestrial herbaceous habitat were observed to have an abundance of Scotch broom. Scotch broom spreads rapidly and can dominate and outcompete sensitive terrestrial herbaceous meadows. It has been identified as a major contributor to the decline of rare and endangered plant species. Removal of invasive vegetation, in particular, Scotch broom and Himalayan blackberry, has also been identified as instrumental in sharp-tailed snake conservation. It is recommended that a management plan to reduce and control this species is implemented to protect the integrity of the terrestrial herbaceous meadow in the north portion of the parcel. The following recommendations for eradication of Scotch broom is based on the *Invasive Species Council of BC: Scotch Broom Tips*:

  Scotch broom

  - Minimize soil disturbance adjacent to infestations to contain seed spread;
  - Cut plants below soil before flowering and seeds set (late winter, early spring). To minimize potential for impacts to sharp-tailed snake, if present, and to avoid the bird nesting season, concentrate removal efforts in the winter when they are inactive;
  - Due to enormous seed banking and regenerating, mechanical control needs to be repeated over a 3-5 yr period;
  - Burning is ineffective as seeds germinate following a burn;

- After mechanical treatment, promptly re-vegetate with an appropriate seed mix (e.g. Garry Oak Ecosystem seed blend from Satinflower Nurseries), followed by an application of phosphorus-rich fertilizer and wood mulch; and,
  Along the slope above the industrial portion (but not the terrestrial herbaceous meadow), promptly establish competitive shrubbery, including snowberry, thimbleberry, and dull Oregon-grape to reduce broom growth.

- The slope above the work yard also has an abundance of Himalayan blackberry that should also be managed. The Invasive Species Council of BC factsheets for Scotch broom and Himalayan blackberry are included with this report as Appendix D. The following recommendations for eradication of Himalayan blackberry are based on the *Invasive Species Council of BC: Himalayan Blackberry Fact Sheet*:

  Himalayan blackberry:

  - Plan for blackberry removal in late August/September when the plants are stressed and when the migratory bird nesting season (March 15-August 15) is over;
  - Removal is only successful if all parts of the plant are removed. This includes canes, roots and root crowns;
  - Cut canes down to ~30cm before digging/grubbing to remove thickets while easily locating root crowns;
  - Hand pulling is recommended for small seedlings or young plants or shade-supressed canes. Pull when plants are large enough to grasp but have not produced seeds;
  - Dig/grub more established plants, avoid leaving root fragments behind as they may resprout. Claw mattocks or Pulaskis have been proven to be effective tools;
  - If machines will be used, dig deep and carefully to get all of the root crown; and,
  - Bag or tarp all plant parts and seeds before transporting to a designated disposal facility such as a landfill or destroy by incineration.

- There is a low potential for some bird species such as barn swallows or dark-eyed juncos to nest in anthropogenic spaces or on equipment. Works within the yard must abide by the *Migratory Bird Convention Act* and the *Wildlife Act.* If birds are found to be nesting in or on equipment they must be left alone and not removed or disturbed until their eggs have hatched and the chicks have fledged.

- There is potential for sharp-tailed snakes to be found within the property. Use of the industrial portion of the property for habitat is considered unlikely due to lack of key habitat elements and continuous disturbance, and because of the 200m forested buffer

between high-value potential sharp-tailed snake habitat and the work yard. They are most likely to find suitable habitat in the terrestrial herbaceous or woodland ecosystems identified to the north of the parcel as several key habitat elements were identified. The northern portion of the parcel should be preserved in the future to maintain connectivity between like habitat and the adjacent nature reserves. Documented sightings of this elusive species are very limited. If it is suspected that this species has been spotted in the subject parcel, document the sighting including photographs, if possible, and report the sighting to the BC Conservation Data Centre and wait for further guidance. If a sharp-tailed snake is identified in the active work yard and imminently at risk of harm, carefully move it to a safe location where it is not in danger of injury or mortality and report it to BC CDC.

- If future residential development is planned for the rural zoned upper portion of the parcel, it is highly recommended to avoid construction in the northern portion of the property due to its connectivity with adjacent nature reserve lands, its high-ecological value, its potential for a wildlife corridor, and its potential to support species-at-risk.

- Trucks and heavy machinery are to be washed down at a certified vehicle washing facility rather than onsite.

- Dust / air quality – dust should be managed by use of water on the site. Idling equipment should be limited as far as possible. Machines are to be kept in good repair to limit air emissions.

- Ensure no track out onto the paved road occurs. If track out occurs, it is to be swept off immediately.

- As understood, there are plans for construction of a new workshop. Ensure standard mitigation measures for construction are in place to prevent negative impacts to the environment including management of sediment laden water to prevent migration off-site, management of hydrocarbons in the case of a spill or leak to prevent soil and groundwater contamination, control of dust, etc.

7.0 CONCLUSIONS

It is Aquaparian's opinion that continued use of the southern portion of the subject parcel for industrial use is consistent with the adjacent industrial parcels along both sides of Port Washington Road frontage in this area and that concentrating similar industrial operations to one small area of the island is preferable to spreading industrial uses throughout the island or to other areas that may cause habitat fragmentation or have existing sensitive environmental attributes that may be lost to new development. There is currently no plan to expand the work yard of the site which is limited to a very small portion of the property (6%). The work yard is separated and downslope of the environmentally sensitive portion of the parcel. The conservation lands identified in the report are located over 300m away from the Big Digem work yard and two of the three parcels are on the opposite side of the ridge from the subject parcel. The nearest known eagle nest tree is over 200m away from the works yard, one of which is on the opposite side of the ridge and the other is separated by a forest stand. It is Aquaparian's opinion that the current proposed rezoning is appropriate for the site and it is not expected to result in further environmental impacts over the existing conditions. If other parcels in this area are rezoned for additional industrial use in the future, increased heavy equipment traffic would be expected to occur along Port Washington Road over current use.

8.0 CLOSURE

Aquaparian Environmental Consulting Ltd was retained to complete an Environmental Assessment to support a re-zoning application to the Islands Trust for continued industrial land use of the south portion of 3334 Port Washington Road, Pender Island, BC. Currently this portion of land is being used for light industrial operations under a Temporary Use Permit since 2011. The remaining area of the parcel is currently undeveloped and forested. The rezoning application is to allow the proponent to come into compliance with the North Pender Island Land Use Bylaw for continued industrial use of the property. This report has been prepared at the rezoning stage. At the time of writing this report, Aquaparian understands that no further expansion of the industrial footprint is proposed and that the activities within this portion of the property will remain more or less the same.

This report was completed to identify general habitat conditions and features within the subject property and to document and map environmentally sensitive areas located within the parcel. No detailed species presence assessments were completed for this study. This assessment includes recommendations for protection of sensitive ecological features including management of invasive species identified within the property.

This report has been completed in accordance with generally accepted biological practices. No other warranty is made, either expressed or implied. Aquaparian trusts that the information provided in this report meets your requirements. Any questions regarding information provided in this document, please contact the undersigned at (250) 591-2258.

Respectfully submitted,

AQUAPARIAN ENVIRONMENTAL CONSULTING LTD.

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FIGURE 1A & 1B

SITE LOCATION MAP

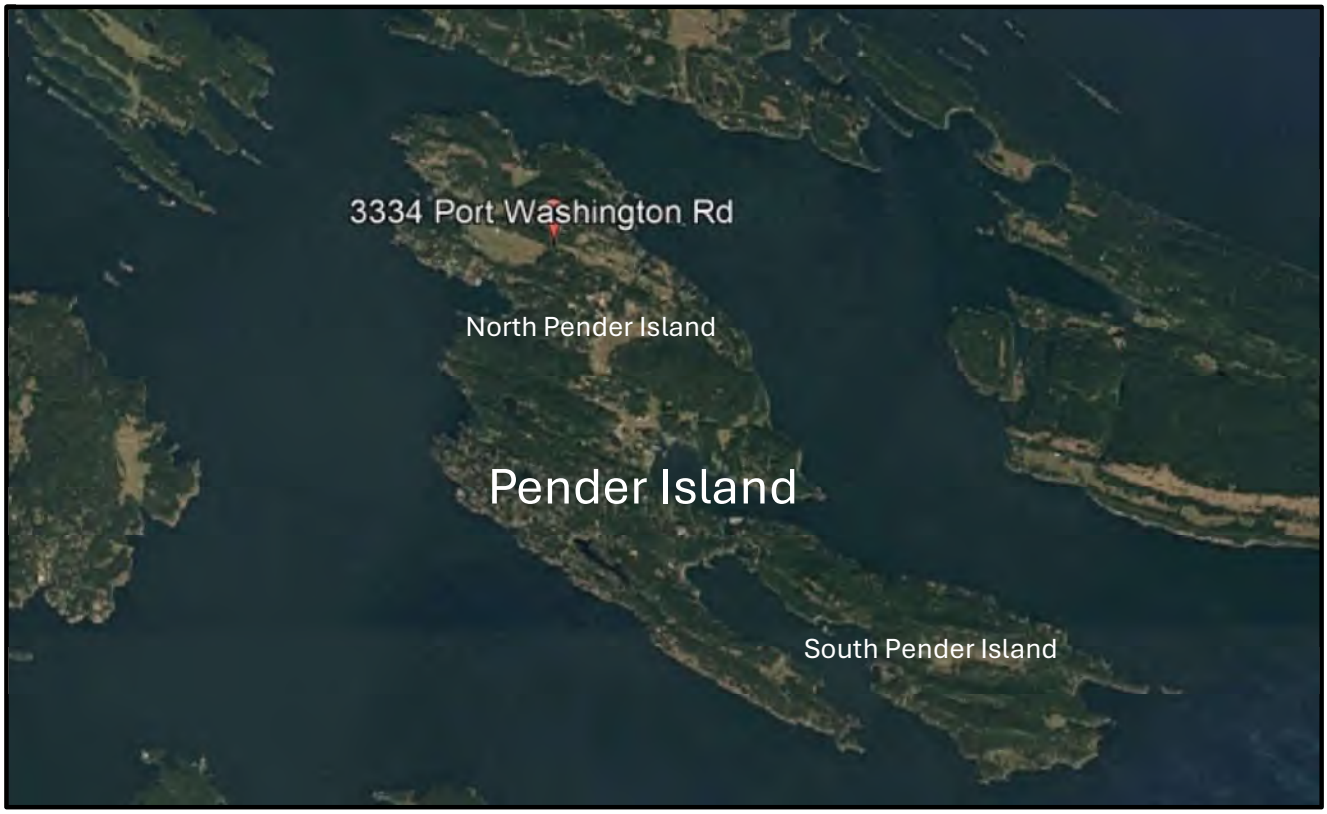


FIGURE 1a & 1b – SITE LOCATION MAPS

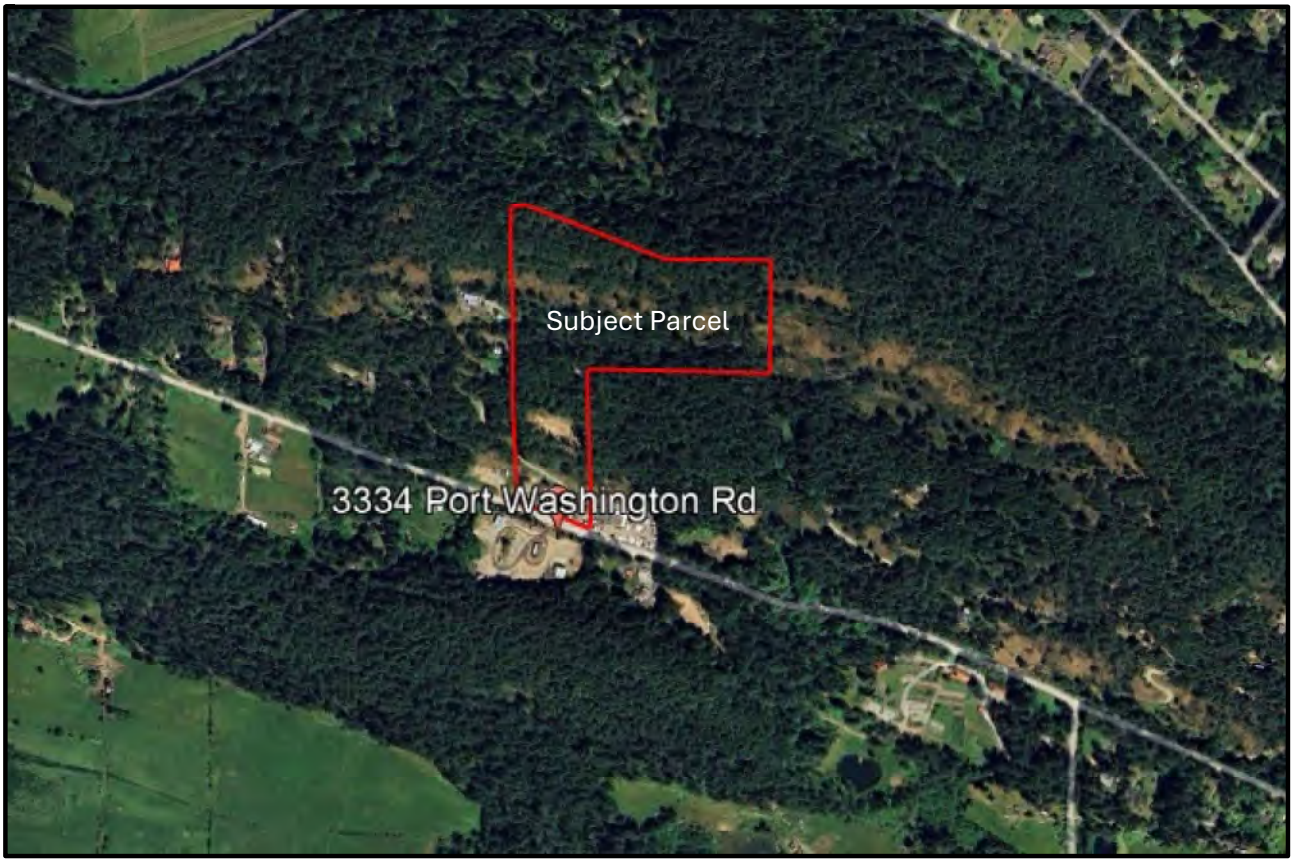


FIGURE 2

SITE PLAN (POLARIS LAND SURVEYING INC.)

FIGURE 2 – SITE PLAN (3334 PORT WASHINGTON RD)

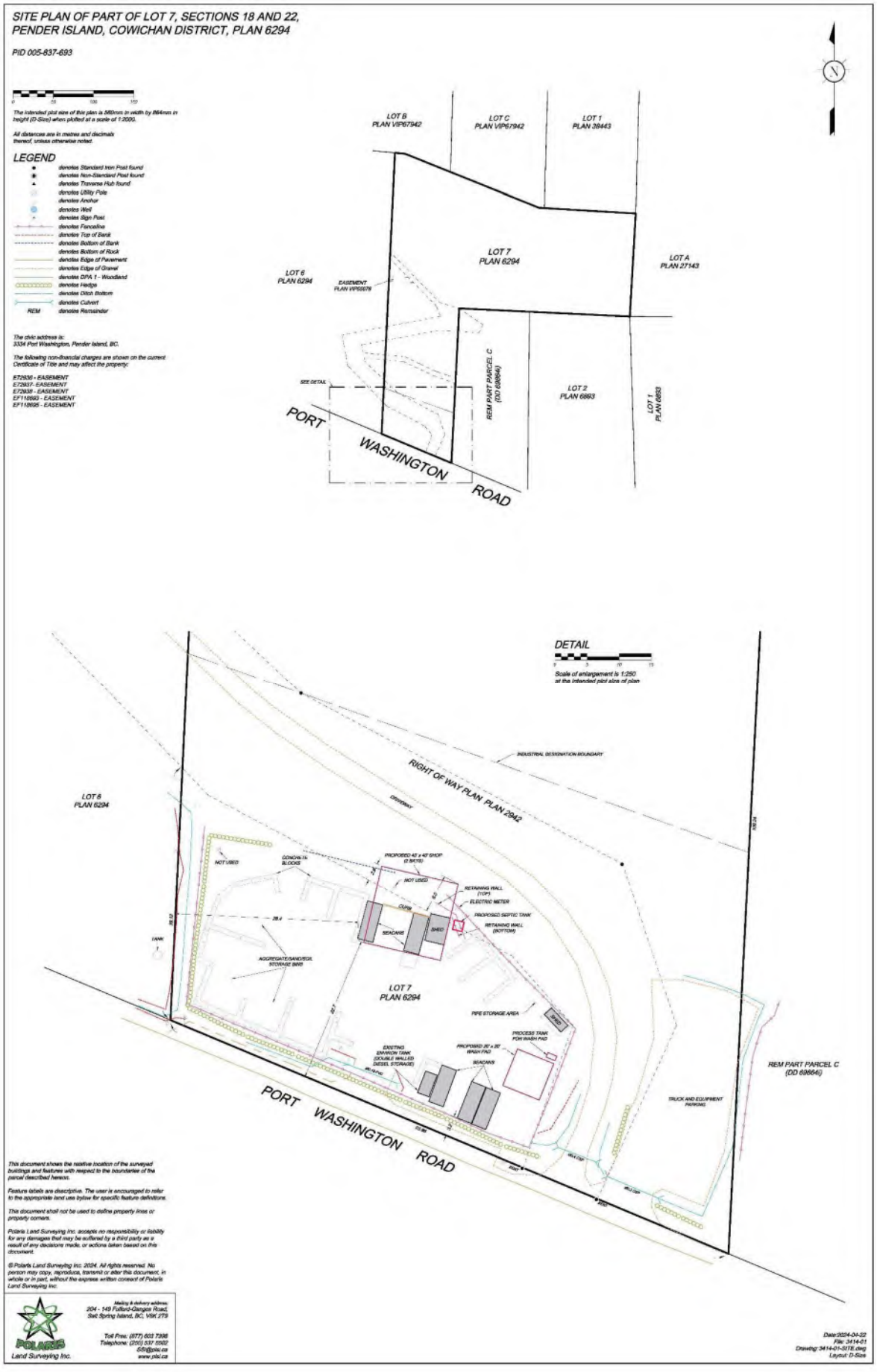


FIGURE 3

BIOPHYSICAL MAP

FIGURE 3 – BIOPHYSICAL MAP (3334 PORT WASHINGTON ROAD)

FIGURE 4

WILDLIFE TREE STEWARDSHIP MAP

FIGURE 4 – WILDLIFE TREE STEWARDSHIP MAP
(EAGLE NEST TREES)

FIGURE 5

SENSITIVE ECOSYSTEM INVENTORY MAP

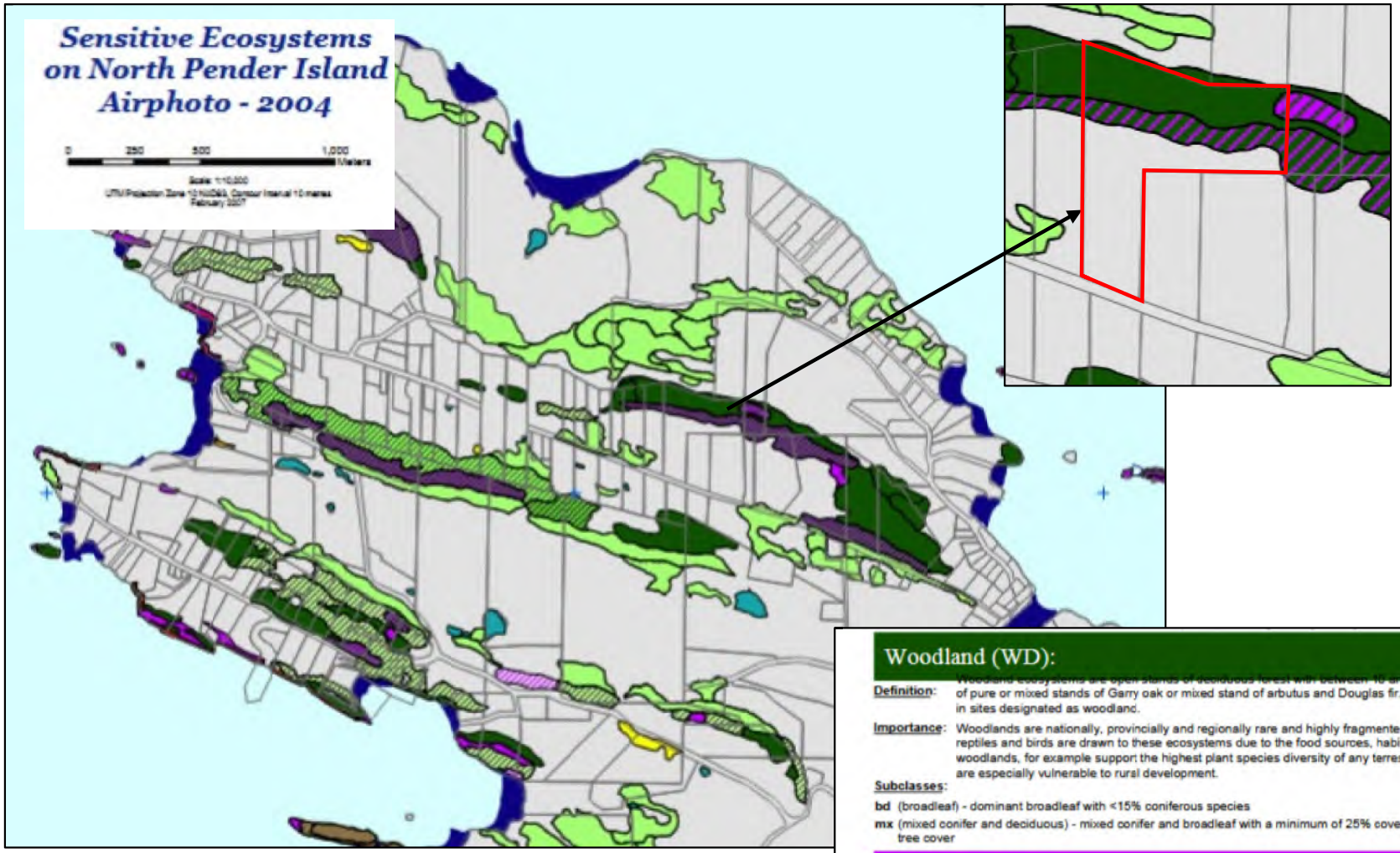
FIGURE 5 – SENSITIVE ECOSYSTEMS INVENTORY (SEI)

Subject Parcel

FIGURE 6

NORTH PENDER ISLAND SENSITIVE ECOSYSTEMS MAP

FIGURE 6 – SENSITIVE ECOSYSTEMS OF NORTH PENDER MAP



Ecosystem composition is complex and often contains a dominant ecosystem with secondary and tertiary ecosystems. In this map the dominant ecosystem has a solid shading and the secondary and tertiary ecosystems are identified by hatched lines.

Example of dominant Woodland ecosystem with a secondary Herbaceous ecosystem

Plotted Feb 15 2007

Woodland (WD):

Definition: of pure or mixed stands of Garry oak or mixed stand of arbutus and Douglas fir. Mature big-leaf maple can also be found in sites designated as woodland.

Importance: Woodlands are nationally, provincially and regionally rare and highly fragmented . A rich assemblage of plants, insects, reptiles and birds are drawn to these ecosystems due to the food sources, habitat and proximity to the ocean. Garry oak woodlands, for example support the highest plant species diversity of any terrestrial ecosystem in British Columbia and are especially vulnerable to rural development.

Subclasses:

bd (broadleaf) - dominant broadleaf with <15% coniferous species

mx (mixed conifer and deciduous) - mixed conifer and broadleaf with a minimum of 25% cover of either group is included in the total tree cover

Herbaceous (HB):

Definition: Non-forested ecosystems (less than 10% tree cover), generally with shallow soils. They include bedrock outcroppings, large openings within forested areas, spits, dunes and shorelines vegetetated with grasses and herbs.

Importance: Terrestrial Herbaceous ecosystems are characterized by thin soils which are easily disturbed. Herbaceous plants can be easily trampled or dislodged onto bare rock where they cannot re-establish. Thus they are highly vulnerable to a range of human disturbance factors including residential development and various recreational uses.

Subclasses:

hb (herbaceous) - non-forested, less than 10% tree cover, generally shallow soils, often with exposed bedrock, predominantly a mix of grasses and forbs, also lichens and mosses

cs (coastal herbaceous) - rocky shoreline or islet, influenced by the marine environment and characterized by less than 20% vegetation cover of grasses herbs, mosses and lichens.

sp (spit) - finger-like extension of beach, comprised of sand or gravel deposited by longshore drifting; low to moderate cover of salt-tolerant grasses and herbs

du (dunes) - ridge or hill, or beach area created by windblown sand; may be more or less vegetated depending on depositional activity, beach dunes will have low cover of salt-tolerant grasses and herbs

sh (shrub) - >20% of total vegetation cover is shrub cover, with grasses and herbs

ro (rock) - rock outcrops not dominated by shrubs

APPENDIX A

SITE PHOTOGRAPHS

APPENDIX A – SITE PHOTOGRAPHS

Photo 1: East side of industrial area used to store vehicles.

Photo 2: West side of industrial area used as Big Digem work yard. Photo shows piles of aggregates.

Photo 3: Soils are contained in lock block bins.

Photo 4: Showing two sea cans. New workshop planned to replace them.

Photo 5: Diesel storage in double walled container with full sized spill kit next to it.

Photo 6: Overlooking the west portion of the industrial area that comprises the Big Digem work yard. Photo facing southeast from slope behind work yard.

Photo 7: Looking northeast at slope behind work yard. The cleared slope is within the industrial designation.

Photo 8: Cleared slope has been overgrown with Himalayan blackberry and Scotch broom – invasive species.

Photo 9: Small cleared bench at top of driveway.

Photo 10: Above the cleared bench is a woodland slope.

Photo 11: Looking east across terrestrial herbaceous meadow in north portion of parcel.

Photo 12: Looking west across terrestrial herbaceous meadow in north portion of parcel.

Photo 13: Showing a thicket of invasive Scotch broom that has established in the terrestrial herbaceous meadow.

Photo 14: Woodland ridge along the north side of the parcel above the band of terrestrial herbaceous meadow.

Photo 15: The topography slopes steeply down beyond the north parcel boundary.

Photos 16-22: Photos of some of the species identified during the survey in woodland or terrestrial herbaceous habitat. In order: Pacific treefrog, fairy slipper, western saxifrage, wingstem monkeyflower, small-flowered woodland star, wholeleaf saxifrage, and giant blue-eyed Mary.

Photo 23: Clearing in south area above industrial portion looking east.

Photo 24: Clearing in south area above industrial portion looking north toward woodland habitat.

Photo 25: Dry second growth Douglas-fir forest habitat.

APPENDIX B

SITE ASSESSMENT VEGETATION PLOT DATA

Appendix B
3334 Port Washington Drive, Pender Island BC
Summary of Vegetation Plots

Plot 1

Location: Northeast corner of parcel.
Coordinates: 48° 48' 34" N / 123° 17' 29" W
Description: Forested ridge peak, 30% canopy cover.
Environmentally Sensitive Area (ESA) Classification: Woodland.

Canopy species:			
Species	Scientific name	Proportion of canopy	Stem diameter range (diameter-at-breast-height (dbh))
Douglas-fir	*Pseudotsuga menziesii*	75%	18-50cm
Arbutus	*Arbutus menziesii*	25%	Up to 70cm

Understory species:	
Species	Scientific name
Grasses & mosses (dominant)	Mixed spp.
Red columbine	*Aquilegia canadensis*
Fairy slipper	*Calypso bulbosa*
Little western bittercress	*Cardamine oligosperma*
Miner's lettuce	*Claytonia perfoliata*
Fragile fern	*Cystopteris fragilis*
Scotch broom (invasive)	*Cytisus scoparius*
Sweet-scented bedstraw	*Galium triflorum*
Dove's-foot crane's-bill	*Geranium molle*
Rattlesnake plantain	*Goodyera oblongifolia*
White hawkweed (invasive)	*Hieracium albiflorum*
Nipplewort	*Lapsana communis*
Small flowered woodland star	*Lithophragma parviflorum*
Hairy honeysuckle	*Lonicera hispidula*
Rose campion	*Lychnis coronaria*
Dull Oregon-grape	*Mahonia nervosa*
Wood forget-me-not	*Myosotis sylvatica*
Frog's pelt	*Peltigera neopolydactyla*
Goldback fern	*Pentagramma triangularis*
Licorice fern	*Polypodium glycyrrhiza*
Western buttercup	*Ranunculus occidentalis*
Baldhip rose	*Rosa gymnocarpa*
Pacific sanicle	*Sanicula crassicaulis*
Common chickweed	*Stellaria media*
Common dandelion (invasive)	*Taraxacum officinale*
Rein orchid	Unidentified (not flowering)

Plot 2

Location: Northwest corner of parcel
Coordinates: 48° 48' 36" N / 123° 17' 40" W
Description: Forested ridge peak, partial canopy opening, small meadow within forest
Environmentally Sensitive Area (ESA) Classification: Woodland / terrestrial herbaceous overlap

Canopy species:			
Species	Scientific name	Proportion of canopy	Avg stem diameter range (diameter-at-breast-height (dbh))
Douglas-fir	*Pseudotsuga menziesii*	78%	20-30cm
Arbutus	*Arbutus menziesii*	20%	30cm
Garry oak	*Quercus garryana*	2%	20-45cm

Understory species:	
Species	Scientific name
Grasses	Mixed spp.
Fairy slipper	*Calypso bulbosa*
Miner's lettuce	*Claytonia perfoliata*
Fragile fern	*Cystopteris fragilis*
Sweet-scented bedstraw	*Galium triflorum*
Alaska oniongrass	*Melics subulata*
Juniper hair cap moss	*Polytrichum juniperinum*
Rough goose neck moss	*Rhytidiadelphus triquetrus*
Sheep sorrel	*Rumex acetosella*
Pacific sanicle	*Sanicula crassicaulis*
Rein orchid	Unidentified (not flowering)

Plot 3

Location: West side of slope below ridge in northern portion of parcel
Coordinates: 48° 48' 34" N / 123° 17' 40" W
Description: Open terrestrial herbaceous meadow with thin soils over bedrock; 35% slope gradient; south-facing aspect; 5% exposed bedrock & 95% moss groundcover; dense patches of invasive Scotch broom (30-40% cover avg. up to >60%); many dead standing trees in canopy upslope of meadow.
Environmentally Sensitive Area (ESA) Classification: Terrestrial herbaceous
Terrestrial wildlife spotted: Pacific treefrog (*Pseudacris regilla*), northern alligator lizard (*Elgaria coerulea*)

Canopy species:			
Species	Scientific name	Proportion of canopy	Avg stem diameter range (diameter-at-breast-height (dbh))
Douglas-fir	*Pseudotsuga menziesii*	Edges only: 75%	20-30cm
Arbutus	*Arbutus menziesii*	Edges only: 25%	20-30cm

Understory species:	
Species	Scientific name
Moss	Mixed spp.
Sweet vernal grass	*Anthoxanthum odoratum*
Giant blue-eyed Mary	*Collinsia grandiflora*
Scotch broom (invasive)	*Cytisus scoparius*
Wingstem monkeyflower	*Erythranthe alsinoides*
Alaska oniongrass	*Melics subulata*
Wholeleaf saxifrage	*Micranthes integrifolia*
Western saxifrage	*Micranthes occidentalis*

Sheep sorrel	*Rumex acetosella*
Wallace's spikemoss	*Selaginella wallacei*
Corn speedwell	*Veronica arvensis*

Plot 4

Location: Approx. centre of parcel
Coordinates: 48° 48' 32" N / 123° 17' 35" W
Description: Woodland band below terrestrial herbaceous meadow band
Environmentally Sensitive Area (ESA) Classification: Woodland

Canopy species:			
Species	Scientific name	Proportion of canopy	Stem diameter range (diameter-at-breast-height (dbh))
Douglas-fir	*Pseudotsuga menziesii*	85%	15-50cm
Arbutus	*Arbutus menziesii*	10%	20-50cm
Bigleaf maple	*Acer macrophyllum*	5%	20-30cm

Understory species:	
Species	Scientific name
Red columbine	*Aquilegia canadensis*
Yerba buena	*Clinopodium douglasii*
Woodland strawberry	*Fragaria vesca*
Rattlesnake plantain	*Goodyera oblongifolia*
Nipplewort	*Lapsana communis*
Purple peavine	*Lathyrus nevadensis*
Western honeysuckle	*Lonicera ciliosa*
Hairy honeysuckle	*Lonicera hispidula*
Grasses & mosses	Mixed spp.
Largeleaf sandwort	*Moehringia macrophylla*
Sword fern	*Polystichum munitum*
Baldhip rose	*Rosa gymnocarpa*
Pacific sanicle	*Sanicula crassicaulis*
Common chickweed (invasive)	*Stellaria media*

Plot 5

Location: Inside elbow of property boundaries.
Coordinates: 48° 48' 31" N / 123° 17' 38" W
Description: Second growth dry Douglas-fir forest bisected by access road shared with 3330 Port Washington Rd; understory has 99% shrub cover.
Environmentally Sensitive Area (ESA) Classification: Second growth dry Douglas-fir forest

Canopy species:			
Species	Scientific name	Proportion of canopy	Stem diameter range (diameter-at-breast-height (dbh))
Douglas-fir	*Pseudotsuga menziesii*	90%	20-40cm
Arbutus	*Arbutus menziesii*	5%	20-25cm
Western redcedar	*Thuja plicata*	5%	20-25cm

Understory species:	
Species	Scientific name
Dull Oregon-grape (89% cover)	*Mahonia nervosa*
Salal (10% cover)	*Gaultheria shallon*

Cleavers	*Galium aparine*
Western honeysuckle	*Lonicera ciliosa*
Moss	Mixed spp.
Bracken fern	*Pteridium aquilinum*
Trailing blackberry	*Rubus ursinus*
Pacific sanicle	*Sanicula crassicaulis*
Starflower	*Trientalis borealis*

Plot 6

Location: Upslope from work yard and downslope from a recently cleared, flat, forested area in the central south end of the property.
Coordinates: 48° 48' 28" N / 123° 17' 40" W
Description: Woodland band below terrestrial herbaceous meadow band along moderate to steep slope.
Environmentally Sensitive Area (ESA) Classification: Woodland

Canopy species:			
Species	Scientific name	Proportion of canopy	Stem diameter range (diameter-at-breast-height (dbh))
Douglas-fir	*Pseudotsuga menziesii*	60%	20-40cm
Arbutus	*Arbutus menziesii*	40%	20-30cm

Understory species:	
Species	Scientific name
Canada thistle (invasive)	*Cirsium arvense*
Scotch broom (invasive)	*Cytisus scoparius*
Foxglove (invasive)	*Digitalis purpurea*
Western honeysuckle	*Lonicera ciliosa*
Grasses	Mixed spp.
Himalayan blackberry (invasive)	*Rubus armeniacus*
Black cap raspberry	*Rubus occidentalis*
Common dandelion (invasive)	*Taraxacum officinale*

Plot 7

Location: Southernmost end of parcel adjacent to Port Washington Road extending up a cleared slope to the extent of the industrial use apportion of the parcel.
Coordinates: 48° 48' 26" N / 123° 17' 41" W
Description: Work yard used for Big Digem industrial activity.
Environmentally Sensitive Area (ESA) Classification: Disturbed Areas

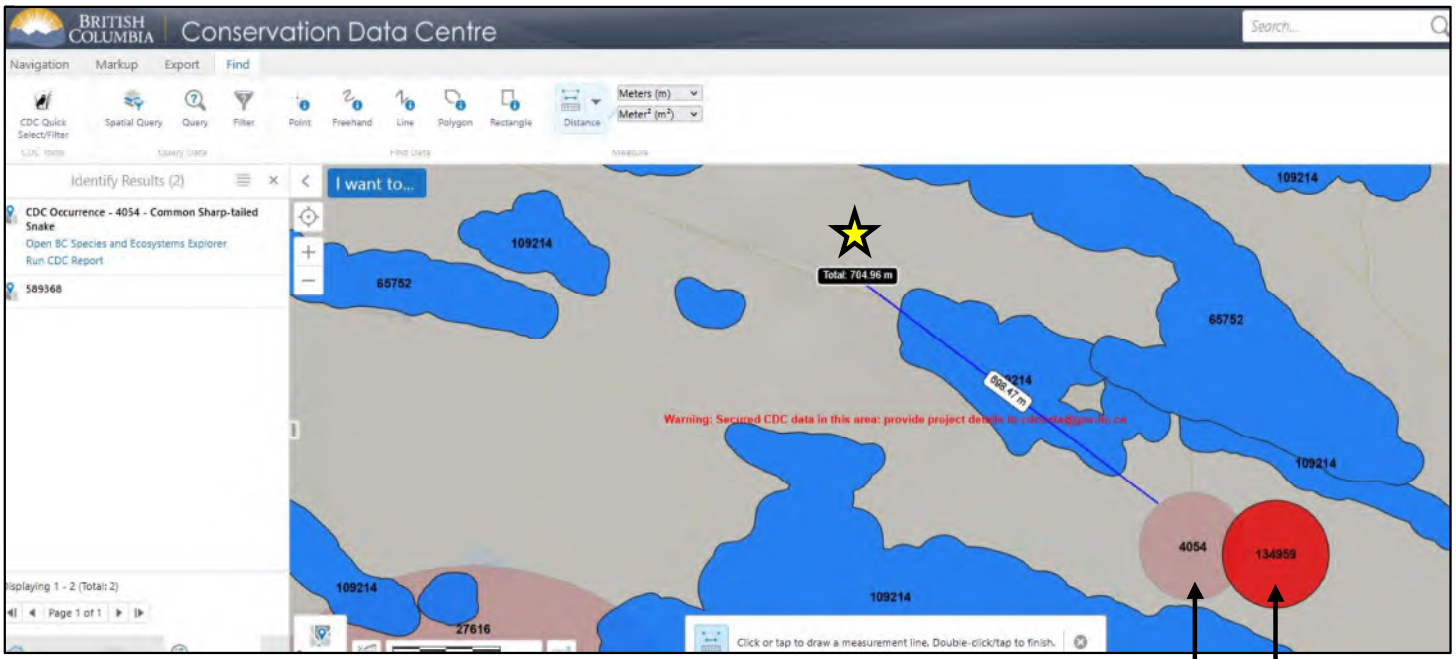
Understory species:	
Species	Scientific name
Scotch broom (invasive)	*Cytisus scoparius*
Grasses	Mixed spp.
Himalayan blackberry (invasive)	*Rubus armeniacus*
Ornamental cedar perimeter hedge	*Thuja* sp.

APPENDIX C

BC CDC SEARCH RESULTS (IMAP, SPECIES/ECOSYSTEM SUMMARY REPORTS & ECOSYSTEM EXPLORER RESULTS)

BC CDC iMAP

Douglas-fir / Alaska Oniongrass ecological community



Western screech-owl, *kennicottii* subsp.

★ = Subject Parcel

Sharp-tailed snake

Species Potential Ranking (Low/Moderate/ High)	Justification for Species Potential Ranking	Scientific Name	English Name	BC List	SARA Schedule	SARA Status	SARA Date	Habitats (Type / Subtype / Dependence)	Global Habitat Comments	Provincial Habitat Comments
High	habitat features present	*Cercyonis pegala incana*	Common Wood-nymph, *incana* subspecies	Red				Agriculture / Pasture/Old Field / Facultative - frequent use ; Forest / Conifer Forest - Dry / Facultative - frequent use ; Grassland/Shrub / Grassland / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Cliff / Facultative - occasional use		Habitat keywords copied from species record.
High	haitat features present	*Platanthera ephemerantha*	white-lip rein orchid	Blue				Forest / Conifer Forest - Dry / Facultative - frequent use ; Forest / Garry Oak Woodland / Facultative - frequent use	This species is found in chaparral, as well as conifer and mixed evergreen forests, occasionally on serpentine soils, within 150 kilometers of the coast, at elevations ranging from 0 to 1,500 meters (Ackerman and Morgan, 2020).	
High	habitat features present	*Sericocarpus rigidus*	white-top aster	Blue	1	Special Concern	Jun-03	Forest / Garry Oak Woodland / Facultative - frequent use ; Forest / Mixed Forest (deciduous/coniferous mix) / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use	Sericocarpus rigidus occurs in open grassland habitats in the Willamette-Puget Trough. A majority of the occurrences occur in gravelly, glacial outwash soils. However, in the southern and northern portions of its range, it occurs in the clayey and exposed bedrock habitats, respectively. The general requirement appears to be open, non-forested habitats that are seasonally mesic but somewhat moisture stressed during late summer. Trees such as *Quercus garryana* and *Arbutus menziesii* are often present, but do not form a closed overstory. Possible associates of the understory of shrubs are *Cytisus scoparius* , *Holodiscus discolor* , and *Symphoricarpos albus* . Dense thickets are not formed by these shrubs because soils are too shallow. The ground tends to be dominated by a mixture of introduced grasses including *Aira praecox* , *Dactylis glomerata* , *Poa* spp., *Cynosurus echinatus* , and *Anthoxanthum odoratum* (Douglas and Illingworth 1994).	In British Columbia, *Aster curtus* occupies level to sloping, seasonally xeric microsites with shallow soil over bedrock. Exposure is full sun to partial shade. Rock outcrops are frequently present. Habitat is open *Quercus garryana - Arbutus menziesii - Pseudotsuga menziesii* forest or woodland, or open shrub stands of *Cytisus scoparius, Holodiscus discolor, Mahonia aquifolium, Symphoricarpos albus, Lonicera hispidula, Arctostaphylos uva-ursi, Rosa gymnocarpa, Daphne laureola* , and *Pachistima myrsinites* . Native species in the herb layer include *Camassia leichtlinii, Elymus glaucus, Erythronium oregonum, Polystichum munitum, Triteleia hyacinthina, Danthonia californica, Sanicula crassicaulis, Fragaria virginiana, Carex inops, Melica subulata, Dodecatheon pulchellum, Zygadenus venenosus, Eriophyllum lanatum* , and *Luzula multiflora* . Exotic species often dominate the herb layer and include *Aira praecox, Dactylis glomerata, Poa pratensis, Cynosurus echinatus* , and *Anthoxanthum odoratum* , with *Anthoxanthum* typically the dominant in sites with *Aster curtus* . Soils vary from shallow dark brown brunisols to brownish-

Low	site lacks old growth features	*Accipiter atricapillus laingi*	American Goshawk, *laingi* subspecies	Red	1	Threatened	Jun-03	Agriculture / Cultivated Field / Facultative - occasional use ; Agriculture / Hedgerow / Facultative - occasional use ; Agriculture / Pasture/Old Field / Facultative - occasional use ; Alpine/Tundra / Krummholtz / Facultative - occasional use ; Forest / Conifer Forest - Dry / Facultative - occasional use ; Forest / Conifer Forest - Mesic (average) / Facultative - frequent use ; Forest / Conifer Forest - Moist/wet / Facultative - frequent use ; Forest / Mixed Forest (deciduous/coniferous mix) / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - occasional use ; Other Unique Habitats / Estuary / Facultative - occasional use ; Riparian / Riparian Forest / Facultative - frequent use	Extensive forests with large stands of mature trees and dense canopies, but with an open understory. Large trees are important in providing nesting and perching platforms, in allowing ample flight space between the trunks for the goshawks to maneuver while hunting, and in providing for greater productivity of preferred prey. Closed forest canopy is believed to provide an optimal microclimate for nesting and also possibly may inhibit open-forest and forest-edge raptor predators (Crocker-Bedford 1992). BREEDING: Closely associated with mature and old-growth forests (Crocker-Bedford 1990, 1991, 1992; ADF&G 1996; McClaren 1999; Chytyk and Cooper 1999; Chytyk et al. 1999; Cooper and Chytyk 2000). On Vancouver Island, 62 per cent of 56 nests were in contiguous old-growth forests, 25 per cent in contiguous second-growth forests over 50 years old, and 13 per cent in fragmented old-growth forests (McClaren 1999). On the Queen Charlotte Islands, four active nests were found in contiguous old-growth forest, while a fifth was found in an old-growth forest bordered by mature forest that	Queen Charlotte Goshawks tend to nest in maturing-to-old mesic, coniferous stands (Manning et al. 2004). On Vancouver Island, these stands are typically dominated by Douglas-fir (Pseudotsuga menziesii) and western hemlock (Tsuga heterophylla) (McClaren 2003), while on the Queen Charlotte Islands, western hemlock is dominant (Chytyk and Dhanwant 1999b). In general, nest stands are characterized by: 1) >45 years old (structural stages 5-7); 2) multi-layered canopies; 3) structurally diverse; 4) canopy closure 50-85%; 5) in areas of larger sized trees; 6) on the lower 2/3 of slopes; 7) on slopes with gradients <40 degrees; 8) where snags and coarse woody debris are present; 9) typically not along "hard edges"; and 10) not near urban areas (Iverson et al. 1996; Daw et al. 1998; McClaren 2003; BC Minist. of Water, Land and Air Protection 2004; Manning et al. 2004).
Low	site lacks stonecrop (obligate host)	*Callophrys mossii mossii*	Moss' Elfin, *mossii* subspecies	Red				Forest / Deciduous/Broadleaf Forest / Facultative - frequent use ; Grassland/Shrub / Grassland / Facultative - frequent use ; Grassland/Shrub / Shrub - Natural / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Cliff / Obligate ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Obligate ; Rock/Sparsely Vegetated Rock / Talus / Obligate		Habitat keywords copied from species record.

Low	site lacks vernal pools and seeps	*Epilobium torreyi*	brook spike-primrose	Red	1	Endangered	Dec-07	Forest / Conifer Forest - Dry / Facultative - occasional use ; Forest / Garry Oak Woodland / Facultative - occasional use ; Other Unique Habitats / Garry Oak Vernal Pool / Facultative - frequent use		In BC, *Epilobium torreyi* occurs in vernal pools in moist grassland and open slopes associated with *Quercus garryana* ecosystems in the lowland Coastal Douglas-fir biogeoclimatic zone. Habitat is clay-rich sediments in pools that are flooded in winter and dry in summer. Associated native species include *Epilobium densiflorum*, *Lotus unifoliolatus* , *Madia* spp., and *Navarretia intertexta*. Fluctuations in hydroperiod suppress establishment of competing woody plants and herbs from uplands, maintaining open vegetation at both sites. There are no records of vegetation composition at the McTavish Road site, but prior to its extirpation the occurrence at Craigflower Meadow was dominated by a mix of native and exotic herbs along with a sparse cover of invasive species such as *Agrostis capillaris, Anthoxanthum odoratum, Cytisus scoparius, Crataegus monogyna, Hypochaeris radicata* , and *Rubus armeniacus* . Historically, the oak habitat surrounding the vernal pools was probably maintained by periodic fire (COSEWIC 2006d; Klinkenberg and Klinkenberg 2006).
Low	site lacks cliff faces, bluffs, fissures, slight seepages, but has some associated species	*Lomatium papilioniferum*	butterfly bearing lomatium	Red	1	Threatened	Feb-11	Forest / Conifer Forest - Dry / Facultative - occasional use ; Forest / Garry Oak Woodland / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Cliff / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Talus / Facultative - frequent use		
Low	site lacks vernal seeps	*Meconella oregana*	white meconella	Red	1	Endangered	Aug-06	Forest / Deciduous/Broadleaf Forest / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use	This is a species of open ground at low elevations, usually in places that are wet in the spring, including Coastal Prairie and Coastal Scrub. Associated species include Narcissus Shooting Star (*Dodecatheon poeticum*), Bulbiferous Fringecup (*Lithophragma bulbifera*), and Grass-widows (*Sisyrinchium douglasii*).	Note Palustrine: 'temporary pool' was selected for habitat in the list provided, since it was the only available choice, whereas 'seepage' is more appropriate. In British Columbia, *Meconella oregana* occurs mainly on open, south-facing slopes of rocky hillsides. Soils are extremely shallow, sometimes to the extent that they support fewer vascular plants than bryophytes. Sites occurr on volcanic, metamorphic and sedimentary (conglomerate) bedrock types. Nearly all stands of *Meconella* were found on or adjacent to early-season seepage sites. However, plants were observed to do poorly without adequate drainage. Its habit of growing close to seepage sites may be related to survival strategy for exceptionally dry years. Sites were either fully exposed to the sun or, rarely, in dappled shade of *Quercus garryana* or deciduous shrubs. Based on 17 stands of *Meconella* , the ten most frequently associated vascular plants were *Aira praecox, Aphanes occidentalis, Saxifraga integrifolia, Triteleia hyacinthina, Bromus hordeaceus, Selaginella wallacei, Silene gallica, Brodiaea coronaria, Montia*

Low	site too dry and not a ravine	*Pristiloma johnsoni*	Broadwhorl Tightcoil	Blue				Forest / Conifer Forest - Dry / Unknown ; Forest / Conifer Forest - Mesic (average) / Unknown ; Forest / Conifer Forest - Moist/wet / Unknown ; Forest / Deciduous/Broadleaf Forest / Unknown ; Forest / Mixed Forest (deciduous/coniferous mix) / Unknown ; Rock/Sparsely Vegetated Rock / Talus / Unknown	This species is found in lower elevation coniferous forests with moist riparian ravines, valleys, or talus sites, and under fallen wood, ferns, bushes, and leaf litter (Foltz Jordan, 2010).	In leaf litter of deciduous, coniferous and mixed-wood forests to an elevation of over 1300 m in the subalpine (Cameron 1986, cited by Forsyth 2004; Branson and Branson 1984, cited by Forsyth 2004). It has also been reported from vegetated rockslide habitats (Forsyth 2004).
Low	steep slopes and lacks moisture	*Silene scouleri* ssp. *scouleri*	coastal Scouler's catchfly	Red	1	Endangered	Jan-05	Forest / Garry Oak Woodland / Unknown ; Grassland/Shrub / Garry Oak Maritime Meadow / Unknown ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Unknown	This subspecies is found on grassy, rocky slopes, coastal bluffs, dry prairies, and woodlands at elevations ranging from 0 to 3,800 meters (Morton, 2020).	*Silene scouleri* ssp. *grandis* is found in dry to mesic maritime meadows and mesic, open, deciduous woodlands in the sub-Mediterranean climate caused by the rain shadow of the Olympic and Vancouver Island mountains. Habitat occurs on nearly level to gentle slopes with various aspects. Meso-slope position is usually level but may include upper and middle slopes. Sites are well to rapidly drained, and are dry in summer and moist in winter. Habitat occurs on shallow soils to bedrock, or in locations with severe exposure to wind and/or salt spray. There may be no root restricting layer. Trees are generally not present. Shrubs, including *Rosa nutkana* or *Symphoricarpos albus*, are occasionally present. A mix of native and introduced plant species dominate the herbaceous layer.
Low	site lacks vernal pools and seeps	*Trifolium depauperatum* var. *depauperatum*	poverty clover	Blue				Grassland/Shrub / Grassland / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Other Unique Habitats / Garry Oak Vernal Pool / Facultative - frequent use ; Other Unique Habitats / Vernal Pools/Seasonal Seeps / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use		
High	south-facing site, rock piles for hide	*Contia tenuis*	Common Sharp-tailed Snake	Red	1	Endangered	Jun-03	Forest / Conifer Forest - Dry / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Unknown ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Talus / Facultative - frequent use ; Subterranean / Caves / Obligate ; Subterranean / Sub-soil / Obligate	Habitat includes moist situations in pastures, meadows, oak woodlands, broken chaparral, and the edges of coniferous or hardwood forests (Stebbins 2003); also shrubby rabbitbrush-sagebrush (Weaver, 2004, Herpetol. Rev. 35:176). This snake generally is found under logs, rocks, fallen branches, or other cover. It retreats underground during dry periods.	There is no unifying description of Sharp-tailed Snake habitat. They seem to occur in a variety of habitats from relatively open Garry Oak meadows to relatively open Douglas-fir stands. Egg-laying sites are thought be on protected south facing slopes. The size of the slope can vary from the base of a stump to larger talus slopes. It appears that the snakes are moving into the forest in the winter (Engelstoft and Ovaska 1999), but little else is known about their winter habitat.

High	habitat features present	*Corynorhinus townsendii*	Townsend's Big-eared Bat	Blue				Anthropogenic / Industrial / Facultative - frequent use ; Anthropogenic / Urban/Suburban / Facultative - frequent use ; Forest / Conifer Forest - Dry / Facultative - frequent use ; Forest / Conifer Forest - Mesic (average) / Facultative - frequent use ; Forest / Conifer Forest - Moist/wet / Facultative - frequent use ; Forest / Deciduous/Broadleaf Forest / Facultative - frequent use ; Forest / Mixed Forest (deciduous/coniferous mix) / Facultative - frequent use ; Grassland/Shrub / Grassland / Facultative - occasional use ; Grassland/Shrub / Shrub - Logged / Facultative - occasional use ; Grassland/Shrub / Shrub - Natural / Facultative - occasional use ; Riparian / Riparian Forest / Facultative - occasional use ; Subterranean / Caves / Obligate	Throughout much of the known range, these bats commonly occur in mesic habitats characterized by coniferous and deciduous forests (Kunz and Martin 1982), but they occupy a broad range of habitats (e.g., see Handley 1959). Generally they are uncommon in prairies and extreme desert, although they occur in the lower elevations of the arid plateau and desert ranges of northcentral Mexico and the arid valleys south of the transverse volcanic belt. They are known in Mexico mostly from relatively arid regions (e.g., grassy hills with nearby pine-oak woodland) but also from more humid localities with oak, pine, juniper, cypress, madrone, and manzanita (Handley 1959). Ozark and Appalachian populations inhabit caves mostly in oak-hickory forest (Handley 1959). On the West Coast, Townsend's big-eared bats are found regularly in forested regions and buildings, and in areas with a mosaic of woodland, grassland, and/or shrubland. In California and Washington, they are known from limestone caves, lava tubes, and human-made structures in coastal lowlands,	
High	habitat features present	*Eurybia radulina*	rough-leaved aster	Red				Forest / Conifer Forest - Dry / Facultative - frequent use ; Forest / Garry Oak Woodland / Facultative - occasional use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use	Roughleaf Aster (*Eurybia radulina*) occurs in "dry rock outcrops, edges of forests, open forests, mostly on slopes, foothill oak woodlands, oak, oak-fir, yellow pine forests" (Flora of North America Editorial Committee 2006).	
High	habitat features present	*Plagiobothrys tenellus*	slender popcornflower	Red	1	Threatened	Feb-11	Forest / Conifer Forest - Dry / Facultative - occasional use ; Forest / Garry Oak Woodland / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Facultative - frequent use		Across its North American range, *Plagiobothrys tenellus* is found on dry slopes in grassland, scrub, woodland, or forest. British Columbia populations are found in, or near, Garry oak and associated ecosystems in the dry Coastal Douglas-fir zone of southeastern Vancouver Island and adjacent Gulf Islands. Here it is found on dry, grassy slopes and coastal bluffs. Sites are generally steep, south- or southwest-facing, open and often with exposed gravelly soils or rocks (COSEWIC 2008). Associated species include *Cerastium arvense* , *Lotus micranthus* , *Poa secunda* , *Stipa lemmonii* , *Trifolium microcephalum* , *T. oliganthum* , *T. microdon* , *Thysanocarpus curvipes* , *Aphanes occidentalis* , and *Vulpia microstachys* . Associated non-native species inlclude *Aira caryophyllea* , *A. praecox* , *Athysanus pusillus* , *Bromus sterilis* , *B. rigidus* , *Silene gallica* , *Torilis japonica* , *Veronica arvensis* , *Cynosurus echinatus* , *Vulpia bromoides* , *Erodium cicutarium* , and *Hypochaeris radicata* .

Low	no vernal seeps/pools	*Allium amplectens*	slimleaf onion	Blue				Forest / Garry Oak Woodland / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Other Unique Habitats / Vernal Pools/Seasonal Seeps / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use		
Low	site lacks limestone, old forest, cedar trees and shell middens	*Cephalanthera austiniae*	phantom orchid	Red	1	Endangered	Feb-19	Forest / Conifer Forest - Mesic (average) / Facultative - frequent use ; Forest / Mixed Forest (deciduous/coniferous mix) / Facultative - frequent use ; Forest / Old Forest / Facultative - frequent use	Dense moist coniferous forests especially in the mountains.	In our region in BC, *Cephalanthera austiniae* occurs naturally in mature mixed woods, or woods with strong deciduous or coniferous components. In most locations, although not all, the orchids occur in sites with little to no ground cover. Occurrence also appears to be strongly correlated with limestone (Klinkenberg 2005). Residual populations persist in areas of human habitation, presumably in areas where no serious disturbance to the ground surface has occurred.
Low	site lacks bluffs	*Falco peregrinus anatum*	Peregrine Falcon, *anatum* subspecies	Red				Agriculture / Cultivated Field / Facultative - frequent use ; Agriculture / Hedgerow / Facultative - frequent use ; Agriculture / Pasture/Old Field / Facultative - frequent use ; Anthropogenic / Urban/Suburban / Facultative - occasional use ; Grassland/Shrub / Antelope-brush Steppe / Facultative - frequent use ; Grassland/Shrub / Grassland / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Grassland/Shrub / Sagebrush Steppe / Facultative - frequent use ; Grassland/Shrub / Shrub - Natural / Facultative - occasional use ; Lakes / Lake / Facultative - frequent use ; Lakes / Pond/Open Water / Facultative - frequent use ; Other Unique Habitats / Alkali Ponds/Salt Flats / Facultative - occasional use ; Other Unique Habitats / Beach / Facultative - occasional use ; Riparian / Gravel Bar / Facultative - occasional use ; Riparian / Riparian Herbaceous / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Cliff / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Talus /	See files for FALCO PEREGRINUS.	Anatum Peregrine Falcons typically nest on rock cliffs above lakes or river valleys where abundant prey is nearby. Interior populations are typically associated with wetland habitats that support a sufficient prey base. In the Okanagan valley, aeries have been reported as low as 6 m above a lake and high on cliffs that towered >260 m above the valley floor (Cannings et al. 1987). In the Lower Mainland, nests are on rock cliffs well back but above the Fraser River. In the Gulf Islands, nests are found on seaside cliffs (Cooper and Beauchesne 2003b).

Low	site lacks bluffs	*Falco peregrinus pealei*	Peregrine Falcon, *pealei* subspecies	Blue	1	Special Concern	Jun-03	Agriculture / Cultivated Field / Facultative - occasional use ; Agriculture / Hedgerow / Facultative - occasional use ; Agriculture / Pasture/Old Field / Facultative - occasional use ; Anthropogenic / Urban/Suburban / Facultative - occasional use ; Grassland/Shrub / Meadow / Unknown ; Lakes / Lake / Facultative - occasional use ; Lakes / Pond/Open Water / Facultative - occasional use ; Ocean / Intertidal Marine / Facultative - frequent use ; Ocean / Marine Island / Facultative - frequent use ; Ocean / Sheltered Waters - Marine / Unknown ; Other Unique Habitats / Beach / Unknown ; Other Unique Habitats / Estuary / Unknown ; Other Unique Habitats / Mudflats - Intertidal / Facultative - frequent use ; Riparian / Gravel Bar / Unknown ; Riparian / Riparian Herbaceous / Unknown ; Rock/Sparsely Vegetated Rock / Cliff / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Unknown ; Stream/River / Stream/River / Facultative - occasional use ; Wetland / Marsh / Facultative - occasional use	Coastal beaches, tidal flats, reefs, islands, marshes, estuaries and lagoons. Nests mostly found on ledges of vertical rocky cliffs in the vicinity of seabird colonies; some nests on grassy benches of rocky bluffs. Heights of nests range from 12 to 366 meters. Many nests sheltered by overhanging grass, sods, rocks, tree roots, salal or mosses (Beebe 1960, Campbell et al. 1990, Nelson 1990).	Peale's Peregrine Falcon typically nests on ledges of rocky island cliffs, usually near seabird colonies. Occasionally, nests occur on mainland headland cliffs. A few nests occurred on grassy ledges on rock bluffs. More rarely, old nests of Pelagic Cormorants (*Phalacrocorax pelagicus*), Bald Eagles and Common Ravens have been used (Campbell et al. 1990).
Low	site lacks moisture	*Marah oregana*	coast manroot	Red				Agriculture / Hedgerow / Facultative - occasional use ; Agriculture / Pasture/Old Field / Facultative - frequent use ; Forest / Garry Oak Woodland / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use		
Low	site lacks several of the habitat features	*Nuttallanthus texanus*	Texas toadflax	Blue				Other Unique Habitats / Sand Dune / Facultative - occasional use ; Other Unique Habitats / Vernal Pools/Seasonal Seeps / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Cliff / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use		On steep rock with seepage, rocky ledges, coastal bluffs, grassy slopes.
Low	site may be too dry	*Ranunculus californicus*	California buttercup	Red	1	Endangered	Feb-11	Grassland/Shrub / Garry Oak Maritime Meadow / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use		In British Columbia, *Ranunculus californicus* is associated with Garry oak ecosystems, and it has been described as an indicator species for coastal prairies, which typically occur on islands and adjacent coastlines along the Pacific coast from California northwards (Denton 1978; Klinkenberg and Klinkenberg 2002). Typical habit is "open, south- to southwest-facing grassy bluffs or rocky slopes just above the seacoast at elevations up to 150 feet" (Klinkenberg and Klinkenberg 2002).

Low	site lacks vernal pools and seeps	*Tonella tenella*	small-flowered tonella	Blue	1	Endangered	Jul-05	Forest / Conifer Forest - Dry / Facultative - frequent use ; Forest / Garry Oak Woodland / Facultative - frequent use ; Other Unique Habitats / Vernal Pools/Seasonal Seeps / Obligate ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Talus / Facultative - frequent use		*Tonella tenella* occurs on west-facing slopes on thin soils over gravelly rock outcrops or stable talus. At the single known locality on Saltspring Island, it occurs in a narrow band extending up the mountainside for approximately 425 m (Douglas and Penny 2003). The talus slope occurs in open *Acer macrophyllum - Arbutus menziesii - Quercus garryana* forest in the dry coastal Douglas-fir zone. Associated species include *Galium aparine* , *Cardamine oligosperma, Claytonia perfoliata, Bromus sterilis, Collinsia grandiflora, Melica harfordii* , and *Torilis japonica* . Conspicuous mosses include *Eurhynchium oreganum* and *Dicranum* species.
Low	site lacks shale slopes	*Trifolium dichotomum*	branched clover	Red				Grassland/Shrub / Meadow / Facultative - occasional use ; Rock/Sparsely Vegetated Rock / Cliff / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Garry Oak Coastal Bluffs / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Talus / Facultative - frequent use	Dry rocky or sandy slopes and fields, coastal prairie, mixed evergreen forest below 3500 feet (Munz 1959).	
Low	site lacks vernal pools and seeps	*Triphysaria versicolor* ssp. *versicolor*	bearded owl-clover	Red	1	Endangered	Jun-03	Grassland/Shrub / Meadow / Facultative - frequent use ; Other Unique Habitats / Garry Oak Vernal Pool / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - frequent use		*Triphysaria versicolor* ssp. *versicolor* is found in wet meadows and vernal pool margins within 30 m of the shoreline in the sub-Mediterranean climate caused by the rain shadow of the Olympic and Vancouver Island mountains. Habitat occurs on nearly level sites with a range of aspects (most sites have a southern aspect but a few have eastern or northeastern aspects). Meso-slope position is a depression. Sites are imperfectly to poorly drained and remain wet through the winter months but dry up by mid summer. Habitat occurs on shallow soils to bedrock. Trees are absent. Shrubs, including *Cytisus scoparius* or *Ulex europaeus* , are occasionally present at the edges of habitat. A mix of native and introduced plant species dominate the herbaceous layer (M. Fairbarns, pers. comm. 2005).

Low	site lacks vernal pools or seeps	*Zeltnera muehlenbergii*	Muhlenberg's centaury	Red	1	Endangered	Feb-10	Forest / Garry Oak Woodland / Facultative - frequent use ; Grassland/Shrub / Garry Oak Maritime Meadow / Facultative - frequent use ; Grassland/Shrub / Meadow / Facultative - frequent use ; Other Unique Habitats / Vernal Pools/Seasonal Seeps / Facultative - frequent use	Moist, open forest;	*Centaurium muhlenbergii* is currently found in two distinct habitat types in B.C.: a vernal pool within a large meadow in a Garry oak woodland, and along the margins of a tidal saltgrass marsh (Miller and Miles 2003; B.C. CDC Element Occurrence Data 2005). Both habitat types are characterized by a sub-Mediterranean-like climate with dry, warm summers and mild, wet winters, and in which most precipitation falls during the winter months. Both habitat types also experience seasonal flooding by rainwater or by the ocean. Vernal pools and depressions in B.C. typically form on relatively level sites underlain by bedrock or by an impervious hardpan soil layer, and they experience winter and spring inundations followed by complete drying in late spring (Miller 2003). Salt marshes are the upper vegetated portions of intertidal mudflats, often in sheltered locations, which undergo varying frequency of inundation. *C. muhlenbergii* occurs in a drier part of a saltmarsh, which likely only occasionally experiences tidal inundation. The species occurs in patches of open, bare, moist soil within the habitat types. The habitats of *C. muhlenbergii* occur
Low	not old growth	*Brachyramphus marmoratus*	Marbled Murrelet	Blue	1	Threatened	Jun-03	Forest / Conifer Forest - Mesic (average) / Facultative - occasional use ; Forest / Conifer Forest - Moist/wet / Facultative - frequent use ; Lakes / Lake / Facultative - occasional use ; Ocean / Kelp Bed / Facultative - frequent use ; Ocean / Sheltered Waters - Marine / Facultative - frequent use ; Ocean / Subtidal Marine / Facultative - frequent use ; Riparian / Riparian Forest / Facultative - frequent use ; Rock/Sparsely Vegetated Rock / Rock/Sparsely Vegetated Rock / Facultative - occasional use ; Stream/River / Stream/River / Facultative - occasional use	Coastal areas, mainly in salt water within 2 km of shore (Marshall 1988), including bays and sounds; not uncommon up to 5 km offshore; occasionally also on rivers and lakes usually within 20 km of ocean (but up to 75 km), especially during breeding season (Carter and Sealy 1986). In Alaska, marine habitats mostly are offshore of large tracts of old-growth coastal coniferous forest, especially Sitka spruce and hemlock (Piatt and Ford 1993). In central California, visited old-growth forest nesting areas (8-9 km from ocean) year-round; fall and winter visitation of nesting areas occurs regularly in other areas of North America as well; perhaps attendance in nonbreeding season is important in maintenance of pair bonds and nest sites (Naslund 1993). Nests often are in mature/old growth coniferous forest near the coast: on large mossy horizontal branch, mistletoe infection, witches broom, or other structure providing a platform high in mature conifer (e.g., Douglas-fir, mountain hemlock). Most nesting occurs in large stands of old growth. Nest sites generally have good	

BC Conservation Data Centre: Species Occurrence Report
Shape ID: 134959

Scientific Name: *Megascops kennicottii kennicottii*
English Name: Western Screech-Owl, *kennicottii* subspecies

Identifiers

Occurrence ID: 16897
Shape ID: 134959
Taxonomic Class: birds
Element Group: Vertebrate Animal

Status

Provincial Rank: S2S3
BC List: Blue
Global Rank: G4G5T4
COSEWIC: T (MAY 2012)
SARA Schedule: 1

Locators

Survey Site: PENDER ISLAND
Directions: North Pender Island, South Pender Island and Greenburn Park.
Biogeoclimatic Zone:
Ecosection: SGI;SOG

Area Description

General Description:

Vegetation Zone:
Min. Elevation (m): **Max. Elevation (m):**
Habitat: TERRESTRIAL: Cropland/Hedgerow, Roadside, Forest Mixed

Occurrence Information

First Observation Date: 2002-02-22 **Last Observation Date:** 2021-03-12

Occurrence Data:

A nesting pair of Western Screech-owls, including their nest in an arbutus tree, were detected in 2021 (J. Hobbs, pers. comm. 2021). In 2007, a Western Screech-owl was heard during the Great Backyard Bird Count (via Hobbs 2017b) and another in 2002 as part of the Nocturnal Owl Survey (via Hobbs 2017b).

Occurrence Rank and Occurrence Rank Factors

Rank: E : Verified extant (viability not assessed)

Rank Date: 2021-03-12

Rank Comments:

Few data to provide a rank. Seemingly persistent over time, though uncertain if there are years in which the species is not present.

Condition of Occurrence:

Size of Occurrence:

Landscape Context:

Version

Version Date: 2021-03-14

Version Author: Davis, H.

Mapping Information

Estimated Representation Accuracy: Medium

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence: N

Confidence Extent Definition: Confident full extent of EO is NOT known

Additional Inventory Needed: Y

Inventory Comments: First detection of breeding was in 2021.

Documentation

References:

Hobbs, J. 2017b. Electronic databases of Western Screech-owl (kennicottii) detections in British Columbia.

Hobbs, J. Personal communication.

Specimen:

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 134959, Western Screech-Owl, kennicottii subspecies. B.C. Ministry of Environment. Available: http://maps.gov.bc.ca/ess/hm/cdc, (accessed May 26, 2025).

BC Conservation Data Centre: Species Occurrence Report
Shape ID: 4054

Scientific Name: Contia tenuis
English Name: Common Sharp-tailed Snake

Identifiers

Occurrence ID: 3120
Shape ID: 4054
Taxonomic Class: reptiles
Element Group: Vertebrate Animal

Status

Provincial Rank: S1S2
BC List: Red
Global Rank: G5
COSEWIC: E/T (DEC 2021)
SARA Schedule: 1

Locators

Survey Site: NORTH PENDER ISLAND
Directions: "North Pender Island": On Corbet Road, about halfway between Hope Bay and Port Washington and "Port Washington": end of Upper Terrace Road, very north tip of North Pender Island.
Biogeoclimatic Zone:
Ecosection: SGI;SOG

Area Description

General Description:

Areas at the base of dry, south-facing, rocky slopes characterized by open stands of Douglas-fir, arbutus and Garry oak.

Vegetation Zone:

Min. Elevation (m): 12 **Max. Elevation (m):**

Habitat: TERRESTRIAL: Suburban/Orchard, Woodland Mixed

Occurrence Information

First Observation Date: 1949-07-05 **Last Observation Date:** 1951-05-15

Occurrence Data:

Five historical observations of Sharp-tailed Snakes reported from Port Washington (Spalding 1991; Species Inventory Database 2012).

Occurrence Rank and Occurrence Rank Factors

Rank: H : Historical

Rank Date: 1951-05-15

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

5 historical sightings of Sharp-tailed Snakes from 1949-1951 (Spalding 1991; Species Inventory Database 2012).

Landscape Context:

Version

Version Date: 2012-09-24

Version Author: Davis, H.

Mapping Information

Estimated Representation Accuracy: Low

Estimated Representation Accuracy Comments:

Confident that full extent is represented by Occurrence: N

Confidence Extent Definition: Confident full extent of EO is NOT known

Additional Inventory Needed: Y

Inventory Comments:

Documentation

References:

Brown, G. Personal communication. Volunteer warden for Chilliwack River ER (#98).

Royal British Columbia Museum. 675 Belleville Street, Victoria, BC. V8V 1X4.

SPI database - incidental sightings. Extract from Ministry of Environment's Species Inventory database, Incidental Sightings table. Project 0. Ecosystems Information Section, Victoria, BC. Available from http://a100.gov.bc.ca/pub/siwe/details.do?id=0

Spalding, D.J. 1991. The sharptail snake (Contia tenuis) in British Columbia: a status report. Unpubl. rep. submitted to B.C. Environ., Wildl. Branch, Victoria.

Spalding, D.J. 1993. Status of the Sharp-tailed Snake in British Columbia. B.C. Minist. Environ., Lands and Parks, Wildl. Branch. Working Rep. WR-57. 15pp.

Specimen: Brooks, M. 1949. PMV.; Brooks, M. 1950. PMV.; McGusty, B.J. 1949. PMV.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 4054, Common Sharp-tailed Snake. B.C. Ministry of Environment. Available: http://maps.gov.bc.ca/ess/hm/cdc, (accessed May 26, 2025).

BC Conservation Data Centre: Ecological Community Summary

Pseudotsuga menziesii / Melica subulata
Douglas-fir / Alaska oniongrass

Scientific Name:	*Pseudotsuga menziesii / Melica subulata*
English Name:	Douglas-fir / Alaska oniongrass
Scientific Name - Concept Reference:	Meidinger, D. 1992. Vegetation classification hierarchy: DBASE September 1992. B.C. Minist. For. Res. Branch, Victoria.
Ecosystem Group:	Terrestrial Realm - Forest: Coniferous - dry

Conservation Status / Legal Designation

Global Status:	G1
Provincial Status:	S1 (Feb 2018)
BC List:	Red
Provincial FRPA list:	Y (Jun 2006)
Notable Species:	

Ecology & Dynamics

Environmental Summary:	This ecological community occurs on dry sites, from 0 to 150 m elevation, which typically have a southerly aspect. These sites are rapidly- to well-drained and are often composed of inactive colluvial and sometimes morainal parent materials. They occur on middle to upper slopes on all aspects. Slopes are gentle to steep, and are often adjacent to rock outcrops. The soils are classified as Sombric or Dystric Brunisols and are often shallow to bedrock (<1 metre), mostly with a sandy loam texture with moderate coarse fragment content. The soil nutrient regime is rich to very rich and the soil moisture is rated as very dry (Roemer 1972, Flynn and Cadrin 2004, Reid and Cadrin 2012, NatureServe 2005).
Vegetation Summary:	This mixed coniferous and deciduous ecosystem occurs on southeastern Vancouver Island and the southern Gulf Islands. It is characterized by a moderately open canopy of *Pseudotsuga menziesii* (Douglasfir) with some interspersed *Quercus garryana* (Garry oak), especially in canopy gaps. *Arbutus menziesii* (Arbutus) is occasionally present, but other conifer species are absent. The shrub layer is sparse to absent, and consists of *Lonicera hispidula* (hairy honeysuckle), *Symphoricarpos albus* (common snowberry) and *Mahonia aquifolium* (tall Oregon-grape). Other shrubs that are occasionally present may include *Amelanchier alnifolia* (Saskatoon), *Gaultheria shallon* (salal), *Holodiscus discolor* (oceanspray) and *Rosa gymnocarpa* (baldhip rose). The diverse and well-developed herb layer is often dominated by *Melica subulata* (Alaska oniongrass) and may also include *Carex inops* (long-stoloned sedge) and *Sanicula crassicaulis* (Pacific sanicle) and usually with *Satureja douglasii* (yerba buena). Other herbs usually present in small amounts include *Elymus glaucus* (blue wildrye), *Festuca occidentalis* (western fescue), *Moehringia macrophylla* (big-leaved sandwort), *Dodecatheon hendersonii* (broad-leaved shootingstar) and *Galium aparine* (cleavers). The moss layer is characterized by *Rhytidiadelphus triquetrus* (electrified cats-tail moss) with a minor component of *Eurhynchium oreganum* (Oregon beaked moss) (Roemer 1972, Green and Klinka 1994, Reid and Cadrin 2012, NatureServe 2005).
Dynamic Processes Summary:	This is a late-successional (mature and climax) climatic forest ecosystem. The natural disturbance regime is described as infrequent stand-initiating events, through medium to high-intensity crown fires every 150 to 200 years and covering 5 to 50 ha (Biodiversity Guidebook 1995). Occasionally windthrow was the stand-initiating event, with regeneration occurring in the resulting canopy gaps. Stand-maintaining surface fires helped maintain an open forest canopy by killing understory regeneration. Death of individual or small groups of trees may be caused by root rot, drought, defoliating insects and windthrow. Succession rates are very slow, and it takes a long time to develop large, old trees, snags and coarse woody debris (Pojar 2004, NatureServe 2005).
Spatial Pattern:	Small patch

Distribution

Endemic:	Y

Authors / Contributors

Author:	de Groot, A., Cadrin, C.M., H.K. Yearsley, I. Ronalds and D.S. McLennan
Last updated:	Feb 22, 2012

References and Related Literature

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Biodiversity Guidebook. 1995. Forest Practices Code of British Columbia. B.C. Minist. For. and B.C. Minist. Environ., Victoria B.C. ix + 99p.

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Reid, H. and C. Cadrin. 2012. Field guides to the Douglas-fir / dull Oregon-grape and the Douglas-fir / Alaska oniongrass Ecological Communities. Version 2. Madrone Consultants and Conservation Data Centre, Ministry of Environment, Victoria, B.C.

Roemer, H.L. 1972. Forest vegetation and environments on the Saanich Peninsula, Vancouver Island. Ph.D. Thesis., Univ. Victoria, Victoria, BC.

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Sensitive Ecosystems Inventory [SEI] of the Sunshine Coast and Adjacent Islands. 2005. Cadrin, C., C. Erwin, B. Fuller, C. Schaefer and J. Stacey. 1:20 000 spatial data.

Terrestrial Ecosystem Mapping [TEM] of Helliwell Provincial Park. 2001. Prepared for BC Parks, Strathcona District Office, B.C., by K. Dunster and J. Booth. 1:5000 spatial data.

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.

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Please visit the website Conservation Status Ranks for definitions of the data fields used in this summary report.

Suggested Citation:

B.C. Conservation Data Centre. 2012. Ecological Community Summary: *Pseudotsuga menziesii / Melica subulata*. B.C. Minist. of Environment. Available: https://a100.gov.bc.ca/pub/eswp/ (accessed Feb 4, 2025).

APPENDIX D

INVASIVE SPECIES COUNCIL OF BC FACT SHEETS SCOTCH BROOM & HIMALAYAN BLACKBERRY


B. Brown

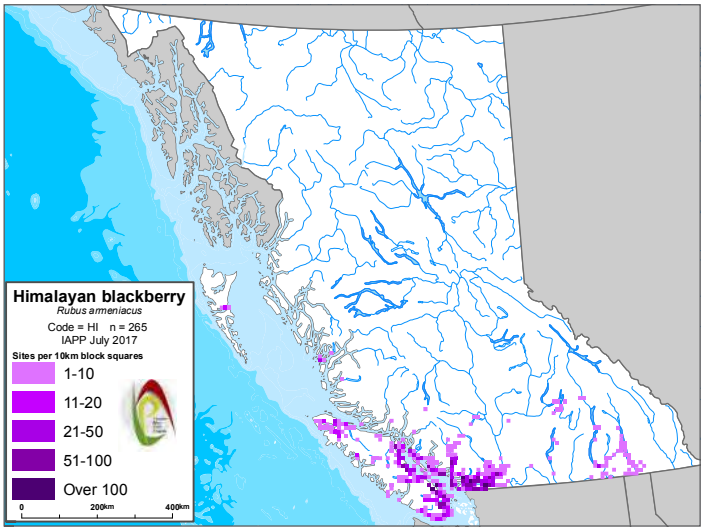
Invasive Species Council of BC

FACTSHEET
MARCH 2019

Himalayan Blackberry *Rubus armeniacus*

Legal Status

Community Charter



Distribution

Currently in BC in the Lower Mainland, Sunshine Coast, Fraser Valley, Gulf Islands, Central to Southern Vancouver Island.

Identification

Flowers: Small (2.5 cm diameter), white to pinkish, stalked, 5-petalled, arranged in clusters of 5-20; flower stalks are wooly and prickly.


S. Dewey

Stems: Robust, stiff, 5-angled stems (canes) that support large, flattened, and hooked or straight prickles. Canes grow to 3 m in height and up to 12 m in length. First year canes produce leaves only and can root at the tips, producing daughter plants. Second year canes grow from the axils of first year canes and produce flowers and fruits.

Leaves: Evergreen, predominantly large, rounded or oblong, toothed leaflets radiate from the end of the leaf stem. Leaves are generally grouped in fives on first-year canes and threes on flowering (second-year) canes.

Fruits: Fruits (drupelets) are up to 2 cm in diameter, oblong to spherical, black and shiny, and hairless. They form on second year canes and ripen from mid-summer to fall. Each berry produces numerous seeds that have a hard, impermeable coat.

Similar Native Species: (i) Trailing blackberry (*Rubus ursinus*) is a smaller and less robust trailing plant with a smaller stem size (0.5 cm), white waxy stem coating, deciduous leaves found in groups of three, and a tendency to lie on the ground; (ii) salmonberry (*Rubus spectabilis*) has smaller zigzagged stems, red-pink flowers, and reddish or yellowish edible berries.

Similar Non-Native Species: Cut-leaf or evergreen blackberry (*Rubus laciniatus*) has deeply incised leaflets. Note: Himalayan blackberry is a variable species with several cultivars, thus making identification difficult.

Ecological Characteristics

Habitat: Found on disturbed sites, along roadsides and right-of-ways, in pastures, along river and stream banks, freshwater wetlands, riparian areas, forest edges, and wooded ravines. Prefers rich, well-drained soils, but can grow well on a variety of barren, infertile soil types, a wide range of soil pH and textures, and is tolerant of periodic flooding by brackish or fresh water. Prefers full sunlight, but can survive in varied light conditions.


Rubus discolor

Reproduction: Reproduces by seed and vegetatively by rooting at stem tips to form daughter plants, and sprouts from root buds. Plants begin flowering in spring with fruit ripening in midsummer to late August. Thickets can produce 7,000-13,000 seeds per square meter, and seeds can remain viable in the soil for several years. Fruiting stems generally die back at the end of the season, but non-fruiting stems may persist for several years before producing fruit.

Dispersal: Primarily dispersed by root and stem fragments. Birds and omnivorous mammals, such as foxes, bears, and coyotes can consume berries and disperse seeds. Humans also contribute to blackberry spread by purposefully planting canes.

Impacts

Ecological: Outcompetes low growing native vegetation through shading and build-up of leaf litter and dead stems. Can prevent the establishment of shade intolerant trees such as Garry oak and ponderosa pine. Himalayan blackberry forms large, dense, impenetrable thickets that limit the movement of large animals, takes over stream channels and stream banks, and reduces sight lines along right-of-ways. Thickets increase flooding and erosion potential by preventing the establishment of deep-rooted native shrubs that would otherwise provide bank stability.

Integrated Pest Management

IPM is a decision-making process that includes identification and inventory of invasive plant populations, assessment of the risks that they pose, development of well-informed control options that may include a number of methods, site treatment, and monitoring.

Prevention

- Monitor for Himalayan blackberry on both disturbed and undisturbed areas.
- Do not purchase, trade, or grow Himalayan blackberry. Instead, grow regional native plants as they are naturally adapted to the local environment and are non-invasive.
- Ensure soil, gravel, and other fill material are not contaminated.
- Avoid unloading, parking, or storing equipment and vehicles in infested areas.
- Remove plants, plant parts, and seeds from personal gear, clothing, pets, vehicles, and equipment. Wash vehicles, including tires and undercarriage, and equipment at designated cleaning sites before leaving infested areas.
- Bag or tarp plants, plant parts, and seeds before transporting to a designated disposal site (e.g. landfill).
- Take special care when controlling Himalayan blackberry near streams or ditch lines, to prevent the movement of plant parts downstream.
- Maintain or establish healthy plant communities that are resistant to invasion by invasive plants.

Mechanical Control

- Mowing, including the use of riding mowers and tractor-mounted mowers, can be very effective, but can also harm desirable species. If roots are not manually removed, mowing several times per year over several years is necessary to exhaust root reserves. If mowing or cutting is only done once per year, it should be done when the plants begin to flower. Do not mow where soil is highly susceptible to compaction or erosion, or where soil is very wet.
- Persistent cultivation (tillage) or cutting in combination with mowing can be very effective. Because mechanical control can stimulate strong regrowth, follow-up with either spot applications of herbicide or hand digging to remove the entire root system.
- Grazing by goats has proven effective.
- Monitor controlled infestations during growing season.
- Disposal: If plants are cut, all plant material must be collected in bags or tarps and incinerated or bagged and deeply buried at a landfill. Care should be taken to ensure that plant parts are not distributed during transport.

Biocontrol

- There are no biocontrol agents for Himalayan blackberry. The release of herbivorous insects has not been undertaken due to the risk these insects may pose to closely related, commercially important Rubus species.

Chemical Control

Herbicide recommendations and use must consider site characteristics and be prescribed based on site goals and objectives. Herbicide labels and other sources of information must be reviewed before selecting and applying herbicides.

- Ensure that chemical treatments do not injure or kill susceptible, non-target vegetation.
- The following herbicides provide effective control for Himalayan blackberry: dicamba, glyphosate, triclpyr or metsulfuron methyl alone. Triclopyr + aminopyralid is alo effective.
- Application of pesticides on Crown land must be carried out following a confirmed Pest Management Plan (Integrated Pest Management Act) and under the supervision of a certified pesticide applicator. https://www2.gov.bc.ca/gov/content/environment/pesticides-pest-management/managing-pests

References/Links

- BC Ministry of Forests, Lands, and Natural Resource Operations, Invasive Alien Plant Program (IAPP). www.for.gov.bc.ca/hra/Plants/application.htm
- Controlling Himalayan Blackberry in the Pacific Northwest. The Nature Conservancy. www.invasive.org/gist/moredocs/rubarm01.pdf
- E-Flora BC, an Electronic Atlas of the Plants of BC. www.eflora.bc.ca/
- King County Noxious Weed Control Program: Best Management Practices for Himalayan blackberry. King County, Washington. http://your.kingcounty.gov/dnrp/library/water-and-land/weeds/BMPs/blackberry-control.pdf
- Garry Oak Ecosystem Recovery Team: Best Practices for Himalayan Blackberry Management. www.goert.ca/publications_resources/invasive_species.php
- DiTomas J, M., G.B. Kyser et al. 2013. Weed Control in Natural Areas in Western United States. Weed Research and Information Centre, University of California. 544 pp https://wric.ucdavis.edu/information/natural%20areas/wr_R/Rubus.pdf

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Thank you to the BC Ministry of Environment and the BC Ministry of Transportation and Infrastructure for providing project funding, and to those who advised the development of these management recommendations

Invasive Species Council of British Columbia

Scotch Broom

Cytisus scoparius

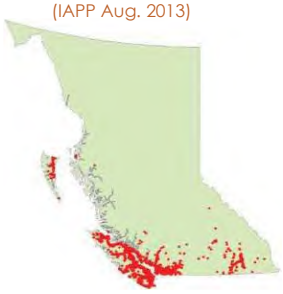
TIPS

Updated July 2014

Legal Status

Invasive Plants Regulation,
Forest and Range Practices Act.

Distribution in BC
(IAPP Aug. 2013)



Distribution

Currently distributed on the Pacific and Atlantic coasts of North America. It is common west of the Coast-Cascade Mountains in southwest BC and is concentrated at the southern end of Vancouver Island. It has also been reported on the Queen Charlotte Islands and in parts of the Kootenays and North Okanagan–Shuswap areas.

Identification

Flowers: Yellow and pea-like; may have a red marking in the middle.

Stems: Woody and 5-angled; 1–3 m tall shrub.

Leaves: Stalked lower leaves are composed of three leaflets; un-stalked upper leaves are simple.

Fruits: Flat, hairy seedpods that are initially green, turn brown to black in color.

Similar Species: Spanish broom flowers grow at the tips of stems (crowning the plant), whereas Scotch broom flowers grow along stems.

Ecological Characteristics

Habitat: This escaped garden ornamental invades exposed, well-drained mineral soil, and is shade-intolerant.

Reproduction: Perennial species that reproduces by seed and lateral bud growth. Mature plants can produce up to 3500 pods, each containing 5–12 seeds.

Dispersal: As seedpods dry they split and spiral, expelling the contained seeds up to 5 metres. The plant can also spread to new disturbed areas through seed transport by vehicles and machinery. Due to its affinity for light-dominated, disturbed areas, any disturbance activity, such as road construction near infested areas, can enhance spread.

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Impacts

Economic: Invades rangeland, replacing forage plants, and can be a serious competitor to conifer seedlings. Douglas fir plantation failures in Oregon and Washington have been credited to infestations by this plant. High density infestations can: (i) increase wildfire fuel loads, thereby escalating wildfire intensity; and (ii) obstruct sight lines on roads, resulting in increased maintenance costs for removal.

Ecological: Can produce dense, impenetrable thickets that may be impacting Garry oak woodlands in southwestern BC and limiting the movement of large animals, wild or domestic. Possesses photosynthetic stems to enable year-round growth, leading to displacement of native plant species.

Integrated Pest Management

IPM is a decision-making process that includes identification and inventory of invasive plant populations, assessment of the risks that they pose, development of well-informed control options that may include a number of methods, site treatment, and monitoring.

Prevention

- Minimize soil disturbance in areas directly adjacent to existing infestations and contain or localize seed spread.
- Remove broom before it flowers (late winter, early spring) to prevent seed maturation.
- After mechanical treatment, promptly re-vegetate with an appropriate seed mix, followed by an application of phosphorous-rich fertilizer and wood mulch. Contact local seed suppliers to determine an appropriate seed mix.
- Promptly establish competitive shrubbery, including snowberry, salmonberry, thimbleberry, and Oregon grape, as well as red alder trees for shading and competition for nitrogen, to reduce broom growth.

Mechanical Control

- Minimizing soil disturbance, cut larger plants below ground level before flowering and seed set. Plants with stems less that 1.5 cm in diameter may be hand pulled, preferably in late spring when the plant is directing its energy into flower and seed production.
- Due to enormous 'seed banking' and re-sprouting potential (stumps and roots), mechanical treatments may need to be repeated over a 3 to 5 year period.
- Mechanical control is most effective if all of the plant is removed, no seeds are dropped and soil disturbance is minimized.
- Hand pulling may encourage broom growth due to the high level of soil disturbance. If pulling will result in soil disturbance, plants can be cut as close to the ground as possible.
- Burning is not an effective control method as broom seeds germinate following a burn.

Biocontrol

- There are currently no approved biocontrol agents for BC; however, seed-feeding beetles released in Washington State have moved north adventitiously, and two other agents released in the US are close to our border and suspected to have arrived in BC. Further surveys will seek to confirm their existence.
- Grazing by goats and consumption of seeds by chickens have been shown to reduce broom infestations.

Chemical Control

Herbicide recommendations and use must consider site characteristics and be prescribed based on site goals and objectives. Herbicide labels and other sources of information must be reviewed before selecting and applying herbicides.

- Herbicides containing 2,4-D, triclopyr, picloram, glyphosate, and hexazinone have some success of control, but long seed viability in the soil requires repeated treatments over many years.
- Selective spot spraying, basal stem injection, or cut surface application methods are recommended to minimize non-target damage.
- Application of pesticides on Crown land must be carried out following a confirmed Pest Management Plan (*Integrated Pest Management Act*) and under the supervision of a certified pesticide applicator. www.env.gov.bc.ca/epd/ipmp/

References/Links

- BC Ministry of Forests, Lands, and Natural Resource Operations, Invasive Alien Plant Program (IAPP). www.for.gov.bc.ca/hra/Plants/application.htm
- E-Flora BC, an Electronic Atlas of the Plants of BC. www.eflora.bc.ca/
- *Field Guide to Noxious and Other Selected Weeds of British Columbia*. 2002. www.agf.gov.bc.ca/cropprot/weedguid/scotchbroom.htm
- Garry Oak Ecosystem Recovery Team. Best Practices for Invasive Species Management in Garry Oak and Associated Ecosystems: Scotch Broom *(Cytisus scoparius)*. www.goert.ca/documents/Best_Practices_for_Broom_revised.pdf
- Prasad, Raj. Scotch Broom, *Cytisus scoparius* L. in British Columbia. http://cfs.nrcan.gc.ca/pubwarehouse/pdfs/31653.pdf

ADDITIONAL CONTACT INFO

Thank you to the BC Ministry of Environment for providing project funding, and to those who advised the development of these management recommendations.

Review of Environmental Impact Assessment for Rezoning Application PLRZ20240110 (Bigham)

The application is to rezone a portion of the site on 3334 Port Washington Road, North Pender Island (PID 005-837-693) from Rural to Industrial. The area proposed for rezoning has been used as Industrial under Temporary Use Permits since 2011. Construction of a workshop with a kitchen and bathroom facility is also being proposed; it is understood that construction of a wash pad is no longer part of the proposed development.

Please note: the areal calculation results of 0.09% and 0.06% (page 11; also 0.06% on page 27) appear to be incorrect; they should be corrected to 9% and 6% according to the information provided in the report.

The QEP states that the proposed industrial zone has been completely disturbed/impacted, no development is proposed elsewhere on the site, and there are no plans to expand the work yard. The QEP also states that rezoning is not expected to have additional impact on the site conditions. Recommendations include the removal of invasive plant species and revegetation with native species.

After a review of this report:

- There does not appear to be additional loss of habitat or connectivity with the proposed rezoning and construction of a workshop. There will be an increase in impermeable area with the construction of the structure. Please note that the site map should be updated to include the proposed construction of the office and remove the wash pad.
- Sharp-tailed snakes are present on an adjacent parcel and could potentially use the site: snakes may be attracted to edge habitats and gravel banks on roadsides; soil disturbance due to removal of invasive plants has also been identified as a potential threat. More information on mitigation to ensure that any existing and proposed uses on the site do not result in harm to sharp-tailed snakes or other amphibians and reptiles should be provided (one option might be fencing or other barriers to prevent access by snakes to the industrial area – please refer to Guidelines for Amphibian and Reptile Conservation 2014).
- Species listed as Special Concern on Schedule 1 of Canada's *Species at Risk Act* have been identified on neighbouring parcels; please include information on whether the proposed rezoning and uses of the lot will have any negative impacts on these species and any mitigative measures that will be in place.
- As per the terms of reference, please provide more information on potential cumulative impacts, measures to reduce impacts to neighbouring properties and

ecosystems during construction and operation, and future site monitoring requirements.

- It is understood that this application is only for rezoning of a portion of the site from Rural to Industrial (as stated in the OCP) and construction of a workshop and office. This review does not consider any potential future uses of the site. However, it is important to note that maintaining intact ecosystems in the northern, Rural zoned portion of the lot would provide additional protection to the existing Nature Reserves and would provide habitat connectivity between them.