

CITY OF PARKSVILLE

# SITE CONDITION ASSESSMENT

## PARKSVILLE AQUATIC & RECREATION CENTRE PARKSVILLE, BC

SEPTEMBER 15, 2021



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September 15, 2021

WSP File No.: 211-06513-00

City of Parksville  
100 Jensen Ave W.  
Parksville, BC  
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**Attention:** Ms. Keeva Kehler, Chief Administrative Officer

**Subject: SITE CONDITION ASSESSMENT  
PROPOSED PARKSVILLE AQUATIC & RECREATION CENTRE SITE  
PARKSVILLE, BC**

WSP Canada Inc. is pleased to submit a final PDF copy of the Site Condition Assessment for the above-referenced property.

We trust that the enclosed report meets your current requirements. If you have any questions regarding this project, the enclosed reports, or our services, please do not hesitate to call the undersigned at (250) 475-1000.

Thank you for utilizing our professional services. We look forward to serving you on this project.

Sincerely,

A handwritten signature in blue ink that reads 'Clucas'.

Christie Lucas, B.Sc., EP  
Team Lead - Environment, Vancouver Island

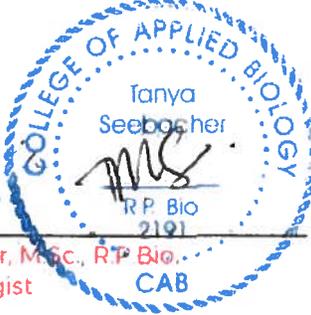
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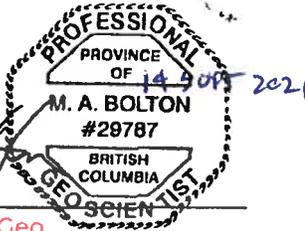


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## LIMITATIONS

No environmental site assessment or investigation can wholly eliminate uncertainty regarding the potential for recognized environmental conditions in connection with a site. Performance of a standardized environmental site assessment protocol is intended to reduce, but not eliminate, uncertainty regarding the potential for recognized environmental conditions in connection with the Site, given reasonable limits of time and cost.

This report was prepared by WSP Canada Inc. (WSP) for the City of Parksville in accordance with the professional services agreement and in a manner consistent with that level of care and skill ordinarily exercised by members of the professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warranty, express or implied, is made. The disclosure of any information contained in this report is the sole responsibility of the intended recipient. The material in it reflects WSP's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. This limitations statement is considered part of this report.

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# 1 INTRODUCTION

The City of Parksville (herein referred to as “the Client” or “the City”) has retained WSP Canada Inc. and Golder-WSP (herein referred to as “WSP”) to complete Site Condition Assessments for the proposed Parksville Aquatic & Recreation Centre (PARC) Site located west of Despard Avenue in the City of Parksville, BC (herein referred to as “the Site”) (Figure 1, Appendix A). The Site Condition Assessments were to comprise a final Land Analysis Report requested by the City for the project.

As presented to City Council on July 5, 2021, potential development constraints were identified during initial site visits completed at the Site by the technical team. WSP recommended that the reports of the preliminary findings be completed prior to moving forward with the remaining assessments. The reports are anticipated to assist the City in determining whether to move forward with additional assessments at this Site or chose a new location. To assist in evaluation of the Site, a single Site Condition Assessment Report has been prepared to detail the findings of the assessments completed to date.

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## 1.1 BACKGROUND

WSP completed an Environmental Overview Assessment (EOA) for the City of Parksville for the Site in February 2021. Our biologists completed a bio-inventory of current conditions of both the instream and riparian components of the freshwater ecosystem, and the terrestrial ecosystems at the Despard Avenue Site. Environmental resources at the Site were identified to determine potential project interactions associated with planned PARC development and to identify mitigation strategies and best management practices that would minimize potential adverse impacts. The bio-inventory included an assessment of other natural environment considerations including sensitive wildlife habitat features, rare plant communities, and invasive species presence.

WSP’s Assessment identified environmental constraints at the Site and provided guidance on the next steps required to meet the City’s objectives including the requirements under their Development Permit process and input for the preliminary design phase. Recommendations included species specific surveys as it is the only way to confirm the potential presence and status of species of conservation concern.

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## 1.2 PROJECT OVERVIEW

The Land Analysis Report was to include the following Site Condition Assessments:

- Ecological and Riparian Areas Assessment
- Hydrogeological Assessment
- Geotechnical Assessment
- Civil Engineering Assessment

The following sections outline what has been completed to date for each assessment.



## 2 PRELIMINARY ECOLOGICAL ASSESSMENT

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### 2.1 OBJECTIVE AND SCOPE OF WORK

The objective of the Preliminary Ecological Assessment was to assess ecological conditions at the Site and potential impacts related to the construction and operation of the proposed PARC. WSP's scope of work for the assessment included the following:

- Desktop review of ecological information including:
  - Site plans
  - Sensitive Ecosystem Inventory (SEI) mapping (1:20,000 scale) ([http://www.env.gov.bc.ca/sei/van\\_gulf/index.html](http://www.env.gov.bc.ca/sei/van_gulf/index.html))
  - RDN GIS Maps (<https://webmap.rdn.bc.ca/Html5Viewer/?viewer=Public>)
  - City of Parksville iVault (<http://map.parksville.ca/Map/Default.aspx>)
  - BC Conservation Data Centre (CDC) iMap BC
  - BC Species and Ecosystem Explorer
  - BC Wildlife Tree Stewardship Atlas / BC Great Blue Heron Atlas
  - Reports prepared by consultants documenting Site conditions
- Site reconnaissance

WSP Canada Inc. completed a terrestrial and aquatic inventory of the Site on June 20 and 21, 2021. The focus of the terrestrial assessment was to determine the potential presence of rare and endangered plant communities, and a reconnaissance level assessment of invasive plant species was also completed. The focus of the aquatic assessment was to delineate watercourses present on Site, assess the instream characteristics and identify riparian conditions. The alignment of the streams situated on the Site were located using an Arrow 100 unit GPS and Avenza Maps® app to collect locational data of the watercourses present on Site.

Concurrent with the aquatic survey incidental wildlife observations, sign and habitat were recorded and the Site was also assessed for the potential to support rare wildlife species such as Western Water Shrew, *brooksi* subspecies (*Sorex navigator brooksi*; provincially red-listed) and northern red-legged frog (*Rana aurora*; provincially blue-listed).

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## 2.2 RESULTS

### 2.2.1 PLANTS AND ECOSYSTEMS

Six vegetation ground inspection plots (PV01 to PV06) were completed during the fieldwork on 21 to 22 June 2021 within the Site (Figure 2, Appendix A and Photo 2, Appendix B). A total of 51 vegetation



species were confirmed during the two-day Site reconnaissance that included 8 tree species, 11 shrub species, 23 herb species, and 9 bryophytes (Table 2-1).

**Table 2-1 Plant Species Confirmed During the Fieldwork 21 to 22 June 2021**

COMMON NAME	SCIENTIFIC NAME	SARA	COSEWIC	BC LIST	PROVINCIAL STATUS
<b>Trees</b>					
Amabilis fir	<i>Abies amabilis</i>	-	-	Yellow	S5 (2019)
bigleaf maple	<i>Acer macrophyllum</i>	-	-	Yellow	S5 (2019)
red alder	<i>Alnus rubra</i>	-	-	Yellow	S5 (2019)
Sitka spruce	<i>Picea sitchensis</i>	-	-	Yellow	S5 (2019)
black cottonwood	<i>Populus trichocarpa</i>	-	-	Yellow	S5 (2019)
coast Douglas-fir	<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>	-	-	Yellow	S5 (2000)
western redcedar	<i>Thuja plicata</i>	-	-	Yellow	S5 (2019)
western hemlock	<i>Tsuga heterophylla</i>	-	-	Yellow	S5 (2019)
<b>Shrubs</b>					
western flowering dogwood	<i>Cornus nuttallii</i>	-	-	Yellow	S5 (2019)
red-osier dogwood	<i>Cornus sericea</i>	-	-	Yellow	S5 (2000)
salal	<i>Gaultheria shallon</i>	-	-	Yellow	S5 (2019)
English ivy	<i>Hedera helix</i>	-	-	Exotic	SNA (2019)
black twinberry	<i>Lonicera involucrata</i> var. <i>involucrata</i>	-	-	Yellow	S5 (2019)
black gooseberry	<i>Ribes lacustre</i>			Yellow	S5 (2019)
thimble berry	<i>Rubus parviflorus</i>	-	-	Yellow	S5 (2000)
salmonberry	<i>Rubus spectabilis</i>	-	-	Yellow	S5 (2019)
Pacific willow	<i>Salix lasiandra</i> var. <i>lasiandra</i>	-	-	Yellow	S5 (2000)
pink spirea	<i>Spiraea douglasii</i> var. <i>douglasii</i>	-	-	Yellow	S5 (2000)
common snowberry	<i>Symphoricarpos albus</i> var. <i>albus</i>	-	-	Yellow	S3S4 (2001)
<b>Herbs</b>					
lady fern	<i>Athyrium filix-femina</i> var. <i>cyclosum</i>	-	-	Yellow	S5 (2019)
Dewey's sedge	<i>Carex deweyana</i> var. <i>deweyana</i>	-	-	Yellow	S5 (2019)
slough sedge	<i>Carex obnupta</i>	-	-	Yellow	S5 (2019)
Douglas' water-hemlock	<i>Cicuta douglasii</i>	-	-	Yellow	S5 (2019)
miner's-lettuce	<i>Claytonia perfoliata</i>	-	-	Blue	S5 (2020)



COMMON NAME	SCIENTIFIC NAME	SARA	COSEWIC	BC LIST	PROVINCIAL STATUS
Pacific bleeding heart	<i>Dicentra formosa</i> ssp. <i>Formosa</i>	-	-	Yellow	S5 (2019)
spiny wood fern	<i>Dryopteris expansa</i>	-	-	Yellow	S5 (2019)
blue wildrye	<i>Elymus glaucus</i> ssp. <i>glaucus</i>	-	-	Yellow	S5 (2020)
common horsetail	<i>Equisetum arvense</i>	-	-	Yellow	S5 (2019)
large-leaved avens	<i>Geum macrophyllum</i> var. <i>macrophyllum</i>	-	-	Yellow	S5 (2000)
-	<i>Lactuca</i> sp.	-	-	-	-
Canby's lovage	<i>Ligusticum canbyi</i>	-	-	Yellow	S5 (2019)
skunk cabbage	<i>Lysichiton americanus</i>	-	-	Yellow	S5 (2019)
wall lettuce	<i>Mycelis muralis</i>	-	-	Exotic	SNA (2019)
western sword fern	<i>Polystichum munitum</i>	-	-	Yellow	S5 (2019)
meadow buttercup	<i>Ranunculus acris</i>	-	-	Exotic	SNA (2019)
trailing blackberry	<i>Rubus ursinus</i>	-	-	Yellow	S5 (2019)
curled dock	<i>Rumex crispus</i>	-	-	Exotic	SNA (2019)
field hedge-nettle	<i>Stachys arvensis</i>	-	-	Exotic	SNA (2019)
fringecup	<i>Tellima grandiflora</i>	-	-	Yellow	S5 (2019)
three-leaved foamflower	<i>Tiarella trifoliata</i> var. <i>trifoliata</i>	-	-	Yellow	S5 (2000)
stinging nettle	<i>Urtica dioica</i> ssp. <i>gracilis</i>	-	-	Yellow	S5 (2019)
American speedwell	<i>Veronica beccabunga</i> var. <i>americana</i>	-	-	Yellow	S5 (2019)
<b>Bryophytes</b>					
-	<i>Brachythecium</i> sp.	-	-	-	-
common tree moss	<i>Climacium dendroides</i>	-	-	Yellow	S4S5 (2015)
-	<i>Climacium dendroides</i>	-	-	#N/A	S4S5 (2015)
Leafy moss	<i>Mnium</i> spp.	-	-	-	-
-	<i>Plagiomnium insigne</i>	-	-	-	S4S5 (2015)
-	<i>Plagiomnium medium</i>	-	-	-	S4S5 (2015)
knight's plume	<i>Ptilium crista-castrensis</i>	-	-	Yellow	S5 (2015)
-	<i>Rhytidiadelphus loreus</i>	-	-	-	S5 (2015)
-	<i>Scapania</i> sp.	-	-	-	-



Invasive and exotic species are plant species that have been introduced to the region by human activities, such as agriculture and forestry. Invasive plant data overlapping the Site from background data sources includes the following species from the Invasive Alien Plant Program (IAPP) Database (Figure 2, Appendix A):

- Bull thistle (*Cirsium vulgare*)
- Common tansy (*Tanacetum vulgare*) - listed as “control” on the Coastal Invasive Species Committee website.
- Giant hogweed (*Heracleum mantegazzianum*) - listed as “eradicate” on the Coastal Invasive Species Committee website.

Four invasive plant species were confirmed during the fieldwork at the Site (Figure 2, Appendix A):

- Giant hogweed (*Heracleum mantegazzianum*) - listed as “eradicate” on the Coastal Invasive Species Committee website.
- Yellow archangel (*Lamium galeobdolon*)
- Bull thistle (*Cirsium vulgare*)
- Himalayan blackberry (*Rubus armeniacus*) - listed as “control” on the Coastal Invasive Species Committee website.

According to the Biogeoclimatic Ecosystem Classification (BEC) system for the province, the Site occurs within the Moist Maritime Coastal Douglas-fir (CDFmm) Biogeoclimatic unit. The CDFmm is within the rainshadow of the Vancouver Island and Olympic Mountains that results in warm and dry summers and mild, wet winters with water deficits common on drier sites (Green and Klinka 1994). Common vegetation in the CDFmm includes coast Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), grand fir (*Abies grandis*), and western redcedar (*Thuja plicata*), with an understory comprised of salal (*Gaultheria shallon*), dull Oregon-grape (*Mahonia nervosa*), and oceanspray (*Holodiscus discolor*) (Green and Klinka 1994).

Site series classification was difficult given the extensive historic disturbance in the area. Areas presently dominated by black cottonwood (*Populus trichocarpa*) have been converted from previously natural ecosystems into agricultural use and have been fallow for approximately 30-40 yrs. Other areas in the Project footprint have not been fully converted to agriculture and retain some of the remnant ecosystem attributes and functions. Plant communities in the Site can generally be grouped into four map units (Figure 2, Appendix A):

- Western redcedar - Douglas-fir / Oregon beaked-moss (05)
- Western redcedar / sword fern – skunk cabbage swamp (Ws53)
- Seral poplar / alder regenerating stand (00)
- Urban (00)

The 1:5,000 Terrestrial Ecosystem Mapping (TEM) was updated for the Project based on the June 2021 field findings and indicates that much of the Project footprint can be classified as a forested swamp wetland - Western redcedar (*Thuja plicata*) – sword fern (*Polystichum munitum*) – skunk cabbage (*Lysichiton americanum*) salmonberry (*Rubus spectabilis*) swamp (Ws53; Mackenzie and Moran 2004).



This seasonally flooded wetland depression is recovering from logging related disturbance and is currently characterized by regenerating western redcedar and red alder (*Alnus rubra*) forest mixed with shrub dominated patches. Higher elevations adjacent to the Ws53 area transition into a western redcedar - Douglas-fir (*Pseudotsuga menziesii*) / Oregon beaked-moss (*Eurhynchium oregonum*) (CDFmm/05) moist forest along the southern edges of the polygon.

The Project footprint has a strongly fluctuating water table with moisture regimes changing significantly from winter flooding to summer drought. A seasonal stream channel is braided through the wetland area and varies in width from 'concentrated' (1m width) to 'dispersed' (no defined channel). Western redcedar stumps 0.8-1.3 m in diameter are common. Living western redcedar trees were observed to have top dieback with dead tops but live lower branches and were aged up to 82 years old, indicative of mature forest attributes. Soil investigation in the Ws53 mapped swamp area shows the late June water table less than 1m from the ground surface.

The northern portion of the Site is recovering from intense agricultural conversion and is currently in the early seral stage characterized by patchy pole / sapling and young forest structural stages. The wetter depression areas are dominated by black cottonwood and red-osier dogwood (*Cornus sericea*) with red alder and patches of salmonberry. Historically, the black cottonwood and alder seral forest was likely a conifer dominated forest type, but little remains in the way of stumps or indicator plants. Soil investigation in the cottonwood and alder dominated area shows the late June water table below 1m.

**PLANTS AND ECOSYSTEMS AT RISK**

Surveys for at risk plant species followed the protocols set out in Penny and Klinkenberg (2007), Alberta Native Plant Council (ANPC 2012) and referenced in Resources Information Standards Committee (RISC 2018). Surveys were undertaken during the field program at survey plots, and while travelling between plot locations. No plant species at risk were confirmed during the field reconnaissance work on 21 to 22 June 2021 overlapping the Site.

One masked occurrence record (ID 46478) is also present overlapping the property; however, no information was obtained about this masked occurrence at the time of writing this report. In addition, no mapped critical habitat for plant species at risk exists overlapping the property.

Two provincially listed ecosystems were confirmed to overlap the Site: Ws53 (refer to Photo 8, Appendix B) and O5 site series (Table 2-2). These ecosystems were present over the majority of the central and southern portion of the Site, where intact mature forest was present (Figure 2, Appendix A).

**Table 2-2 Listed Ecosystems Confirmed During the Fieldwork at Site**

COMMON NAME	SCIENTIFIC NAME	BEC UNIT	BC LIST
Western redcedar / sword fern - skunk cabbage	<i>Thuja plicata</i> / <i>Polystichum munitum</i> - <i>Lysichiton americanus</i>	CDFmm/Ws53	Blue
Western redcedar - Douglas-fir / Oregon beaked-moss	<i>Thuja plicata</i> - <i>Pseudotsuga menziesii</i> / <i>Eurhynchium oregonum</i>	CDFmm/05	Red

## 2.2.2 WILDLIFE

Although a dedicated wildlife survey was not conducted, there were numerous sightings of wildlife during Site visits completed on 21 to 22 June 2021 as described in the following sections:

### MAMMALS

Black-tail deer (*Odocoileus hemionus*), eastern cottontail (*Sylvilagus floridanus*) and red squirrel (*Tamiasciurus hudsonicus*) were observed as well as a dead shrew (*Sorex* sp.) located on the trail to the west of the Site.

### BIRDS

Two adult and two juvenile barred owls (*Strix varia*) were observed in the east part of the Site adjacent to Romney Creek (refer to Photo 9, Appendix B). Passerine populations were diverse and included several warbler species, dark-eyed junco (*Junco hyemalis*), chestnut-backed chickadee (*Poecile rufescens*), American robin (*Turdus migratorius*), Pacific wren (*Troglodytes pacificus*), Pacific-slope flycatcher (*Empidonax difficilis*), red-breasted nuthatch (*Sitta canadensis*), American crow (*Corvus brachyrhynchos*) and golden-crowned kinglet (*Regulus satrapa*). Woodpeckers observed included downy woodpecker (*Dryobates pubescens*), red-breasted sapsucker (*Sphyrapicus ruber*) and northern flicker (*Colaptes auratus*). There were no bald eagle or great blue heron nests reported within the Property based on provincial databases (WITS 2021, GBHMT 2021).

### AMPHIBIANS

Amphibians observed on the Site included Pacific treefrog (*Pseudacris regilla*), red-backed salamander (juvenile, *Plethodon cinereus*) and several unidentified larval salamanders. Although not noted during the survey there is potential for red-legged frog (*Rana aurora aurora*), which are a provincially blue-listed species, to occur on the Site. There is an abundance of rearing habitat and likely several residual deep pools within the mainstem of Romney Creek that would sustain tadpoles until they metamorphose.

### WILDLIFE TREES

Several clusters of snags were observed during the June 2021 survey (Figure 2, Appendix A; Photos 1, 7 and 11, Appendix B). In particular, the large treed area located to the south of Romney Creek mainstem had numerous deciduous and coniferous dead trees which had good potential for supporting cavity nest creation and foraging. To the immediate north of the mainstem near the trail crossing there was also a grouping of coniferous snags. It should be noted that many of these snags did not show current signs of wildlife use (excavations, nesting) but should be considered for retention.

### WILDLIFE AT RISK

No wildlife species at risk were observed during the site reconnaissance. The nearest observed species at risk occurrence is an observation record of common wood-nymph (*Cercyonis pegala incan*) located approximately 750 m east of the Site on the edge of the Englishman River (DataBC 2021). In addition, there is no mapped critical habitat for wildlife species at risk overlapping the Site.

The Western Water Shrew *brooksi* subspecies (formerly the Vancouver Island Water Shrew) is a habitat specialist of the land/water interface in riparian habitat of eastern and southern Vancouver Island (Craig,



2004). Habitats have included permanent and ephemeral watercourses and wetlands within a variety of forest types. A requirement of suitable habitat includes the presence of intact riparian vegetation and some water where a diet of aquatic macroinvertebrates and terrestrial invertebrates is consumed, and they have been captured along intermittent and ephemeral streams. Past capture locations have included complex stream habitat with pools and coarse woody debris, undercut banks, exposed roots, and multi-storey dense riparian vegetation. The majority of watercourse capture locations occurred along gravel or cobble substrate streams ranging from 1.2 m to 26 m wide (Craig, 2004). At the time of the survey the majority of Romney Creek was dry; what remained were short stretches of shallow standing water and several residual deep pools. This also made it difficult to complete a habitat analysis for the water shrew. This species has some potential for occurring on the Site, but species-specific surveys were not completed as of the writing of this report.

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### **2.2.3 FISHERIES**

At the time of the survey the majority of Romney Creek was dry; what remained were short stretches of shallow standing water and several residual deep pools (refer to Photos 4, 6 and 10, Appendix B). The initial field program proposed a fish inventory survey using minnow trapping and electrofishing but this was not possible due to the dry creek conditions.

Romney Creek passes under the E & N Railway through a 600 mm culvert. Downstream of the railway culvert the watercourse flows in a northeast direction towards the trail. The flows pass through a set of large double culverts (Culvert C1) under the trail (refer to Photo 5, Appendix B). The stream's alignment is off center (east) of the culverts at the inlet therefore some of the flow moves north passively through the culverts while some flows continue southeast alongside the trail to another set of lower elevation double culverts (Culverts C2). Flows that pass through the most northern culverts continue to flow northeast until the northern portion of the property where some flows pass into an entrenched stream bed heading east (herein referred to as the Romney Creek eastern channel) but the majority of flows continue on to the north in a wider and shallower channel (herein referred to as the Romney Creek northern channel) through a pole sapling forest. At the northern border of the Site these flows become unconfined overland flow and eventually enter a bioswale situated to the north of the Site which is located along the west boundary of the trail that runs parallel to Chestnut Street and connects to the Parksville Wetlands Trail system. The Romney Creek eastern channel flows east towards Despard Avenue W and enters the stormwater system near the Springwood Water Plant. The entrance into the stormwater system at this site is fenced off after which the watercourse passes over a 2 m drop spillway then through a debris grate and into the pipe inlet.

Flows that pass under the trail in the lower elevation C2 culverts immediately form three braided channels that meander through the forest and eventually merge before connecting with the mainstream of Romney Creek approximately 65 m downstream of the trail.

A small black plastic culvert (C3) captures trail runoff from the southern border of the trail which then flows northeast through the forest likely joining the Romney Creek mainstem approximately 90 m downstream of the trail.

No fish were observed on the Site during the June 2021 field survey.

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## 2.3 DISCUSSION

Vegetation and ecosystem constraints for the PARC project include the following:

- The proposed development footprint overlaps two types of provincially listed ecosystems (one blue-listed Ws53 mature forest swamp and one red-listed Western redcedar - Douglas-fir / Oregon beaked-moss fresh-moist forest ecosystem) (Figure 2, Appendix A).
  - Impacts to Ws53 wetland functions including flood protection, ground water recharge, water quality, carbon storage, biodiversity, and temperature regulation for downstream wetland complex.
  - Impacts to Ws53 sensitive organic soils.

Wildlife constraints for the PARC project include the following:

- Impacts to mature forest (>80 years) attributes including cavity nesting bird habitat, structural complexity, amphibian breeding habitat.

Fisheries constraints for the PARC project include the following:

- Fish presence in Romney Creek has not yet been confirmed due to the creek being mostly dry at the time of the site reconnaissance. If fish are present in the system at certain times of year, permitting under the *Fisheries Act* would be required along with potential offsetting sites for a Fisheries and Oceans Canada (DFO) Authorization and approval of an offsetting plan.

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## 2.4 RECOMMENDATIONS

Based on the results of the Preliminary Ecological Assessment, it is recommended that the City consider alternative options for the proposed PARC facility that would avoid development within the provincially listed ecosystems; a blue-listed Ws53 mature forest swamp and a red-listed Western redcedar - Douglas-fir / Oregon beaked-moss fresh-moist forest ecosystem as shown on Figure 2, Appendix A. If the City wishes to proceed with further evaluation of the Site for the proposed PARC facility, the following recommendations for the next stage of ecological assessment are provided:

- Fisheries surveys in Romney Creek to confirm fish presence or absence during the fall when rainfall has increased in the area and the water level in the creek is higher. The recommendation to be compliant with MFLNRORDs conditions is to sample in the spring and fall using two separate sampling methods; electroshocking and minnow trapping during both seasons (provincial fish salvage permit required – 1-2 months).
- Western Water Shrew *brooksi* subspecies habitat assessment for Romney Creek and tributaries. Stream data will be summarized along segments across the riparian zone (Craig 2005). Field data will be analyzed and combined to determine an overall habitat suitability rating for water shrew (Craig, 2005).
- Amphibian breeding surveys – In accordance with RIC standards (RIC 1999), two rounds of amphibian breeding surveys should be completed to confirm amphibian breeding. Time constrained searches are the most direct approach to determine presence/not detected (RIC 1998 and 1999).



## 3 HYDROGEOLOGICAL ASSESSMENT

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### 3.1 OBJECTIVE AND SCOPE OF WORK

The objective of the Preliminary Hydrogeological Assessment was to assess hydrogeological conditions at the Site and potential impacts related to the construction and operation of the proposed PARC. WSP's scope of work for the assessment included the following:

- desktop review of hydrogeological information including:
    - Site plans
    - aquifer information and available well records (i.e., logs)
    - data available on the BC Provincial Groundwater Observation Well Network (PGOWN) database
    - reports prepared by consultants documenting Site conditions
    - well operation records (water levels, pumping rates) provided by the City for the supply wells at the Site
  - Site reconnaissance to assess Site conditions, including conditions of the wellheads of the City's supply wells and the immediate surroundings
  - preparation of this technical memorandum documenting the results of the above
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### 3.2 RESULTS

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#### 3.2.1 SURFICIAL GEOLOGY

The surficial geology in the area of the Site is mapped by Fyles (1963) as generally comprising a marine veneer complex of varied stony gravel, gravel, sand, silt, clay and stony loam deposits generally less than 1.5 m (5 feet) in thickness, overlying ground moraine deposits of till, lenses of gravel, sand and silt. The marine veneer is mapped as being directly underlain by Quadra sediments along a band that is mapped as extending west to southeast through the Site; the Quadra sediments comprise deposits of sand with minor gravel that are in part covered by remnants of till (Fyles, 1963).

Natural Resources Canada (2015) also maps the surficial geology in the area of the Site as comprising a marine veneer of variously boulder gravel, sand, silt and clay less than 1 m thick and discontinuous, underlain by a blanket (>2 m thick) of till deposits described as boulder diamictons of a sandy to clayey matrix with clasts of various lithologies. A band of undifferentiated glaciofluvial deposits overlying a till blanket overlying Quadra Sand is mapped as extending west to southeast through the Site. The Quadra Sand deposits are described by Natural Resources Canada (2015) as consisting of glaciofluvial channel fill and floodplain deposits that are cross bedded, sorted sand with minor gravel and silt that are 3 to 30 m thick. Natural Resources Canada (2015) also maps the surficial soils in the immediate vicinity of the Site as organic deposits of accumulated plant material in various stages of decomposition, bog or swamp deposits.



The surficial maps provided by Fyles (1963) and Natural Resources Canada (2015) are generally consistent; however, there is uncertainty regarding the thickness and composition of the marine deposits that overlie Quadra deposits in the immediate vicinity of the Site, particularly towards the north. As both maps are regional in scale, there is uncertainty regarding the extents of the mapped units and Site-specific information is required to characterise subsurface conditions at the Site.

Tetra Tech Canada Inc. (Tetra Tech; 2020) conducted a preliminary subsurface investigation that included advancement of two test pits to depths of approximately 3 m below ground surface (bgs) in the northern portion of the Site. Tetra Tech described the soils encountered as comprising an organic topsoil overlying a veneer of sand and silt deposits, overlying clay deposits that were inferred to be glaciomarine in origin. The soil consistencies ranged from dense in the near surface sand to very stiff clay at depths of approximately 1.2 to 1.3 mbgs to firm clay at the maximum depth of equipment reach at 3 mbgs.

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### **3.2.2 HYDROGEOLOGICAL SETTING**

The BC Groundwater Wells and Aquifers database (GWELLS database) maps the Site as being underlain by Aquifer no. 216 which comprises sand and gravel deposits of the Quadra Sands unit (Government of BC, 2021a). This aquifer is approximately 25 km<sup>2</sup> in area and extends from French Creek east towards the Englishman River, and from south of Highway 19 north to the Salish Sea (Figure 3, Appendix A). Groundwater flow through the aquifer is inferred to generally be in a northern direction from the upland areas in the south towards the ocean.

Aquifer 216 is classified by the BC Ministry of Environment and Climate Change Strategy (ENV) as IIB, reflecting relatively moderate development relative to its moderate productivity and a moderate vulnerability to contamination from surface sources. The Aquifer Classification Work Sheet indicates that the aquifer is confined with low permeability materials described as “till/hardpan” that range in thickness from 0 to 24 m, but notes Quadra deposits at surface (windows) in the area of Church Road and Highway 19, approximately 1.5 km west of the Site (BC ENV, 1996).

The GWELLS database identifies a total of 302 registered well records within the mapped extents of Aquifer 216. Within the general area of the Site (i.e., 500 m radius), registered wells are generally located along the E&N Railway, south and west of the Site. The majority of these records are related to wells that are owned and operated by the City as part of the Springwood Wellfield. The Springwood Wellfield is located approximately 1.2 km north of the upgradient (southern) boundary of Aquifer 216. A summary of the registered wells within the area of the Site is presented in Table 3-1. The locations of the Springwood wells that are within approximately 50 m of the proposed PARC are presented on Figure 4, Appendix A.



**Table 3-1 Summary of Registered Wells<sup>a</sup> in Vicinity of Proposed PARC Site**

WELL TAG NO.	WELL/SPRING NAME	YEAR <sup>b</sup>	SCREEN DEPTH (MBGS) <sup>c</sup>		CONFINING DEPOSITS		ADDITIONAL COMMENTS
			TOP	BOTTOM	DEPTH (TOP TO BOTTOM; MBGS) <sup>c</sup>	DESCRIPTION <sup>d</sup>	
<b>Actively Used Production Wells</b>							
39215	Springwood 1	1978	22.3	30.2	0 to 2.4; 2.4 to 9.1	brown clay till, boulders; till	
107121	Springwood 3	1983	18.7	25.3	no record	no record	Well log does not provide information regarding lithology
37482	Springwood 5	1977	20.5	30.2	0 to 3.1; 3.1 to 3.7; 3.7 to 16.8	brown till, sand; silty blue till; till, small silt lenses	GWELLS database lists well as being artesian
107119	Springwood 6	1988	21.3	30.8	no record	no record	Well log does not provide information regarding lithology
107111	Springwood 7	1990	30.4	39.9	0 to 1.8 1.8 to 3.7 3.7 to 12.2 12.2 to 18.3	silt sand silty gravel and sand sand large clasts silt & cobbles very compact gravel & hardpan	
107112	Springwood 8	1990	29.0	38.1	0 to 1.2 1.2 to 21.0	silty sand and gravel hardpan, some gravel & cobbles	Some water bearing material noted at depth 9.4 to 15.8 m; GWELLS database lists well as being artesian
95022	Springwood 10	2008	20.8	25.6	0 to 1.2 1.2 to 11.0	silts, till with wood silt till gravelly	Replacement for well for Springwood 2
95023	Springwood 11	2008	22.5	27.3	0 to 1.5 1.5 to 11.0	silts and wood silt till	Replacement for well for Springwood 4
<b>Unused Production Wells and other Registered Wells</b>							
107113	Springwood 2	1983/ 2014 <sup>e</sup>	end of casing <sup>f</sup> : 10.4	no record	no record	Well reported to have insufficient production; decommissioned and replaced with Springwood 10 <sup>g</sup>	



WELL TAG NO.	WELL/SPRING NAME	YEAR <sup>b</sup>	SCREEN DEPTH (MBGS) <sup>c</sup>		CONFINING DEPOSITS	ADDITIONAL COMMENTS
			TOP	BOTTOM		
107122	Springwood 4	1970/2015 <sup>e</sup>	end of casing <sup>f</sup> : 9.8	no record	no record	Well decommissioned and replaced with Springwood 11 <sup>h</sup>
107110	Springwood 9	1997	28.6	38.3	0 to 1.5 1.5 to 22.0	silt; compact gravel till Well currently capped, unused and located within walking path
37431	-	1977	n/a	n/a	0 to 0.9 0.9 to 3.7 3.7 to 5.5	brown clay and stone; glacial till; brown clay Well reportedly not developed: information not provided regarding decommissioning
38752	-	1978	n/a	n/a	0 to 0.9 0.9 to 3.7 3.7 to 5.5	brown clay and sand; till; dry brown sand and brown clay Abandoned at time of drilling: casing pulled, borehole cemented and backfilled
<b>Registered Springs</b>						
677	Spring 1 <sup>i</sup>	1974	n/a	n/a	n/a	n/a 1974 record indicates a spring owned by Parksville, 121 GPM
4035	Spring 2 <sup>i</sup>	1950	n/a	n/a	n/a	n/a 1950 record indicates a spring owned by Parksville, 121 GPM
674	-	1950	n/a	n/a	n/a	n/a 1950 record indicates a spring owned by Parksville, 121 GPM

- Notes:**
- Wells registered on BC Government GWELLS database
  - year of construction or registration, as provided on water well record
  - mbgs = metres below ground surface
  - description of confining deposits, as reported on available water well record
  - year well was constructed and decommissioned (e.g., 1983/2014 = constructed in 1983, decommissioned in 2014)
  - well completed as open-ended casing without well screen assembly
  - well decommissioning report on record: well deactivated by over drilling 6-inch casing with 10-inch core barrel to depth of 4.3 mbgs, bentonite poured in the well/borehole from ground surface to 8.7 mbgs; 6-inch casing below 4.3 mbgs left in place
  - no well decommissioning report on record; however, GWELLS database indicates that 6-inch casing was left in place from 0.3 to 9.8 mbgs and filled with poured bentonite
  - spring inferred based on relative location on GWELLS database compared to Koers & Associates Engineering Ltd. (1996) General Watermain Piping Plan



Thurber Engineering Ltd. (TEL; 1998) reported that all the wells that were in use at the Springwood wellfield in 1998 (specific well numbers were not provided) were completed in the Quadra Sand aquifer (Aquifer 216), noting that the thickness and location of the aquifer is variable. TEL also reported that at the Site the aquifer was overlain by 7 m of Capilano Sediments (water bearing silt, sand and gravel) and from 5 to 20 m of Vashon Till, which was interpreted to be an aquiclude which provided good attenuation characteristics (i.e., low permeability barrier). However, review of the available well records, as summarized in Table 3-1 above, suggests that the thickness and composition of the confining deposits at the Site are variable. Water bearing lenses are reported to occur within the confining deposits such as the silty gravel and sand lenses that were identified on the well record for Springwood Well 7 and are inferred to have been encountered in Springwood Wells 2 and 4, as these two wells were completed with open casing (i.e., no screen) and had sufficient yield to be used for water supply.

The thickness of the confining deposits is inferred to generally decrease from west to east from approximately 20 m at Springwood Well 8 to approximately 11 m at Springwood Well 10 and 11, which are located immediately south of the proposed facility (Figure 4, Appendix A). Within the area of the proposed PARC facility (i.e., at the Site and the immediate surroundings), confining deposits are primarily described on well records as comprising till. Tetra Tech (2020) encountered clay deposits to a depth of 3 mbgs in two test pits that were advanced in the north-central part of the Site. However, no additional subsurface information is available within the footprint of the proposed PARC facility, as no lithology information is provided on the record for Springwood Well 3, which is the only well within the area of the proposed development (Figure 4, Appendix A). The topography within the area of the proposed PARC facility is also variable, resulting in uncertainty regarding the elevation of the base of the confining deposits.

Consistent with the information on the BC ENV (1996) Aquifer Classification Work Sheet, TEL (1998) reported that the wells at the Site were artesian and flowing under static (non-pumping) conditions. The GWELLS database identified Springwood Wells 5 and 8 as being artesian and the registered springs presented in Table 3-1 and located directly west, south and east of the Site reflect flowing artesian conditions at the times that they were mapped. Well operations data indicated that Springwood Wells 3, 5, 10 and 11, located within and adjacent to the area of the proposed PARC facility, are all regularly pumped to supply the City's municipal water system. The data also indicated that flowing artesian conditions were recorded at Springwood Well 3 with maximum water levels in the well recorded to be as high as 1.0 m above the well flange in December 2020. The well flange was measured during the Site reconnaissance to be approximately 0.4 m above grade and ground surface in the fenced compound for Springwood Well 3 was higher than the immediate vegetated surrounding areas. These results indicate that seasonal flowing artesian conditions occur in the Quadra Sands that underlie the area of the proposed PARC facility.

Under Phase 1 of the Regional District of Nanaimo (RDN) Water Budget Project, Aquifer 216 was identified with a high level of stress (i.e., relatively high water use relative to water availability) (Waterline Resources Inc., 2013). Water level data for Observation Well No. 304, located approximate 400 m southeast of the Site, obtained from the BC Provincial Groundwater Observation Well Network (PGOWN), indicate a declining trend from pre-1990 to approximately 2015, with water levels decreasing from approximately 4 mbgs to 11 mbgs during this period. The water level at this monitoring well recovered to a level of approximately 7 mbgs by 2021. During the Site reconnaissance, the Parksville Chief Operator of Utilities advised that pumping rates for some of the Springwood wells had decreased in recent years, and higher groundwater levels had been encountered during the wet winter season (S.



Churko, 2021). The Chief Operator also indicated that flowing artesian conditions had been observed at a dug well which was located approximately 20 m northwest of Springwood Well 10. The location of the dug well, which is inferred to be Spring 2 based on municipal drawings prepared by Koers & Associates Engineering Ltd. (1996), was reported to have been dry in previous years.

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### 3.3 DISCUSSION

In the area of the Springwood wellfield, Aquifer 216 is currently relatively well protected: (1) the subject property is undeveloped and vegetated, thereby limiting potential sources of contamination; (2) the wellheads of the Springwood supply wells are protected and secured in kiosks within fenced compounds; and (3) a confining unit is inferred to provide protection to the underlying aquifer. However, the characteristics of the confining unit are inferred to be variable, ranging from clay to till (hardpan) and some variation in the thickness of the confining unit is noted. Some water bearing lenses are reported within this confining unit such as the silty gravel and sand identified in the well record for Springwood Well 7 and it is unknown if there is a direct hydraulic connection between Aquifer 216 and springs that have been mapped in the area.

Development in the area of the Springwood wellfield has the potential to impact the Springwood wells and groundwater conditions in the underlying aquifer through reduction of the thickness of the confining layer and introduction of potential sources of contamination. It is anticipated that the proposed PARC facility would include some moderately deep excavations, in particular for the pool and potentially for related deeper civil infrastructure. Lithology information on the well logs for the Springwood wells suggests that the confining unit may be sufficiently thick to provide protection for the underlying aquifer; however, some background information (i.e., surficial geology mapping, TEL (1998)) also suggests that the thickness of the confining layer is variable and may be relatively thinner within the area of the Site. Furthermore, the topography in the area of the proposed facility is also variable, with low elevation areas observed in the central portion of the Site during the Site reconnaissance. If the confining unit were to be thinner than what is recorded on the existing well logs, excavation for the proposed development would reduce the thickness of, or potentially penetrate, the confining unit and thereby decrease the protection that the confining unit currently provides to the underlying aquifer. In addition to potentially providing a pathway for contamination to affect the quality of the groundwater, alteration or penetration of the confining unit could also potentially affect the water balance for the aquifer as groundwater could discharge via preferential pathways to ground surface (i.e., openings in the confining layer resulting from construction) below the new building and/or along utility trenches, potentially lowering the yield of the aquifer and potentially requiring management of groundwater inflows, including flowing artesian conditions. In addition to construction of the pool and associated infrastructure, the plan for the proposed facility includes development around the wellhead of Springwood Well 3 as a parking lot (Figure 4, Appendix A).

From a groundwater protection perspective, it is preferable to limit development within the area of a water supply wellfield in order to avoid impacts to groundwater quality and quantity. Development of the PARC facility at a location away from water supply wells and where there is an adequate confining unit would protect the City's groundwater supply. If, after consideration of the above, the City wishes to proceed with assessment of the Site for the PARC facility, subsurface assessment (drilling) would be required to reduce uncertainty regarding subsurface conditions and verify the presence, thickness and nature of the confining layer within at the Site. In conjunction with a detailed topographic survey, this



information would then be used to compare the elevation of the base of the confining unit to the construction plans (i.e., elevation of the base of excavation) to confirm that excavations would not extend into the underlying aquifer and to assess the thickness of underlying confining deposits that would remain undisturbed. The results from these analyses would inform a feasibility assessment that considers potential impacts associated with construction and operation of the proposed facility to both the quality and quantity of the groundwater in the aquifer and recommended mitigative measures.

If, following the subsurface investigation above, development of the Site was to be considered further, adequate measures would be required to protect the aquifer and the City's water supply. The design should include measures for mitigation and management of flowing artesian conditions that are reported at the Site and to prevent potential impacts to groundwater quality. Although the Springwood Wellfield is not designated as a Development Permit Area (DPA) for groundwater protection<sup>1</sup>, Chapter Nine: Development Permit Areas in the City's Official Community Plan (OCP) provides guidelines that support protection of groundwater (City of Parksville, 2020). These guidelines include requirements for sufficient mitigative measures to reduce the risks of groundwater contamination. Requirements which could be relevant to the proposed PARC facility and considered in detailed design include, but are not limited to, the following:

- appropriate location and design of areas used for storage, use and disposal of material including chemicals and fuels that may negatively impact groundwater resources
- use of oil and sedimentation removal facilities to handle water such as stormwater and diverted runoff where there is potential for contaminants to infiltrate into the ground or enter watercourses
- measures used during construction and site planning to reduce risks of contamination of groundwater resources
- discouraging the use, disposal or discharge of any material that may pose a threat to the integrity of groundwater resources
- management of runoff from impervious surfaces and parking areas through an appropriately sized and engineered sedimentation, soil, water and grease separator, or other engineered solution

The City (2020) notes that where the possibility exists of a development impacting groundwater, a report must be prepared by a Qualified Professional (QP) providing an assessment and recommendations to ensure that groundwater is protected.

In addition to the requirements listed above, the wellhead conditions at Springwood Well 3 would require further design. Although the plan for the PARC facility includes a buffer zone around the well, the adequacy of the <20 m radius of the buffer and proposed grading around the wellhead would need to be confirmed with Island Health. In addition to assessment of the subsurface conditions, it is anticipated that Island Health will also require assessment of potential sources of contamination related to the proposed development and the associated minimum setbacks that are required in the legislation and other requirements such as grading and conveyance of stormwater and surface water away from the Springwood wells.

It is understood that Springwood Well 3 is actively pumped and the City would prefer not to remove this well from its groundwater supply. However, if adequate water supply is available through operation

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<sup>1</sup> The area of the Springwood wellfield is designated as a DPA for Watercourse Protection and as a Sensitive Area in the City of Parksville Bylaw No. 1523



of other wells in the Springwood Wellfield, Springwood Well 3 could be closed to limit the potential for groundwater contamination at this location within the parking lot of the proposed PARC facility.

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### 3.4 RECOMMENDATIONS

Based on the results of the Preliminary Hydrogeological Assessment and remaining uncertainties associated with unconfirmed ground conditions, it is recommended that the City consider alternative options for the proposed PARC facility that would avoid development within the vicinity of the Springwood supply wells. From a hydrogeological perspective, identification of an alternative site could avoid potential risks to the City's water supply related to excavation into the confining layer, ground disturbance in the area of the wells and management of surface run-off from the development, particularly near Springwood Well 3.

If the City wishes to proceed with further evaluation of the Site for the proposed PARC facility, the following recommendations for the next stage of hydrogeological assessment are provided:

- A subsurface drilling assessment should be conducted to confirm the presence, thickness and composition of the confining unit that is mapped in the proposed development area.
- A detailed topographic survey should also be conducted and analysed with the results of the drilling program to determine the base of the confining unit.
- The elevation of the base of the confining unit should be compared to the construction plans to confirm that the excavation would not extend into the underlying aquifer and that an adequate thickness of confining deposits would remain undisturbed to provide protection to the aquifer. In addition to groundwater quality, the analysis should also consider potential for the proposed PARC facility to cause groundwater to discharge from the aquifer via preferential pathways to due to flowing artesian conditions at the Site; discharge from the aquifer would lower the yield from the aquifer and require provisions for management.
- Based on the above, potential impacts to the aquifer associated with construction and operation of the proposed facility should be identified. If the City wishes to proceed with detailed design, mitigative measures should be incorporated into the design, and a groundwater protection plan and monitoring program developed and implemented.
- It is further recommended that the Health Authority be engaged early in the design process to confirm that the approvals will be provided to continue operation of wells within the vicinity of the proposed facility, in particular Springwood Well 3. Alternatively, if adequate water supply is available through operation of the other Springwood wells, closure of Springwood Well 3 could be considered.



## 4 GEOTECHNICAL ASSESSMENT

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### 4.1 OBJECTIVE AND SCOPE OF WORK

The objective of the geotechnical assessment was to assist the City with determining the geotechnical suitability of the Site for the proposed PARC facility including potential geotechnical challenges, anticipated seismic ground performance, foundation bearing capacities and settlement estimates. The geotechnical assessment was planned in conjunction with environmental and hydrogeological reviews and a site reconnaissance with WSP biologists was completed on 22 June 2021 to confirm preliminary equipment routing, however the subsurface components of the geotechnical assessment were put on hold due to the initial environmental constraints identified at the Site.

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### 4.2 RESULTS

In summary of surficial geology mapping information described in Section 3.2.1 above, the Site is underlain by variable ground conditions. The general sequence of soils in order of increasing depth is a surficial veneer of marine deposits overlying a thick blanket of glacial till over Quadra sediments. However, an undifferentiated band extending west to southeast through the Site is mapped with the marine layer directly underlain by Quadra sediments and/or glaciofluvial deposits overlying a till blanket overlying Quadra Sand. This indicates that the thickness of the confining soils above the Quadra Sand (aquifer) could reduce from that described in the groundwater well logs. In addition, test pits advanced by others during previous stages of the project encountered marine clay that reduced in stiffness with depth. Thick marine clays are mapped north of the Site, and this could be indicative of the presence of soft clay.

In addition to the hydrogeological impacts described in Section 3, from a geotechnical perspective, the potential reduced thickness of the confining layer introduces considerations in relation to temporary excavation stability for a deep pool excavation, and uplift forces and related seepage for both construction and design perspectives. Soft clay, if present, would need to be reviewed in the context of settlement and bearing support.

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### 4.3 DISCUSSION AND RECOMMENDATIONS

To determine if these conditions are present and their potential impacts on the proposed PARC facility, subsurface drilling assessment would be required in conjunction with a topographic survey. Geotechnical reconnaissance was conducted with the hydrogeologist and environmental teams and focussed on site access for drilling equipment. Ground surface elevations are variable and the area is heavily vegetated. Vegetation disturbance would be required to create suitable access to the proposed building footprint and would be relatively disruptive to the sensitive habitat. Accordingly, drilling for geotechnical purposes should only occur once the City has high confidence in the potential viability of the Site from other perspectives. To avoid inadvertently breaching the aquifer, test pits should only be advanced once the thickness of the confining layer has been confirmed. A modified drilling program through which test holes are advanced at accessible locations (generally at the peripheries of the Site) could be considered for preliminary information; however, this would leave some uncertainty at the building site and drilling within the proposed footprint would be required for detailed design.



## 5 CIVIL ENGINEERING ASSESSMENT

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### 5.1 OBJECTIVE AND SCOPE OF WORK

The Site has been assessed for access and Site servicing requirements by Herold Engineering (Herold) and is summarized in a memo dated September 8, 2020. WSP intended to supplement this memo with additional information produced from this scope of work. Further details were to be provided on:

- environmental and geotechnical constraints as they relate to civil services
- fire flow requirements
- estimated sanitary flows
- potential stormwater management low impact development (LID) features
- power and communications connections
- possible offsite improvements

WSP was to coordinate with Parksville staff to undertake utility model runs to confirm water supply as well as sewer and drain capacity. We planned to also contact private utility providers to obtain record drawings and as-built information to recommend servicing corridors. High-level capacity discussions were then to be held with the utility providers to identify possible offsite upgrades.

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### 5.2 COMPLETED TO DATE

WSP's Infrastructure team reviewed the previous report completed by Herold and commenced discussions with the project team regarding next steps. The project was put on hold before any of the milestone dates for the Civil Engineering Assessment were hit.

## 6 TRAFFIC STUDY

As discussed in the Project Initiation Report and Work Plan for the project, WSP recommended that a Detailed Traffic Study for the Site be completed following the preliminary design phase for the PARC project. WSP's traffic team was to work with the City to determine what level of input they could provide at this stage that would be of value prior to the completion of the preliminary design. The project was paused prior to any discussions with the City.



## 7 PROJECT CONCLUSIONS

Based on the results of the Site condition Assessment, WSP has identified various ecological, hydrogeological and geotechnical constraints at the current proposed PARC Site which include the following:

- The proposed footprint overlaps two types of provincially listed ecosystems (one blue-listed Ws53 mature forest swamp and one red-listed Western redcedar - Douglas-fir / Oregon beaked-moss fresh-moist forest ecosystem).
- The proposed project would cause impacts to mature forest (>80 years) attributes including cavity nesting bird habitat, structural complexity and amphibian breeding habitat.
- While fish presence has not been confirmed within Romney Creek at the time of this report, if fish are present in the system at certain times of year, permitting under the *Fisheries Act* would be required along with potential offsetting sites for a Fisheries and Oceans Canada (DFO) Authorization and approval of an offsetting plan.
- The presence and thickness of the confining layer in the proposed building area is not known and has potential hydrogeological and geotechnical considerations
  - Excavation for the proposed project could disturb the confining layer that is present at the Site and potentially result in impacts to groundwater quality and quantity.
  - From a geotechnical perspective, a confining layer with limited thickness has potential to affect both temporary excavation conditions and long-term building support.
  - Subsurface drilling would be required to confirm ground conditions and determine if these are real constraints. Creation of equipment access routes for drilling would be disruptive to the existing vegetation at the site and could also require importing fill (i.e. add cost).
- Development in the area of the wells, particularly near Springwood Well 3, increases potential for impacts to the aquifer from surface run-off.

It is recommended that the City consider alternative options for the proposed PARC facility that would avoid development within the vicinity of the Springwood supply wells and within the provincially listed ecosystems located at the current proposed location.

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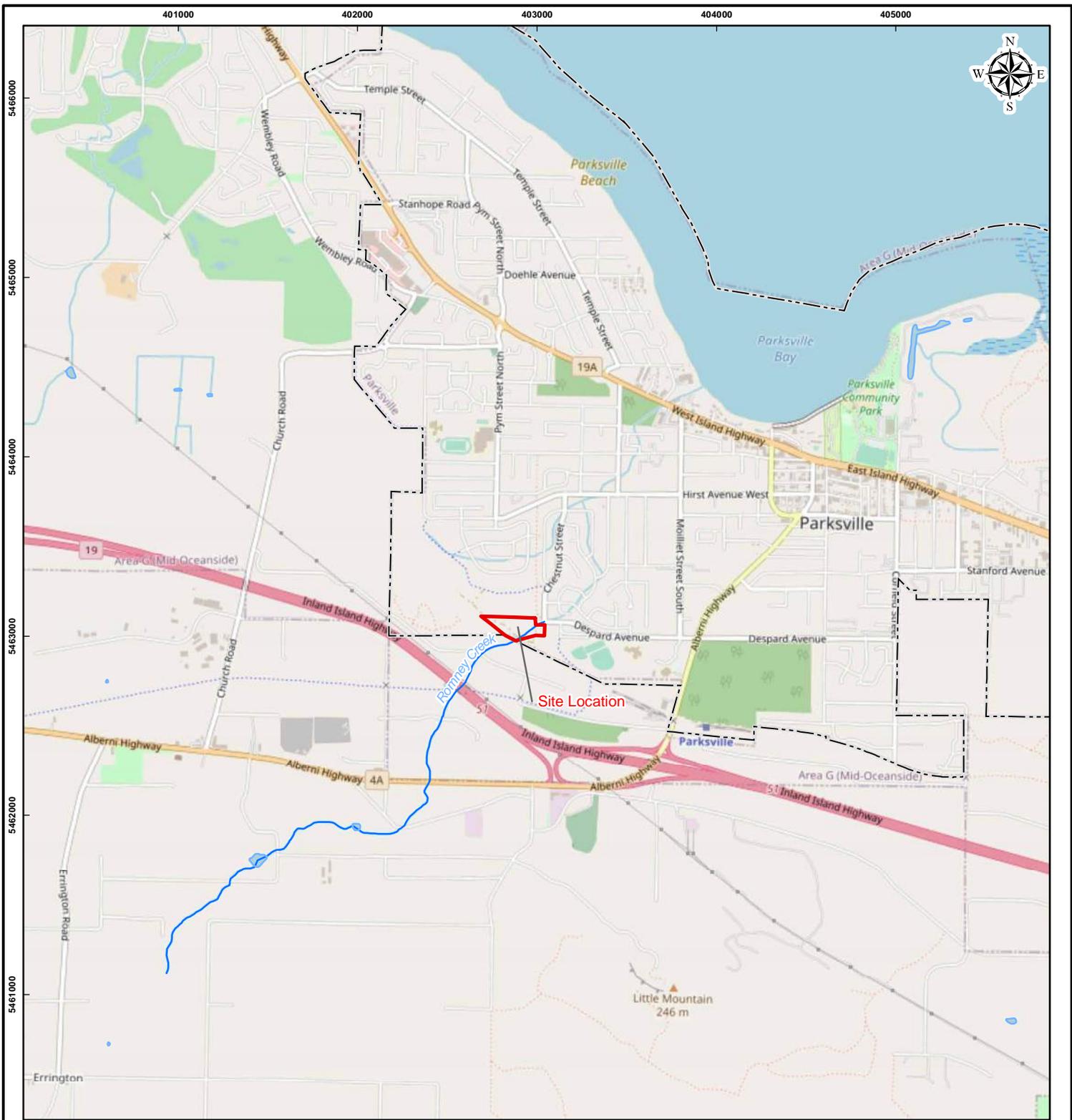
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# APPENDIX

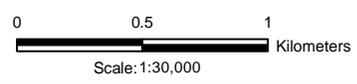
## A FIGURES





**Legend**

- Watercourse (BC Freshwater Atlas)
- Parkville City Limit
- Site Location



**References:**  
 Data BC - BC Catalogue  
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<http://www.data.gov.bc.ca/>  
 NRCAN Geogratis  
 Open Government License  
<http://geogratis.cgdi.gc.ca/>

<b>CLIENT:</b>	City of Parkville		
<b>PROJECT:</b>	City of Parkville Aquatic & Recreation Center		
<b>TITLE:</b>	Site Overview		
<b>DATE:</b>	2021-09-14	<b>PROJECT NO.:</b>	211-06513-00
<b>GIS FILE:</b>	01-01-005_Site_1_Overview_v2.mxd		<b>Figure 1</b>
<b>COORDINATE SYSTEM:</b>	NAD 1983 UTM Zone 10N	<b>ANALYST:</b>	MY
		<b>REVIEWED:</b>	TS



Y:\GIS\Projects\2020\201-12373-00\_Parkville\_Site\Mapping\01\_general\01\_Overview\01-01-005\_Site\_1\_Overview\_v2.mxd



**LEGEND**

**PROJECT DATA**

- ▲ INVASIVE PLANT SPECIES
- AMPHIBIAN OBSERVATION
- AVIAN OBSERVATION
- WILDLIFE TREE
- CULVERT
- SPILLWAY
- PUMP
- VEGETATION PLOT
- WATERCOURSE
- - - ESTIMATED WATERCOURSE
- FLOW DIRECTION
- ▭ TERRESTRIAL ECOSYSTEM MAPPING
- ▭ PROJECT

**BASE DATA**

- RAILWAY
- LOCAL ROAD
- - - RECREATION / UNCLASSIFIED ROAD
- - - PEDESTRIAN PATH
- WATERCOURSE
- ▭ PARK
- ▭ INVASIVE ALIEN PLANT
- ▭ ENVIRONMENTAL DEVELOPMENT PERMIT
- ▭ WATERCOURSE PROTECTION
- ▭ DOUGLAS-FIR & TERRESTRIAL
- ▭ FARM PROTECTION
- ▭ SENSITIVE ECOSYSTEMS INVENTORY
- ▭ PARCEL

**INVASIVE PLANT SPECIES SITE LABELS - SPECIES CODE, DISTRIBUTION CODE, DENSITY CODE**

**Species Code**

Code	Common Name
BT	Bull thistle
CT	Common tansy
GH	Giant hogweed
YA	Yellow archangel

**Distribution Code**

Code	Description
2	Few sporadically occurring individuals
4	Several sporadically occurring individuals
8	Continuous occurrence of a species with a few gaps in the distribution

**Density Code**

Code	Description
1	Low (<+ 1 plant / m <sup>2</sup> )
2	Medium (2-5 plants / m <sup>2</sup> )
3	High (6-10 plants / m <sup>2</sup> )

**TERRESTRIAL ECOSYSTEM MODEL LABEL**

**Ecosession**  
EVI Eastern Vancouver Island

**Biogeoclimatic Units**  
CDFmm Coastal Douglas-Fir Moist Maritime

**Ecosystem Unit Labels**  
10-05-6C  
Stand Composition:  
C = Conifer  
B = Broadleaf  
M = Mixed  
Site Series 1  
Proportion of Component 1

Map Code	Description	Site Series
Fresh to Moist Forest		
RK	Western redcedar - Douglas-fir / Oregon beaked-moss	05
Wetlands		
Ws53	Western redcedar / sword fern - skunk cabbage swamp	11
Anthropogenic Disturbance		
UR	Urban / Suburban	00
seral \$Act / Dr	Seral poplar / alder regenerating stand	
<b>Symbol</b>	<b>Structural Stage</b>	<b>Description</b>
3b	Tall Shrub	Shrubs > 2 m tall
4	Pole / Sapling	Trees > 10 m tall; stands typically 20-40 years old
5	Young Forest	Trees > 10 m tall; stands typically 40-80 years old
6	Mature Forest	Trees > 10 m tall; stands typically 80-250 years old
7	Old Forest	Trees > 10 m tall; stands typically >250 years old

Scale: 1:1,500 METRES

**NOTE(S)**

- SECURED SENSITIVE ELEMENT OCCURRENCE CDC DATA COVERS CURRENT FIGURE EXTENT. PROJECT DETAILS PROVIDED TO COCDATA@GOV.BC.CA.
- TERRESTRIAL ECOSYSTEM MAPPING BASED ON FIELD FINDINGS (GOLDER 2021).

**REFERENCE(S)**

- RAILWAY DATA CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - CANADA.
- ROAD AND INVASIVE PLANT DATA CONTAINS INFORMATION OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
- WATERCOURSE AND SENSITIVE ECOSYSTEM INVENTORY DATA CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA.
- IMAGERY, PEDESTRIAN PATH, PARK, DEVELOPMENT PERMIT AREA, PROJECT AREA AND PARCEL DATA OBTAINED FROM THE CITY OF PARKSVILLE 2021. COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT  
CITY OF PARKSVILLE

PROJECT  
CITY OF PARKSVILLE AQUATIC AND RECREATION CENTRE

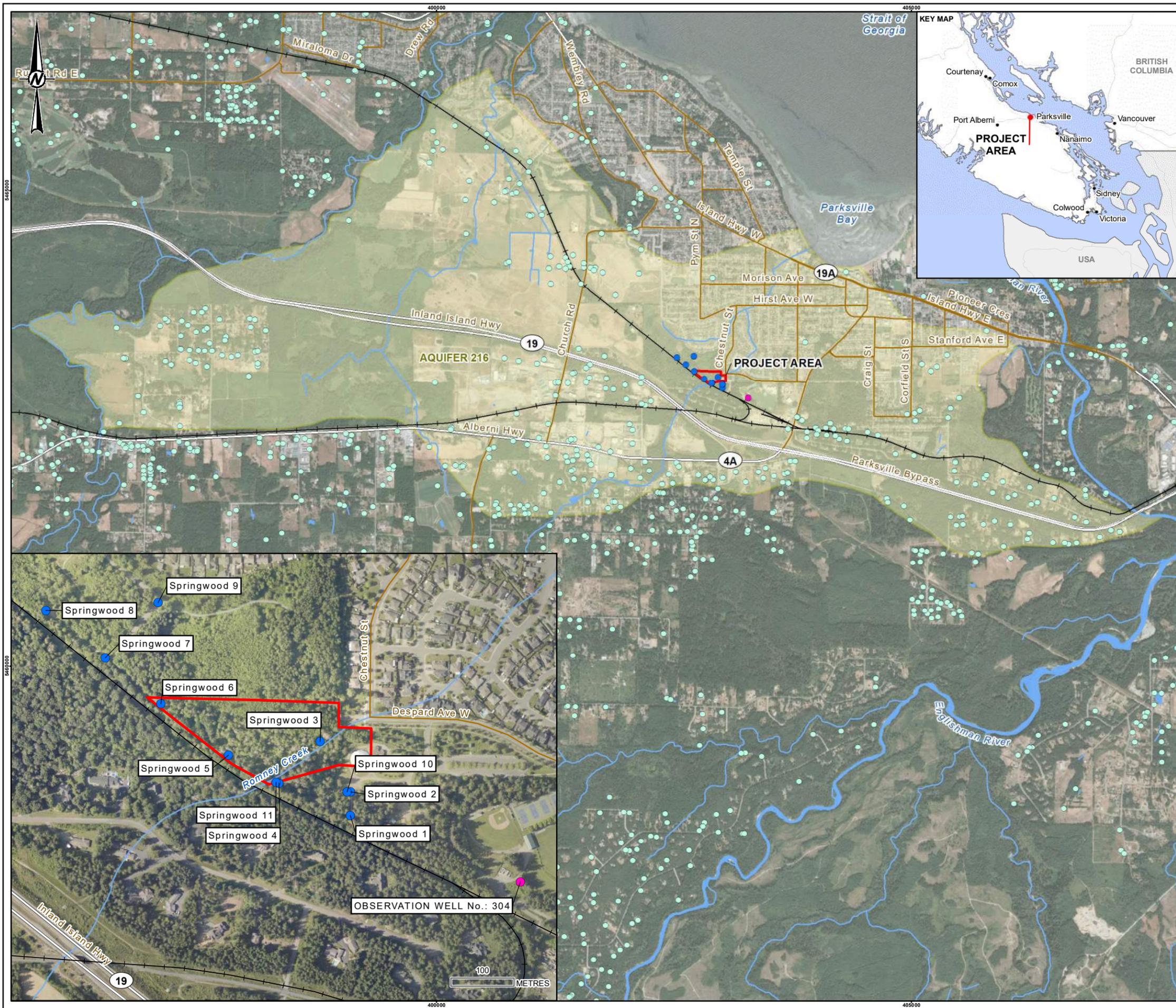
**TITLE**  
ENVIRONMENTAL FEATURES

CONSULTANT

YYYY-MM-DD	2021-09-14
DESIGNED	TS
PREPARED	LH
REVIEWED	TS
APPROVED	MB

PATH: Y:\bim\city\CAD-GIS\client\City\_of\_Parksville\Parkville\989\_PROJECTS\21466061\0302\_PROD\CD\ENVIRONMENTAL\_FEATURES\_Refer\mod\_PRINTED\_ON\_2021-09-14\_AT\_9:47:08.AM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: A4S 6



**LEGEND**

- CITY OF PARKSVILLE WATER SUPPLY WELL - SPRINGWOOD WELLFIELD
- OBSERVATION WELL No. 304
- REGISTERED GROUNDWATER WELL - OTHER
- RAILWAY
- HIGHWAY
- ARTERIAL AND COLLECTOR ROAD
- WATERCOURSE
- WATERBODY
- AQUIFER 216
- PROJECT AREA



- REFERENCE(S)**
1. RAILWAY DATA CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - CANADA.
  2. ROAD DATA CONTAINS INFORMATION OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
  3. AQUIFER, OBSERVATION WELL SITE, REGISTERED GROUNDWATER WELL, WATERCOURSE AND WATERBODY DATA DATA CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE - BRITISH COLUMBIA.
  4. INSET IMAGERY AND PROJECT AREA DATA OBTAINED FROM THE CITY OF PARKSVILLE 2021.
  5. CITY OF PARKSVILLE WATER SUPPLY WELL DATA OBTAINED FROM THE CITY OF PARKSVILLE ON 2021/07/20 (SPRINGWOODWELLLOCATIONS.XLSX).
  6. BASEMAP OBTAINED FROM BING MAPS FOR ARCGIS PUBLISHED BY MICROSOFT CORPORATION, REDMOND, WA, 2021.
- COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT  
CITY OF PARKSVILLE

PROJECT  
CITY OF PARKSVILLE AQUATIC AND RECREATION CENTRE

TITLE  
**AQUIFER 216 AND LOCATIONS OF REGISTERED GROUNDWATER WELLS**

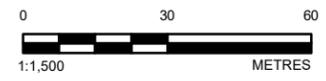
CONSULTANT	WSP	YYYY-MM-DD	2021-09-14
DESIGNED			MB
PREPARED			LH
REVIEWED			TS
APPROVED			MB

PROJECT NO. 21466061    CONTROL 03    REV. 0    FIGURE 3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- CITY OF PARKSVILLE WATER SUPPLY WELL - SPRINGWOOD WELLFIELD
  - RAILWAY
  - LOCAL ROAD
  - - - RECREATION / UNCLASSIFIED ROAD
  - WATERCOURSE
  - ▭ PROJECT AREA
  - ▭ PARCEL
- PROPOSED PARKSVILLE AQUATIC RECREATION CENTRE SITE PLAN – OPTION 1
- ▭ MULTIPLEX FACILITY FOOTPRINT
  - ▭ POOL
  - ▭ PARKING AREA (120 STALLS)



**REFERENCE(S)**

1. RAILWAY DATA CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – CANADA.
2. ROAD DATA CONTAINS INFORMATION OBTAINED FROM THE B.C. MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT.
3. WATERCOURSE AND WATERBODY DATA CONTAINS INFORMATION LICENCED UNDER THE OPEN GOVERNMENT LICENCE – BRITISH COLUMBIA.
4. PARCEL, PROJECT AREA AND IMAGERY DATA OBTAINED FROM THE CITY OF PARKSVILLE 2021.
5. CITY OF PARKSVILLE WATER SUPPLY WELL DATA OBTAINED FROM THE CITY OF PARKSVILLE ON 2021/07/20 (SPRINGWOODWELLLOCATIONS.XLSX).
6. PROPOSED AQUATIC RECREATION CENTRE (OPTION 1) DERIVED FROM CITY OF PARKSVILLE PROPOSED SITE PLAN – OPTION 1 PDF ([HTTPS://LETSTALKPARKSVILLE.CA/19613/WIDGETS/78084/DOCUMENTS/49534](https://letstalkparkville.ca/19613/WIDGETS/78084/DOCUMENTS/49534)), ACCESSED ON 2021/07/20.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT  
CITY OF PARKSVILLE

PROJECT  
CITY OF PARKSVILLE AQUATIC AND RECREATION CENTRE

TITLE  
**PROPOSED PARC FACILITY AND SPRINGWOOD WELL LOCATIONS**

CONSULTANT	YYYY-MM-DD	2021-09-14
	DESIGNED	MB
	PREPARED	LH
	REVIEWED	TS
	APPROVED	MB

PROJECT NO.	CONTROL	REV.	FIGURE
21466061	03	0	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: A4S B

# APPENDIX

# B

# PHOTOGRAPHS





Photo 1: Wildlife tree observed during site reconnaissance June 2021.



Photo 2: Soil pit dug during site reconnaissance at PV01.



Photo 3: A tributary to Romney Creek, looking upstream.

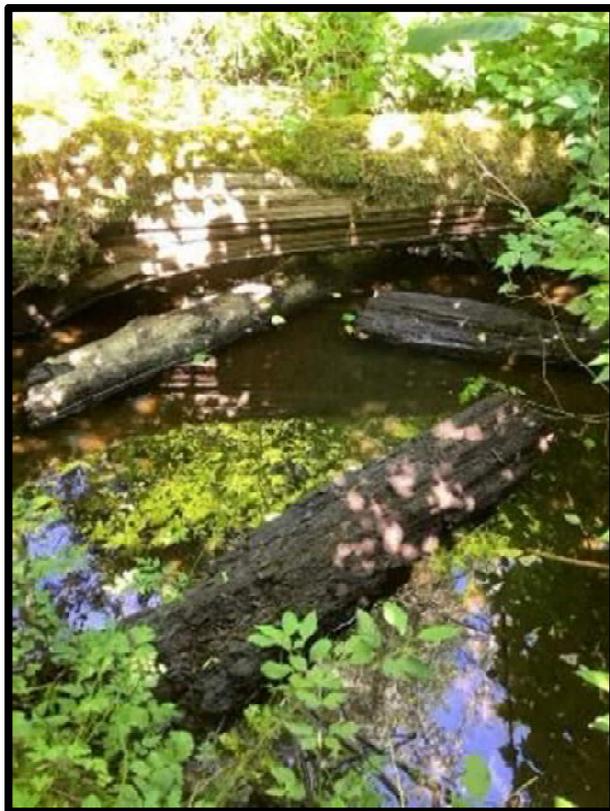


Photo 4: Deep pool along Romney Creek with amphibian larvae observed June 2021.



Photo 5: Romney Creek culverts at the trail crossing, looking upstream.



Photo 6: Romney Creek mainstem, looking downstream.

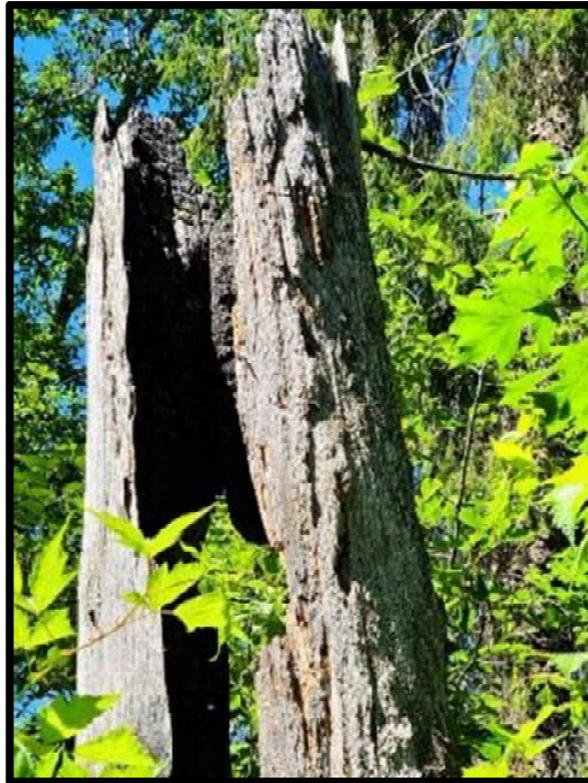


Photo 7: Wildlife tree observed in June 2021.



Photo 8: Ws53 swamp habitat observed.



Photo 9: Family of barred owls observed during site reconnaissance June 2021.



Photo 10: Dry section of Romney Creek observed during site reconnaissance.



Photo 11: Wildlife tree observed during site reconnaissance.



Photo 12: Wooden structure observed during the site reconnaissance.

# APPENDIX

## C

### STANDARD LIMITATIONS

## STANDARD LIMITATIONS

**WSP CANADA INC. CONDUCTED A SITE CONDITION ASSESSMENT (THE “Project”) AT THE PROPERTY LOCATED WEST OF DESPARD AVENUE, PARKSVILLE, BC (THE “Site”) AS REQUESTED BY THE CITY OF PARKSVILLE (THE “Client”) AND AGREED UPON IN THE PROPOSAL DATED APRIL 30, 2021 (THE “Proposal”). THE FINDINGS AND CONCLUSIONS ARE DOCUMENTED IN THIS REPORT (THE “Report”). SUCH USE AND RELIANCE BY Client IN THIS Report IS SUBJECT TO THE TERMS, CONDITIONS AND LIMITATIONS SET OUT IN WSP’S TERMS AND CONDITIONS FOR THE Project.**

1. The findings and conclusions documented in this Report have been prepared for specific application to this Project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the area.
2. The findings of this Report are based solely on data collected on Site during this investigation and pertain only to the locations that have been investigated and on the conditions of the Site during the completion of the work and services. WSP Canada Inc. has relied on good faith on information provided by individuals and sources noted in the Report. No other warranty, expressed or implied, is made.
3. If new information is developed in future work that affects the conclusions of this Report, WSP Canada Inc. should be contacted to re-evaluate the conclusions of this Report and provide amendments as required.
4. The service provided by WSP Canada Inc. in completing this Report is intended to assist the Client in a business decision. The liability of the Site is not transferred to WSP Canada Inc. as a result of such work and services, and WSP Canada Inc. does not make recommendation regarding the purchase, sale, or investment in the property.
5. This document is intended for the exclusive use of The City of Parksville for whom it has been prepared. WSP does not accept responsibility to any third party for the use of information presented in this Report, or decisions made or actions taken based on its content.
6. The information presented in this Report is based on, and limited by, the circumstances and conditions acknowledged herein, and on information available at the time of its preparation. WSP has exercised reasonable skill, care, and diligence to assess the information acquired during the preparation of this Report, but cannot guarantee or warrant the accuracy or completeness of the information. Information provided by others, whether represented or otherwise utilized, is believed to be accurate but cannot be guaranteed.

