AQUATERRA ENVIRONMENTAL LTD.

ENVIRONMENTAL ASSESSMENT

Anmore South Neighbourhood Plan

Environmental Impact Assessment

PREPARED FOR:
ICONA PROPERTIES
130 BREW ST #303
PORT MOODY, BC
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AquaTerra Project No. 20221035

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1 PROJECT BACKGROUND

Anmore South (the 'site'), as illustrated in **Figure 1**, is comprised of undeveloped and historically developed areas situated to the north and south of Sunnyside Road within the Village of Anmore and are currently owned by Icona Properties ('Icona'; the 'client'). Specifically, areas to the north consist of large swaths of forested lands that have been historically logged with a varied landscape including localized ravines and hillside drainages. Areas to the south include a historical target shooting range, which includes remnants of backstop berms, re-graded slopes, drainage infiltration areas and infrastructure including culverts and wooden staves as well as access roads and densely vegetated areas consisting of regenerating Red Alder and invasive Himalayan Blackberry. The areas to the south also include forested, undeveloped lands and contiguous forested and riparian areas bordering watercourses. Evidence of re-direction of hillside drainage features have been noted in this area, which also includes numerous perched culverts, and roadside ditches as a result of Sunnyside Road, which bisects the site.

Icona retained AquaTerra Environmental Ltd ('AquaTerra') to conduct a comprehensive Environmental Impact Assessment (EIA) to identify, evaluate, and recommend measures to mitigate the potential environmental effects associated with prospective development. Aquatic and terrestrial habitats, environmentally sensitive areas, unique habitat features, and sensitive species, as well as potential development opportunities and constraints have been evaluated throughout the neighbourhood planning process, with findings from AquaTerra circulated through the technical expert project team for incorporation into design iterations in conjunction with input from the public and stakeholders throughout the engagement process. Potentially adverse impacts have been identified, and measures to avoid, reduce, or offset these effects, are discussed herein.

This EIA specifically evaluated the proposed Anmore South Preferred Plan (the 'plan'), which proposes 2,202 residences, comprising a mix of residential, mixed use, and community based land uses. The plan has been developed to balance residential growth with the conservation of natural habitats, promoting sustainability, and minimizing the impact on the surrounding ecosystem and affording a larger percentage of retained natural areas and greenspace. Specifically, the plan, proposes the dedication of 22-hectares (35%) of the land area to a natural conservation framework, which well exceeds the typical conservation targets set by the Village of Anmore per Official Community Plan (OCP) Policy P&TUL-7, which encourages developers to dedicate land for trails and parks in excess of the minimum 5% allocation. Environmental Assessments and ongoing monitoring by AquaTerra have been conducted since 2014, with historical findings summarized in Section 7.

Figure 1. Icona Properties – Anmore South, approximate site boundary (Red Polygon) and surrounding area.

2 ENVIRONMENTAL IMPACT ASSESSMENT OBJECTIVES

The primary objectives of this Environmental Impact Assessment are to:

1. Assess and discuss federal, provincial, and municipal regulations and policies to identify their applicability and compliance requirements;
2. Review and address environmental requirements associated with Anmore's Official Community Plan (OCP);
3. Compile relevant historical reports, background information, and data to date of EIA issuance as well as to evaluate for any notable changes in habitat and/or habitat function based on updated field assessments;
4. Assess Icona's selected development concept based on the 'Preferred Plan' which has incorporated AquaTerra input and recommendations from previous phases and to compile and review focused, detailed aquatic, riparian, and terrestrial historical data to identify the significance of direct, and indirect potentially adverse environmental impacts;
5. Identify potential impacts (including residual impacts) and mitigation measures to minimize adverse impacts on the environment;
6. Identify and assess the significance of any residual effects from potential construction activities associated with the development; and
7. Provide recommendations and guidance for the next steps.

3 REPORT LIMITATIONS

Information provided in this Environmental Impact Assessment is a compilation of data collected by AquaTerra from 2014 – 2024, presented chronologically. Updates to this EIA are anticipated to be required prior to the onset of project-related construction works, including early utility and road layout works, drainage and stormwater infrastructure works, and subsequent development related activities to ensure accurate and precise data are represented, validated and will be contingent on changes and advancement of the proposed development.

Consequently, while findings and conclusions documented in this Environmental Impact Assessment have been prepared in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession practicing under similar circumstances, this report is not intended, nor is it able to provide a totally inclusive review of past

or present environmental conditions within the site area. This report is intended to provide information to reduce, but not necessarily eliminate, uncertainty regarding the potential for opportunities and constraints associated with site development.

4 SITE OVERVIEW – BIOPHYSICAL CONDITIONS

The site occupies areas to the north and south of Sunnyside Road, comprising a total area of approximately 60 hectares. While both areas share similar environmental attributes, the area to the south of Sunnyside Road is more heterogeneous in its vegetation distribution, assemblage, and age class with a notably larger presence of localized invasive species relative to the area situated to the north of Sunnyside Road, which consists primarily of a stand of similar age-class second and tertiary growth coniferous forest. The areas north and south of Sunnyside Road are discussed in detail in Section 4.1 and Section 4.2, respectively.

4.1 North of Sunnyside Road

The project area to the north of Sunnyside Road comprises an area of approximately 40 hectares and consists primarily of undeveloped, forested stands, which have been historically logged. Dominant forest stands consist of second- and tertiary-growth, mature coniferous stands dominated by Coastal Western Hemlock (*Tsuga heterophylla*), with lesser amounts of Western Red Cedar (*Thuja plicata*), and Douglas Fir (*Pseudotsuga menziesiii var. menziesii*). Boundary areas consist of mixed forest dominated by Western Hemlock and Red Alder (*Alnus rubra*). Sub-canopy / shrub layer consists of pockets of dense Salmonberry (*Rubus spectabilis*), Vine Maple (*Acer circinatum*), and Red Huckleberry (*Vaccinium parvifolium*), and sub-dominant Salal (*Gaultheria shallon*) and Trailing Blackberry (*Rubus ursinus*). The forest floor (herbaceous layer) consists of dominant fern species such as Sword Fern (*Polystichum munitum*) and Deer Fern (*Blechnum spicant*), with select areas covered by dominant moss species including Step Moss (*Hylocomium splendes*) and Wavy-leaved Cotton Moss (*Buckiella undulata*). Invasive species presence was minimal, although species including Himalayan Blackberry (*Rubus armeniacus*), English Ivy (*Hedera helix*), and English Holly (*Ilex aquifolium*) were observed sporadically along roadside edges. English Ivy and English Holly were also observed in small patches throughout the assessed portion of the site, with the potential for spread if unmanaged. Schoolhouse Creek North bisects the property on the eastern portion of the site with multiple tributaries associated with the watercourse, and Doctors Creek bisects the property on the western portion of the site with various tributaries and one wetland associated with the watershed.

4.2 South of Sunnyside Road

The project area to the south of Sunnyside Road comprises an area of approximately 20 hectares and is dominated by logged forested stands and is also the location of a historical shooting range that is regenerating to semi-naturalized conditions. Second and third-growth coniferous stands contain a greater proportion of Western Red Cedar than the north, while native species vegetation within the sub-canopy and herbaceous layer remain consistent. Invasive species presence was greater than areas north of Sunnyside Road, with English Ivy, Scotch broom (*Cytisus scoparius*), Himalayan Blackberry, and Japanese Knotweed (*Reynoutria japonica*) observed. English Ivy infestations were most prevalent among roadside edges while blackberry was established sporadically in large patches with infestations most densely concentrated at the historical shooting range area, forming a large dense monoculture. Additionally, Scotch Broom was observed within the former gun range site. Japanese Knotweed infestations are observed predominantly along the western site boundary fronting 1st Avenue, with treatment efforts observed in recent years. Some recent clearing of Himalayan Blackberry and Red Alder had occurred in the vicinity of the shooting range to facilitate site access, geotechnical and survey work. Schoolhouse Creek North and S-Trib-5 bisect the site. Doctors Creek Main Stem and Schoolhouse Creek – North and associated tributaries bisect the southern portion of the site.

5 MUNICIPAL DEVELOPMENT FRAMEWORK

This section outlines the applicable municipal environmental requirements with the Village of Anmore relating to development (OCP Bylaw No. 532, 2014)[1].

5.1 Natural Environment

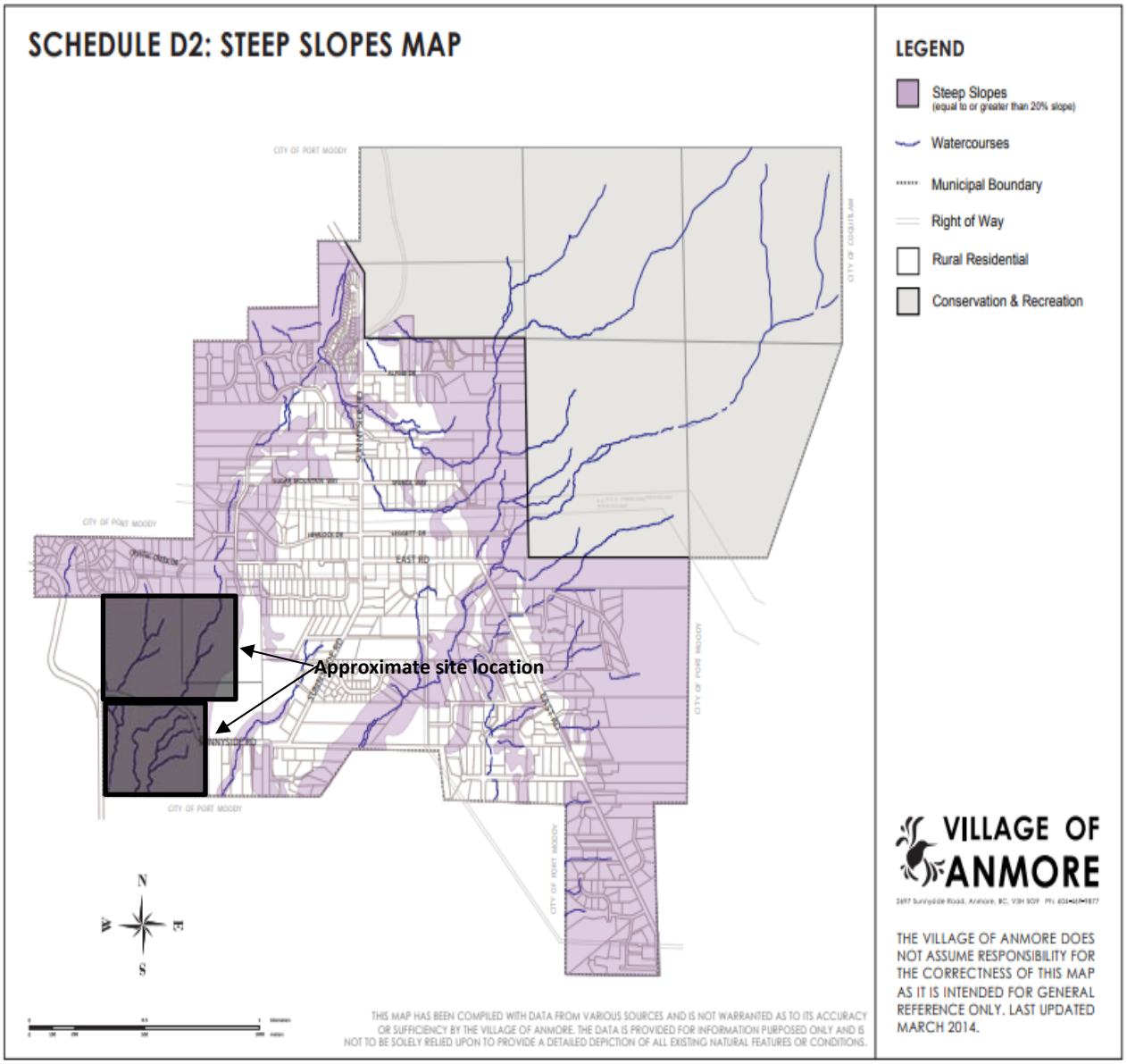
The current Village of Anmore OCP[1] from 2014 identifies the site as a Special Study Area. Chapter 7 of the OCP focuses on the environment, identifying those areas of the municipality that may contain environmental attributes that are worthy of retention or special care. The Village supports the promotion and preservation of the long-term health of surrounding terrestrial, aquatic and riparian ecosystems, species of concern and sensitive environmental areas.

Several Village of Anmore policies serve to guide the mitigation of potential environmental impacts associated with future development, including development permit guidelines and bylaws, to ensure that appropriate measures are taken in areas with steep slopes to prevent erosion and

[1] Available online here: https://anmore.com/wp-content/uploads/2019/04/Bylaw-532-2014-OCP-Full-Consolidated-April-2019.pdf

minimize environmental impacts. OCP Schedule D2 - Steep Slopes Map, identifies the site as containing steep slopes **(Insert 1)**. Other measures include the encouraged retention of existing trees and additional tree / planting materials, inclusion of integrated stormwater management plans, and cooperation with regional, provincial, and federal environmental agencies to ensure effective management of environmentally sensitive areas. The Village of Anmore also encourages the retention and enhancement of wildlife corridors and the use of the Dark Sky principles to reduce light pollution as part of the wildlife protection policies.

Insert 1: Official Community Plan (OCP) – Schedule D2 – Steep Slopes Map

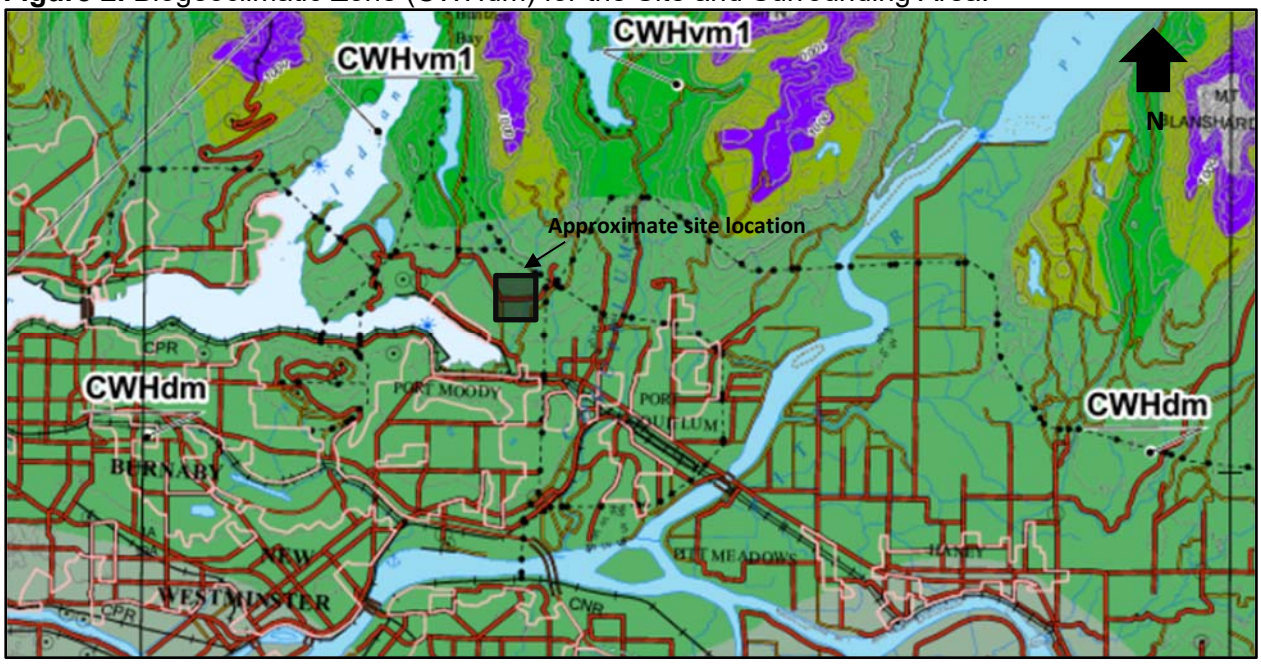


6 BACKGROUND REVIEW RESULTS

6.1 Biogeoclimatic Zone

The site is situated within the Coastal Western Hemlock (CWH) biogeoclimatic zone (**Figure 2**), which occurs at low to middle elevations mostly to the west of the coastal mountains, along the entire British Columbia Coast and on into both Alaska and Washington/Oregon. The CWH consists of 10 subcategories of continentality (hypermaritime, maritime, and submaritime subzones) and precipitation (very dry, dry, moist, wet, and very wet). Applicable to the site is the Coastal Western Hemlock Dry Maritime Subzone (CWHdm), occurring at low elevations on the mainland and immediately adjacent islands. Elevational limits range from sea level to approximately 650 m. The CWHdm has warm, relatively dry summers and moist, mild winters with little snowfall. Growing seasons are long and feature only minor water deficits on zonal sites. Mean annual temperature is approximately 8°C and ranges from 5.2 °C to 10.5 °C among the CHW subzones. The mean annual precipitation for the zone is 2228 mm (ranging from 1000 to 4400 mm) (MOF, 1991).

Figure 2. Biogeoclimatic Zone (CWHdm) for the Site and Surrounding Area.



The following climate information is based on data collected by Environment & Climate Change Canada (ECCC) at the Port Moody Glenayre STP weather station (49° 16'45.000 N, 122° 52'53.000 W; 129.5 meters [m] elevation) between 1981 and 2010, located approximately 4.2

kilometers (km) northeast of the site. ECCC has not collected annual data at this weather station since 2010.

Daily Mean Temperature	10.2º C
Precipitation	1969 mm/year
Highest Monthly Avg.	October, 138.6 mm
Lowest Monthly Avg.	April, 59.0 mm

6.2 Local Ecology

Dominant forest species of the drier maritime subzones (including the CWHdm subzone) typically have a substantial component of Douglas-fir, along with Western Hemlock and Western Redcedar (*Thuja plicata*). Salal (*Gaultheria shallon*), Dull-Oregon Grape (*Mahonia nervosa*) and Red Elderberry (*Vaccinium parvifolium*) typify the poor-to-moderately developed shrub layer. Oregon Beaked Moss (*Kindbergia oregana*), Step Moss (*Hylocomium splendens)*, Lanky Moss (*Rhytidiadelphus loreus)* and Flat Moss (*Plagiothecium undulatum*) dominate the well-developed moss layer.

6.3 Federal and Provincial Databases and Mapping Utilities

Accessible federal, provincial and public databases as well as mapping utilities were queried to collect pertinent biophysical information associated with the site. Results are provided in the following sections.

6.3.1 BC Species & Ecosystems Explorer – Species-at-risk overview (https://a100.gov.bc.ca/pub/eswp/)

Species listed on the BC Species & Ecosystems Explorer for the Village of Anmore and surroundings was queried on 03 November 2024, to evaluate which species may be present within or adjacent to the site. The resulting unfiltered list of species was evaluated in depth by the Project Biologist in the context of available local area habitats and known habitat requisites for each species. The result is the refined focused list of provincially and federally ranked species-at-risk potentially occurring on-site along with their respective rankings:

Mammals

- Pacific Water Shrew (*Sorex bendirii*) – Red; Endangered

- Snowshoe Hare (*Lupus americanus washingtonii*) – Red; no federal status
- Townsend's Big-eared Bat (*Corynorhinus townsendii*) – Blue; no federal status
- Townsend's Mole (*Scapanus townsendii*) – Red; Endangered
- Trowbridge's Shrew (*Sorex trowbridgii*) – Blue; no federal status

Birds

- Band-tailed Pigeon (*Patagioenas fasciata*) – Blue; Special Concern
- Barn Swallow (*Hirundo rustica*) – Blue; Special Concern
- Common Nighthawk (*Chordeiles minor*) – Yellow; Special Concern
- Great Blue Heron (*Ardea herodias fannini*) – Blue; Special Concern
- Green Heron (*Butorides virescens*) – Blue; no federal status
- Olive-sided Flycatcher (*Contopus cooperi*) – Blue; Special Concern
- Western Screech-Owl (*Megascops kennicottii kennicottii*) – Blue; Threatened

Reptiles and Amphibians

- Coastal Tailed Frog (*Ascaphus truei*) – Yellow; Special Concern
- Northern Red-legged Frog (*Rana aurora*) – Blue; Special Concern
- Northern Rubber Boa (*Charina bottae*) – Yellow; Special Concern
- Western Toad (*Anaxyrus boreas*) – Yellow; Special Concern

Invertebrates

- Dun Skipper (*Euphyes vestris*) – Blue; Threatened
- Monarch (*Danaus plexippus*) – Red; Endangered
- Oregon Forestsnail (*Allogona townsendiana*) – Red; Endangered
- Threaded Vertigo (*Nearctula* sp.) – Blue; Special Concern

Vascular Plants

- American Sweet-flag (*Acorus americanus*) – Blue; no federal status
- Streambank Lupine (*Lupinus rivularis*) – Red; Endangered
- Vancouver Island Beggarticks (*Bidens amplissima*) – Blue; Special Concern
- Washington Springbeauty (*Claytonia washingtoniana*) – Red; no federal status

Mosses

- Poor Pocket Moss (*Fissidens pauperculus*) – Red; Endangered
- Roell's Brotherella (*Brotherella roellii*) – Red; Endangered

A detailed discussion of those federally listed sensitive species that may utilize the site is included in Section 7.3.3.

6.3.2 Conservation Data Center (http://www.env.gov.bc.ca/atrisk/ims.htm)

The BC Conservation Data Center (CDC) database was queried on 03 November 2024, to obtain details on known occurrences of rare animal species or plant communities for the site and surrounding areas. The CDC is part of the Wildlife Inventory Section of the Resource Inventory Branch of the BC Ministry of Environment[2] (MOE) that uses a listing process to identify species that are candidates for legal designation as extirpated, endangered, or threatened (**Red-listed**), as well those species that are of special concern (**Blue-listed**).

The results of the CDC query indicated no records of rare species or plant community's occurrence in the CDC database mapped specifically for the site. Four (4) non-sensitive elemental occurrences were recorded within approximately five (5) kilometers of the site, which are summarized in **Table 1**. Two (2) occurrences were recorded approximately three (3) kilometers from the site boundary. The potential for these species to occur within or adjacent to the site is discussed in Section 7.3.3. A summary of the CDC mapping results is provided in **Appendix A**. No listed plant communities of concern were queried or identified within the site or adjacent to the site boundaries.

[2] Presently referenced as the Ministry of Water, Land and Resource Stewardship (MWLRS), formerly Ministry of Forests (MoF) and previously Ministry of Forests, Lands and Natural Resource Operations (MFLNRO).

Table 1. BC Conservation Centre Results – Organized by Distance from Site

Shape ID	Common Name	Scientific Name	Provincial; Federal Ranking*	Observed Location	Distance from Site	Last Observed
72700	Pacific Water Shrew	*Sorex bendirii*	Red; EN	Terrestrial; Mixed Forest	235 m	1897
122033	Roell's Brotherella	*Brotherella roellii*	Red; EN	Mossom Creek	350 m	2017
142314	Snowshoe Hare	*Lupus americanus washingtonii*	Red	Village of Anmore	700 m	2020
137927	Snowshoe Hare	*Lupus americanus washingtonii*	Red	Village of Belcarra	2.9 km	2017
81215	Washington Springbeauty	*Claytonia washingtoniana*	Blue	Admirality Point	4.0 km	2005

*EN: Endangered (federal ranking).

6.3.3 BC iMAP (http://maps.gov.bc.ca/ess/sv/imapbc/)

The BC iMAP database and mapping utility was queried on 03 November 2024. Query results confirm that the site and surrounding areas are not part of a designated or proposed Wildlife Habitat Area (WHA) nor is the site situated within a Wildlife Management Area (WMA). Similarly, no reported amphibians, reptiles, birds, or mammals have been specifically mapped within the site area boundaries.

6.3.4 Community Mapping Network (http://www.cmnbc.ca)

The Sensitive Habitat Inventory Mapping (SHIM) database, the Great Blue Heron (GBHE) Management Team database, and the Wildlife Tree Stewardship (WiTs) database were queried on 03 November 2024 to evaluate watercourse features and the potential for raptor or heron nests within or adjacent to the site boundaries. One (1) watercourse, referenced as Schoolhouse Creek, and several tributaries are mapped in the SHIM database. Schoolhouse Creek is identified as "fish bearing", and the tributaries are mapped as "Unknown" as illustrated in **Appendix B**. The watercourse originates from Buntzen Lake and eventually confluences with the Port Moody inlet, draining into the Pacific Ocean.

The review of the Great Blue Heron (GBHE) Management Team database and Wildlife Trees Stewardship (WiTs) database did not identify any existing or historic raptor or heron nests within the site boundaries. Two (2) Bald Eagle (*Haliaeetus leucocephalus*) nests and two (2) Great Blue Heron *(Ardea herodias fannini)* nesting locations were mapped within approximately seven (7)

km from the site as illustrated in **Figure 3** and **Table 2**. The status of the identified colony is unknown.

Figure 3. Map view of GBHE Management Team and Wildlife Tree Stewardship database results.

Table 2. GBHE Management Team and Wildlife Tree Stewardship database results.

Identification	Common/Scientific Name	Distance to site (km)
GBHE-208-004	Great Blue Heron *(Ardea herodias fannini)*	2.3
GBHE-208-054	Great Blue Heron *(Ardea herodias fannini)*	3.8
BAEA-204-044	Bald Eagle (*Haliaeetus leucocephalus*)	6.1
BAEA-204-045	Bald Eagle (*Haliaeetus leucocephalus*)	6.6

6.3.5 Habitat Wizard (http://maps.gov.bc.ca/ess/hm/habwiz/)

The province of British Columbia's "Habitat Wizard" mapping utility was queried on 03 November 2024 to evaluate the presence of watercourses and fish within or adjacent to the site boundaries. Habitat Wizard indicated one (1) watercourse bisecting the site referenced as Schoolhouse Creek. The database illustrates the historical presence of provincially blue-listed Coastal

Cutthroat Trout (*Oncorhynchus clarkii clarkii*) within Schoolhouse Creek approximately 750 m south of the site boundary.

6.3.6 Fisheries Information Summary System (FISS) (http://www.env.gov.bc.ca/fish/fiss/index.html)

The BC Fisheries Information Summary System (FISS) was queried on 03 November 2024 to evaluate the presence of watercourses and fish presence within or adjacent to the site boundaries. FISS results indicated one (1) watercourse bisecting the site identified as Schoolhouse Creek North. Results did not indicate fish presence within the site boundaries at the time of the query.

7 HISTORICAL FIELD ASSESSMENTS

7.1 HISTORICAL FIELD ASSESSMENTS OVERVIEW

AquaTerra has been conducting assessments, studies and monitoring for the site and surrounding area since 2014. Specifically, a preliminary study of the site was completed by AquaTerra in 2014 focusing on terrestrial and aquatic habitats and their inhabitants. The area to the south of Sunnyside Road was further assessed by AquaTerra in 2015 and re-assessed in 2019 providing supplementary fish, fish habitat and species at risk data.

In 2018 (updated in 2019), a detailed watercourse assessment was conducted for watercourses to the north and south of Sunnyside Road, followed by a preliminary detailed Riparian Areas Protection Regulation (RAPR) assessment with a focus on Schoolhouse Creek, its tributaries and the main stem of Doctors Creek.

From 2020 – 2022, a total of eleven (11) groundwater monitoring wells were installed by Aplin Martin and AquaTerra in select locations south of Sunnyside Road. These wells were monitored routinely by AquaTerra personnel to evaluate groundwater conditions in the context of groundwater inputs to surrounding watercourse monitored concurrently with surface flow as well as to evaluate depth to groundwater to evaluate potential groundwater management planning considerations associated with prospective development.

In 2022 and 2023, AquaTerra completed a detailed terrestrial environmental assessment to supplement and update the inventory and assessment data collected in 2014 and 2015 with a focus on the area north of Sunnyside Road. Between August 2023 and October 2023 AquaTerra

re-assessed the area to the south of Sunnyside Road, completing detailed terrestrial and aquatic assessments and evaluating for any changes in habitat mapping and habitat function relative to the 2014 and 2015 data.

In July 2024, supplementary terrestrial and aquatic assessments, with a focus on sensitive species, were conducted across the site. Additionally, nine (9) motion activated trail cameras were installed on the north side of Sunnyside Road to monitor wildlife movement with the objective of identifying wildlife corridors within the proposed development area. Cameras were collected in September 2024 and the data was analyzed and compiled. Additionally, focused Presence / Not-detected (PN) time-constrained Coastal Tailed Frog (*Ascaphus truei*) surveys were conducted in Schoolhouse Creek and tributaries. Results and additional incidental observations were documented and are discussed in the following sections.

7.2 HISTORICAL FIELD ASSESSMENTS METHODS

Since 2014, AquaTerra personnel conducted assessments and studies using various field assessment methods to document and evaluate mapped and unmapped watercourse characteristics, aquatic and terrestrial habitat attributes, unique natural features, and wildlife use within the site boundaries north and south of Sunnyside Road with methods discussed in detail in the following sections.

7.2.1 Aquatic and Riparian Habitats

In 2014, AquaTerra conducted a preliminary baseline study identifying aquatic habitats and their inhabitants to the north and south of Sunnyside Road. A detailed field survey was conducted by AquaTerra personnel to document existing watercourse attributes, aquatic habitat features, and unique natural habitat areas. A high accuracy Trimble GeoXH GPS unit with GeoBeacon receiver, as well as handheld Garmin GPS units were utilized to collect watercourse and riparian habitat data in the field, including the location of culverts, the orientation of watercourses, watercourse substrate details, and other notable observations.

A supplementary fish habitat assessment was subsequently completed in 2019 and 2024 to augment the preliminary 2014 Development Feasibility report. AquaTerra personnel utilized comparable sampling methods and assessed the same attributes as in previous studies. Additionally, the watercourse High Water Mark (HWM) was flagged with pink ‘creek’ flagging tape for inclusion in a detailed topographical survey, completed by Aplin & Martin.

A detailed Watercourse Assessment for watercourses within the site boundaries north of Sunnyside Road was completed in 2018. Four (4) tributaries; two (2) within Doctors Creek (D-Trib 2, and D-Trib 4), and two (2) within Schoolhouse Creek North (S-Trib 5-4, and S-Trib 6), were routinely assessed (typically twice per month). Each of the assessed tributaries were sampled at two (2) separate locations (upper reach and lower reach).

Field data from the 2018 / 2019 Detailed Watercourse Assessment study was compiled and analyzed to provide a general summary of attributes including:

1) Permanence – permanent, intermittent, or ephemeral watercourses;
2) Length – total distance along the stream's course, measured from the headwaters to the mouth;
3) Hydraulic Inputs – groundwater inflows, runoff, and contributions from other water bodies;
4) Habitat Condition – health and suitability of the watercourse for supporting aquatic species;
5) Food / Nutrient Inputs – presence of organic materials, wastewater / agricultural runoff, algae or aquatic plants;
6) Impacted Areas – altered watercourse due to human activities, natural events, or other disturbances;
7) Flow Dynamics – rate, direction, and pattern of flow; and
8) Flow Contribution – relative importance of the stream within its watershed, considering how much water it contributes to downstream systems.

Data was then compiled, analyzed to evaluate watercourse function as aquatic habitat, connectivity and hydraulic contribution to downstream reaches.

In 2018 and 2019, a preliminary detailed Riparian Areas Protection Regulation (RAPR) assessment was conducted encompassing the main stem of Doctors Creek and Schoolhouse Creek North, south of Sunnyside Road in Anmore. The site was thoroughly traversed and identified watercourses were tracked to the site boundary or the source, such as a groundwater seepage. Watercourse wetted width measurements and gradient were recorded using a collapsible ruler and clinometer in accordance with the detailed RAPR methodology. Streambed composition and riparian vegetative assemblage were also recorded at each assessed watercourse and the watercourses were divided into reaches, where appropriate.

Stream characteristics at each proposed stream crossing within the site were recorded. The following observations were recorded at each location:

- Water presence;
- Substrate type and proportions;
- Channel morphology and depth;
- Vegetation type and percent cover; and
- Width at high water mark.

A selection of watercourses were further assessed over a period spanning approximately 1 year to evaluate habitat contributions to Schoolhouse Creek and Doctor's Creek. The attributes that were assessed included:

- Permanence (i.e., whether watercourses for >6 months of the year, which constitutes a 'permanent' designation as opposed to seasonal/ephemeral);
- Length (<25 m [short]), 25-50 m [moderate] and 50-100 m+ [long);
- Hydraulic Inputs (i.e., observed headwaters, ponded areas, ditches, or seepage zones);
- Habitat condition (i.e., intact or impacted [by historical development or invasive species]);
- Food and nutrient inputs and contributions to downstream fish habitat; if any;
- Identified impacted areas (i.e., areas where flow alteration or culverting, if any, were observed);
- Flow dynamics (i.e., laminar, linear flow, or diversity consisting of pools and riffles and other unique habitat features); and
- Flow contribution (i.e., the conveyance of water throughout the assessment period to Schoolhouse Creek and Doctor's Creek.

7.2.1.1 Fish

In November 2014, AquaTerra personnel set ten (10) baited gee (minnow) traps throughout identified watercourses north and south of Sunnyside Road in the main stem of Schoolhouse Creek North, Doctors Creek, and various tributaries.

Supplementary data was collected in December 2015 where additional baited gee (minnow) traps were set within upper reaches of Schoolhouse Creek and Doctors Creek, where feasible, to provide additional data for the watercourses in Anmore, within, and adjacent to the site boundaries.

7.2.1.2 Amphibians

Presence / Not detected surveys were conducted for amphibians during field studies in 2015. Incidental observations have been documented during field assessments since 2014, with a focus on sensitive species / species-at-risk in 2024. Coastal Tailed Frog (*Ascaphus truei*) surveys were conducted in within Schoolhouse Creek, north and south of Sunnyside Road. Results of the Presence / Not Detected (PN) surveys, incidental amphibian observations, and Coastal Tailed Frog surveys were documented and discussed in Section 7.3.1.2.

7.2.2 Terrestrial Habitat

During the 2014 preliminary assessment, terrestrial vegetation data was collected and a high-quality aerial imagery assessment was conducted. Information collected during the assessment included canopy cover, tree species, shrub species, and herbaceous species along with percent cover. Unique habitat features, such as rocky outcrops and areas of high biodiversity were also assessed and documented. Using data from the field survey and aerial interpretation, the site was categorized into various habitat types with approximate boundaries.

Additional detailed terrestrial environmental assessments were conducted in 2022 and 2023. Transect lines were traversed and terrestrial vegetation information from 165 plots (approximately 20 m x 20 m grid) was collected within the site area north of Sunnyside Road. Nineteen (19) vegetation plots were selected within proposed areas of development and within the former gun range site south of Sunnyside Road. Attributes documented reflected data collected in previous preliminary assessment. While completing vegetation plots, areas with specific landscape features, such as large areas of Himalayan Blackberry and patches of Japanese Knotweed were also recorded. These assessments were meant to further validate the findings of previous reports and to inform the findings of this EIA.

7.2.2.1 Wildlife and Wildlife Habitats

In the 2014 and 2022 studies, wildlife observations, including direct and indirect signs (scat, pellets, feathers, plucking stations, bedding areas, tracks, and potential den sites) were recorded incidentally during the terrestrial habitat assessments. Additionally, raptor nest sites, high value wildlife trees, and areas potentially utilized by species-at-risk were also assessed.

In 2023, the status of a raptor's nest previously identified in 2014 on the northeast corner of the site was re-evaluated, and wildlife observations were recorded as part of terrestrial surveys south of Sunnyside Road. Transect lines were traversed in the vicinity of the nest and AquaTerra personnel inspected the area for any indication of raptor nests. Incidental wildlife observations were recorded during terrestrial surveys. The presence of Pileated Woodpecker nests was also assessed in areas north and south of Sunnyside Road based on the new requirements under the updated *Migratory Birds Convention Act* (MBCA) in 2022.

7.2.2.2 Wildlife Cameras

To effectively monitor wildlife use and identify appropriate wildlife corridors within the proposed development area, AquaTerra personnel deployed nine (9) remote automated wildlife cameras within the site area to the north of Sunnyside Road in July 2024. Three (3) cameras were relocated in August 2024, noting no wildlife captures during the preceding month. Cameras were collected in September 2024 and data was analyzed and documented. Cameras were deployed at approximately 1 m high with the objective of capturing medium-to-large mammals. Placement was determined by indication of wildlife use in the areas observed and by habitat type. Wildlife Camera locations and associated results are discussed in Section 7.3.3.2. Due to seasonal time constraints, wildlife cameras were not installed south of Sunnyside Road; however, further studies and camera re-deployment will be conducted as the project advances, noting a focus on the northern portion of the site as prospective initial development phases will occur in this area.

7.2.3 Groundwater Monitoring

Between 2020 and 2022, five (5) groundwater monitoring wells were installed by Aplin Martin, and six (6) groundwater monitoring wells were installed by AquaTerra Environmental and subsequently monitored by AquaTerra personnel twice per month. These well locations were installed at select locations south of Sunnyside Road. Results collected during monitoring events included:

- Depth below the top of the well;
- Top of well to the ground; and
- Water depth below ground.

The groundwater well monitoring results served to facilitate design details associated with road grading and depth of excavation prior to encountering groundwater, as well as to model stormwater management and to minimize potential impacts associated with the depletion of the groundwater table, which provides baseflow to watercourses during the drier, summer months.

8 HISTORICAL FIELD ASSESSMENT RESULTS

8.1 Aquatic and Riparian Habitats

A total of sixteen (16) watercourses were identified within the Anmore South site boundaries, north and south of Sunnyside Road between 2014 and 2023. Anticipated minimum setbacks were identified based on the municipal framework parameters for the Village of Anmore and are summarized in **Table 3**. The setbacks apply to the current, comprehensive watercourse survey, illustrated in **Figure 4**.

Based on the preliminary detailed RAPR assessment completed in 2019 for the southern portion of the site including Doctors Creek, Schoolhouse Creek North, and S-Trib 5, the Streamside Protection & Enhancement Areas (SPEAs) were calculated as being a minimum of 10 m from the High Water Mark (HWM) for identified watercourses noting that it excluded arborist and geotechnical considerations, which could result in modifications to the SPEAs.

Table 3. Identified Watercourses within Site Boundaries (2014 – 2023) with Associated Anticipated Minimum Watercourse Setbacks per the Preliminary Detailed Riparian Areas Protection Regulation (RAPR) Methodology.

Watercourse ID	Fish-bearing (Y)es, (N)o, (U)known	Municipality	Anticipated Minium Setback
Doctor's Creek main stem	Y	Anmore	10 m from High Water Mark
Doctor's Creek Tributary 1	U	Anmore	10 m from High Water Mark
Doctor's Creek Tributary 2	N	Anmore	10 m from High Water Mark
Doctor's Creek Tributary 3	N	Anmore	10 m from High Water Mark
Doctor's Creek Wetland	N	Anmore	15 m from High Water Mark
Schoolhouse Creek North main stem	Y	Anmore	10-15 m from Top-of-Bank[1]
Schoolhouse Creek Tributary 3	U	Anmore	10-15 m from Top-of-Bank[1]
Schoolhouse Creek Tributary 5	Y	Anmore	10-15 m from Top-of-Bank[1]
Schoolhouse Creek Tributary 5-2	N	Anmore	10 m from High Water Mark

Schoolhouse Creek Tributary 5-3	N	Anmore	10 m from High Water Mark
Schoolhouse Creek Tributary 5-4	N	Anmore	10 m from High Water Mark
Schoolhouse Creek Tributary 6	N	Anmore	10 m from High Water Mark
Schoolhouse Creek Tributary 7	N	Anmore	10 m from High Water Mark
Schoolhouse Creek Tributary 8	N	Anmore	10 m from High Water Mark
Schoolhouse Creek Tributary 9	N	Anmore	10 m from High Water Mark
Schoolhouse Creek Tributary 10 **Further assessment required**	U	Anmore	10 m from High Water Mark

1 – watercourse width varied significantly along the creek. Under RAR, the setback is based on average watercourse widths in 100 m intervals.

The detailed summary of select monitored watercourse attributes and their contributions to Schoolhouse Creek or Doctor's Creek as denoted per Section 7.2.1 are provided in **Table 4**.

Table 4. Watercourse Evaluation Framework Parameter Rankings.

ID	Permanence	Length	Hydraulic Inputs	Habitat Condition	Food / Nutrient Inputs	Impacted Areas	Flow Dynamics	Flow Contribution
S-Trib 5-4	Permanent	Short	Low-to-Moderate	Intact	Minor	None	Low - Moderate	Low - Moderate
S-Trib 6	Permanent	Moderate	Low-to-Moderate	Intact	Moderate	None	Low - Moderate	Low - Moderate
D-Trib 2	Ephemeral	Moderate	Low	Intact	Minor	None	Low	Low
D-Trib 4	Ephemeral	Short	Low	Intact	Minor	None	Low	Low

Figure 4. Site Watercourse Mapping / Survey Details as of June 2024.

In 2023, AquaTerra personnel assessed the aquatic habitat conditions and prospective stream crossings associated with the preliminary design layout, developed in consideration of environmental sensitivities. Prospective Schoolhouse Creek stream crossings – denoted as N1, N3, N4, and N5 (situated to the north of Sunnyside Road - refer to Section 9.3 for specific location details) were dry and were comprised predominantly of organic substrate. N2 was situated at the point of confluence of Doctors Creek and D-Trib-3 resulting in a wider crossing comprised of primarily of cobble, gravel, and sand substrate. Schoolhouse Creek North (N6) location had a cobble-gravel substrate, stream cover, and presence of Large Woody Debris (LWD). South of Sunnyside Road, survey results from Schoolhouse Creek North (S1) and S-Trib-5 (S2) included observations of step-pool morphology, boulder-cobble-gravel-sand substrate, and stream cover. Doctors Creek, at the prospective S3 stream crossing location, was comprised of low flows at the time of the assessment with dense stream cover and primarily gravel and sand substrate. A comprehensive summary of the results from stream crossing surveys completed between August 2023 and October 2023 are provided in **Appendix C**.

8.1.1 Fish

Minnow trapping results from the 2014 preliminary assessment included the capture of one (1) juvenile Coho Salmon (*Oncorhynchus kisutch*) (fry) within the Schoolhouse Creek North main stem and one (1) Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*) within Schoolhouse Creek – Tributary 3 (south of Sunnyside Rd.). A spawning Coho Salmon pair was observed within Tributary 5 (south of Sunnyside Rd.) near the confluence with the main stem to the south of the site.

The 2015 fish presence assessment resulted in numerous fish captures limited to the resident Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*), which is a provincially blue-listed (Special Concern) species. No fish were captured in the surveyed watercourses north of Sunnyside Road, although several Coastal Cutthroat Trout were captured immediately south of Sunnyside Road inhabiting the connected watercourses. The 2014 and 2015 fish presence survey results are illustrated in **Table 5.**

Table 5. Fish Capture Results from 2014 and 2015 Assessments.

Watercourse ID	Year	Fish Capture Results	Comments
Schoolhouse Creek North	2014	1 Coho Salmon	-
Schoolhouse Creek Tributary 3	2014	1 Cutthroat Trout	-
Doctor's Creek main stem	2015	5 Cutthroat Trout	-
Doctor's Creek Tributary 1	2015	No Captures	Gradient barrier near Sunnyside Road >15% to hanging culvert; otherwise, no other barriers observed. No captures north of Sunnyside Road.
Doctor's Creek Tributary 2	2015	No Trapping Conducted	Insufficient Water*
Doctor's Creek Tributary 3	2015	No Trapping Conducted	Insufficient Water*
Doctor's Creek Wetland	2015	No Trapping Conducted	Insufficient Water*
Schoolhouse Creek North main stem	2015	2 Cutthroat Trout	Perched culvert >0.6 m drop and potential gradient barrier at Sunnyside Road
Schoolhouse Creek Tributary 3	2015	4 Cutthroat Trout	-
Schoolhouse Creek Tributary 5	2015	2 Coho (adult spawning pair)	Perched culvert >0.6 m drop and potential gradient barrier at Sunnyside Road
Schoolhouse Creek Tributary 5-2	2015	No Trapping Conducted	Insufficient Water*
Schoolhouse Creek Tributary 5-3	2015	No Trapping Conducted	Insufficient Water*
Schoolhouse Creek Tributary 5-4	2015	No Captures	Perched culvert >0.6 m drop and potential gradient barrier at Sunnyside Road
Schoolhouse Creek Tributary 6	2015	No Trapping Conducted	Insufficient Water*
Schoolhouse Creek Tributary 7	2015	No Trapping Conducted	Insufficient Water*
Schoolhouse Creek Tributary 8	2015	No Trapping Conducted	Insufficient Water*

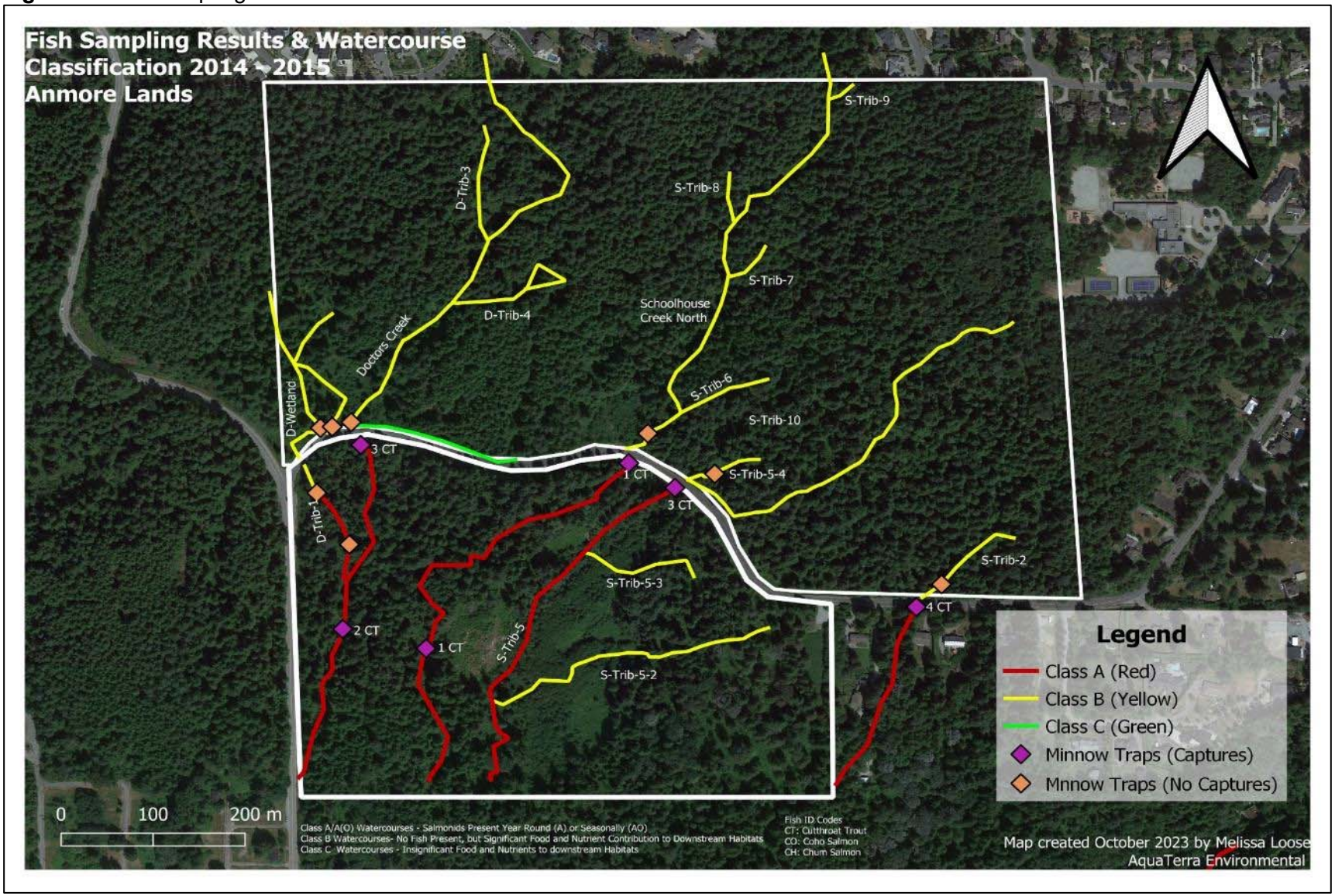
*Watercourses listed as 'Insufficient Water' are seasonal / ephemeral (i.e., dry >6 months of the year) based on monitoring observations. Insufficient indicates a depth that is typically <2-5 cm and is insufficient for passive trapping or active netting given the general absence of flowing and/or standing water.

Based on the 2014 and 2015 fish capture results, the watercourses within the project area were classified as either:

1) fish-bearing (red-coded);
2) non fish-bearing, but providing significant food and nutrient value to downstream fish populations (yellow-coded); or
3) non fish-bearing and insignificant food and nutrient value (green coded).

The watercourses to the north of Sunnyside Road were classified as non-fish bearing, although providing significant food and nutrient value to downstream fish population (yellow-coded) noting no fish captures or observed fish during the assessments to the north of Sunnyside Road. In some instances, perched culverts (i.e., culverts suspended >0.6 m above the water level in an incised reach) and/or steep grades (i.e., >15%) limited the potential for fish habitat to the north of Sunnyside Road, noting that 5% is often deemed to be the gradient where fish are able to navigate unimpeded. Immediately south of Sunnyside Road, watercourses were generally classified as fish bearing (red-coded). Watercourse classifications are illustrated in **Figure 5**. Watercourse conditions, locations and flow dynamics remained unchanged since the initial assessments 2014 and 2015 when re-evaluated in 2024.

Figure 5. Fish Sampling Results and Watercourse Classification 2015.

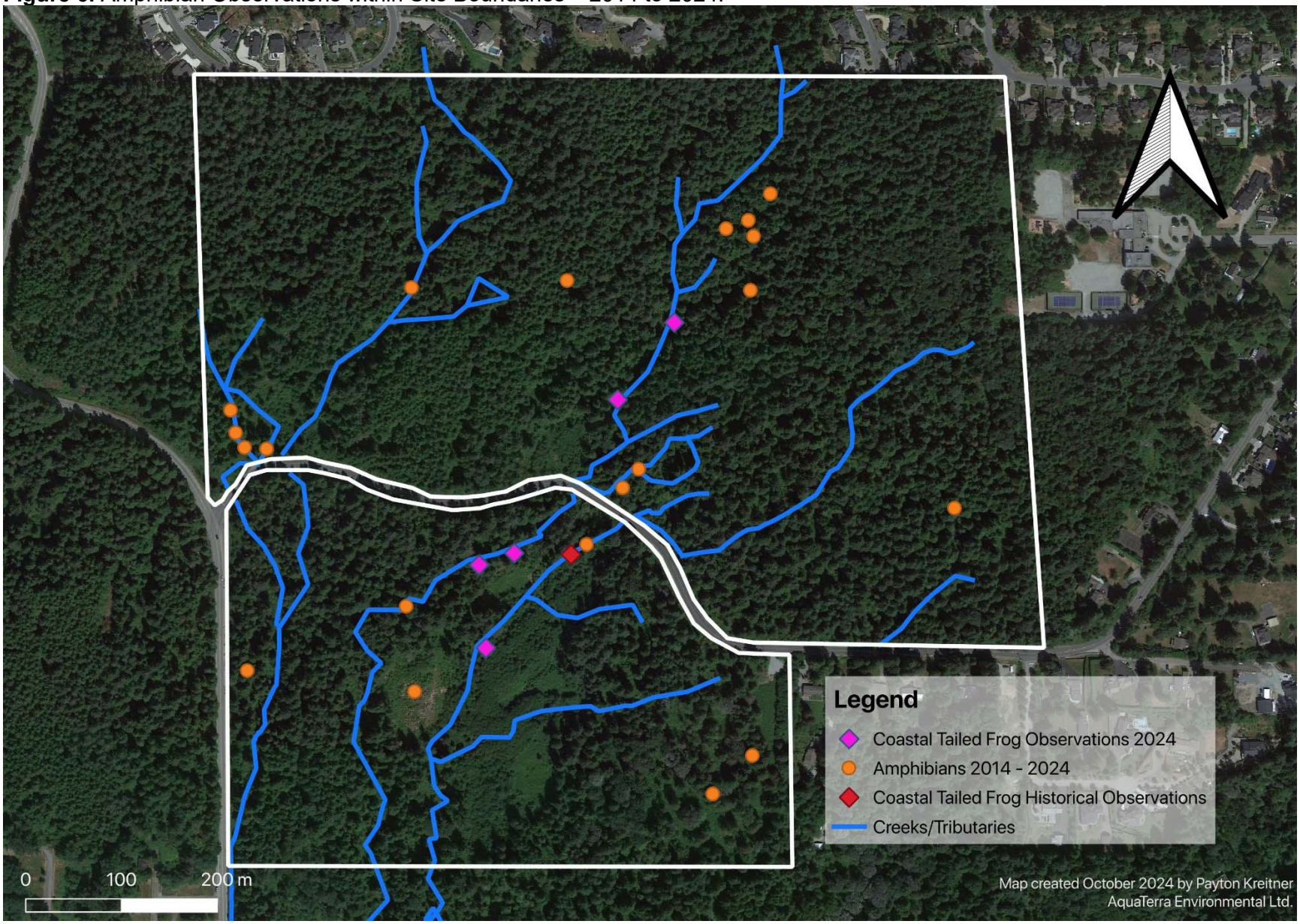


8.1.2 Amphibians

Amphibians observed during the field surveys included one (1) Northwestern Salamander (*Ambystoma gracile*), located in the Schoolhouse Creek North, south of Sunnyside Road, Northern Red-legged Frogs (*Rana aurora*) within Schoolhouse Creek, and Doctor's Creek corridors north and south of Sunnyside Road. Northern Red-legged Frogs are provincially blue-listed (Special Concern) and are designated as a species of 'Special Concern' federally. Coastal Tailed Frog (*Ascaphus truei*) surveys were conducted in the main stem of Schoolhouse Creek and S-Trib 5 in 2024. Five (5) tadpoles and one (1) adult Coastal Tailed Frog were identified by field staff. The Coastal Tailed Frog is listed as a species of "Special Concern" under the federal Species at Risk Act (SARA) and is also designated as a species of "Special Concern" under the British Columbia provincial Conservation Status. The Coastal Tailed Frog has been historically recorded within the Schoolhouse Creek North watershed, south of Sunnyside Road.

Amphibian observations, including Coastal Tailed Frog, are illustrated in **Figure 6**. Limited observations locally are likely associated with the inconspicuous nature of these species. Habitats within the site area may be utilized by a variety of common amphibian species including Pacific Tree Frog (*Pseudacris regilla*), Long-toed Salamander (*Ambystoma macrodactylum*), and Ensatina (*Ensatina eschscholtzii*).

Figure 6. Amphibian Observations within Site Boundaries – 2014 to 2024.



8.1.3 Terrestrial Habitats and Unique Habitat Features

Based on the 2014 preliminary assessment and the updated 2022 detailed terrestrial assessment, the site was dominated by mature second-growth / tertiary-growth coniferous forest with pockets of mature mixed forest, rocky outcroppings and riparian areas. The summary of terrestrial vegetation plot details north of Sunnyside Road collected in 2022 studies are provided in **Appendix D**. Four (4) different habitat types were identified including:

1) Mature second-growth / tertiary-growth coniferous forest;
2) Mixed forest;
3) Regenerating forest; and
4) Wetland.

Vegetation plots and various habitat types based on vegetation assessment details are illustrated in **Figure 7**, which is in general agreement with the preliminary habitat mapping completed by AquaTerra in 2014. An abundance of wildlife trees being actively utilized by wildlife and other potential wildlife trees were also documented. The majority of wildlife trees ranged from decay class 4 (advanced stages of decay) to 7 (trunk very soft; contributing coarse woody debris to the forest floor). Unique terrestrial habitat features including wildlife trees, rocky outcroppings and encountered tributaries are provided in **Figure 8**.

Figure 7. Mapped Habitat Types and Vegetation Plots north of Sunnyside Road (2022 & 2023).

Figure 8. Mapped Locations of Unique Habitat Features north of Sunnyside Road (Terrestrial Assessments 2014 - 2022).

Results from the terrestrial assessment to the south of Sunnyside Road completed in 2023 were similar to the area north of Sunnyside Road, with the exception of the former gun range site and large patches of invasive species (**Figure 9**). Terrestrial assessments also found a greater proportion of mature Western Redcedar amongst second-growth coniferous forest when compared to areas north of Sunnyside Road. Similar to the north, an abundance of wildlife trees ranging from decay class 4 to 7 were observed throughout the southern portion of the site and unique habitat features were documented (**Figure 10**). The summary of south terrestrial vegetation plot results are provided in **Appendix E**. Six (6) different habitat types were confirmed as noted during previous assessments, consisting of:

1) Mature second-growth / tertiary-growth coniferous forest;
2) Mixed forest;
3) Deciduous forest;
4) Regenerating forest;
5) Mixed regenerating forest / invasive species; and
6) Invasive species dominated areas.

Figure 9. Mapped Habitat Types and Vegetation Plots south of Sunnyside Road (Terrestrial Assessment 2023).

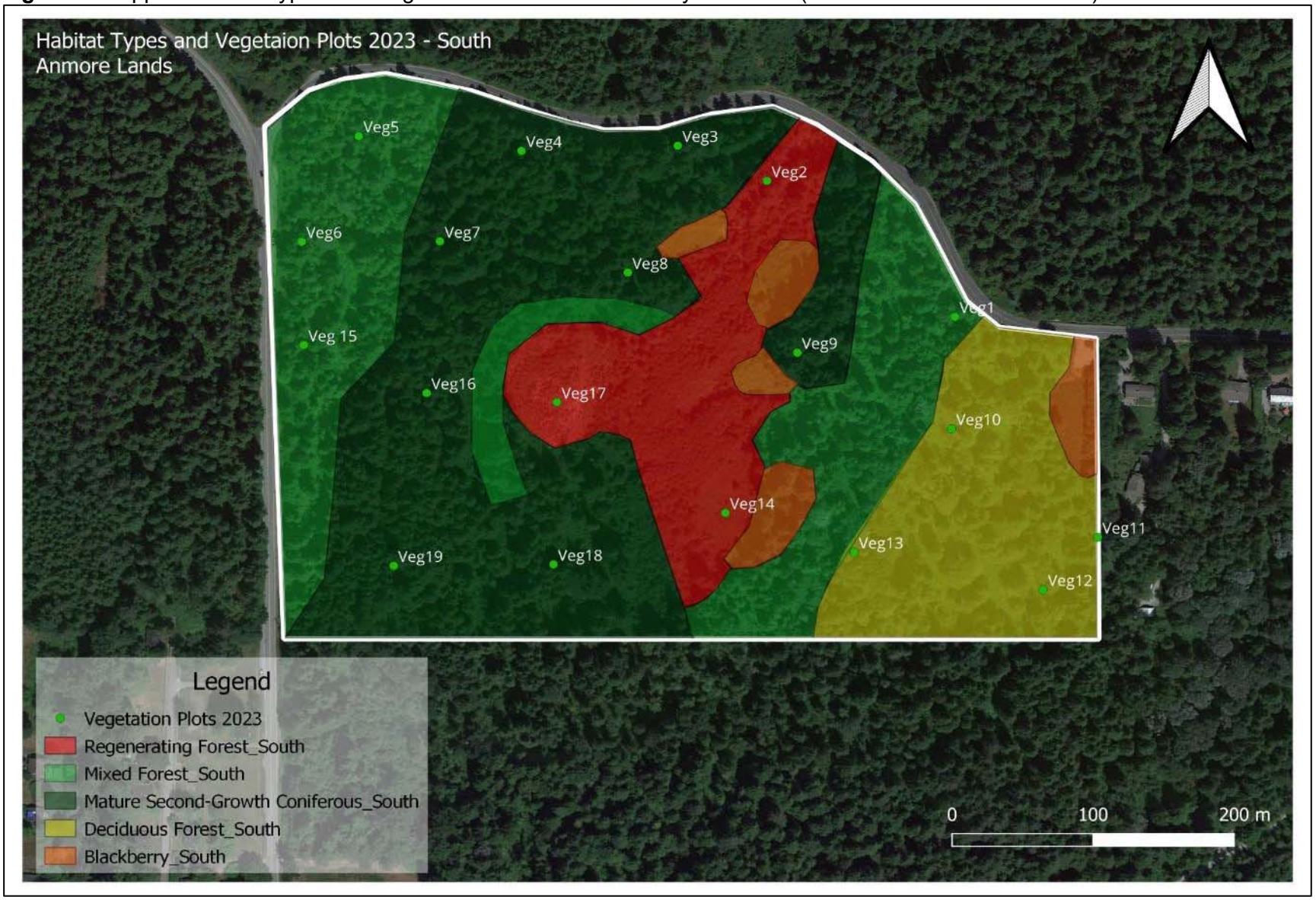


Figure 10. Historical Mapped Locations of Unique Habitat Features south of Sunnyside Road (Environmental Assessments 2014 - 2023).

8.1.4 Invasive Species

Invasive species were observed at multiple locations across the site during the assessments completed by AquaTerra. These species included Himalayan Blackberry (*Rubus armeniacus*), English Ivy (*Hedera helix*), English Holly (*Ilex aquifolium*), Scotch Broom (*Cytisus scoparius*), Japanese Knotweed (*Fallopia japonica*) – evidence of treatment, and Spotted Touch-me-not (*Impatiens glandulifera*). Areas with the highest densities of invasive species included the edges of roadways and areas adjacent to development.

The distribution of native species differed between the areas north and south of Sunnyside Road. In the northern site, small pockets of English Ivy, English Holly, and Spotted Touch-me-not were observed throughout the assessed portion of the site, although minimal observation of invasive species was observed through the mid-section of the site. In the south, an estimated 240 m^2 area of Japanese Knotweed is established at the western border near the intersection of 1st Ave and Sunnyside Road, and additional small patches of Japanese Knotweed were observed along the north edge of Sunnyside Road. Immediately south of the temporary gravel parking lot is a large patch of Himalayan Blackberry, and additional large patches exist within and along the borders of the former gun range site. Scotch broom is also present among juvenile Western Hemlock and Black Cottonwood at the center of the remediated site. In the absence of management and/or treatment, these invasive species will continue to impact and degrade the available habitats on-site. Spotted Touch-me-not is particularly detriment to aquatic ecosystems and can proliferate and spread rapidly in the absence of proper controls and management.

8.1.5 Terrestrial Wildlife

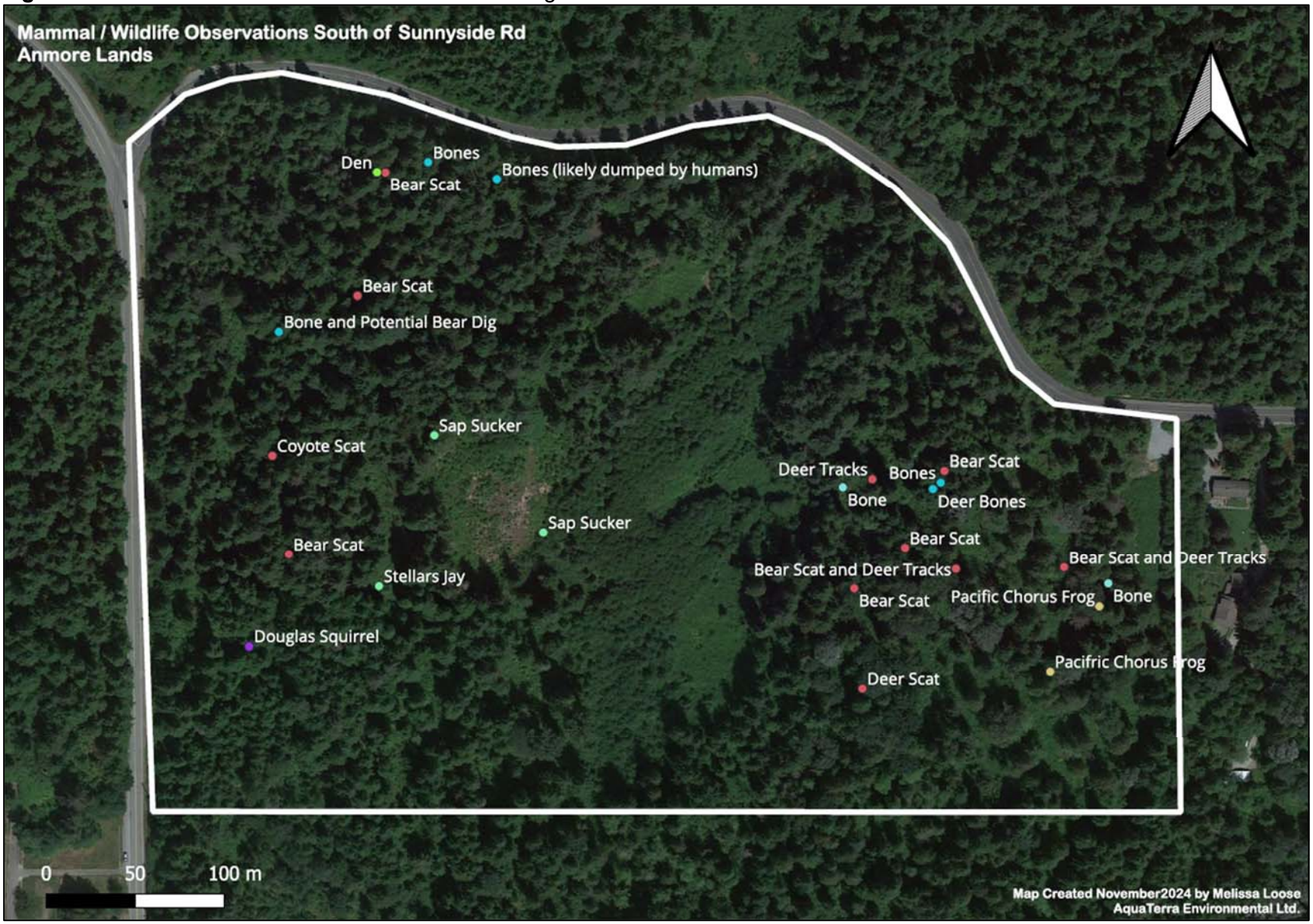
A summary of common and sensitive terrestrial wildlife or terrestrial wildlife sign (pellets, scat, tracks, etc.), if any, observed during the field surveys are outlined in the following sections.

8.1.5.1 Mammals

Direct mammal observations were limited to the Douglas Squirrel (*Tamiasciurus douglasii*), Black-tailed Deer (*Odocoileus hemionus* ssp. *columbianus*), and American Black Bear (*Ursus americanus*). Indirect mammal observations included Raccoon (*Procyon lotor*) scat and tracks, Coyote (*Canis latrans*) scat, Black-tailed Deer pellets, and tracks, and Black-bear scat and tracks. Multiple kill sites with feathers and bones were observed indicating the presence of a carnivorous mammal(s). Observations are illustrated in **Figure 11** & **Figure 12** for areas north and south of Sunnyside Road, respectively.

Figure 11. 2014 - 2024 Mammal Observations Including Direct and Indirect Observations – North.

Figure 12. 2014 - 2024 Mammal Observations Including Direct and Indirect Observations – South.



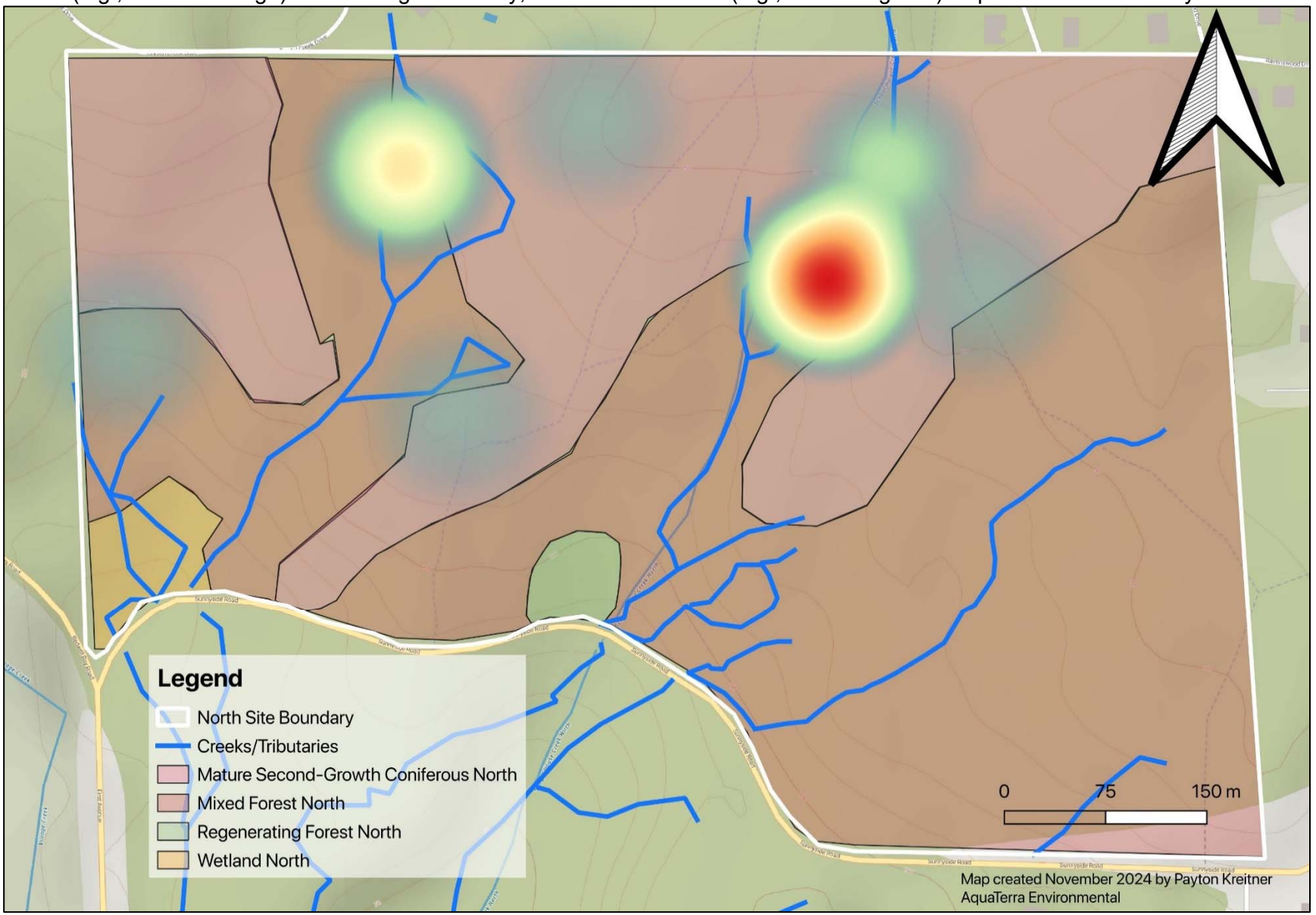
8.1.5.2 Wildlife Cameras

Wildlife cameras captured a total of five (5) American Black Bears (*Ursus americanus*), eight (8) adult Black-tailed Deer (*Odocoileus hemionus*) and three (3) fawns, and one (1) Douglas Squirrel (*Tamiasciurus douglasii*). **Figure 13** illustrates camera locations with arrows indicating approximate camera aspect. To highlight frequency and intensity of wildlife activity, a usage intensity map was generated from wildlife camera data collected (**Figure 14**). The intensity map was developed based on the number of detections during the cameras' deployment period. Cameras 2 and 5 recorded three (3) detections each - the largest number. In contrast, Camera 4 recorded two (2) detections, while Cameras 1, 3, 7, and 9 each recorded one (1) detection. Cameras 6 and 8 resulted in null (0) detections. The usage intensity map revealed a notable pattern of higher wildlife activity in riparian zones relative to the mixed forest vegetation type and was used to contribute to the guiding of the layout of the proposed development. This trend suggested that riparian zones serve as key wildlife corridor habitats. A detailed summary of captures with corresponding dates and times of captures is provided in **Appendix G** and representative photographs from the wildlife cameras are provided in **Appendix H.**

Due to seasonal timing constraints, the parcel south of Sunnyside Road was not assessed but will be evaluated in the future as development design details shift to future phases.

Figure 13. Wildlife Camera Placement and Aspect and North of Sunnyside Road.

Figure 14. Wildlife Usage Intensity Map Generated from Wildlife Camera Data illustrating Frequency of Wildlife Activity. Warmer Colors (e.g., red and orange) Indicate Higher Activity, while Cooler Colors (e.g., blue and green) Represent Lower Activity.



8.1.5.3 Birds

Bird observations were documented over the course of the field assessments between 2014 to 2024 consisted of the following species:

1. Northwestern Crow (*Corvus caurinus*);
2. American Robin (*Turdus migratorius*);
3. Bald Eagle (*Haliaeetus leucocephalus*);
4. Black-capped Chickadee (*Poecile atricapillus*);
5. Brown Creeper (*Certhia americana*);
6. Cedar Waxwing (*Bombycilla cedrorum*);
7. Chestnut-backed Chickadee (*Poecile rufescens*);
8. Common Raven (*Corvus corax*);
9. Dark-eyed Junco (*Junco hyemalis*);
10. Downy Woodpecker (*Picoides pubescens*);
11. Golden-crowned Kinglet (*Regulus satrapa*);
12. Hairy Woodpecker (*Picoides villuosus*);
13. Northern Flicker (*Colaptes auratus*);
14. Olive-sided Flycatcher (*Contopus cooperi);* Pacific-slope Flycatcher (*Empidonax difficilis*);
15. Pacific Wren (*Troglodytes pacificus*);
16. Pileated Woodpecker (*Dryocopus pileatus*);
17. Purple Finch (*Haemorhous purpureus*);
18. Red-breasted Nuthatch (*Sitta canadensis*);
19. Red-breasted Sapsucker (*Sphyrapicus ruber*);
20. Red Crossbill (*Loxia curvirostra*);
21. Rufous Hummingbird (*Selasphorus rufus*);
22. Song Sparrow (*Melospiza melodia*);
23. Spotted Towhee (*Pipilo maculatus*);
24. Steller's Jay (*Cyanocitta stelleri*);
25. Swainson’s Thrush (*Catharus ustulatus*);
26. Townsends Warbler (*Setophaga townsendi*);
27. Warbling Vireo (*Vireo gilvus*);
28. Wilson’s Warbler (*Cardellina pusilla*); and
29. Owl (sign; pellets).

Bird observations were collected during the months of November 2014, June 2022, between August 2023 - October 2023, and between July – September 2024. The early – mid-summer timing of the June assessment, inside of the active nesting season, is anticipated to be the primary reason for the abundant bird activity observed during the field assessment. AquaTerra notes that Pileated Woodpecker individuals and nests are now protected year-round under the updated (2022) *Migratory Birds Convention Act,* which will necessitate nest assessments and up to 3 years of monitoring prior to being eligible for removal (if inactive during this period)[3]. Owl pellets were observed near the southern site boundary. Based on the large, undisturbed, second growth and mixed forest with abundant snags, this site is anticipated to be regularly utilized by numerous bird species for nesting and foraging. One (1) raptor nest was observed in the northeastern site boundary in 2014. No raptor nests were identified in 2022 and a follow up assessment focusing on the status of the raptors nest identified in 2014 was conducted; however, no raptors' nests were observed during the follow up assessment.

8.1.5.4 Reptiles

Reptile observations were limited to the yellow-listed (Not-at-Risk) Northern Alligator Lizard (*Elgaria coerulea*) on the eastern site boundaries north of Sunnyside Road. Limited observations locally are likely associated with the inconspicuous nature of these species. Habitats within the site area may be utilized by common reptile species including Common Garter Snake (*Thamnophis sirtalis*), and Northwestern Garter Snake (*Thamnophis ordinoides*).

8.1.5.5 Species-at-Risk

Observed species-at-risk during the field assessments between 2014 and 2024 included Coastal Cutthroat Trout (*Oncorhynchus clarkii clarkii*; provincially blue-listed), Northern Red-legged Frog (*Rana aurora;* provincially blue-listed; federally listed – Special Concern), Coastal Tailed Frog (*Ascaphus truei;* provincially yellow-listed, federally listed – Special Concern), and the Olive-sided Flycatcher (*Contopus cooperi;* federally listed – Special Concern). Pacific Water Shrew (*Sorex bendirii*) has been historically documented in connecting and nearby watercourses. A ranking of potential for provincially and federally listed rare and endangered species is provided in **Table 6**.

[3] https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/fact-sheet-nest-protection-under-mbr-2022.html

Table 6. Ranking potential for Federally-listed Rare and Endangered Species.

Common and Scientific Names	Status[2]	Potential Occurrence Ranking	Rationale
MAMMALS			
Pacific Water Shrew *Sorex bendirii*	Red; EN	**CONFIRMED (HISTORICAL RECORD)**	The Pacific Water Shrew requires riparian habitat including but not limited to dense wet forests, marshes, streams, or bogs. Due to the excess of water resources and riparian habitat on site, there is potential for suitable habitat for this species. There is a reported historical record for this species in the watershed to the south of the site.
Snowshoe Hare *Lupus americanus washingtonii*	Red	**HIGH**	The Snowshoe Hare is often associated with coniferous and mixed forest stands with a dense understory. Given the coniferous and mixed forest stands, and patches of dense understory, some suitable habitat lies within site boundaries. Unconfirmed observations of this subspecies near the Burrard inlet have been documented, although there have been minimal observations over the years in the Lower Mainland. Snowshoe Hare have been observed in the region but not specifically on-site.
Trowbridge's Shrew *Sorex trowbridgii*	Blue	**HIGH**	This shrew species is more terrestrial relative to the Pacific Water Shrew, although it does frequent water. Due to the prevalence of coniferous and mixed forest, there is a potential for this species to occur.
Townsend's Mole *Scapanus townsendii*	Red; EN	**LOW**	The Townsends's Mole generally inhabits more open canopy habitats with riparian areas nearby. Suitable habitat may be present within the site in specific areas although minimal open canopy habitat was observed throughout the site. Records for this species are limited to areas in the Fraser Valley, south of the Fraser River.
BIRDS			
Band-tailed Pigeon *Patagioenas fasciata*	Blue	**MODERATE - HIGH**	Prevalence of suitable berries present on-site and some coniferous forests provide favorable nesting potential.
Barn Swallow *Hirundo rustica*	Blue, TH	**LOW**	Generally, forages and nests in open areas. Minimal open areas suitable for nesting results in low probability of encountering this species.
Common Nighthawk *Chordeiles minor*	TH	**MODERATE**	Utilizes a wide range of habitats including mountains and plains in open and semi-open habitats. Specific habitats include open forests, savannah, grasslands, fields, and areas around cities and towns. Given the variable habitat conditions, there is a potential for this species to occur.
Great Blue Heron *Ardea herodias* ssp. *Fannini*	Blue; SC	**LOW - MODERATE**	Although watercourse and riparian areas are present on-site, the predominantly closed canopy will limit use by this species.

Table 6. Con't.

Common and Scientific Names	Status[2]	Potential Occurrence Ranking	Rationale
Olive-Sided Flycatcher *Contopus cooperi*	SC	**CONFIRMED**	Suitable foraging and nesting habitat exist within the site, likely transitory en-route to more suitable breeding habitat.
Western Screech-Owl *Megascops kennicottii* ssp. *Kennicottii*	Blue; SC	**MODERATE**	May occasionally roost and forage in forested areas. Site of a sufficient size to support this species. Preference given to larger tracts of contiguous, undisturbed areas away from developed areas.
AMPHIBIANS AND REPTILES			
Northern Red-legged Frog *Rana aurora*	Blue; SC	**CONFIRMED**	This species is directly associated with streams, ponds and marshes although have been identified away from water sources in moist forests. Suitable habitat exists within the site area. Historical AquaTerra records nearby.
Western Toad *Anaxyrus boreas*	SC	**MODERATE**	Suitable foraging, dispersal and breeding habitat exists within the site area.
Coastal Tailed Frog *Ascaphus truei*	SC	**CONFIRMED**	Permanent watercourse on-site, but may convey insufficient flows year-round and average temperature / substrate may preclude this species.
Northern Rubber Boa *Charina bottae*	SC	**LOW**	Generally utilize rocky outcrop areas which are not prevalent within the site boundaries.
INVERTEBRATES			
Dun Skipper *Euphyes vestries*	Blue; TH	**LOW**	Utilizes a wide variety of habitats including wetlands, fields, meadows, right-of-ways, etc.
Monarch *Danaus plexippus*	Blue; SC	**LOW - MODERATE**	Has been observed in low moist spots in fields, meadows, right of ways, etc., but typically prefers large tracts of undisturbed, natural habitat. Anthropogenic activities (habitat degradation, fragmentation and introduction of invasive species) are thought to be the primary reason for this species decline.
Oregon Forestsnail *Allogona townsendiana*	Red; EN	**LOW**	Some suitable habitat (Big-leaf Maple) within the site area. Did not identify Stinging Nettle during the field survey, which is commonly found alongside forestsnails. This species is generally found in the Fraser Valley to the south of the Fraser River.
Threaded Vertigo *Nearctula* sp.	Red, SC	**MODERATE**	Often found in moist deciduous and mixed wood forests at low elevations in areas dominated by Bigleaf Maple and ferns. Due to the lack of Bigleaf maple dominant forests, habitat is generally unsuitable.

Table 6. Con't.

Common and Scientific Names	Status[2]	Potential Occurrence Ranking	Rationale
PLANTS			
Streambank Lupine *Lupinus rivularis*	Red, EN	**LOW**	Often found along riverbanks and within open woods including natural riverbank habitats and gravelly railway beds and dykes. Aquatic habitats are generally unsuitable.
Vancouver Island Beggarticks *Bidens amplissima*	Red; EN	**LOW - MODERATE**	Often found in wetland and shoreline areas including ditches, wet fields and marshes as well as old riverbeds, pond margins, streamside and river edges. Marginally suitable habitat on-site.
Washington Springbeauty *Claytonia washingtoniana*	Red	**LOW - MODERATE**	Moist to mesic mossy rock outcrops and forests in the lowland and montane zones. Minimal rocky outcrop areas are present on site.
MOSSES			
Poor Pocket Moss *Fissidens pauperculus*	Red, EN	**LOW - MODERATE**	Found on bare, moist soil banks often growing with *Fissidens bryoides*. Observed on silty damp slopes or outcrops that are wet in winter and dry in summer shaded by Douglas-fir and Western Hemlock. Some suitable areas on-site.
Roell's Botherella *Brotherella roellii*	Red	**LOW – MODERATE**	Forms mats on rotten logs, stumps and bases of trees in cool-to-moist mixed deciduous and conifer forests at low elevations along valley margins. Some suitable areas on-site.

[2] Federal status is SC = Special Concern; TH = Threatened; EN = Endangered

8.1.6 Groundwater Monitoring

Groundwater well water monitoring data has been collected and documented internally by AquaTerra and was issued to Icona Properties to facilitate development, design parameters, and stormwater management. Depth to groundwater ranged varied widely across the site, in some cases being dry to full well depth (3+ m) to being at ground surface during prolonged, heavy rainfall events. Typical water depth range across the site was approximately 0.5 – 1.5 m Below Ground Surface (BGS). The specific interpretation or design elements of the groundwater monitoring results are beyond the scope of this EIA.

9 ENVIRONMENTAL IMPACT ASSESSMENT

Valued Ecosystem Components (VECs) were identified and are discussed in the following sections. VECs are those attributes in the environment that are of particular importance due to their physical, environmental and economic attributes. Each VEC was subjected to further analyses serving to quantify potential adverse impacts, formulate site-specific mitigation measures and assess for residual effects. The relative significance of anticipated project activities on each VEC was evaluated using the following criteria (EOA 2013):

- Context – current and future sensitivity and resilience of the VEC to change due to the project (low, moderate or high sensitivity)
- Magnitude - the effects of the impact on the VEC (low, medium or high impact)
- Extent - area/volume covered, distribution (immediate, local or regional area)
- Duration of impacts - short or long term
- Reversibility/irreversibility - extent of recovery and length of time required to recover
- Frequency; intermittent or continuous

Of note, the evaluation of impacts were evaluated prior to the development and implementation of mitigation measures, which have also been provided in the following sections as a strategy to offset the significance and associated effects of potential impacts.

9.1 Anmore South Preferred Plan – Development Overview and Environmental Design Considerations

The potential VECs were then assessed to determine the applicability to the project based on proposed design for the Anmore South Preferred Plan (**Figure 15)**. Following discussion with the Village of Anmore council and public input sessions, the conceptual 'Preferred Plan' was further developed to include a lower-density development with a total of 2,202 residences inclusive of single-family homes, townhomes, duplexes, and apartment complexes with 4,500 residents projected in the area over a 20 year phased build out.

A total of 22-hectares (35%) of the land has been proposed to be dedicated to Natural Protection Areas, with 11-hectares (18%) retained as riparian area buffer zones, and an additional, 4-hectares (7%) proposed for neighborhood parks (**Figure 16**).

Public roadways were designed to maintain gradient below 12% avoiding and protecting steep slopes, and to minimize the number of stream crossings. Council expressed interest in integrating a road system that allows for connectivity with the 'Crystal Creek' neighborhood directly north of the development which has been implemented into the design.

The greenway and trail network, including the 4 m wide multiuse greenway was developed to link public destinations with walkways as an attempt to minimize car use during the operational phase.

Specific design elements that has been incorporated into the design by the project team consist of the following:

<u>Aquatic Areas / Fish and Fish Habitat Design Elements</u>

- The plan avoids riparian areas with the exception of proposed crossings.
- Rainwater management plan including bioswales within street cross sections to manage both quantity and quality of rainwater.
- The plan provides a 'Conservation Framework', which expands the amount of retained forest in conjunction with the riparian areas as well as buffers to existing neighbourhoods (35% of total area). This structures the neighbourhood towards ensuring the following:

    1. protecting the functional integrity of the natural systems;
    2. enhancing recreational opportunities for outdoor activities; and

3. preserving the natural features that define the area's landscape character.

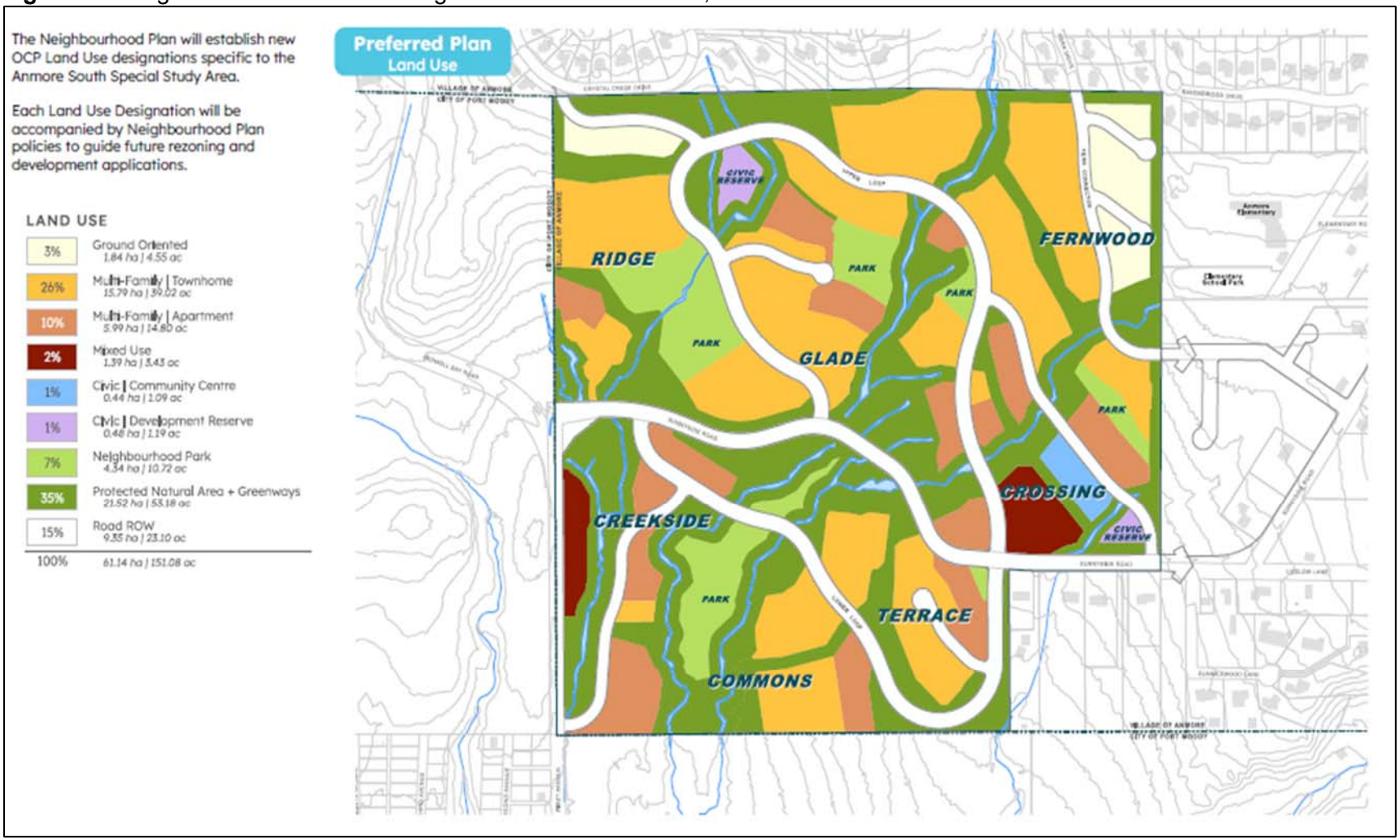
- Comparison with existing subdivision plan.
    - The Anmore South Neighbourhood Plan more than doubles the total lands dedicated to green space in comparison to the current approved subdivision plan using RS-1 zoning (42% vs 20%).
    - The Anmore South Neighbourhood Plan is subject to higher development standards and will ensure improved environmental outcomes than what is required.

Terrestrial Areas / Wildlife Design Elements

- Development is limited to a clustered form as opposed to clear cutting, which reduces tree and habitat loss.
- Design of neighbourhood works with hillside to soils and local geology.
- Underpass / oversized crossings providing wildlife / movement corridors.
- Proposed public street cross section with planted and tree lined boulevards as part of urban canopy response, and lighting that adheres to dark sky lighting principles.
- Forested buffered areas retained along existing neighbourhoods and existing roads.
- Phased development – limits development to this area where environmental protections are put in place and subject to a comprehensive public planning and development management.

Figure 15. Icona Properties – Anmore South, 'Preferred Plan'.

Figure 16. Neighborhood Land Use Designations – Anmore South, 'Preferred Plan'.



The applicable VECs that have been deemed applicable to the project consist of the following:

- Terrestrial Wildlife, Sensitive Species and Associated Terrestrial Habitats – Section 9.2;
- Fish and Fish Habitat – Section 9.3;
- Surface Water Quality and Storm Water Run-off – Section 9.4;
- Soils and Local Geology – Section 9.5;
- Air Quality – Section 9.6; and
- Noise and Light – Section 9.7.

The above-mentioned VECs are discussed in detail in the following sections.

9.2 Terrestrial Wildlife, Sensitive Species, and Associated Terrestrial Habitats

The footprint of the development is situated within private property owned by Icona Properties in the Village of Anmore. The 60-hectare property is primarily undeveloped, second and tertiary growth forest, and is bisected by Sunnyside Road. The area to the north of Sunnyside Road constitutes approximately 40 hectares and the area to the south of Sunnyside Road constitutes approximately 20 hectares. The southern area also has been historically impacted by a former shooting range. Suitable habitats for a variety of species groups are present throughout the site, including invertebrates, mammals, birds, amphibians and reptiles, and native plant communities. Specific potential impacts, mitigation measures, and residual effects relating to each species or species group are discussed in the following sections.

9.2.1 Potential Impacts to Invertebrates

Potential impacts to common invertebrates, including a barrier to movement, habitat loss and mortality, will occur within the development footprint; however, these invertebrates are generally abundant in adjacent areas and are not anticipated to result in local population declines provided mitigation measures can be implemented. For example, due to limited wildflower presence, native flowering shrubs and open areas for pollination, pollinator utilization may decline throughout the site in the absence of mitigation. Flying invertebrates, such as bees and wasps (Order *Hymenoptera*), dragonflies and damselflies (Order *Odonata*), butterflies and moths (Order *Lepidoptera*), are highly mobile and will avoid the active construction area during construction works. A reduction in foraging habitat will occur for invertebrates during the clearing and grubbing operations. During the operational phase, vehicular collisions with flying invertebrates will likely

increase. Invertebrates play an important role in the foodchain as forage for higher trophic levels and are a key indicator for ecosystem health.

9.2.2 Potential Impacts to Amphibians and Reptiles

Amphibians utilizing the project area include Northern Red-legged Frog, Coastal Tailed Frog, Western Toad, Long-toed Salamander, Northwestern Salamander, Rough-skinned Newt, and Pacific Chorus Frog. Reptile species with potential to utilize the project area are limited to Common Garter Snake and Western Terrestrial Garter Snake. These species are anticipated to be strongly associated with riparian areas, wetlands, rocky outcrops and the former shooting range on the south side of Sunnyside Road. Fragmentation can impact amphibian and reptile populations by isolating migration corridors and limiting wildlife movement.

Additionally, changes in flows and discharges can impact breeding and foraging habitats. Blasting of the rocky outcroppings along with clearing and culverting of creek crossings may result in loss in habitat for local amphibians and reptiles, as well as direct mortality.

In the absence of mitigation, impacts to water quality as a result of sedimentation or spills may adversely affect the local populations. Similarly, dispersing adults may enter the active construction area resulting in direct mortality without the implementation of mitigation measures to isolate associated habitat areas.

9.2.3 Potential Impacts to Birds

Foraging habitat will be lost for common bird species utilizing the soils and vegetated portions of the proposed development. Additionally valuable nesting habitat will be lost for songbirds and potential raptors as part of clearing mature forested stands as well as a reduction in wildlife trees / snags.

Construction activities (e.g., clearing, grubbing, blasting etc.) will result in sensory disturbance to birds nesting and utilizing undisturbed adjacent habitats, particularly during the active nesting period (March 1 – August 31) and should be considered when scheduling construction activities. Certain small birds readily habituate to human noise and activity; therefore, the reduced habitat effectiveness from sensory disturbance for some species is considered to be ‘low’ to ‘moderate’ and will readily relocate to adjacent areas during construction. However, some larger bird species

such as raptors are more susceptible to sensory disturbance (MFLNRO 2013); therefore, construction activities will be limited to appropriate timing to coincide with raptor nesting windows, and raptor nest surveys will be completed to reduce disturbance to nesting raptors. During the operational phase, road use is anticipated to result in an increase in bird / vehicle collisions. As such, mitigation, such as a lower speed limit, is recommended to reduce direct mortality rate.

9.2.4 Potential Impacts to Mammals

Potential impacts to mammals include the following:

- Bear / Human and Garbage interactions;
- Coyote / Human and Garbage interactions;
- Deer / Human interactions;
- Domesticated pet interactions;
- Loss of small and large mammal foraging and hunting habitat;
- Loss of movement corridors through the site;
- Loss of denning habitat; and
- Mammal sensory disturbance.

The significance of localized impacts of habitat loss is considered to be low-to-moderate for smaller mammals such as Douglas Squirrel, Coast Mole, and Townsend's Vole, which are likely to occupy the site. These species are common in the area and abundant habitat is available to support them in adjacent areas. During the construction phase, active work areas will be generally avoided by larger mammals; however, in the absence of mitigation, wildlife are anticipated to enter active work areas following periods of inactivity. Short-term sensory disturbance (i.e., during blasting activities, if any) may occur, which is also anticipated to result in avoidance. The impact on large mammals such as Black-tailed Deer, Black Bear, Coyote, Lynx, Bobcat and Cougar, likely to utilize the area as a wildlife corridor and foraging, is of moderate significance on a local scale as the development of roads and watercourse crossings will result in an increase in wildlife interactions and a partial barrier to movement in the absence of appropriate mitigation.

9.2.5 Potential Impacts to Species at Risk

9.2.5.1 Pacific Water Shrew

Historical documentation of the Pacific Water Shrew has been identified within connecting watercourses in the vicinity of the site boundaries. Indirect impacts to potentially occurring Pacific

Water Shrew in the absence of mitigation may include a reduction in water quality (i.e., sedimentation, spills etc.), which may affect foraging ability and survival. Incidental mortality may also occur if individuals venture into the active construction area without the implementation of mitigation measures to isolate associated habitat areas. Changes in the hydrological regime of watercourses, if groundwater/interflow and stormwater run-off are not effectively managed, also have the potential to affect watercourse function and thereby impact utilization by this species. Movement through the site may be impacted if watercourse crossings do not consider movement of small mammals, resulting in habitat fragmentation.

9.2.5.2 Northern Red-legged Frog

Potential impacts largely mirror those described in Section 9.2.5.1 for Pacific Water Shrew as habitat utilization is similar; however, given the limited mobility of larval individuals and permeable skin of adults, the introduction of deleterious substances into water bodies adjacent to the alignment footprint as a result of sedimentation or spills has the potential to directly impact local Northern Red-legged Frog populations if adequate mitigation measures are implemented.

9.2.5.3 Cutthroat Trout

Refer to Section 9.3.1 for details.

9.2.5.4 Olive-sided Flycatcher

Historical observations of the Olive-sided Flycatcher within site boundaries during field assessments indicate that the species is present within the area. Development may result in potential impacts to the species that inhabit the area. Loss of foraging and nesting habitat due to clearing and grubbing may occur, although with similar habitat in the immediate area, minor impacts are anticipated provided appropriate mitigation measures are implemented. For further details regarding potential impacts to birds, refer to Section 9.2.3.

9.2.5.5 Coastal Tailed Frog

The Coastal Tailed Frog has been historically documented within site boundaries. The presence of both juveniles and adults was confirmed during a survey conducted in 2024. Potential impacts will be similar to those of the Pacific Water Shrew and Northern Red-legged Frog due to the similar habitat utilization and life stages. Of particular importance for this species is the continued flow of cool water year-round and mirroring flows to pre-development levels in watercourses where Coastal Tailed Frogs are confirmed and anticipated to be present. Changes in hydrological

regime, flow pattern, and/or temperature can result in local extirpation of this species. Appropriate mitigation measures will be critical to ensure the minimization of adverse impacts to the species. The Coastal Tailed Frog is highly dependent on riparian areas as these habitats provide essential resources for breeding, feeding, and shelter.

9.2.6 Terrestrial Wildlife, Sensitive Species and Associated Terrestrial Habitat – Summary of Potential Impacts

A general summary of the significance of potential impacts on Terrestrial Wildlife, Sensitive Species, and Associated Habitats (prior to implementation of mitigation measures) is provided in **Table 7**.

Table 7. Relative Significance of the Potential Impacts on Terrestrial Wildlife, Sensitive Species, and Associated Habitats.

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Reversibility**	**Frequency**
Construction Phase							
Clearing and Grubbing	moderate	low-high	local	short-term	immediate	irreversible	intermittent
Soil Stripping	moderate	low-high	local	short-term	immediate	irreversible	intermittent
Cut Excavation and Rock Excavation / Blasting	low	medium	local	short-term	immediate	irreversible	intermittent
Road Pre-construction and Fill Placement	low	high	local	short-term	immediate	irreversible	continuous
Road Construction / Retrofit and Installation of Culverts	moderate	moderate	local	short-term	immediate/ delayed	irreversible	continuous
Utility, Fencing and Infrastructure Access Construction	low	low	local	short-term	immediate	reversible	continuous
Road Paving	low	low	local	short-term	immediate	irreversible	continuous
Development / construction	moderate	moderate	local	long-term	immediate	irreversible	continuous

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Reversibility**	**Frequency**
Operational Phase							
Active Residential Community	moderate	medium	local / regional	long-term	delayed	irreversible	continuous
Safety / Environmental and Human Health							
Construction Equipment Spills	moderate	low	local	short-term	immediate/ delayed	reversible	intermittent
Construction Debris	low	low	immediate area	short-term	immediate/ delayed	reversible	intermittent
Accidents & Malfunctions	low	low	immediate area/ local	short-term	immediate/ delayed	reversible	intermittent

n/a - not applicable

Although impacts to the immediate and local areas will occur, impacts on a regional level are considered to be of low significance. Impacts to wildlife, sensitive species and associated habitats can be effectively mitigated through the implementation of applicable mitigation measures, outlined in the following sections.

9.2.7 Mitigation Measures for Invertebrates

The strategic layout of the development will retain 35% of land dedicated to Natural Protection Areas maintaining a higher proportion of natural areas to reduce habitat loss relative to default land dedication requirements (5%). Due to the type of the development, landscaping is likely to occur in both public areas and within private residences, which is anticipated to offset potential impacts with a potential benefit certain pollinating species. These areas and landscaping composition with a focus on wildflower mixes and pollinator meadows, will be incorporated into the detailed design stage. Additionally, the development has been designed to limit stream crossings, reducing disruption to riparian habitats and aquatic invertebrates, which also limits the disturbance to water quality and flow regimes, which are important for invertebrate species that depend on clean, flowing water. Appropriate stream crossing structures will be recommended and rationalized prior to final design plans to ensure the integrity of the watercourses is maintained supporting aquatic invertebrate species.

General mitigation measures to be protective of invertebrate populations are provided below:

- Maximize the retention of forested and undisturbed areas;
- Avoid altering natural drainage patterns. Retention of drainage courses and groundwater levels will play a key role in maintaining moist forest floor conditions and herbaceous vegetation required by many invertebrate species;
- Limit habitat disruption activities within riparian areas. Specifically, retain coarse woody debris, including large-diameter downed logs, on the forest floor which provide valuable habitat for a variety of invertebrates; and
- Identify areas for habitat enhancement, introducing native species through landscaping, adopting green roofs, identifying areas for pollinator meadows and mixed use open space, which are to be incorporated into the detailed design stage in consultation with the Project Biologist.

9.2.8 Mitigation Measures for Amphibians and Reptiles

Expanded watercourse setback areas have been incorporated into the overall project design, with 18% as retained riparian areas, increasing the preservation of suitable habitat for amphibians and reptiles well above default requirements. Habitat connectivity has been considered, serving to reduce the potential for habitat fragmentation by retaining corridors north-south, and east-west to allow migration paths for populations.

The roadway was strategically placed to minimize stream crossings and avoid steep slopes to maintain the 12% gradient requirement for public roadways. This design further reduces barriers that may impede amphibian and reptile movement and retains suitable habitat on rocky outcrops, where feasible, maintaining essential habitat.

The design layout incorporates a variety of Best Management Practices (BMPs) and has been developed to retain a significant amount of land (35%) as Protected Natural Areas. The design retains riparian buffers, with 18% of the land specifically designated as riparian zones within the 35% Natural Protection Area, preserving habitat for both amphibians and reptiles, particularly those dependent on riparian environments. The development has been planned strategically to divert roadways and built structures away from key habitat areas, reducing disturbance and fragmentation that could impede amphibian migration and limit access to breeding or feeding

sites. Based on discussions with the developer, appropriate stream crossings (i.e., open box culverts, clear span bridges etc.) are planned to facilitate the safe movement of amphibians and reptiles, ensuring they can migrate effectively minimizing direct mortality. Crossing designs and selection will be determined in consultation with the Project Biologist at the detailed design stage.

Applicable Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in BC (Ovaska, 2024) and supplementary recommendations are provided below:

- Retain CWD including downed logs and stumps, along and within riparian corridors;
- Implement strategies to discourage human access to key habitat areas, such as riparian zones and wetlands (i.e., install fences and / or signage to delineate environmentally sensitive areas);
- Manage and control invasive species during the developmental and operational phases to reduce impacts to riparian areas;
- Prevent sediment laden water from discharging directly into potential amphibian breeding habitat;
- Avoid altering natural hydrological flow patterns, ensuring that both surface water flow and groundwater recharge are maintained;
- Protect south facing slopes and rocky outcroppings, where feasible, to retain basking, hibernating, and rearing sites which are valuable for reptile species;
- Perform construction work within amphibian and reptile habitats outside the amphibian breeding window (late winter – summer [February to early July]); and
- Perform environmental monitoring on an as needed basis during construction activities such as in-stream works (i,e., culvert installations).

9.2.9 Mitigation Measures for Birds

Crucial habitat for a variety of bird species will be retained due to the preservation of the Natural Protection Areas, riparian zones, and proposed habitat corridors with efforts made to minimize habitat fragmentation in excess of the default greenspace retention requirements (5%). These retained areas will maintain key features such as nesting sites, foraging habitats, and migratory stopover locations supporting both resident and migratory bird populations and will be designed to serve as habitat nodes as well as contiguous corridors for movement between areas within eth site as well as adjacent areas.

By preserving 35% of the land as 'Protected Natural Areas', the development reduces the risk of fragmentation and provides migration corridors for birds. Undisturbed spaces to breed and feed within these protected areas will support local bird populations and reduce the overall impacts from the development. Additionally, suitable habitat is currently present in adjacent areas providing refuge for local species.

The proposed greenway and trail network through the development has been designed to be highly walkable, in an attempt to minimize decreasing wildlife-vehicle collisions.

The following supplementary mitigation measures shall be implemented into the detailed design and construction phases to minimize the impacts to birds:

- To avoid undue impacts to nesting birds, do not remove or alter vegetation during the sensitive breeding period between March 01 and August 31. Disturbance or destruction of nesting birds contravenes Section 35 of the *Wildlife Act* and the *Migratory Birds Convention Act.* If land-clearing is necessary within this window, proceed only once a breeding bird nest survey has been conducted immediately prior to land-clearing activities to ensure that nesting or breeding wildlife impacts are assessed. Guidelines to avoid harm to Migratory Birds provided by Environment and Climate Change Canada (ECCC) should be followed to ensure proper management techniques are being utilized;
- Evaluate the presence of species directly protected under the *Migratory Birds Convention Act*, prior to the onset of clearing and detailed development, including raptors and Pileated Woodpecker;
- Retain mature trees and wildlife trees, where feasible to maintain potential nesting and roosting opportunities raptors, woodpeckers, owls, and other bird species;
- Where tree removal is required, give consideration to tree topping or girdling to create wildlife trees, instead of removing them entirely, where feasible;
- If active raptor nests are found, implement applicable buffer zones and develop management and monitoring plans to reduce sensory disturbance until chicks have fledged. Refer to document entitled: Best Management Practices for Raptor Conservation during Urban and Rural Land Development in British Columbia (MOE 2005) for applicable set-backs and recommendations;
- Implement and maintain reduced vehicle speeds throughout the site to reduce the potential for direct mortality via vehicle collisions;

- Disturbed areas should be re-seeded with native seed mixes or planted with native shrubs as soon as possible after disturbance to prevent the establishment invasive species; and
- In high value bird habitat areas (reviewed in consultation with the Project Biologist), avoid social programming and higher noise amenities, which can reduce utilization and impact bird foraging and nesting.

9.2.10 Mitigation Measures for Mammals

As illustrated in the Preferred Plan, wildlife corridors throughout the development have been developed based on input from AquaTerra, feedback from the public and Interest Groups, as well as findings from wildlife movement studies. These corridors are situated along expanded riparian zones and Protected Natural Areas in the north-south, and east-west orientation to facilitate wildlife movement through the site, while reducing interactions with residents and the development. The east-west corridor will be further refined with opportunities for a congruous route via utilizing oversized wildlife-oriented culverts, arch culverts and/or clearspan bridges to minimize wildlife interactions. Additionally, specific locations for suitable crossings will be established in consultation with the Project Biologist, to direct wildlife towards crossings beneath roadways as opposed to up and over the roadways. By protecting a larger portion of land, the 35% Protected Natural Area serves as a buffer between development and wildlife, reducing the risk of human-wildlife conflicts. Providing protected habitat reduces their need to encroach on developed areas, which can lower the likelihood of roadkill, or interaction with humans.

The design of the development was carefully planned by the designers to minimize the number of stream crossings, while still meeting the requirement of maintaining a roadway gradient of under 12%. An underpass has been proposed under Sunnyside Road at the four-way intersection where the planned ‘upper loop’ and ‘lower loop’ roadways meet. An underpass is an effective wildlife mitigation structure designed to facilitate the safe movement of wildlife across roads. By allowing mammals to pass underneath roads, habitat connectivity can be maintained, and negative effects of fragmentation can be reduced. Open bottom box culverts and clear span bridges are recommended as stream crossing structures to allow for wildlife migration, with specific details to be further refined in consultation with the Project Biologist during the detailed design stage.

- Pets, especially dogs and cats, can have both direct and indirect impacts on wildlife, particularly when they enter green spaces and retained habitat areas. These impacts can

be mitigated by installing fencing and signage to restrict access to sensitive areas. In high value wildlife areas (reviewed in consultation with the Project Biologist), avoid social programming and higher noise amenities, particularly dog parks or similar, which can impact utilization and wildlife movement.

The greenway and trail network through the development has been designed to be highly walkable, in an attempt to minimize car use decreasing wildlife-vehicle collisions

The following mitigation measures should be implemented to minimize the impacts to mammals:

- Disturbance or destruction of breeding wildlife contravenes Section 35 of the *Wildlife Act*. If land-clearing is necessary within this window, proceed only once a survey of the project area has been conducted to ensure that breeding wildlife impacts are adequately assessed;
- Expand wildlife camera assessments to include additional areas and areas south of Sunnyside Road. Ensure that there are wildlife corridors in an east-west direction with minimal road crossings or sufficient direction to oversized culverts/bridges to maintain wildlife movement without increasing potential for human/wildlife interactions / vehicle strikes;
- Design wildlife corridors that are intended for wildlife only, without trails or other passive recreational activities to reduce the potential for direct wildlife/human interaction. Where possible, evaluate options to maximize wildlife corridor size to include an undisturbed core corridor area to account for disturbance / edge effects. Consult with the Project Biologist to determine appropriate corridor widths and varying widths based on wildlife utilization;
- Maximize culvert size to facilitate wildlife movement (e.g., small mammals) below the road in critical or strategic areas. Researchers have determined that wildlife actively utilize culverts (Yanes *et al*., 1995; Clevenger and Waltho 2000). Secondary dedicated wildlife crossings can be utilized at crossings, with a preference for large open bottomed culverts, box culverts, arch culverts, and most preferentially, clear span bridges. Ensure that gravels or dense natural substrates are placed in the culvert bottoms to provide a natural footing surface. Plant vegetation around the culvert openings to provide cover for wildlife;
- Retain of coarse woody debris (CWD) and downed logs in natural areas where feasible, to preserve valuable habitat for small mammals;

- Preserve features such as wildlife trees providing shelter and denning opportunities for mammals like bats and tree-dwelling species;
- Install fencing in conjunction with culverts to direct animals to underpasses, as planned;
- Limit mammal access to road via fencing;
- Post and enforce speed limit frequently to reduce road-related mammal mortality; and
- During the operational phase, actively monitor road-kill and implement additional mitigation measures, if required.

9.2.11 Mitigation Measures for Species at Risk

9.2.11.1 Pacific Water Shrew

Design considerations have been undertaken resulting in the retention of a significant portion of land (35%), inclusive of Pacific Water Shrew habitat requisites. As part of the development planning, efforts were made to minimize the number of stream crossings, thereby reducing potential disturbances to aquatic habitats. Stream crossings to support wildlife migration and reduce habitat fragmentation in sensitive areas are recommended (i.e., clear span bridges, open box culverts), which will be established in consultation with the Project Biologist during the detailed design stage.

The principal mitigation measure, in accordance with the Pacific Water Shrew Draft Best Management Practices (BMPs) (Craig and Vennesland 2010), is avoidance. Additional relevant BMPs that are applicable to the project are as follows:

- Retain natural protected areas and maintain habitat connectivity, specifically within riparian areas;
- Align associated roadways and structures away from known or potential Pacific Water Shrew habitat;
- Minimize barriers and use clear span bridges over streams and wetlands instead of culverts, where feasible. If culverts are utilized for stream crossings, they should be large-diameter (2 m minimum) with open bottoms. Open-bottomed pipe arch culverts will increase the connectivity of habitat by maintaining a natural substrate;
- Maintain native trees and shrubs and Coarse Woody Debris (CWD) in the riparian zone and in the ROW adjacent to the waterbody to minimize erosion and sedimentation effects;
- Restore native riparian vegetation and CWD along degraded waterways to improve water quality and the suitability of the habitat for many species;

Retention of the Natural Protected Areas and riparian zones support Pacific Water Shrew and adhere to BMPs, due to these riparian areas providing vegetation and invertebrate prey for the Pacific Water Shrew. By maintaining these areas, the development will preserve valuable foraging and reproductive habitats. Retention of riparian corridors beyond the provincial minimums per the Riparian Areas Protection Regulation have been considered for this species to increase the buffers between watercourses and infrastructure. Additionally, CWD and native riparian vegetation will be retained through the riparian area buffer zones, maintaining shelter and nesting sites. The proposed development minimizes stream crossings with strategic road placement, and appropriate stream crossing structure types are in discussions (such as clear span bridges or open box culverts) which would allow for the safe passage of the Pacific Water Shrew. These structures are designed to facilitate unobstructed movement between riparian habitats and prevent fragmentation of critical habitats, which could otherwise lead to increased mortality or isolation of local populations.

Lesser impacts can be mitigated through the implementation of the following mitigation measures:

- Utilize the Project Biologist to delineate potential Pacific Water Shrew habitat areas and designate them as a ‘no-go’ zone. Isolate these areas from the active work area via the installation of trenched silt/exclusion fencing. Continue to consider the implementation of larger buffers, beyond those required under RAPR, in higher value Pacific Water Shrew areas to maintain habitat function;
- Conduct habitat enhancement (as a component of compensation), which may include riparian planting, and maintaining a proportion of downed timber on-site for use as CWD once construction has been completed in a given area. Place CWD across or within a tributary to create cover from predators, shade for thermoregulation and a substrate for aquatic macroinvertebrates to enhance foraging opportunities. Place CWD strategically to ensure it does not become a barrier to fish passage or impede storm water discharge;
- Conduct environmental monitoring during construction works within the vicinity of the creeks, tributaries, and wetland; and
- Provide regular maintenance during the operational phase by City personnel, including garbage removal and monitoring the integrity of barriers / access constraints.

9.2.11.2 Northern Red-legged Frog

Mitigation measures for Northern Red-legged Frogs largely mirror those established for Pacific Water Shrew (Section 9.2.11.1); however, given that Red-legged Frogs may occur up to 200-300 m from a waterbody (Nussbaum et al. 1983), a salvage (will require a salvage permit, which should be obtained well in advance of construction) within the exclusion area (i.e., the area isolated from contiguous adjacent habitat areas by trenched silt/exclusion fencing) may be required as determined by the Project Biologist. If deemed to be required, salvages should be conducted immediately prior to the onset of construction works. Salvage methodology should consist of an active search methodology, consisting of 1-2 surveyors, covering an area of approximately 1 ha hr^{-1}. To be effective, the salvage timing window should be associated with higher activity levels (i.e., late March to late October). Amphibians identified during the active searches will be captured manually by hand or through use of hand-held nets and relocated to suitable habitats set well outside the project area boundary in consultation with the Ministry of Water, Land and Resource Stewardship.

9.2.11.3 Cutthroat Trout

Refer to Section 9.3.2.

9.2.11.4 Olive-sided Flycatcher

Refer to Section 9.2.9 for development considerations and applicable mitigation measures for birds, inclusive of Olive-sided Flycatchers. Clearing should be completed outside of the bird nesting window, where feasible. If clearing and grubbing is required during the nesting window, nest surveys will be required to comply with the *Migratory Bird Convention Act* and prevent direct harm to nesting birds, including the Olive-sided Flycatcher. Habitat offsetting and restoration works, particularly in degraded habitats and edge habitats may be implemented to improve habitat and success of the species within the area.

9.2.11.5 Coastal Tailed Frog

Refer to Section 9.2.8 for applicable BMPs and development considerations for Amphibians in Urban and Rural Environments in BC. Mitigation measures largely mirror those established for Northern Red-legged Frog (Section 9.2.11.2); however, additional mitigation for this species is required. Specifically, any hydrological changes to the flow within the permanent watercourses (i.e., those watercourses flowing >6 months of the year) have the potential to directly and

adversely affect this species, as the juveniles are reliant on a year-round water supply (i.e., during base flow conditions). Stormwater management, instantaneous discharge and water quality must be satisfactorily assessed, designed and engineered to mirror pre-development conditions such that water quality and quantity are not affected with sufficient baseline data to ensure effective modeling and implementation.

9.2.12 Residual Effects for Terrestrial Wildlife, Sensitive Species, and Associated Habitats

Residual effects include the permanent loss of terrestrial habitat within the development footprint, which includes road construction, infrastructure and both hard and softscape development throughout the project area, as well as potential habitat fragmentation and species isolation in the absence of appropriate mitigation. Effects will be realized within the immediate and local area but are not significant at a regional level as similar habitat types exist throughout the region. The project will also result in a loss of habitat to accommodate the road crossings. Some habitat retention will be incorporated using wildlife corridors along riparian corridors and is encouraged in north-south and east-west directions, along with the incorporation of 35% of the site boundaries being dedicated to 'Protected Natural Areas' throughout the development with increased buffers in excess of RAPR minimums. The significance of residual effects due to increased mortality of wildlife or sensitive species can be reduced if the recommended mitigation measures are implemented as intended.

9.2.13 Terrestrial Wildlife, Sensitive Species, and Associated Habitats – Section Summary

Potential Impacts, associated mitigation measures to minimize the potential impacts to terrestrial wildlife, sensitive species, and associated habitats as well as anticipated residual effects, if any, are summarized in **Table 8**.

Table 8. Summary of Potential Impacts, Corresponding Mitigation Measures and Residual Effects Associated with Proposed Project Works on Terrestrial Wildlife, Sensitive Species, and Associated Habitats

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Construction Phase			
Clearing and Grubbing	Disturbances from construction activities Potential spread of invasive species	Delineate work area and install exclusion fencing to prevent encroachment to adjacent areas Minimize clearing area Conduct breeding bird nest surveys for clearing within the nesting window (March 1 – August 31) Adhere to applicable BMPs and timing windows Conduct pre-clearing surveys to identify / delineate areas occupied by sensitive species Avoid the use of pesticides and herbicides Conduct pre-clearing salvages for species where direct impacts may occur Do not chip or transport invasive species. Delineate / demarcate and treat invasive species as required Re-vegetate as soon as possible to prevent spread of invasive species Conduct periodic environmental monitoring, as required	Habitat loss realized within the immediate area of the project footprint and local area. Not significant at the regional level
Soil Stripping	Potential mobilization of sediments and concurrent reduction in water quality Potential spread of invasive species	Design and implement a Sediment and Erosion control plan to prevent sedimentation to downstream areas. May include the use of trenched silt fencing, filter socks, check dams, erosion control blankets or sediment retention ponds, as required Undertake salvages for species where direct impacts may occur Conduct periodic environmental monitoring, as required	Habitat loss realized within the immediate area of the project footprint and local area. Not significant at the regional level
Cut Excavation and Rock Excavation / Blasting	Auditory disturbance	Consider drill-and-shoot method or smaller charges to reduce the amount of noise produced Consider use of blast-mats to reduce noise produced Conduct pre-clearing surveys to identify / delineate areas occupied by sensitive species Ensure work area is isolated to	Potential significance in the absence of mitigation including wildlife surveys and salvages prior to the onset of works, coupled with noise and vibration reducing measures such as blast mats

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
		prevent animals from entering the active construction zone Conduct periodic environmental monitoring and noise monitoring during blasting activities to establish noise levels	
Road Pre-construction and Fill Placement	Potential mortality	Isolate work area prior to commencement of construction Design and implement a Sediment and Erosion control plan to prevent sedimentation to downstream areas. May include the use of trenched silt fencing, filter socks, check dams, erosion control blankets or sediment retention ponds, as required Conduct periodic environmental monitoring, as required	Potential significance in the absence of mitigation including wildlife surveys and salvages prior to the onset of works
Development Construction and Installation of Culverts and Wildlife Crossing	Reduction in habitat connectivity In-stream and riparian habitat loss	Conduct work in the dry, where possible Design and implement a Sediment and Erosion control plan to prevent sedimentation to downstream areas. May include the use of trenched silt fencing, check dams, erosion control blankets or sediment retention ponds, as required Design and implement a Spill Response Plan for appropriate materials stored within the Project area to contend with an unscheduled discharge Conduct instream work within preferred working window Consult with DFO prior to the commencement of instream works or works to be conducted outside the window Conduct periodic environmental monitoring and water quality testing, as required Maximize culvert dimensions with a preference for a dedicated wildlife culvert, arch culvert, open bottomed culvert or clear span bridge Implement and maintain larger wildlife corridors beyond those required by the RAPR legislation	Reduced habitat connectivity / isolation Habitat loss offset by compensation Significant within the Project Area and Locally in the absence of appropriate mitigation
Utility, Fencing and Infrastructure Access Construction	Potential mortality	Isolate work area prior to the onset of construction	Not significant
Road Paving	Potential mortality	Isolate work area prior to the onset of construction	Not significant

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Operational Phase			
Active Residential Community	Potential mortality	Implement and enforce reduced vehicle speeds through the project area Monitor roadkill along road and implement additional mitigation measures, if necessary	Not significant
Safety / Environmental and Human Health			
Construction Equipment Spills	Potential mortality Concrete spills during pile installation of culverts / headwalls	Implement and adhere to an Emergency Spill Response Plan Ensure that adequate spill containment materials are available within the project area Store CO_2 canisters and diffusers on-site in case of concrete spill	Not significant
Construction Debris	Potential mortality Reduced biological function or habitat impairment	Strictly manage construction wastes, pollutants and storm water run-off Remove construction wastes from the project area on a regular basis, and as soon as possible Fence-off / isolate & cover debris / stockpiles	Not significant
Accidents & Malfunctions	Potential impacts to survival Deleterious discharges	Prepare and adhere to a project-specific CEMP	Not significant

9.3 Fish and Fish Habitat

Construction of the Anmore South development will require the crossing of three (3) fish-bearing watercourses and up to ten (10) non-fish bearing watercourses throughout the proposed development. The majority of the tributaries (~77%) have been rated as Class B, permanent or ephemeral watercourses, providing food and nutrients supplying the sensitive salmonid-bearing habitats (Class A) downstream (south of Sunnyside Road), including the Doctors Creek mainstem, Schoolhouse Creek North mainstem, and Schoolhouse Tributary 5. It is critical to ensure that the Doctors Creek and Schoolhouse Creek headwaters continue to convey an uninterrupted flow conveyance to downstream aquatic habitat areas both within and downgradient of the proposed project development area during both the construction and operational phases, with a potential for impact as a result of development in the absence of appropriate mitigation.

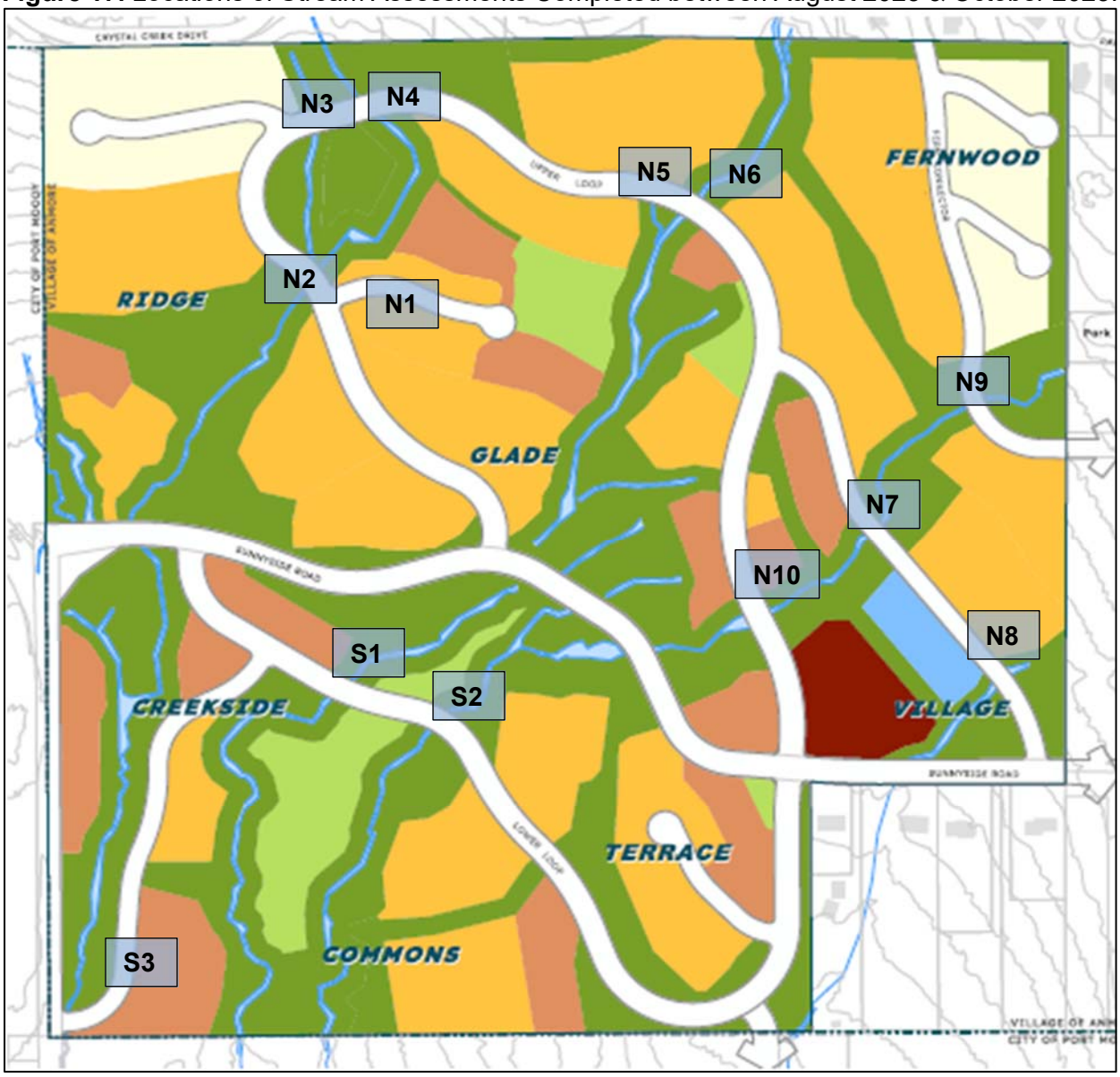
Creek crossings at the identified locations will be required to facilitate access roads within the development. Oversize culverts, box culverts, and clear span bridges will be recommended at each crossing location during the detailed design / site servicing design stage in consultation with the Project Biologist to effectively minimize potential impacts and ensure appropriate flow is conveyed to downstream watercourses.

As a component of developing the 'Preferred Plan', AquaTerra assessed potential watercourse crossings to the north of Sunnyside Road (N1, N2, N3, etc.) and south of Sunnyside Road (S1, S2, S3), as illustrated in **Figure 17**.

The results of the assessments of prospective watercourse crossings are used to inform mitigation recommendations and appropriate stream / watercourse crossings at each location in an effort to effectively mitigate and minimize the potential impacts, assess aquatic habitat functionality and contribution, to evaluate potential regulatory considerations, and to ensure the maximization of wildlife movement through riparian corridors as summarized in **Table 9**.

The plan currently provides expanded riparian setbacks and serves to maximize aquatic habitat retention, with direct loss associated with road crossings, which is typical of development. The plan has been designed to minimize the number of stream crossings, limited to 3 crossings where fish presence have been confirmed, with the intent to utilize open bottomed culverts or clear span bridges, as recommended as part of the Environmental Network Plan that is a component of the detailed design phase, with potential options to improve fish access at identified barrier locations.

Figure 17. Locations of Stream Assessments Completed between August 2023 & October 2023.



9.3.1 Potential Impacts to Fish and Fish Habitat

Direct potential impacts to fish and fish habitat as a result of watercourse crossings to facilitate site access include loss of instream and riparian habitat, potential changes in hydrology, stormwater inputs, peak flow volumes low flow (base flow) conditions, nutrient inputs, stormwater run-off and introduction / spread of invasive vegetation. Potential impacts to fish and fish habitat and proposed mitigation measures, as well as proposed watercourse crossing structure(s) to accommodate access based on aquatic habitat conditions and contributions are summarized in **Table 9.**

Table 9. Watercourse Identifier, Existing Features and Proposed Mitigation and Recommended Crossing Type to Facilitate Access with Anmore South Development

Watercourse Identifier	Existing Features	Crossing Recommendation and Proposed Mitigation
N1 (D-Trib-4)	• Semi-defined channel and seepage areas • High organic substrate • Base-flow ephemeral • Vegetation consists of native riparian species	• Crossing Recommendation: clear-span bridge or arch culvert installation. • Implement erosion and sediment control measures. • Re-vegetate with native riparian species. • • Maintain groundwater / interflow inputs to contribute to downstream base flow.
N2 (Doctors Creek / D-Trib-3)	• Point of confluence of Doctors Creek and D-Trib 3. • Defined channel and seepage area • Base-flow permanent and continuous • High gravel substrate with sand, cobble, and organics. • Vegetation consists of native riparian species and invasive English Ivy	• Crossing Recommendation: box culvert. • Implement erosion and sediment control measures. • Effectively manage invasive species and re-vegetate with native riparian species. • Maintain groundwater / interflow inputs to contribute to downstream base flow.
N3 (D-Trib-3)	• Narrow (<1 m width), defined channel, and seepage areas. Low flow conditions for most of the year. • Dense native riparian vegetation • Predominantly organic substrate with gravel, sand and minimal cobble	• Crossing Recommendation: oversized concrete culvert box culvert(s). • Implement erosion and sediment control measures. • Re-vegetate with native riparian species.
N4 (Doctors Creek)	• Defined channels and seepage areas (≈2 m width) • Base-flow permanent and ephemeral • High volume of CWD within the watercourse • Predominantly organic substrate • Native riparian vegetation and invasive Himalayan Balsam	• Crossing Recommendation: clear span bridge or arch culvert. • Implement erosion and sediment control measures. • Effectively manage invasive species and re-vegetate with native riparian species.
N5 (S-Trib-8)	• Semi-defined channel & seepage area • Base-flow ephemeral • Narrow in width with steep gradient • Predominantly organic substrate with high volume of CWD • Sparse native riparian vegetation	• Crossing Recommendation: oversized concrete culvert or box culvert(s). • Implement erosion and sediment control measures. • Re-vegetate with native riparian species.

Watercourse Identifier	Existing Features	Crossing Recommendation and Proposed Mitigation
	• Walking trail constructed over the watercourse	
N6 (Schoolhouse Creek)	• Defined channel within 'steep ravine' • Base-flow permanent • Step Pools with cobble, boulder, gravel substrate • High volume of CWD • Native riparian vegetation (≈50% stream cover)	• Crossing Recommendation: clearspan bridge. • Implement erosion and sediment control measures. • Re-vegetate with native riparian species.
N7 (S-Trib-5)	*Not assessed in 2023*	Conduct further assessment, as needed – contingent on detailed design
N8 (S-Trib-2)	*Not assessed in 2023*	Conduct further assessment, as needed – contingent on detailed design
N9 (S-Trib-5)	*Not assessed in 2023*	Conduct further assessment, as needed – contingent on detailed design
N10 (S-Trib-5)	• Semi-defined channel and seepage areas • Base-flow permanent and ephemeral • Dense Spotted Touch-me-not with sparse native riparian vegetation • High volume of CWD • Primarily sand and gravel substrate	• Crossing Recommendation: oversized box culvert(s). • Implement erosion and sediment control measures. • Effectively manage invasive species and re-vegetate with native riparian species.
S1 (Schoolhouse Creek)	• Defined channel • Base-flow permanent and continuous • Cobble and gravel substrate • LWD creating pools • Native riparian vegetation (≈40% stream cover)	• Crossing Recommendation: clearspan bridge. • Implement erosion and sediment control measures. • Re-vegetate with native riparian species.
S2 (S-Trib-5)	• Defined channel • Base-flow permanent and continuous • Cobble and gravel substrate • Steep gradient and step pools • Native riparian vegetation (≈60% stream cover)	• Crossing Recommendation: oversized box culvert(s) • Implement erosion and sediment control measures. • Re-vegetate with native riparian species.
S3 (Doctors Creek)	• Defined, fish bearing channel • Base-flow permanent and continuous	• Crossing Recommendation: open-bottomed, oversized arch culvert.

Watercourse Identifier	Existing Features	Crossing Recommendation and Proposed Mitigation
	• Gravel, sand, and organic substrate	• Implement erosion and sediment control measures. Effectively manage invasive species and re-vegetate with native riparian species.
	• Dense native riparian vegetation and invasive Himalayan Blackberry (≈90% stream cover)	

Indirect potential impacts to downstream fish populations associated with pre-construction (i.e., land clearing and grading) and construction prior to the implementation of mitigation measures may include:

- Sediment and erosion concerns during clear and grub, cut-and-fill, and excavation activities;
- Loss of in-stream and adjacent riparian habitats in areas requiring culverting or drainage blanket installation within the proposed road crossing locations;
- Potential for deleterious substances (e.g., road run-off, construction spills etc.) to enter tributaries during construction;
- Increased anthropogenic influence (i.e. recreational activity) in tributaries and riparian areas; and
- Increased localized colonization and spreading of invasive plant species in riparian areas.

A summary of the significance of potential impacts on Fish and Fish Habitat (prior to implementation of mitigation measures) is provided in **Table 10**.

Table 10. Relative Significance of the Potential Impacts on Fish and Fish Habitat

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Context**	**Duration**	**Context**	**Reversibility**	**Context**
Construction Phase							
Clearing and Grubbing	moderate	medium	Immediate - local	short-term	immediate	reversible ./ irreversible	intermittent
Soil Stripping	moderate	medium	Immediate - local	short-term	immediate	reversible ./ irreversible	intermittent
Cut Excavation and Rock	moderate	medium	Immediate - local	short-term	immediate	reversible ./ irreversible	intermittent

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Context**	**Duration**	**Context**	**Reversibility**	**Context**
Excavation / Blasting							
Road Pre-construction and Fill Placement	moderate	high	immediate	long-term	Immediate / delayed	irreversible	continuous
Road Construction / Retrofit and Installation of Culverts	high	moderate	local	long-term	immediate/ delayed	irreversible	continuous
Utility, Fencing and Infrastructure Access Construction	moderate	low	immediate	long-term	immediate	reversible	continuous
Road Paving	low	low	immediate	long-term	immediate	irreversible	continuous
Development construction	moderate	low – moderate	immediate / local	long-term	immediate / delayed	irreversible	continuous
Operational Phase							
Active Residential Community	low	medium	local	long-term	immediate/ delayed	irreversible	continuous
Safety / Environmental and Human Health							
Construction Equipment Spills	low-high	low	local	short-term	immediate/ delayed	reversible	intermittent
Construction Debris	low	low	immediate area	short-term	immediate/ delayed	reversible	intermittent
Accidents & Malfunctions	low	low	immediate area/ local	short-term	immediate/ delayed	reversible	intermittent

9.3.2 Mitigation Measures for Fish and Fish Habitat

To mitigate disturbances, no work in or about fish or fish habitat will occur outside the Reduced Risk In-stream Work Window for the Lower Mainland between August 1 and September 15 (MOE 2006), unless authorized by Fisheries and Oceans Canada (DFO) and/or the Ministry of Forests (MoF) with input/guidance/mitigation identified and implemented by a QEP (which can allow for adjustments to this default window provided additional mitigation and/or monitoring are implemented). Other proposed measures, including project specific recommendations the *DFO*

Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. 1993) and *Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia* (Polster, D. and J. Cullington. 2014) consists of the following:

- Utilize oversized crossings with a preferred hierarchy of: clear-span bridge → arch culvert → box culvert(s) → culverts with baffles and substrate → culverts;
- Culverts with a gradient of >5% should be fitted with baffles and substrate retention to facilitate fish movement;
- Culvert length should be minimized to facilitate fish movement with a target length of <15 m;
- Complete Riparian Area Protection Regulation (RAPR) Assessments for watercourses within phased development areas, and delineate, demarcate and maintain established setback buffer areas along tributaries. Consider increasing SPEA boundaries with consideration of arborist and geotechnical considerations and wildlife corridors above the provincial minimum setback requirements;
- Minimize disturbances to riparian areas outside the proposed alignment area;
- Conduct works in the dry, where possible;
- Install trenched silt-fencing or filter socks along the toe of the slope in the active work area in close proximity to watercourses;
- If groundwater is encountered during construction activities, prevent turbid water from entering tributaries;
- Re-plant in disturbed riparian areas. Re-seed all disturbed areas with native seed mixes or plant with native shrubs as soon as possible after disturbance to prevent the establishment of invasive species;
- Remove existing debris and garbage/refuse from tributaries;
- Design and implement signage around the site to educate residents of sensitivities and inhabitants of watercourses;
- Limit direct discharges to watercourses;
- Design and implement stormwater detention facilities to mimic pre-development conditions and to maintain baseflows to all watercourses;

- Design and implement water quality monitoring and management including pre-development, construction and post-development conditions to augment the existing baseline dataset to monitor for water quality changes over time and to adapt to any changes, if necessary;
- Prevent pets from entering environmentally sensitive areas via the implementation of fencing in addition to low visibility mesh within the lower portion of the fencing to prevent access;
- Include sensitive habitat maintenance in the strata budget/fees to ensure fencing, signage and waste are budgetary items during the post-development stage to ensure these habitats are not degraded and effectively maintained in perpetuity;
- Implement strict garbage / refuse / deleterious discharge bylaws in concert with Village of Anmore bylaw infractions with appropriate fines and directing of accrued funds to be use for habitat maintenance and restoration;
- Work directly with local area interest groups to develop stewardship programs for the watercourses including caretaker, outreach and monitoring groups;
- Prior to accessing riparian areas, verify that machinery used is in good working condition and free of fuel and lubricant leaks. Necessary maintenance oils/lubricants are to be stored in a separate, contained lay-down area, and should be conducted well away from any drainage course / ditch (> 30 m). Equipment working within 30 m of aquatic habitat features must be fitted with enviro oil / bio oil, to reduce the risk to aquatic ecosystems;
- Ensure that fueling of machinery is in excess of 30 m from tributaries / drainage features;
- Park construction machinery on spill pads in excess of 30 m from drainage crossings / drainages;
- As a precautionary measure, ensure that spill-containment kits containing sufficient quantities of absorbent materials are present in the active work area in close proximity to working machinery;
- Ensure that an environmental monitor is on site for in-stream works and conduct periodic water quality testing to confirm appropriate mitigation measures are being implemented; and
- Develop and implement habitat offsetting projects, as required, based on aquatic and riparian impact areas identified during the detailed design stage.

9.3.3 Residual Effects to Fish and Fish Habitat

Residual effects include localized losses of aquatic and associated riparian habitat where watercourse crossings are required to accommodate the access road and pedestrian route networks; however, efforts will be made to minimize the residual impacts via a preference for lower impact crossing infrastructure to be established in consultation with the Project Biologist. Additional potential residual effects may include the degradation of edge and riparian habitats and spread of invasive species, which can be offset via a larger, widened riparian buffer, as planned, and potential residual effects associated with reductions in water quality or changes in flow dynamics, which can be offset via water quality monitoring and management, and stormwater/baseflow monitoring and retention infrastructure. Provided efforts are undertaken to incorporate protective mitigation measures and habitat preservation measures into detailed design planning and implementation, the significance of residual effects as a result of development on fish and fish habitat can be effectively mitigated.

9.3.4 Fish and Fish Habitat - Section Summary

Permanent losses of fish habitat will occur at the proposed road crossings. Similarly in the absence of mitigation, water quantity and quality can be adversely affected during the pre-construction, construction and post-construction stages. The introduction and spread of invasive species in riparian areas may occur and pets and anthropogenic use have the potential to degrade riparian and aquatic habitats over time. Impacts can be reduced if the identified mitigation measures are implemented. Potential Impacts and associated mitigation measures to minimize the potential impacts to fish and fish habitat are summarized in **Table 11**.

Table 11. Summary of Potential Impacts, Corresponding Mitigation Measures and Residual Effects Associated with Proposed Project Works on Fish and Fish Habitat

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Construction Phase			
Clearing and Grubbing	Reduction in water quality as a result of mobilization of sediment and erosion Loss of riparian vegetation Introduction of invasive species Changes in hydrology	Design and implement a Sediment and Erosion control plan to prevent sedimentation to downstream areas. May include the use of trenched silt fencing, filter socks, check dams, erosion control blankets or sediment retention ponds, as required. Delineate and demarcate areas to prevent encroachment. Use appropriate equipment to conduct works.	Habitat loss within riparian areas requiring habitat offsetting

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
		Avoid use of tracked machinery in sensitive areas. Conduct equipment check prior to working within riparian areas. Conduct periodic environmental monitoring and water quality testing, as required.	
Soil Stripping	Reduction in water quality as a result of mobilization of sediment and erosion Introduction of invasive species Changes in hydrology	As above	Not significant if appropriate mitigation measures are implemented coupled with environmental monitoring and water quality testing
Cut Excavation and Rock Excavation / Blasting	Reduction in water quality as a result of mobilization of sediment and erosion.	As above	Not significant if appropriate mitigation measures are implemented coupled with environmental monitoring and water quality testing
Road Pre-construction and Fill Placement	Reduction in water quality as a result of mobilization of sediment and erosion.	As above	Not significant if appropriate mitigation measures are implemented coupled with environmental monitoring and water quality testing
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	Reduction in water quality as a result of mobilization of sediment and erosion; Unscheduled release of uncured concrete / grout, increasing pH; Changes in hydrology; Introduction / spread of invasive plants.	Design and implement a Sediment and Erosion control plan to prevent sedimentation to downstream areas. May include the use of trenched silt fencing, check dams, erosion control blankets or sediment retention ponds, as required. Give preference for pre-cast headwalls and culverts, where possible. When uncured concrete is being used, ensure that adequate spill prevention measures are in place. Use drainage blankets and culverts to maintain existing hydrology. Manage invasive vegetation appropriately. Re-plant disturbed riparian areas with native vegetation as soon as possible to prevent establishment / spread of invasive plants.	Loss of instream and riparian habitat to accommodate culverts / roads, requiring habitat offsetting
Utility, Fencing and Infrastructure Access Construction	Reduction in water quality as a result of mobilization of sediment and erosion.	As above	Not significant if appropriate mitigation measures are implemented coupled with environmental monitoring and water quality testing

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Road Paving	Discharge of deleterious substances (e.g., Polycyclic Aromatic Hydrocarbons [PAHs]) during asphalt works. Increased instantaneous discharge to watercourses due to increase in impermeable areas.	Isolate work area prior to the onset of works and implement necessary mitigation measures to prevent sedimentation and erosion issues to adjacent areas.	Not significant if appropriate mitigation measures are implemented coupled with environmental monitoring and water quality testing Direct stormwater run-off to designated detention areas, basins, rain gardens, rockpits etc., to maintain pre-development run-off conditions
Operational Phase			
Active Residential Community	Reduction in water quality due to road run-off. Increase of anthropogenic waste / garbage in riparian / creek side areas.	Remove litter from roadside areas on a regular basis as a component of road maintenance, as planned. Work with local area interest groups / stewardship groups and strata to provide funding for on-going management, maintenance and enhancement of sensitive habitat areas. Limit human access to sensitive riparian and creek side areas through fencing and signage. Prevent pets from entering sensitive habitat areas. Establish funding for on-going maintenance and implement signage and impose fines for individuals observed breaking bylaws.	Not significant if appropriate mitigation measures are implemented
Safety / Environmental and Human Health			
Construction Equipment Spills	Potential impacts to survival of aquatic inhabitants Concrete spills during concrete work.	Implement and adhere to an Emergency Spill Response Plan. Regular Environmental Monitoring Ensure that adequate spill containment materials are available on-site. Park equipment on spill pads. Fuel machinery in excess of 30 m from tributaries / drainage features. Store CO_2 canisters and diffusers on-site in case of concrete spill.	Not significant if appropriate mitigation measures are implemented
Construction Debris	Potential impacts to survival of aquatic inhabitants	Remove debris from Project area on a regular basis. Fence-off / isolate & cover debris / stockpiles	Not significant if appropriate mitigation measures are implemented

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Accidents & Malfunctions	Potential impacts to survival of aquatic inhabitants Deleterious discharges	Prepare and adhere to a Project-specific CEMP	Not significant if appropriate mitigation measures are implemented

9.4 Surface Water Quality and Stormwater Run-off

Maintaining the existing drainage pattern and water quality during the construction and operational phases of the project present significant challenges given the topography, rainfall levels and numerous tributaries throughout the development footprint; therefore, surface water quality / storm water run-off was included as a VEC.

9.4.1 Potential Impacts to Surface Water Quality and Stormwater Run-off

Potential impacts to surface water quality and stormwater run-off as a result of the project include:

- increased TSS / turbidity;
- increase in hydrocarbons, metals, and other Potential Contaminants of Concern (PCOCs) into surface water run-off areas leading to aquatic habitats;
- mobilization of sediment into the water column during cut-and-fill and excavation operations;
- Introduction of uncured concrete leachate into tributaries within the alignment footprint;
- Changes in hydrology (i.e., peak flows and base flows); and
- Contamination due to accidents and malfunctions

A summary of the significance of potential impacts on surface water quality and stormwater run-off (prior to implementation of mitigation measures) is provided in **Table 12**.

Table 12. Relative Significance of the Potential Impacts on Surface Water Quality and Storm Water Run-off

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Construction Phase							
Clearing and Grubbing	medium	low	immediate area / local	long-term	immediate / delayed	intermittent	reversible
Soil Stripping	medium	medium	immediate area / local	short-term	immediate / delayed	intermittent	irreversible
Cut Excavation and Rock Excavation / Blasting	low	low	immediate area / local	long-term	immediate / delayed	intermittent	irreversible
Road Pre-construction and Fill Placement	low	medium	immediate area / local	long-term	immediate / delayed	intermittent	irreversible
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	medium	medium	immediate area / local	long-term	immediate / delayed	continuous	irreversible
Utility, Fencing and Infrastructure Access Construction	n/a	n/a	n/a	long-term		continuous	reversible
Road Paving	high	high	immediate area	long-term	immediate immediate / delayed	continuous	irreversible
Operational Phase							
Active Residential Community	high	high	immediate area/ local	long-term	immediate/ delayed	continuous	irreversible
Safety / Environmental and Human Health							
Construction Equipment Spills	low	low	local	short-term	immediate/ delayed	intermittent	reversible
Construction Debris	low	low	immediate area	short-term	immediate/ delayed	intermittent	reversible

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Accidents & Malfunctions	low	low	immediate area/ local	short-term	immediate/ delayed	intermittent	reversible

9.4.2 Mitigation Measures for Surface Water Quality and Stormwater Run-off

The following mitigation measures will be implemented to alleviate potential environmental impacts to surface water quality and storm water run-off, detention and infiltration, where possible:

- Complete a project-specific Construction Environmental Management Plan (CEMP) to plan for unscheduled discharges and accidents with a potential to impact surface water quality;
- Require construction contractor to comply with Emergency Spill Response Plan (as a component of the CEMP) to adequately respond to equipment leakage and spills;
- Implement and adhere to a site-specific, phased Sediment and Erosion Control Plan (as a component of the CEMP), which may include the use of silt fencing, geotextile fabric, check dams, hay-bales, filter socks (e.g., Filtrexx), erosion blankets and/or detention ponds during excavation and cut-and-fill operations, as needed;
- Conduct construction works in the dry, where possible;
- Re-vegetate exposed areas after construction is complete with native riparian or seed mix;
- Use pre-cast headwalls and bag walls, where possible;
- Isolate work area when uncured concrete is in use;
- Provide automatic and manual shut-down systems on construction equipment in case of accidents and malfunctions;
- Dispose of waste materials in accordance with applicable regulations at licensed facilities;
- As a precaution, ensure that spill-containment kits containing sufficient quantities of absorbent materials are present on-site during the proposed remediation works in close proximity to working machinery;

- Conduct regular environmental monitoring coupled to periodic water quality sampling (TSS/turbidity) and locations downstream from the active construction area following rainfall events more than 25 mm within 24 hrs., by a qualified environmental monitor;
- Install stormwater filtration system designed to effectively reduce TSS, hydrocarbons, metals and other contaminants potentially within storm water run-off; and
- Catchbasins (CBs) should be fitted with oil-water separators to ensure that any spills resulting from accidents are not directly discharged into watercourses prior to treatment.

9.4.3 Residual Effects for Surface Water Quality and Stormwater Run-off

Through the implementation of the recommended mitigation measures, no significant adverse environmental impacts to surface and storm water run-off are expected to occur as a result of development related activities.

9.4.4 Surface Water Quality and Storm Run-off - Section Summary

Potential Impacts, associated mitigation measures to minimize the potential impacts to surface water quality and storm water run-off and anticipated residual effects, if any, are summarized in **Table 13**.

Table 13. Summary of Potential Impacts, Corresponding Mitigation Measures and Residual Effects Associated with Proposed Project Works on Surface Water Quality and Storm Water Run-off

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Construction Phase			
Clearing and Grubbing	Potential erosion and release of sediment into nearby waterbodies Changes in hydrology (peak flow & base flow)	Familiarize and implement applicable BMPs and Guidance. Design and implement a Sediment and Erosion Control Plan and include in CEMP. Conduct works in the dry, where possible. Conduct periodic environmental monitoring, as required. Design and implement a stormwater management plan to mimic pre-development conditions including reducing peak flows / instantaneous flow during storm events and maintaining base flow during the summer period.	Not significant if appropriate mitigation measures are implemented
Soil Stripping	Potential erosion and release of sediment into nearby waterbodies Changes in hydrology (peak flow & base flow)	As above	Not significant if appropriate mitigation measures are implemented
Cut Excavation and Rock Excavation / Blasting	Potential erosion and release of sediment into nearby waterbodies Changes in hydrology (peak flow & base flow)	As above	Not significant if appropriate mitigation measures are implemented
Road Pre-construction and Fill Placement	Potential erosion and release of sediment into nearby waterbodies Changes in hydrology (peak flow & base flow)	As above	Not significant if appropriate mitigation measures are implemented
Construction / Retrofit and Installation of Culverts and Wildlife Crossings	Potential erosion and release of sediment into nearby waterbodies Changes in hydrology (peak flow & base flow)	As above + Upsize culvert crossing sizing to facilitate wildlife crossings and to ensure flows are not restricted, accumulation of debris and storm events. Incorporate climate change considerations into design parameters.	Not significant if appropriate mitigation measures are implemented
Utility, Fencing and Infrastructure Access Construction	None anticipated	None	Not Applicable
Road Paving	None anticipated	None	Not Applicable

Operational Phase			
Active Residential Community	Decrease in surface water and storm water quality discharging from the road ways.	Conduct regular inspections and maintenance to verify water quality. Develop and implement a water quality monitoring program for hydrocarbons, metals, salinity, nutrients, anions, total organic/inorganic carbon, total nitrogen, ammonia and biological oxygen demand to evaluate trends in water quality over time, and mitigate as necessary. Compare with baseline conditions and augment baseline dataset prior to the onset of works.	Not significant if appropriate mitigation measures are implemented
Safety / Environmental and Human Health			
Construction Equipment Spills	Potential impacts to survival of aquatic inhabitants Concrete / grout spills during development	Implement and adhere to an Emergency Spill Response Plan Ensure that adequate spill containment materials are available on-site Complete CEMP to plan for unscheduled discharges and accidents with a potential to impact surface water quality Store CO_2 canisters and diffusers on-site in case of concrete spill	Not significant if appropriate mitigation measures are implemented
Construction Debris	Impacts from debris	Remove debris from project area on a regular basis and as soon as possible Fence-off / isolate & cover debris / stockpiles	Not significant
Accidents & Malfunctions	Potential impacts to survival of aquatic inhabitants Deleterious discharges	Prepare and adhere to a project-specific CEMP Ensure construction equipment is maintained / serviced / fueled a minimum of 30 m from watercourses unless supervised by a QEP/EM Catchbasins (CBs) should be fitted with oil-water separators to ensure that any spills resulting from accidents are not directly discharged into watercourses prior to treatment	Not significant if appropriate mitigation measures are implemented

9.5 Soils and Local Ecology

Given the steep grades and potential for soil stripping, blasting, and cut-and-fill construction components of the project, soils and local geology were included for consideration and investigation as a VEC.

9.5.1 Potential Impacts to Soil and Local Ecology

Potential impacts to soils and local geology as a result of the project include:

- De-stabilization of adjacent off-alignment areas as a result of blasting;
- Improper fragmentation of rock;
- Soil destabilization / landslides during construction of roadway and project infrastructure;
- Erosion of exposed areas following excavation and during stockpiling;
- Contamination of soils as a result of imported fill from unconfirmed sources and/or excavation of contaminated / uncharacterized material (e.g., backstop berms from former gun range site);
- Contamination of soils as a result of a spill; and

A summary of the significance of potential impacts on soils and local geology is provided in **Table 14.**

Table 14. Relative Significance of the Potential Impacts on Soils and Local Geology

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Construction Phase							
Clearing and Grubbing	low	low	immediate area	long-term	immediate	continuous	reversible
Soil Stripping	low-high	low-high	immediate area / local	long-term	Immediate / delayed	intermittent / continuous	irreversible
Cut Excavation and Rock Excavation / Blasting	high	high	immediate area / local	long-term	immediate	continuous	irreversible

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Road Pre-construction and Fill Placement	moderate	medium	immediate area / local	long-term	immediate	continuous	irreversible
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	low	low	Immediate	short-term	immediate	continuous	reversible
Utility, Fencing and Infrastructure Access Construction	low	low	immediate area	long-term	immediate	continuous	irreversible
Road Paving	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Operational Phase							
Active Residential Community	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Safety / Environmental and Human Health							
Construction Equipment Spills	low	low	immediate area	short-term	immediate	intermittent	reversible
Construction Debris	low	high	n/a	n/a	n/a	n/a	n/a
Accidents & Malfunctions	low	high	immediate area/ local	short-term/ long-term	immediate/ delayed	intermittent	reversible

9.5.2 Mitigation Measures for Soil and Local Ecology

The following mitigation measures will be implemented to address potential environmental impacts to soils and local geology:

- Use specified, clean fill materials;
- Do not re-use blast materials (e.g., in environmentally sensitive areas);

- Test / characterize potentially contaminated soils and remediate / dispose of appropriately and in accordance with legislation;
- Use specified materials only, to meet engineering requirements;
- Review and become familiarized with geotechnical findings;
- Isolate active work area;
- Consider utilization of hay-bales, straw mats, filter socks (e.g., Filtrexx), erosion control blankets etc., to limit erosion in areas containing exposed soils for prolonged periods;
- Re-vegetate disturbed areas outside the alignment footprint as soon as possible;
- Cover exposed / stockpiled materials with tarpaulins or polypropylene sheets, where feasible, in areas where erosion may occur;
- Collect and store drilling core waste materials, to be characterized prior to disposal, in an upland area;
- Dispose waste materials in accordance with applicable regulations at licensed facilities;
- Consider the use of piezometers to identify slope instabilities, if any, during construction through to operation;
- Use appropriately sized blast charges, loading densities and weights, as well as firing sequence and delays based on geotechnical report findings;
- Comply with Emergency Spill Response Plan to adequately respond to equipment leakage and spills;
- Provide automatic and manual shut-down systems in case of accidents and malfunctions;
- As a precaution, ensure that spill-containment kits containing sufficient quantities of absorbent materials are present on-site during the proposed remediation works in close proximity to working machinery;
- Conduct environmental monitoring by a qualified Environmental Monitor and Geotechnical Engineer; and
- City to appoint geotechnical engineer to approve cut-slope stability.

9.5.3 Residual Effects to Soil and Local Ecology

With the mitigation measures proposed, there are unlikely to be significant adverse soil and local geology effects resulting from construction activities or operations.

9.5.4 Soils and Local Ecology - Section Summary

Potential impacts, associated mitigation measures to minimize the potential impacts to soils and local geology as well as anticipated residual effects, if any, are summarized in **Table 15**.

Table 15. Summary of Potential Impacts, Corresponding Mitigation Measures, and Residual Effects Associated with Proposed Project Works on Soils and Geology

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Construction Phase			
Clearing and Grubbing	Exposure of soil and resulting erosion	Isolate work area Cover exposed areas with tarpaulins / polypropylene sheets in areas where erosion may occur Re-vegetate disturbed areas outside the alignment footprint as soon as possible	Not significant if appropriate mitigation measures are implemented
Soil Stripping	Erosion of soil Potential exposure / mobilization and transport of contaminated materials	As above + Test / characterize potentially contaminated soils and dispose of appropriately in accordance with legislation	Not significant if appropriate mitigation measures are implemented
Cut Excavation and Rock Excavation / Blasting	De-stabilization of adjacent off-alignment areas as a result of blasting Improper fragmentation of rock Potential disturbance to wildlife Contamination of soils from drill core waste	Ensure appropriate blast charges, loading densities and weights Characterize drill core waste prior to disposal and dispose in accordance with applicable regulations at licensed facilities Conduct monitoring, as required, by QEP and geotechnicial engineer	Not significant if appropriate mitigation measures are implemented
Road Pre-construction and Fill Placement	Erosion of soil Contamination of soils due to fill importation from unconfirmed sources	Cover stockpiled / fill materials with tarpaulins or polypropylene sheets Use specified, clean fill materials only	Not significant if appropriate mitigation measures are implemented
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	None anticipated	None	Not Applicable
Utility, Fencing and Infrastructure Access Construction	None anticipated	None	Not Applicable
Road Paving	None anticipated	None	Not Applicable

Operational Phase			
Active Residential Community	Localized bank failures, landslides	Provide regular maintenance, inspections	Not significant if appropriate mitigation measures are implemented
Safety / Environmental and Human Health			
Construction Equipment Spills	Contamination of soils as a result of a spill	Implement and adhere to an Emergency Spill Response Plan Ensure that adequate spill containment materials are available on-site Require characterization, removal and confirmatory testing for larger spills (typically spills in excess of 2-5 litres)	Not significant if appropriate mitigation measures are implemented
Construction Debris	Impacts from debris	Remove creosote debris Fence-off / isolate & cover debris / stockpiles	Not significant if appropriate mitigation measures are implemented
Accidents & Malfunctions	Potential impacts to survival Deleterious discharges	Ensure that construction contractor prepares and adheres to a Project-specific CEMP Provide automatic and manual shut-down systems in case of accidents or malfunction	Not significant if appropriate mitigation measures are implemented

9.6 Air Quality

The construction works may temporarily affect air quality (via combustion emissions) in the immediate vicinity of the project area. Fugitive dust from excavated materials and exposed, unvegetated soil surfaces may also pose localized air quality concerns. During the operational period, increased traffic volumes within the project area have a potential to directly affect air quality, particularly during prolonged hot weather with little or no wind to facilitate dissipation. As such, air quality has been included for consideration and investigation as a VEC.

9.6.1 Potential Impacts to Air Quality

9.6.1.1 Construction Phase

Potential impacts to air quality as a result of the project during the construction phase are anticipated to include the following:

- Fugitive dust as a result of vehicular traffic entering and leaving the project area / track out;

- Fugitive dust resulting from unpaved access / construction roads;
- Fugitive dust resulting from uncovered stockpiles;
- Fugitive dust resulting from cut-and-fill and excavation operations;
- Odors during construction from activities such as paving and painting; and
- Construction vehicle and machinery emissions;

9.6.1.2 Operational Phase

Potential impacts to air quality as a result of the project during the operational phases based on available information to-date (noting that these details will be refined as detailed project-related design information becomes available) are anticipated to include the following:

- Increased localized concentrations of particulate matter (PM) and common pollutants in the vicinity of the project area associated with increased traffic including, but not limited to, carbon monoxide, sulfur dioxide and hydrocarbons;
- Increased emissions from residential and commercial activities (e.g., shops / restaurants / deliveries etc.); and
- A net decrease the overall air quality at a local level.

A summary of the significance of potential impacts to air quality (prior to implementation of mitigation measures) is provided in **Table 16.**

Table 16. Relative Significance of the Potential Impacts to Air Quality

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Construction Phase							
Clearing and Grubbing	low	low	immediate area	long-term	immediate	continuous	reversible
Soil Stripping	moderate	high	immediate area / local	long-term	immediate	continuous	irreversible

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Cut Excavation and Rock Excavation / Blasting	moderate	high	immediate area / local	long-term	immediate	continuous	irreversible
Road Pre-construction and Fill Placement	low	medium	immediate area / local	long-term	immediate	continuous	irreversible
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Utility, Fencing and Infrastructure Access Construction	n/a	low	immediate area	long-term	immediate	continuous	irreversible
Road Paving	low	n/a	n/a	n/a	n/a	n/a	n/a
Operational Phase							
Active Residential Community	low	n/a	n/a	n/a	n/a	n/a	n/a
Safety / Environmental and Human Health							
Construction Equipment Spills	n/a	low	immediate area	short-term	immediate	intermittent	reversible
Construction Debris	n/a	high	n/a	n/a	n/a	n/a	n/a
Accidents & Malfunctions	n/a	high	immediate area/ local	short-term/ long-term	immediate/ delayed	intermittent	reversible

9.6.2 Mitigation Measures for Air Quality

The following construction and operational mitigation measures will be implemented to address potential environmental impacts to air quality, noting that additional impacts and mitigation

measures will be implemented during the detailed design/development phase:

- Develop and implement and Air Quality Management Plan as a component of the CEMP;
- Use environmentally acceptable dust suppressants (e.g., Dustguard®) or water, as necessary, to control dust on unpaved access roads. Control dust throughout the life of the construction phase of the project. Do not use oils for dust control. Give preference to the use of water, bearing in mind water conservation and drainage / potential sedimentation issues where appropriate;
- Cover stockpile(s) with tarpaulins or polypropylene sheeting;
- Use low sulfur diesel;
- Conduct paving and line-painting works on calm days, where feasible;
- Minimize idling of heavy equipment and truck traffic – supported and enforced by an Environmental Monitor(s);
- Use electrical equipment over gasoline/diesel equipment, where feasible;
- Develop ride-sharing incentives and consider the use of shuttles and alternative modes of transportation;
- Limit / discourage vehicle access / use and incorporate on-site services to reduce trips off-site for goods and services;
- Encourage use of electrical motorized transportation with incentives for charging stations and electric vehicles.

9.6.3 Residual Effects to Air Quality

With the mitigation measures proposed, there may be residual effects associated with emissions during the operational phase that will require innovative solutions to maintain local air quality.

9.6.4 Air Quality - Section Summary

Potential Impacts, associated mitigation measures to minimize the potential impacts to air quality and anticipated residual effects, if any, are summarized in **Table 17**.

Table 17. Summary of Potential Impacts, Corresponding Mitigation Measures and Residual Effects Associated with Proposed Project Works on Air Quality

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Construction Phase			
Clearing and Grubbing	Fugitive Dust Vehicle and machinery emissions	Familiarize and adhere to the EC document entitled: "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities, March 2005" Develop and implement an Air Quality Management Plan as a component of the CEMP Cover stockpiles with tarps or polypropylene sheeting Use environmental acceptable dust suppressants, as required Use low sulphur diesel Minimize vehicle idling Use electrical or manual equipment, where feasible Conduct periodic environmental monitoring, as required	Not significant if appropriate mitigation measures are implemented
Soil Stripping	As above	As above	Not significant if appropriate mitigation measures are implemented
Cut Excavation and Rock Excavation / Blasting	As above	As above	Not significant if appropriate mitigation measures are implemented
Road Pre-construction and Fill Placement	As above	As above	Not significant if appropriate mitigation measures are implemented
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	As above	As above	Not significant if appropriate mitigation measures are implemented
Utility, Fencing and Infrastructure Access Construction	As above	As above	Not significant if appropriate mitigation measures are implemented
Road Paving	Odours during paving or road-line painting.	Conduct on calm days, where scheduling permits	Not significant if appropriate mitigation measures are implemented

Operational Phase			
Active Residential Community	Increased fossil fuel emissions	Reduce vehicle idling Allow for public transit and walking/biking options	Not significant if appropriate mitigation measures are implemented
Safety / Environmental and Human Health			
Construction Equipment Spills	Volatization of spilled material	Implement and adhere to an Emergency Spill Response Plan Ensure that adequate spill containment materials are available on-site Develop and implement an Air Quality Management Plan as a component of the CEMP	Not significant if appropriate mitigation measures are implemented
Construction Debris	Fugitive dust	Remove debris from the Project area on a regular basis and as soon as possible	Not significant if appropriate mitigation measures are implemented
Accidents & Malfunctions	Fugitive dust Volatization of spilled material	Ensure that the construction contractor prepares and adheres to a Project-specific CEMP	Not significant if appropriate mitigation measures are implemented

9.7 Noise and Light

During the construction phase there is expected to be occasional periods of time when noise levels will be elevated. Similarly, noise levels will be elevated as a result of traffic during the operational phase. As such, noise was included as a VEC. Light was also included as a VEC; noting the significance of the impacts is based on available design details, noting that changes in design may change potential impact considerations as the project evolves.

9.7.1 Potential Impacts from Noise and Light

Cut-and-fill activities in areas of development with existing bedrock will require rock splitting and blasting, in addition to removal via excavators and dump trucks. These types of sensory disturbances are expected to be short-term and are likely to have short-term, reversible impacts on birds and mammals utilizing the Anmore South development area and surroundings. During the operational phase, noise as a result of traffic and residents utilizing the development will increase on a local level.

Excessive or poorly managed lighting can disrupt nocturnal wildlife, particularly species that rely on darkness for foraging, mating, or migratory activities. Light pollution can interfere with natural behaviors, especially for species like bats, amphibians, and certain birds, which are sensitive to artificial light.

The development is designed to align with the municipality's Dark Sky Policy, which is intended to reduce light pollution and preserve the natural night sky. By following these guidelines, the development ensures compliance with the Dark Sky Policy and contributes to the municipality's ongoing efforts to minimize light pollution, which is also intended to reduce potential impacts to wildlife via use of lower intensity light sources, and directing light sources towards the ground with cut-offs to reduce the diffusion of light upward.

A summary of the significance of potential impacts as a result of project-related noise (prior to implementation of mitigation measures) is provided in **Table 18**.

Table 18. Relative Significance of the Potential Impacts as a result of Project-related Noise

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Construction Phase							
Clearing and Grubbing	moderate	low	immediate area	long-term	immediate	intermittent	reversible
Soil Stripping	moderate	medium	immediate area / local	long-term	immediate	intermittent	reversible
Cut Excavation and Rock Excavation / Blasting	high	high	immediate area / local	long-term	immediate	intermittent	reversible
Road Pre-construction and Fill Placement	low	medium	immediate area / local	long-term	immediate	intermittent	reversible
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Utility, Fencing and Infrastructure Access Construction	low	low	immediate area	long-term	immediate	intermittent	reversible
Road Paving	low	n/a	immediate area	short-term	n/a	intermittent	reversible

Project Component	**Evaluation Criteria**						
	Context	**Magnitude**	**Extent**	**Duration**	**Timing**	**Frequency**	**Reversibility**
Operational Phase							
Active Residential Community	moderate	n/a	n/a	long-term	n/a	continuous	n/a
Safety / Environmental and Human Health							
Construction Equipment Spills	n/a	low	immediate area	n/a	immediate	n/a	n/a
Construction Debris	n/a	high	n/a	n/a	n/a	n/a	n/a
Accidents & Malfunctions	n/a	high	immediate area/ local	short-term/ long-term	immediate	n/a	reversible

9.7.2 Mitigation Measures for Noise and Light

The following operational mitigation measures will be implemented to address potential environmental impacts as a result of noise and light:

9.7.2.1 Construction Phase

Mitigation measures to be implemented during the construction phase include:

- Coordinate and schedule activities to minimize overall construction-related noise levels, where possible;
- Restrict construction activities to normal weekday day-time, where possible;
- Enforce engine speed limits that are consistent with minimum noise generation at the work site;
- Utilize the natural terrain to direct as little noise as possible towards noise sensitive areas;
- During blasting, consider drill-and-shoot method or smaller charges to reduce the amount of noise produced;
- Consider blast-mats during blasting to reduce noise produced;

- Schedule construction activities generating significant noise, such as blasting, in an intermittent fashion, where possible, and not for extended periods during any given day;
- Minimize equipment and vehicle idling times and the use of compression release engine brakes on trucks, particularly in residential areas during the early hours;
- Ensure that exhaust systems function in a manner to control exhaust noise within acceptable levels. If night-time work is required, fit all construction equipment with residential-rated mufflers/silencers;
- Perform general construction operations to minimize noise through timing and duration of activities;
- Conduct a visual assessment for wildlife prior to and during blasting activities (via binoculars) and temporarily cease works (under the direction of the environmental monitor), if required;
- Develop a Noise Management Plan as a component of the CEMP, including the establishment of a noise complaint program, to ensure that noise will not become an issue with this project; and
- Per the Dark Sky Policy, incorporate shielded outdoor lighting, low-intensity lighting, and energy-efficient options to minimize glare and over-illumination, as intended.

9.7.2.2 Operational Phase

Potential noise and light impacts relating to the operational phase of the project (i.e., residential occupancy and commercial operations) will be evaluated when detailed project information is provided for review; however, design and incorporate of the Dark Sky Policy is anticipated to be the foremost effective mitigation strategy to offset light pollution and associated adverse impact to residents and wildlife.

9.7.3 Residual Effects from Noise and Light

Residual effects in the absence of appropriate mitigation consists of potential disruption to nesting / reproduction for wildlife. Monitoring and noise mitigation strategies during the construction phase (e.g., blast mats) and appropriate timing are proposed to minimize potential impacts. During the operational phases, social activities and events should be organized to be situated away from sensitive habitat areas and conducted during appropriate timing windows to minimize impacts

during the operational (residential occupancy) phase of the project. Light pollution may result in residual effects to nocturnal wildlife due to their sensitivity to artificial light; however, the implementation of the Dark Sky Policy approach, potential adverse effects will be reduced.

9.7.4 Noise and Light - Section Summary

Potential Impacts, associated mitigation measures to minimize the potential impacts as a result of noise and light and anticipated residual effects, if any, are summarized in **Table 19**.

Table 19. Summary of Potential Noise Impacts, Corresponding Mitigation Measures and Residual Effects Associated with Proposed Project Works (Limited to Construction Operations)

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
Construction Phase			
Clearing and Grubbing	Disruption to wildlife species Disruption to local area residents	Coordinate and schedule activities to minimize overall construction-related noise levels Restrict construction activities to the allotted time periods Utilize the terrain to direct noise away from sensitive areas Notify public of blasting activities Comply with CCOHS and WorksafeBC Conduct noisier activities in an intermittent fashion Utilize noise attenuating devices (i.e., mufflers) on equipment and ensure they are in good working order	Potential disruption to nesting / reproduction
Soil Stripping	As above	As above	Not significant
Cut Excavation and Rock Excavation / Blasting	Disruption to wildlife species Disruption to local area residents	Assess for wildlife species (via a qualified environmental monitor) in the vicinity of the work area prior to blasting Consider drill-and-shoot method or smaller charges to reduce noise produced Consider blast-mats to reduce noise produced during blasting activities	Potential disruption to nesting / reproduction
Road Pre-construction and Fill Placement	As above	Coordinate and schedule activities to minimize overall construction-related noise levels Restrict construction activities to the allotted time periods Utilize the terrain to direct noise away from sensitive areas	Potential disruption to nesting / reproduction

Project Component	Potential Impact(s)	Mitigation Measure(s)	Residual Effects
		Notify the public of blasting activities Comply with CCOHS and WorksafeBC Conduct noisier activities in an intermittent fashion Utilize noise attenuating devices (i.e., mufflers) on equipment and ensure they are in good working order	
Construction / Retrofit and Installation of Culverts and Wildlife Crossing	As above	As above	Not significant
Utility, Fencing and Infrastructure Access Construction	As above	As above	Not significant
Road Paving	As above	As above	Not significant
Operational Phase			
Active Residential Community	Disruption to local area residents Disruption to wildlife species in the area	Consider construction of noise walls, where noise reduction will result Allow for wildlife corridors within the development plan	Potential disruption to nesting / reproduction / direct wildlife utilization
Safety / Environmental and Human Health			
Construction Equipment Spills	n/a	n/a	n/a
Construction Debris	n/a	n/a	n/a
Accidents & Malfunctions	n/a	n/a	n/a

10 NEXT STEPS

AquaTerra recommends the following next steps in support of detailed design and regulatory authorizations / approvals:

1. Complete an updated detailed Riparian Areas Protection Regulation (RAPR) – which may be phased based on construction staging - once a detailed site development plan has been completed to establish the wetland and watercourse setbacks for the site with consideration for increased Streamside Protection & Enhancement Area (SPEA) setbacks to account for wildlife corridor and species at risk protection above the provincial minimums;
2. Design wildlife corridors that are intended for wildlife only, without trails or other passive recreational activities to reduce the potential for direct wildlife/human interaction. Where possible, evaluate options to maximize wildlife corridor size to include an undisturbed core corridor area to account for disturbance / edge effects. Liaise with the Project Biologist to determine appropriate corridor widths and varying widths based on wildlife utilization, as well as a dedicated east-west wildlife corridor;
3. Advance and finalize the aquatic and riparian habitat offsetting prescription for the site, effectiveness monitoring and implementation strategy, noting that these requirements may only apply to subsequent phases;
4. Complete a detailed arborist assessment of the site, identifying significant trees as well as danger trees and windthrow boundaries that could modulate the watercourse / wetland setbacks under the detailed RAPR methodology;
5. Conduct supplementary wildlife utilization assessments using remote, motion activated wildlife cameras to further refine wildlife utilization with a focus on additional areas outside of riparian zones north of Sunnyside Road, and areas to the south of Sunnyside Road, which have not yet been assessed;
6. Conduct an invasive species survey during the late spring-early summer and identify high risk areas to be managed during development;
7. Collect supplementary baseline (pre-development) water quality data and flow data to determine variability in water quality seasonally and to assist in post-construction stormwater modelling efforts; and
8. Continue to engage with stakeholders, local interest groups, residents and the Village of Anmore on to provide input.

11 CLOSURE

This Environmental Impact Assessment report summarizes the environmental background information applicable to the proposed Anmore South development site, north and south of Sunnyside Road based on findings between 2014 and 2024 field studies and available development information provided for review. The comprehensive study details are inclusive of aquatic, terrestrial and their associated inhabitants serving to identify potential environmental impacts over the duration of the development that have been utilized to guide responsible and sustainable development by Icona and its multidisciplinary consulting team.

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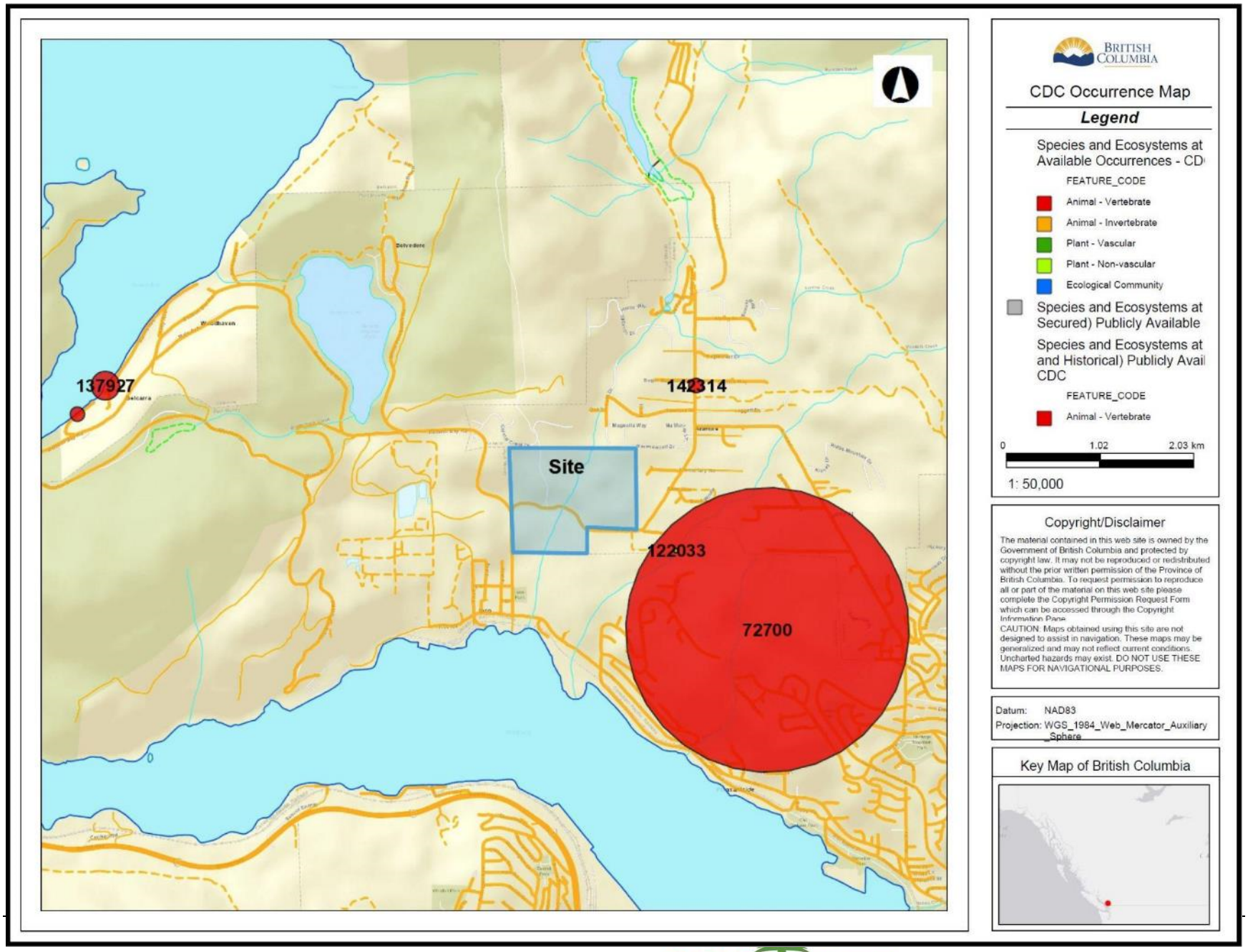
APPENDIX A

Conservation Data Center Mapping Results


137927
142314
Site
122033
72700
BRITISH COLUMBIA
CDC Occurrence Map
Legend
Species and Ecosystems at
Available Occurrences - CD
FEATURE_CODE
Animal - Vertebrate
Animal - Invertebrate
Plant - Vascular
Plant - Non-vascular
Ecological Community
Species and Ecosystems at
Secured) Publicly Available
Species and Ecosystems at
and Historical) Publicly Avail
CDC
FEATURE_CODE
Animal - Vertebrate
0
1.02
2.03 km
1: 50,000
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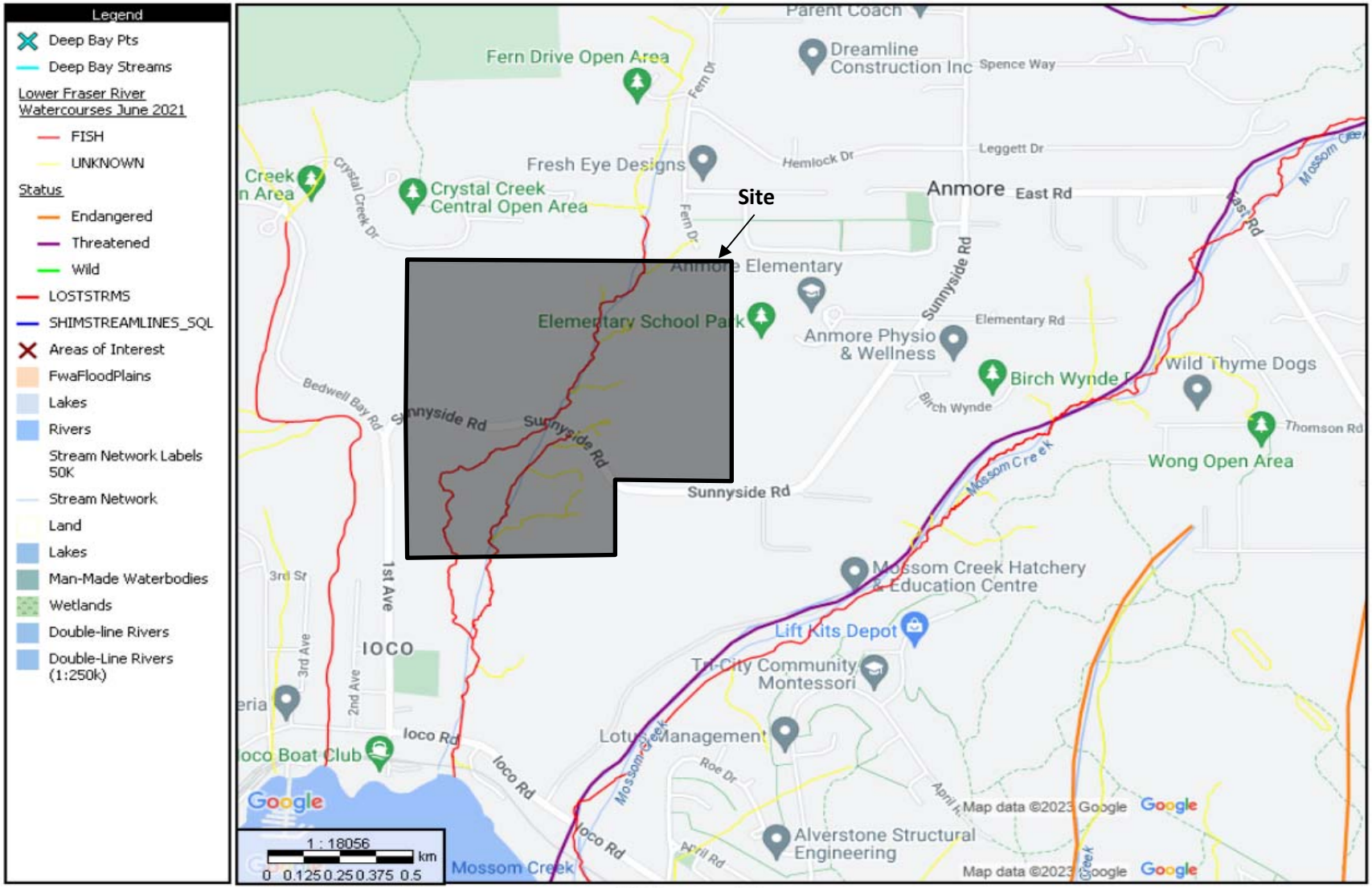
CAUTION: Maps obtained using this site are not designed to assist in navigation. These maps may be generalized and may not reflect current conditions. Uncharted hazards may exist. DO NOT USE THESE MAPS FOR NAVIGATIONAL PURPOSES.
Datum: NAD83
Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere
Key Map of British Columbia

APPENDIX B
SHIM Mapping Results

CMN

SHIM Database



APPENDIX C

2024 Creek Crossing Assessment Observations

APPENDIX D

2022 Terrestrial Vegetation Plot Data – North of Sunnyside Road

APPENDIX E

2023 Terrestrial Vegetation Plot Data – South of Sunnyside Road

APPENDIX F

Field Site Photographs

APPENDIX G

Wildlife Camera Data

APPENDIX H

Wildlife Camera Photographs