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## An Integrated Plan to Restore and Enhance Waterways in the City of Chilliwack



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Prepared for the Canada Nature Fund for Aquatic Species at Risk, Environmental Damages Fund, and the City of Chilliwack.



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## Acknowledgements

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Thanks to our contractors and community partners: Stó:lō Research and Resource Management Centre and People of the River Referrals Office.

Sincere thanks to our FVWC directors and community volunteers!  
Together, we are working towards *“healthy watersheds and healthy communities.”*



## Executive Summary

This project is a collaborative effort to enhance, restore and promote shared conservation values in the Chilliwack-Vedder River Watershed. Year 2 (fiscal 2020-2021) focused on four main activities to benefit targeted species at risk and improve community values.

### Activity 1: Conceptual Designs and Refining Assessment Matrix

#### Results:

- Additional sites have been considered and added -matrix refinement. This was supported by municipality.
- Prioritization of some restoration concept plans have occurred based on a variety of parameters including benefitting SAR, climate adaptation, habitat footprints and socio-cultural values

### Activity 2: Restoration & Habitat improvement

#### Results:

- Enhancement activities occurred at five sites:
  - Salwein East-West Weir adjustment (Known SSU critical habitat)–100m<sup>2</sup> aquatic gravels exposed.
  - Sinclair Wetlands -Lewis Lateral Slough - 462 m<sup>2</sup>
  - Jackson Irwin Reach (Known SSU crit habitat)- 450 m<sup>2</sup>
  - Peach Creek /Hooge wetland– enhancement efforts – 5,009 m<sup>2</sup>
  - Stewart Creek – Invasion vegetation clearing 300 m<sup>2</sup>

### Activity 3: Monitoring, Information Verification, Assessment, and Adaptive Feedback

#### Results:

- Monitoring, assessments across six sites:
  - Lewis Lateral Slough
  - Horse Pasture
  - Bells Slough
  - Sardis Park
  - Atchelitz Creek
  - Stewart Creek - Wilson Park
  - Hooge wetlands, Peach Creek

### Activity 4: Strategic Partnership & Communications

#### Results:

- Due to Covid-19 no steering committee meetings to share on the activities, opportunities and challenges of the project or community events to support species understanding were hosted.

This report summarizes the results of work completed between April 1, 2020 and March 31, 2021 under the financial contribution of the Environmental Damages Fund, Pacific Salmon Foundation, Canada Nature Fund for Aquatic Species at Risk, Wally Hall Jr. Memorial Steelhead Fishing Derby, DFO's Resource Restoration Unit, City of Chilliwack, local community members, and the Fraser Valley Watersheds Coalition. We recognize the impact of COVID-19 on the project activities and the partners and community's ability to participate.



## 1.0 Introduction

This project will employ strategies to address threats to species at risk (SAR) and their associated habitats through conservation and watershed planning and the implementation of restoration activities within the municipal boundaries of Chilliwack, British Columbia.

The population of Chilliwack is projected to double by the year 2041 and therefore, the development of both immediate and future management and restoration initiatives is critical to ensure ongoing ecological function. Waterways within the targeted area have been subject to impacts by numerous anthropogenic factors which threaten SAR such as the Coastrange (Pygmy) Sculpin, Salish Sucker and Sockeye, Chinook and Coho Salmon. Both the quality and quantity of SAR habitat in this area has been reduced due to infrastructure development, agricultural and forestry activities, introduction of invasive plant species and the increasing impacts of climate change. Impacts include reduced access to off channel habitat (vital to support various life-stage requirements), declining aquatic water quality (low dissolved oxygen levels, high water temperatures, degradation to habitat complexity and structures) and disruptions to natural systems (culverts, pump stations, etc.).

Key sub-set areas within the Chilliwack area will be identified, assessed and prioritized for restoration and habitat improvement activities which will be undertaken with the goal of ensuring the long-term health and biodiversity of these waterways in order to meaningfully contribute to the recovery of local SAR as well as support diverse aquatic species populations in general.

In year two of this project five sites were enhanced, and six sites were monitored and assessed further to gain baseline information and assess effectiveness of previous efforts. A comprehensive planning and conceptual document was developed that looked at habitat enhancement opportunities from a municipal perspective that incorporated socio-economic design considerations and the need for further programming to address municipal and crown land encroachment challenges.

## 2.0 Workplan Activities: Methods and Results

### 2.1 Conceptual Designs and Refining Assessment Matrix

#### Overarching Objective

To identify and prioritize opportunities to improve aquatic targeted species at risk, biodiversity and aquatic ecology and incorporate socio-economic landscape values into the design to promote longest project activity viability.

#### General Summary

From April 01, 2020 until March 31, 2021 significant challenges as a result of the global Pandemic COVID-19 which was officially announced by the World Health Organization on March 12, 2020. As the year progressed and lockdowns and gathering restrictions increased, the ability to form the stakeholder committee as originally planned was severely reduced. This impacted the ability to obtain direct feedback on potential sites for restoration, enhancement and assessment. However, connections with the City of Chilliwack engineering and environmental department and with Fisheries and Oceans staff and in reviewing Year 1 reports from Pearson

Ecological, further potential restoration and enhancement sites and several conceptual designs have been developed to improve target species habitats and include a variety of parameters including benefitting SAR, climate adaptation, habitat footprints and socio-cultural values. Appendix A represents an integrated booklet on restoration opportunities throughout key areas within the City of Chilliwack. Sites were identified using a layered value approach: target waterways with known critical habitats for species at risk, known salmon streams and other biodiversity values. Then, other layers of values and restoration considerations were added, including cadastral, utilities and rights-of-way /easements, buried and above ground restrictions, wells and water withdrawals, culverts and infrastructure. After all the layers were geospatially laid out, and further literature review and visual observations were made, then enhancements opportunities were conceptually created. These were then prioritized across several varying parameters: greatest overall combined habitat restoration opportunities and enhanced social and community values; greatest climate change GHG potential offsets, greatest social-cultural opportunities, and greatest biological opportunities. Detailed below are how each conceptual site will support a species at risk recovery objective/action and/or the Wild Salmon Policy.

Site	Primary Benefitting Species	Salish Sucker Recovery actions	Wild Salmon Policy's
		<ul style="list-style-type: none"> <li>A. Protect existing habitat, restore lost or degraded habitat</li> <li>B. Increase the integrity and function of all riparian habitats</li> <li>C. Encourage stewardship among private landowners, local government and agencies, and the general public.</li> <li>D. Reduce fragmentation of instream and riparian habitats</li> </ul>	<p>Goal to restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity by:</p> <ul style="list-style-type: none"> <li>A. Safeguard the genetic diversity of wild Pacific salmon</li> <li>B. Maintain habitat and ecosystem integrity</li> </ul>
Atchelitz Creek	Salish Sucker Salmon (coho)	A, B, C, D	A, B
Big Ditch – Upper Prairie	Salish Sucker Salmon (coho)	A, B, C, D	A, B
Carl Creek West – Sardis Park	Salish Sucker Salmon (coho) Western Painted Turtle	A, B, C, D	A, B
Chilliwack Creek - Carl Creek West	Salish Sucker Salmon (coho) Western Painted Turtle	A, B, C, D	A, B
Dunville Creek – McElwee Ditch	Salmon (coho)		A, B
Dunville Creek – Rosedale	Salmon (coho)		A, B
Nevin Creek- Dunville Creek	Salmon (coho)		A, B

As extracted from the Appendixes report:

LINKAGES	Atcheltz Creek	Bell Slough McDonald Road	Big Ditch	Carl Creek West – Sardis Park	Chilliwack Carl Creek	Dunville Creek – McElwee Ditch	Dunville Creek – Rosedale	Hope Camp Slough Nature Wetlands	Hope Slough Blueway	Luckacuck Creek Trail	Nevin & Dunville Creek-Ford Rd	Nevin Creek	Salween East-West Wetland	Semlault Creek – Robertson Elementary	Sinclair Wetlands
<b>COC OFFICIAL COMMUNITY PLAN:</b>															
Goal 2. Strengthen Agriculture	✓	✓	✓		✓	✓			✓		✓	✓			
Goal 4. Protect the Environment															
Water Resource Management Policies, Stewardship Policies, Gravel Extraction & Forest Management Policies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Goal 5. Build Healthy Communities															
Parks and Greenspace, Heritage values, Social Wellbeing, Public Art, Promote attractive design	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
<b>COC GREENSPACE PLAN</b>	✓			✓	✓	✓	✓	✓	✓	✓			✓	✓	✓
<b>COC BLUEWAY ACCESS STRATEGY</b>									✓						✓
<b>COC TRAIL NETWORK PLAN:</b>															
Neighborhood trails, Valley Rail Trail, ETF				✓	✓		✓		✓	✓			✓		✓
<b>COC NEIGHBORHOOD PLANS:</b>															
Sardis, Rosedale, Eastern Hillside				✓	✓		✓		✓						
<b>RECOVERY STRATEGIES AND/OR PLANS FOR SPECIES AT RISK:</b>															
Salish Sucker	✓		✓	✓	✓			✓	✓				✓	✓	✓
Western Painted Turtle				✓	✓				✓						✓
Oregon Spotted Frog														✓	
<b>HERITAGE &amp; CULTURE:</b>															
Stó:lō Heritage Policy Manual	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>OTHER GOVERNMENT PRIORITIES:</b>															
FVRD Regional Growth Strategy Clean economy, Greenspace/Natural areas protection actions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>DFO Wild Salmon Policy</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>Wetland Ways</b>															
Interim Guidelines for Wetland Protection and Conservation in British Columbia				✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
<b>Government of Canada Climate Change Action</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓



## 2.2 Restoration and Habitat Improvement

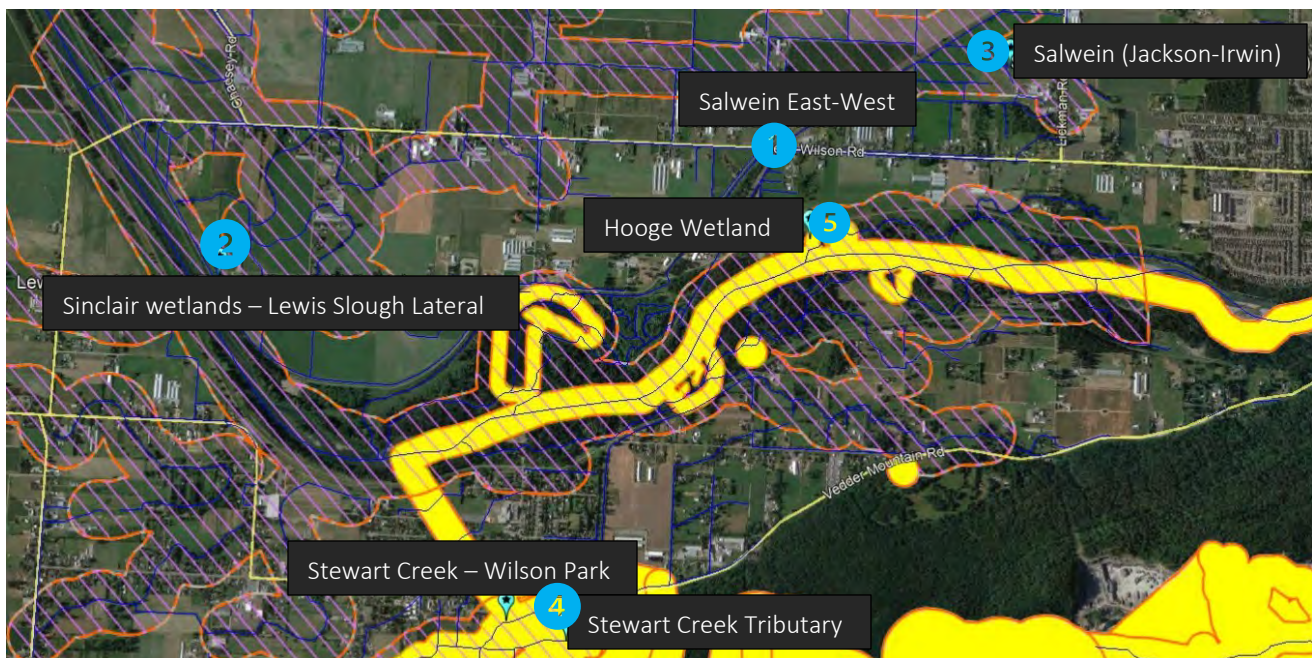
### Overarching Objective

To enhance, restore and improve aquatic and riparian habitat conditions to support critical habitats and supporting habitats for targeted aquatic species at risk, while incorporating socio-economic landscape values into the design for longest project-life and greatest community support and awareness.

### General Summary

In Year 2, a total of five sites were enhanced between April 01, 2020 to March 31, 2021. Activities across all sites involved invasive species removal, vegetation pruning, planting of native trees and shrubs, bioengineering efforts. This year 2020-21 marks last year from matching EDF funds, used to enhance a newly constructed off-channel habitat. In addition, riparian enhancements and invasion control has been underway at this and a variety of other sites to support SAR, biodiversity and healthy riparian areas.

### Overarching Habitat Improvement Map



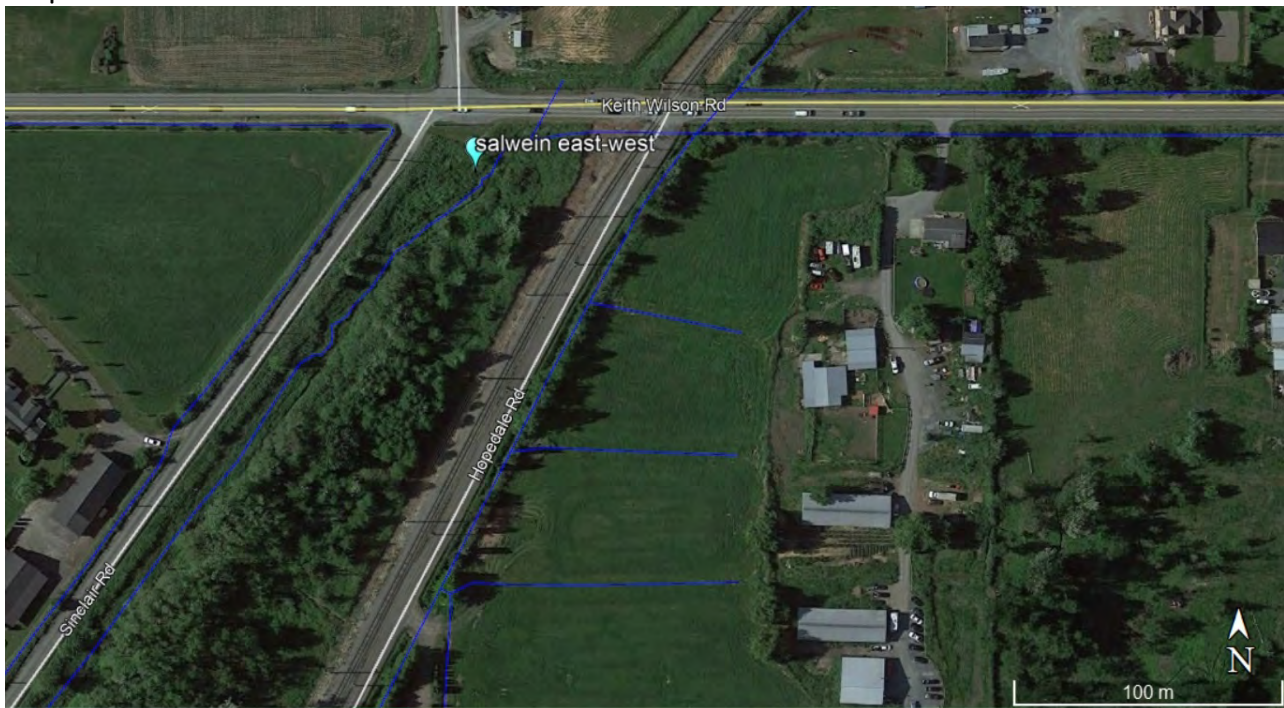


**Site Name:** ① Salwein East-West

**Location Description:** Within known Salish Sucker (SSU) critical habitat. Approximate address: 5580 Hopedale Road Chilliwack BC.

**Lat/Long:** 49° 6'13.02"N /122° 1'43.88"W

**Map:**



**Threats/Impacts:** Reduced stream flows to Salwein-East due to a constructed split flow (between east and west channels) has resulted in lower flows to important SSU habitat (Salwein East) that has been less impacted from agriculture and landuse practices. Invasive species such as Reed canary grass (*Phalaris arundinacea*) impact waterflow and dissolved oxygen levels.

**Actions:** In the Summer of 2020 during the instream fisheries works window, the rock weir was raised in Salwein Creek to split the flows approximately 30:60 so that the greater flows travel down the east side channel. This involved the addition of four truck loads of rock placed by an excavator in the stream near the pumphouse location. By adding the rock 60% of the water was directed to move through the east channel. This will directly benefit target species such as Salish sucker, Coho salmon, and Chum salmon because increased water flow will likely help water temperatures stay low and reduce the effects of hypoxia on fish.

**Target Species:**

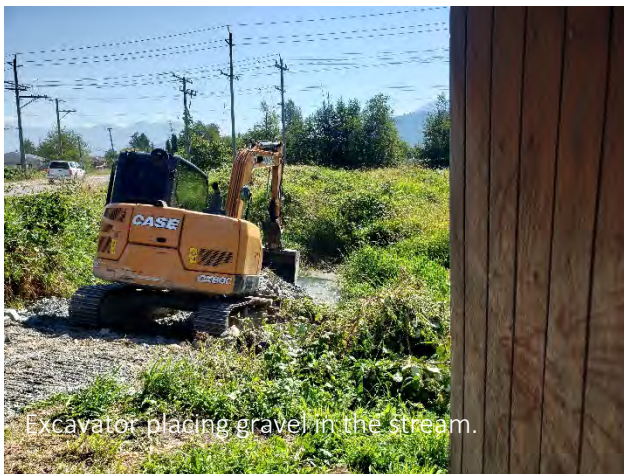
- Salish sucker (*Catostomus Catostomus*)
- Coho salmon (*Oncorhynchus kisutch*)



**Benefitting Species:**

- Chum salmon (*Oncorhynchus keta*)
- Great blue heron (*Ardea herodias fannini*)

**Representative Photos:**





**Site Name:** <sup>2</sup> Sinclair Wetlands – Lewis Lateral Slough

**Location Description:** located on City of Chilliwack parcel and represents 0.96 hectares extending east from the setback dike and pressure release wells just beyond the existing Lewis Slough lateral ditch line.

**Lat/Long:** 49° 5'47.68"N 122° 4'8.07"W

**Map:**



**Threats/Impacts:** Invasion from non-native vegetation such as Himalayan blackberry (*Rubus armeniacus*) and Reed canary grass (*Phalaris arundinacea*) reduces riparian viability, cover (shading over aquatic habitats), and can impact native plant growth and establishment. The site has invasive plants such as Reed canary grass and Himalayan blackberry growing along the channel and over much of the property. The southern section has dense blackberry growth and on the northeast section of the property invasive plants such as Sweet white clover (*Melilotus albus*), Common tansy (*Tanacetum vulgare*) and Canola (*Brassica napus*) are growing densely. Additionally, a large amount of fill has been dumped on the northeastern section of the property. The waterway lacks cold water inputs and registered low for dissolved oxygen content which could put all fish species at risk for hypoxia.

**Actions:** The FVWC field team assessed the site for invasive plants, water quality in the stream, and overall health of the site. Water quality measurements were sampled at three different locations

shown on map in February 2021. The FVWC field team also controlled Himalayan blackberry and Reed canary grass along the slough surrounding the native trees and shrubs to give them a chance to grow with less competition (approximately 676 m<sup>2</sup> of Himalayan blackberry and Reed canary grass was controlled). These actions protect existing habitat, restore degraded habitat as well as increasing the integrity and function of the area.

**Target Species:**

- Salish sucker (*Catostomus Catostomus*)
- Coho salmon (*Oncorhynchus kisutch*)

**Benefitting Species:**

- Chum salmon (*Oncorhynchus keta*)
- Great blue heron (*Ardea herodias fannini*)
- Western Painted Turtle (*Chrysemys picta*)
- Red Legged Frog (*Rana aurora*)
- Song birds

**Representative Photos:**







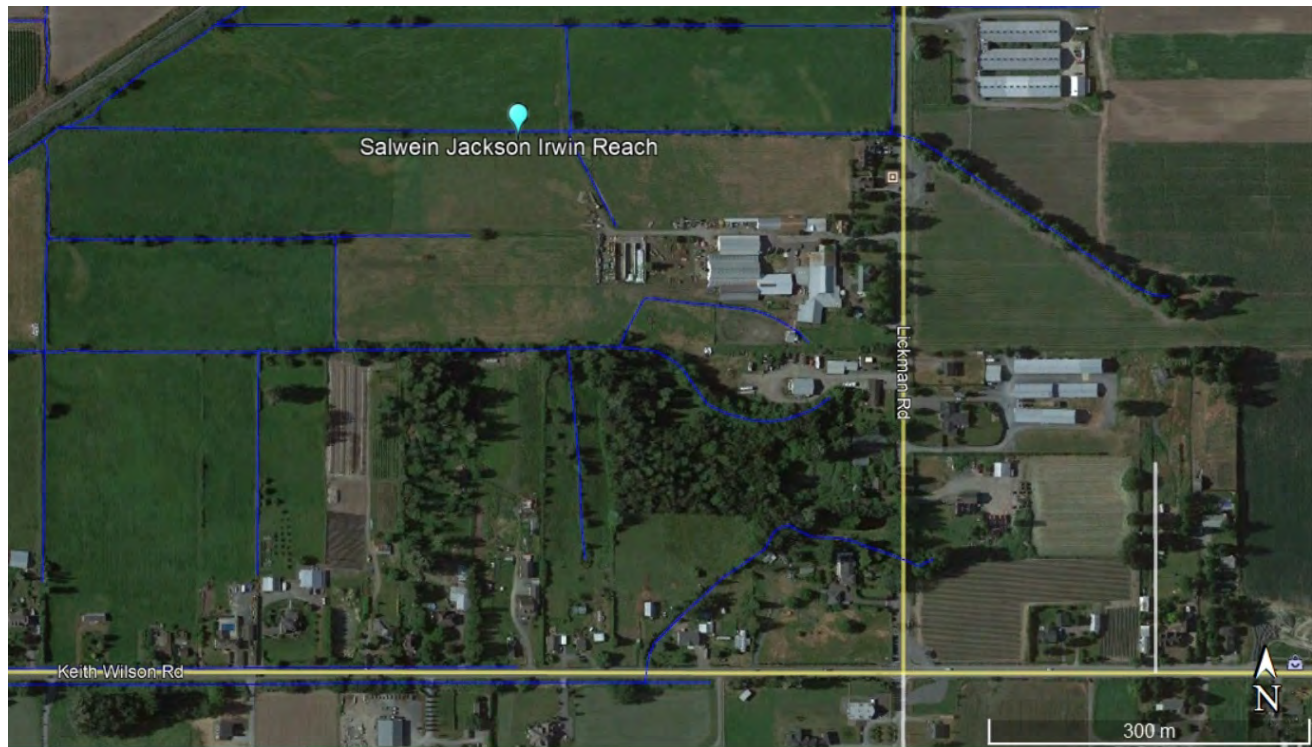


**Site Name:** 3 Salwein Creek (Jackson Irwin reach)

**Location Description:** Salwein Creek is a groundwater-fed tributary of the Vedder River, is highly utilized by salmonids and is in Salish sucker critical habitat.

**Lat/Long:** 49° 6'29.96"N 122° 0'42.42"W

**Map:**



**Threats/Impacts:** Adjacent land-use practices have resulted in the loss or degradation of riparian habitats and contributed to increased nutrient loading in the water. Encroachment of invasive Reed canary grass in the waterway causes barriers for salmon to reach spawning grounds. Himalayan blackberry invades the riparian area reducing biodiversity, impacting native plant growth and decreasing bank stabilization.

**Actions:** The FVWC field team spent 3 days controlling Himalayan blackberry along the Jackson Irwin reach of Salwein Creek (approximately 450m<sup>2</sup> of Himalayan blackberry was controlled). The existing riparian vegetation was pruned and maintained to encourage healthy growth. These actions protect existing habitat, restore degraded habitat as well as increasing the integrity and function of the riparian area.



**Target Species:**

- Salish sucker (*Catostomus Catostomus*)
- Coho salmon (*Oncorhynchus kisutch*)

**Benefitting Species:**

- Chum salmon (*Oncorhynchus keta*)
- Great blue heron (*Ardea herodias fannini*)
- Western Painted Turtle (*Chrysemys picta*)
- Red Legged Frog (*Rana aurora*)
- Songbirds

**Representative Photos:**



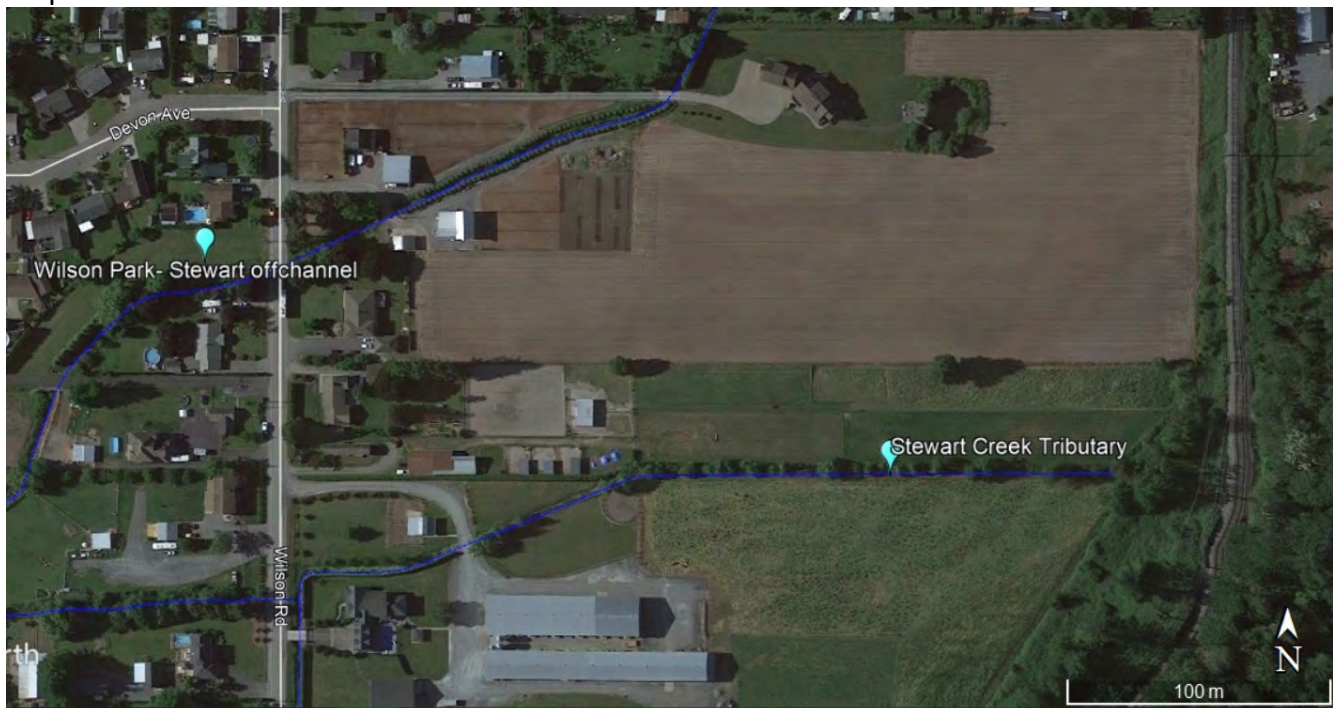


**Site Name:** 4 Stewart Creek

**Location Description:** Stewart Creek is a vibrant stream that runs through agricultural land in Chilliwack BC. The stream originates on Vedder Mountain, flows west through Chilliwack and joins the Sumas canal, which empties into the Fraser River. The cold mountain water input to this stream increases the quality of the habitat and provides good year-round dissolved oxygen levels.

**Lat/Long:** 49° 4'47.31"N 122° 2'30.54"W

**Map:**



**Threats/Impacts:** Stewart creek is impacted by numerous challenges such as removal of riparian vegetation, development and infilling, agricultural run-off, and encroachment from invasive plant species such as Reed canary grass (*Phalaris arundinacea*) and Himalayan balsam (*Impatiens glandulifera*). Adjacent land-use practices have contributed to increased nutrient loading in the water. Encroachment of invasive Reed canary grass in the waterway causes barriers for salmon to reach spawning grounds. Invasive Himalayan blackberry invades the riparian area reducing biodiversity and decreasing bank stabilization.

**Actions:** The FVWC field team spent 1/2 day controlling Himalayan blackberry along the Stewart Creek tributary (approximately 300m<sup>2</sup> of Himalayan blackberry was controlled). The existing riparian vegetation was pruned and maintained to encourage healthy growth. These actions protect existing habitat, restore degraded habitat as well as increasing the integrity and function of the riparian area.



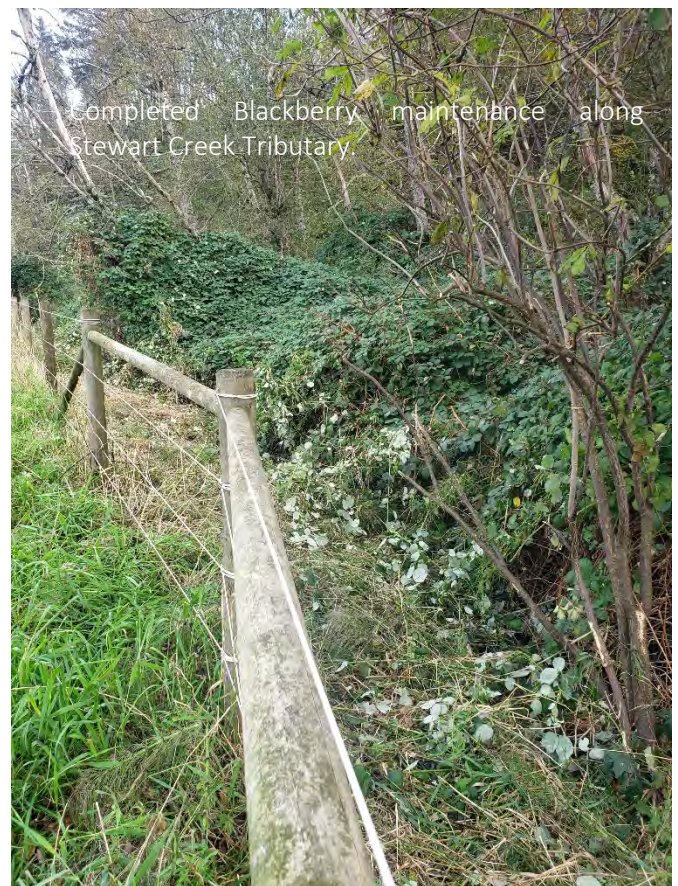
**Target Species:**

- Salish sucker (*Catostomus Catostomus*)
- Coho salmon (*Oncorhynchus kisutch*)

**Benefitting Species:**

- Chum salmon (*Oncorhynchus keta*)
- Great blue heron (*Ardea herodias fannini*)
- Western Painted Turtle (*Chrysemys picta*)
- Red Legged Frog (*Rana aurora*)
- Songbirds

**Representative Photos:**





**Site Name:** 5 Hooge Wetland

**Location Description:** Hooge Wetland is a 2,022 m<sup>2</sup> off-channel wetland that was created for salmon rearing and overwintering in 2019. The wetland was dug to expose groundwater and provide off channel habitat for salmonids which are limited on the Vedder River system.

**Lat/Long:** 49° 5'58.24"N 122° 1'31.67"W

**Map:**



**Threats/Impacts:** Hooge Wetland is impacted by invasion from non-native vegetation such as Himalayan blackberry, Himalayan balsam, Canola etc. These invasive plants reduce riparian viability, cover (shading over aquatic habitats), impact native plant growth/establishment and can cause edge-effects (reduction of complex riparian-aquatic habitat interface). This area is also affected by human use for target practice and illegal dumping.

**Actions:** The FVWC field team spent 3 days controlling Himalayan blackberry (*Rubus ameniacus*), Sweet white clover (*Melilotus albus*), Common tansy (*Tanacetum vulgare*) and Canola (*Brassica napus*) along the banks of Hooge wetland and surrounding area including the parking lot for Vedder River and Peach Creek. The existing riparian vegetation was pruned and maintained to encourage healthy growth. These actions protect existing habitat, restore degraded habitat as well as increasing the integrity and function of the area.



**Target Species:**

- Salish sucker (*Catostomus Catostomus*)
- Coho salmon (*Oncorhynchus kisutch*)

**Benefitting Species:**

- Chum salmon (*Oncorhynchus keta*)
- Great blue heron (*Ardea herodias fannini*)
- Western Painted Turtle (*Chrysemys picta*)
- Red Legged Frog (*Rana aurora*)
- Songbirds

**Representative Photos:**





## 2.3 Monitoring, Information Verification, Assessment and Adaptive Feedback

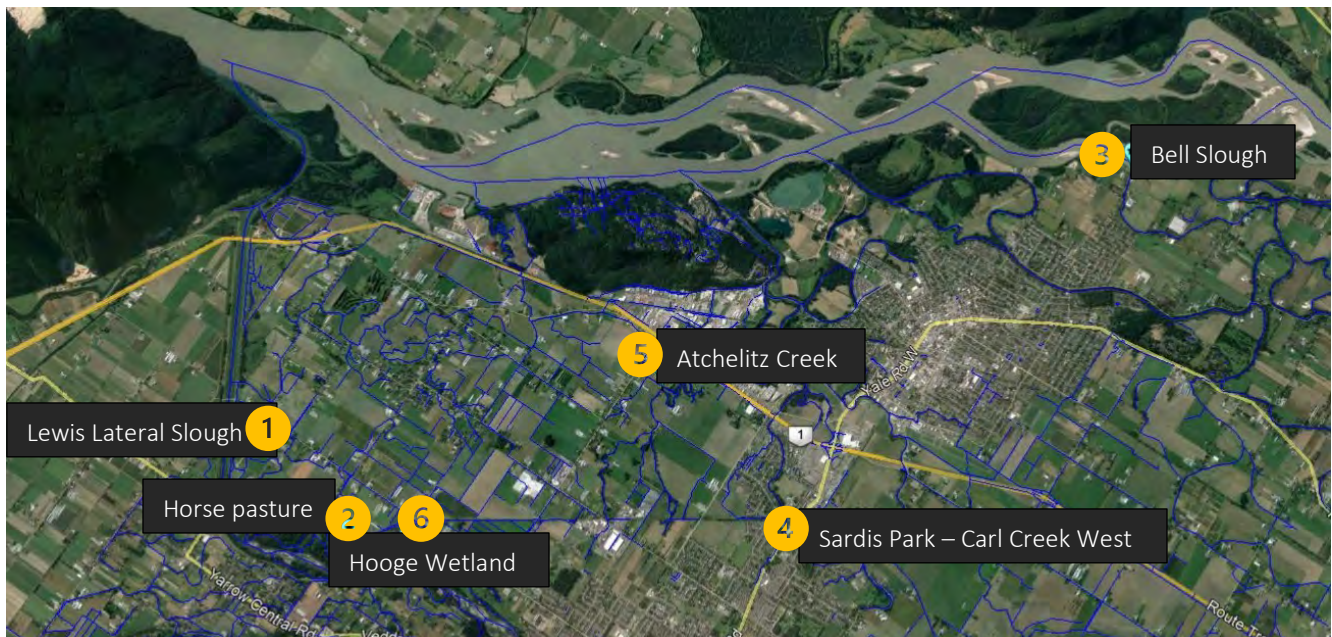
### Overarching Objective

To monitor and maintain the aquatic and riparian habitat conditions so that habitat information (to better understand critical habitats for targeted aquatic species at risk) can be gathered to support adaptive management strategies and future enhancement actions for longest project-life and greatest community benefit.

### General Summary

In Year 2, a total of six sites were monitored between April 01, 2020 to March 31, 2021. Activities across all sites involved water quality monitoring, vegetation growth/natural regeneration and qualitative assessments and invasive plant control.

### Overarching Monitoring Map





Site: **1** Lewis Lateral Slough WQ, vegetation assessment

Site map:



Monitoring Locations	Lat/Long:	Type (WQ/Fish/Invert/Veg/Hab Assess)
LSL- WQ # 1	49° 5'47.73"N 122° 4'8.08"W	WQ/ Veg/Hab Assess
LSL- WQ # 2	49° 5'46.10"N 122° 4'6.24"W	WQ/ Veg/Hab Assess
LSL- WQ # 3	49° 5'44.39"N 122° 4'3.70"W	WQ

**Water Quality Monitoring Results:**

Site#	Turbidity (NTU's)	Temp (degrees C)	DO (%)	DO (mg/l)	Conductivity (µS/cm)	pH	TDS (ppm)	Depth (meters)	Time
LSL- WQ #1	20	4.9	24.2	3.31	141.6	6.35	208	0.26	8:00 am
LSL- WQ #2	20	9.2	19.2	2.20	99.8	6.14	125	0.14	2:30 pm
LSL- WQ #3	20	10.5	33.2	3.75	104.2	5.98	124	0.14	2:30 pm

### Vegetation/Habitat Assessment Monitoring information:

The site is inundated with Reed canary grass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus ameniacus*) growing along the channel in both polygons and in large sections elsewhere on property. In the southern section of the site, the Himalayan blackberry is dense and extends to the property edge. There are invasive plants such as Sweet white clover (*Melilotus albus*), Common tansy (*Tanacetum vulgare*) and Canola (*Brassica napus*) growing in the northeast section of the property (red circular polygon).

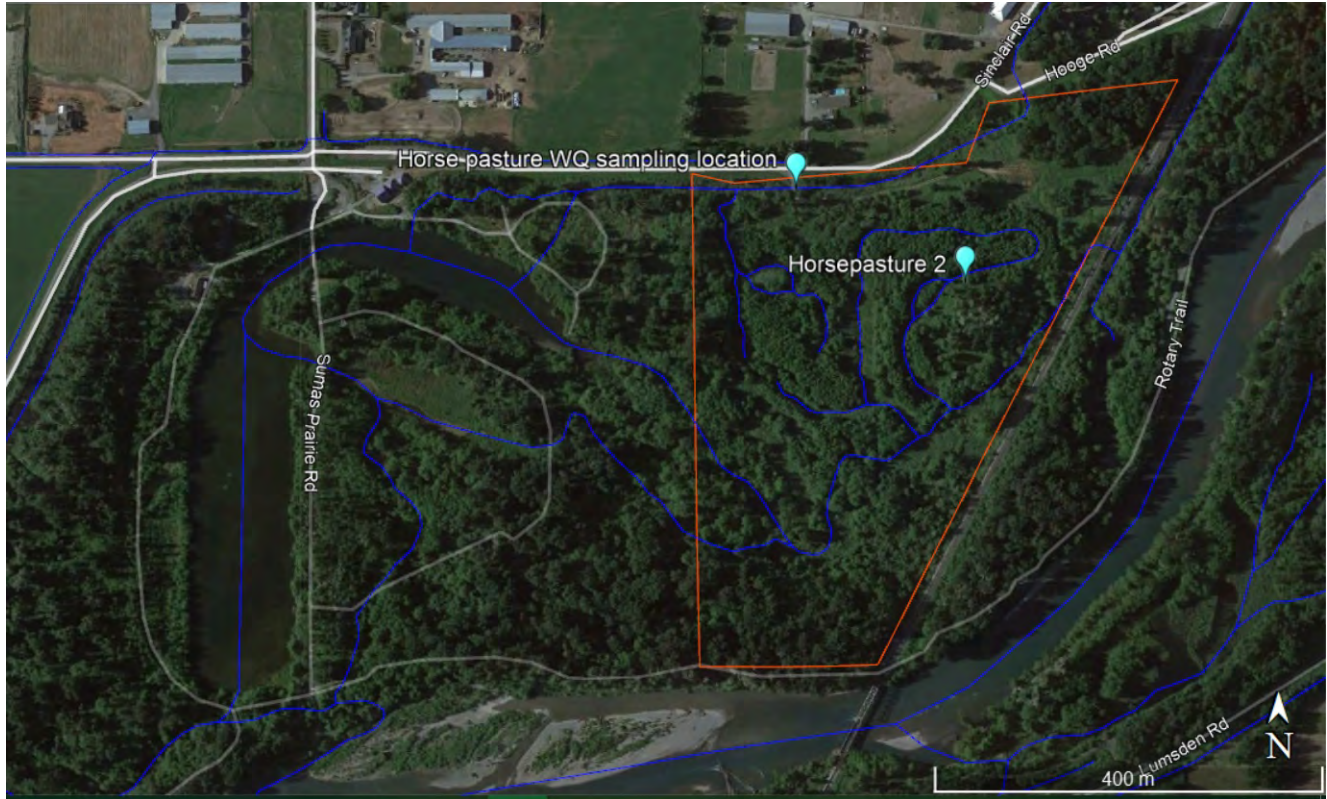
The substrate is compacted throughout the property. Significant amounts of fill were placed on the site in large piles (unknown source).

There are 24 flood control wells located on the property situated at the base of the dyke (on the west side of the property).

Native plants growing along the channel (north polygon outlined in red) include Red osier dogwood (*Cornus sericea*), Pacific Crab-apple (*Malus fusca*), Sitka spruce (*Picea sitchensis*), Black cottonwood (*Populus trichocarpa*), and Red alder (*Alnus rubra*). There are also more established Red osier dogwood and Pacific crab-apple growing along the channel in the southernmost polygon on the map.

Site: **2** Horse Pasture

Site map:



Monitoring Locations	Lat/Long:	Type (WQ/Fish/Invert/Veg/Hab Assess)
HP- WQ # 1	49° 5'46.80"N 122° 2'19.41"W	WQ/ Veg/Hab Assess
HP- WQ # 2	49° 5'43.71"N 122° 2'10.86"W	WQ/ Veg/Hab Assess

**Water Quality Monitoring Results:**

Site#	Turbidity (NTU's)	Temp (degrees C)	DO (%)	DO (mg/l)	Conductivity (µS/cm)	pH	TDS (ppm)	Depth (meters)	Time
HP-WQ #1	21+	8.8	69.5	8.08	82.0	5.49	109	0.62	1:00 pm
HP-WQ #2	21+	7.4	78.5	9.43	65.1	5.74	85.2	0.42	1:30 pm



### Vegetation/Habitat Assessment Monitoring information:

The site is inundated with Reed canary grass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus ameniacus*) growing along the channels and in large sections on property. There are invasive plants such Butterfly bush (*Buddleja davidii*), Himalayan blackberry and Reed canary grass growing on the property. There is evidence beaver activity in the area including a beaver dam.

Wildlife observed – Bald eagles (*Haliaeetus leucocephalus*), American robins (*Turdus migratorius*), American Dipper (*Cinclus mexicanus*), and Spotted towhee (*Pipilo maculatus*).

### Representative Photos:



Site: 3 Bell Slough

Site map:



Monitoring Locations	Lat/Long:	Type (WQ/Fish/Invert/Veg/Hab Assess)
BS- WQ # 1	49°12'8.88"N 121°56'21.19"W	WQ/ Veg/Hab Assess

**Water Quality Monitoring Results:**

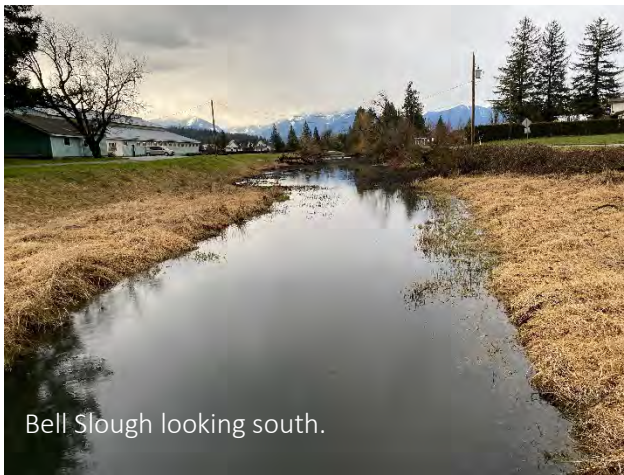
Site#	Turbidity (NTU's)	Temp (degrees C)	DO (%)	DO (mg/l)	Conductivity (µS/cm)	pH	TDS (ppm)	Depth (meters)	Time
BS-WQ #1	21+	6.6	40.3	4.91	55.3	5.17	82.1	0.24	8:00 am



### Vegetation/Habitat Assessment Monitoring information:

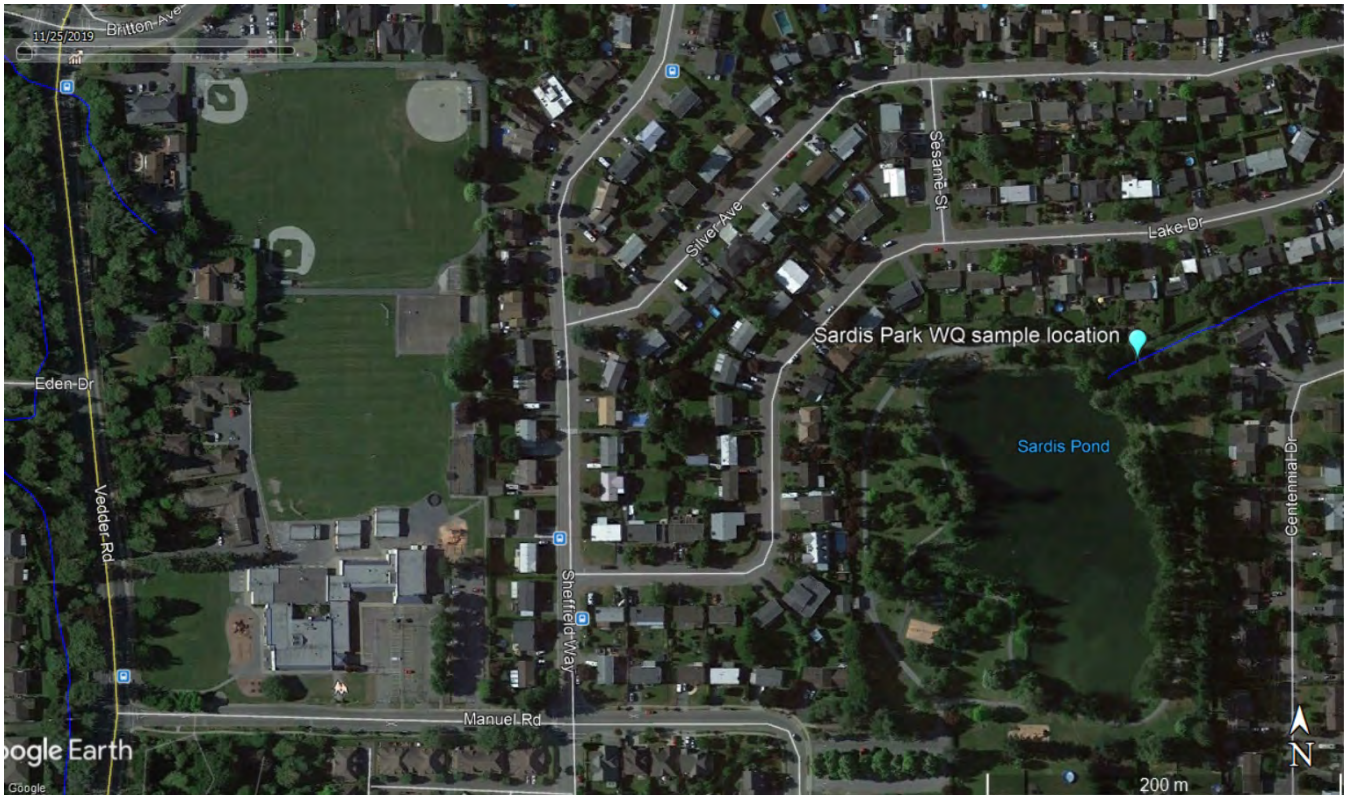
Invasive Reed canary grass (*Phalaris arundinacea*) is growing on the banks, and Himalayan blackberry (*Rubus ameniacus*) is growing near the culvert. There is Reed canary grass plugging the grate in front of the culvert. Wildlife observed – Bald eagles (*Haliaeetus leucocephalus*), American robins (*Turdus migratorius*).

### Representative Photos:



Site: 4 Sardis Park Carl Creek

Site map:



Monitoring Locations	Lat/Long:	Type (WQ/Fish/Invert/Veg/Hab Assess)
SP- WQ # 1	49°7'46.26"N 121°57'7.42"W	WQ/ Veg/Hab Assess

**Water Quality Monitoring Results:**

Site#	Turbidity (NTU's)	Temp (degrees C)	DO (%)	DO (mg/l)	Conductivity (µS/cm)	pH	TDS (ppm)	Depth (meters)	Time
SP-WQ #1	21+	7.3	99.5	11.98	141.1	5.46	189	0.19	10:00 am



### Vegetation/Habitat Assessment Monitoring information:

At this site both banks are covered with Reed canary grass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus ameniacus*). The banks of the stream had recently been mowed. The waterway is filled with RCG. There is evidence beaver activity in the park and many of the existing trees have been guarded to prevent herbivory.

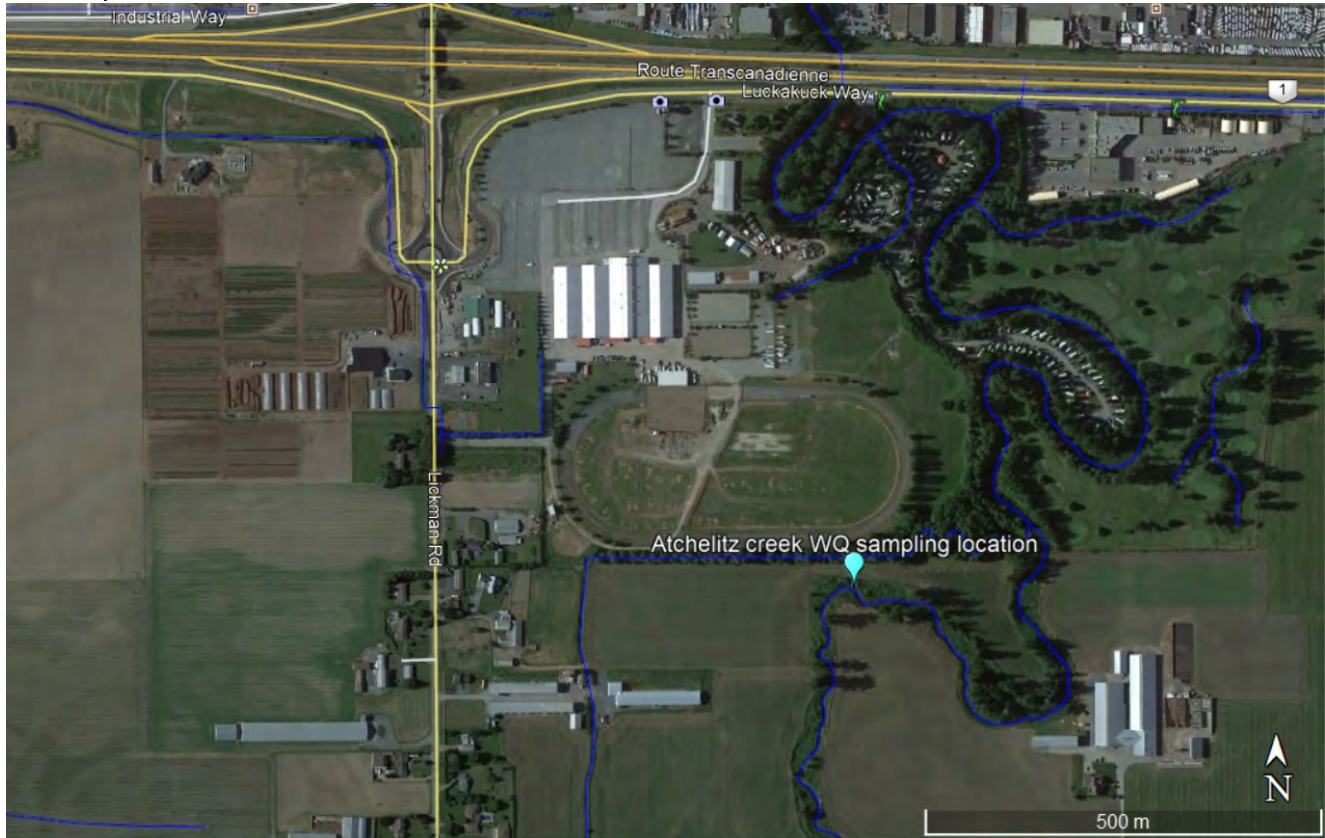
Wildlife observations at time of visit: Mallard ducks (*Anas platyrhynchos*), Black capped chickadees (*Poecile atricapillus*), House sparrows (*Passer domesticus*), Bald Eagle (*Haliaeetus leucocephalus*), American crows (*Corvus brachyrhynchos*), Canada geese (*Branta canadensis*), Downey woodpecker (*Picoides pubescens*), Annas hummingbird (*Calypte anna*).

### Representative Photos:



Site: **5** Atchelitz Creek

Site map:



Monitoring Locations	Lat/Long:	Type (WQ/Fish/Invert/Veg/Hab Assess)
AC- WQ # 1	49°8'17.94"N 121°59'58.51"W	WQ/ Veg/Hab Assess

**Water Quality Monitoring Results:**

Site#	Turbidity (NTU's)	Temp (degrees C)	DO (%)	DO (mg/l)	Conductivity (µS/cm)	pH	TDS (ppm)	Depth (meters)	Time
AC-WQ #1	21+	8.2	48.4	5.70	115.4	5.12	150	0.93	12:00 pm

**Vegetation/Habitat Assessment Monitoring information:**

The waterway and stream banks at this site are inundated with Reed canary grass (*Phalaris arundinacea*), Bindweed (*Convolvulus arvensis*) and Himalayan blackberry (*Rubus ameniacus*). There is evidence beaver activity and a beaver dam. The native vegetation consists of Hardhack (Spirea



douglasi), Twinberry (*Lonicera involucrata*), Pacific Crab-apple (*Malus fusca*), Roses (*Rosa sp.*), Willow (*Salix sp.*) and Red-Osier Dogwood (*Cornus sericea*). There are some wildlife snags at this site and the creek is surrounded by a cornfield.

Wildlife observations at time of visit: American robins (*Turdus migratorius*), Mallard ducks (*Anas platyrhynchos*), Black capped chickadees (*Poecile atricapillus*), House sparrows (*Passer domesticus*), Bald Eagle (*Haliaeetus leucocephalus*), Northern flicker (*Colaptes auratus*), Downey woodpecker (*Picoides pubescens*)

### Representative Photos:



Atchelitz Creek looking East



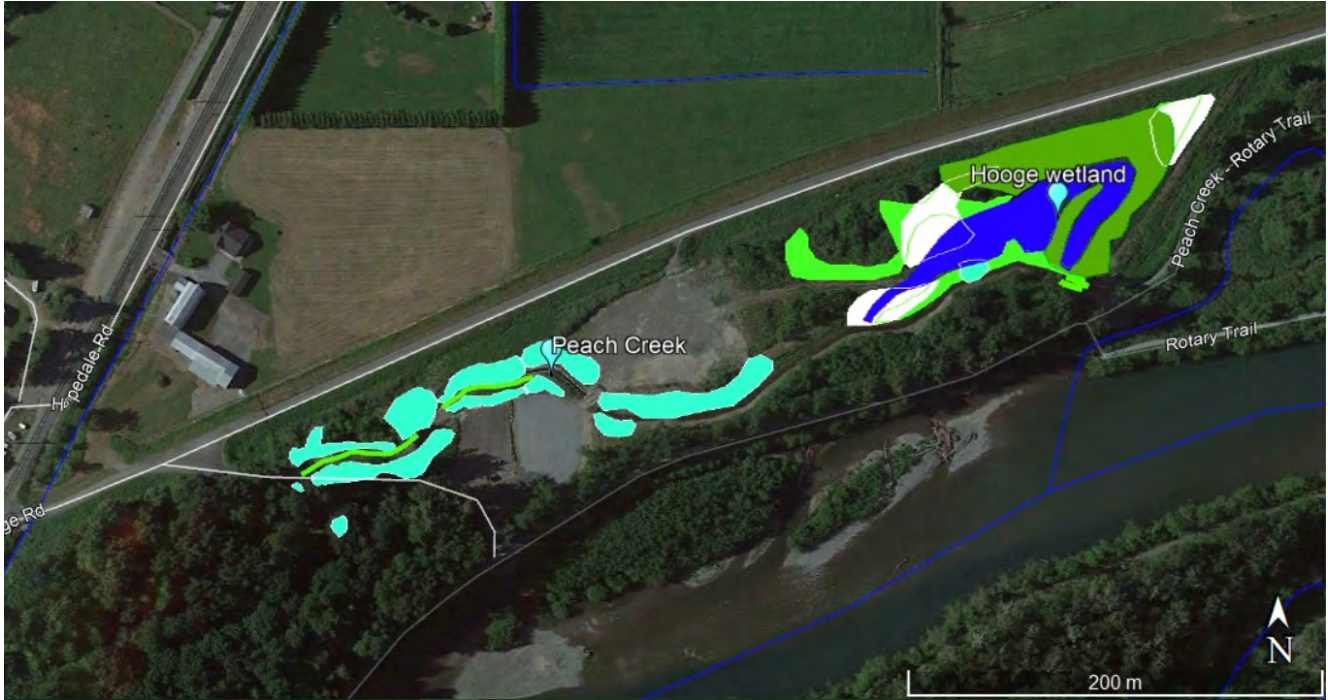
Atchelitz Creek Looking West



Beaver dam in Atchelitz Creek



Site: 6 Hooqe Wetland / Peach Creek  
Site map:



Monitoring Locations	Lat/Long:	Type (WQ/Fish/Invert/Veg/Hab Assess)
WQ # 1	49°8'17.94"N 121°59'58.51"W	WQ/ Veg/Hab Assess

**Vegetation/Habitat Assessment Monitoring information:**

Hooqe Wetland riparian vegetation has recently been planted and is starting to grow and fill in around the wetland. This area sees a significant amount of foot and vehicle traffic. This may be leading to the large amounts of garbage and other human related impacts to the site.



**Representative Photos:**



## 2.4 Strategic Partnership and Communications

### Overarching Objective

To develop strategic partnership and communication with key stakeholders and partners to begin to prioritize and implement restoration and enhancement activities and build lasting community support and awareness.

### General Summary

Due to the restrictions required as a result of COVID-19 we were unable to host a steering committee meeting or the community and volunteer events.

## 3.0 Discussion and Next Steps

The year long impact of COVID-19 has reduced the partnerships capacity to complete aspects of this project. The original plan for Salwein East-West was to split the weir flows and then construct a rearing wetland and improve the riparian area that is currently being impacted from livestock grazing and access and invasion from non-native plants. However, this first required our municipal partner to address land encroachment issues, that, given the severity of the pandemic, was not pursued last year. Conversations with Stó:lō Research and Resource Management Centre about completing a preliminary cultural assessment of the potential habitat enhancement sites, however more information and intention to pursue was required before t

2021-2020 fiscal year will look to reassess the Salwein East-West weir, address Salwein east channel for barriers, blockages and shift into the Horse Pasture. Horse pasture activities may include removing blocked beaver boxes, planning and surveying alignments and reconsidering the loop channel to address standing and stagnant ponded water.



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<https://www.chilliwack.com/main/attachments/Files/2387/2040%20OFFICIAL%20COMMUNITY%20PLAN%20-%20FINAL%20VERSION%20-%20DO%20NOT%20DELETE%20-%20REVISED%202019%2011%202022.pdf>
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## 5.0 Appendices

Appendix A. COC Booklet

Appendix B. CA Amendment Request & Email Correspondence





FRASER VALLEY  
WATERSHEDS  
COALITION

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CITY OF CHILLIWACK  
AQUATIC & RIPARIAN  
OPPORTUNITIES 2020





## ACKNOWLEDGEMENTS

Set within the City of Chilliwack (COC), we acknowledge the aboriginal heritage of the S'ólh Téméxw (Stó:ló) People of the River: the Ts'elxwéyeqw and Pilalt tribes and their historic villages including Cheam, Kwaw kwaw Apilt, and Skwah (Pilalt); and Aitchelitz, Skowkale, Shxwhà:y, Soowahlie, Squiala, Tzeachten, and Yakweakwioose (Ts'elxwéyeqw). We recognize the rich cultural and ecological values of this landscape and their importance towards building natural and community resilience and togetherness for future.

We are grateful for the financial contribution made by the City of Chilliwack and Canada's Nature Fund for Aquatic Species at Risk. We thank our community partners including the Fraser Valley Regional District, Fisheries and Oceans Canada, University of the Fraser Valley, our directors, volunteers and members for your support. We take a moment to give special thanks to:

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### COVER PHOTO:

Air photo of Vedder River fall 2018.

2020. Cox.,N., Drennan. R., Clegg.S. Aquatic and riparian opportunities: Integrated conceptual plans to restore and enhance waterways within the City of Chilliwack. BC. (c) Fraser Valley Watersheds Coalition.

## ABOUT THE FRASER VALLEY WATERSHEDS COALITION

The **Fraser Valley Watersheds Coalition** is a registered charity and environmental non-profit organization governed by a volunteer board of directors.

### OUR VISION

Healthy Watersheds, Healthy Communities.  
We believe healthy watersheds provide the foundation for vibrant, healthy communities.

### OUR PURPOSE

Our purpose is to organize and participate in environmental projects designed to conserve, protect, and restore watersheds in the Fraser Valley and increase community understandings and foster stewardship by providing seminars and training on watershed management through:

- ▶ Science
- ▶ Collaboration
- ▶ Community support
- ▶ Active habitat/watershed/ecosystem restoration.

### OUR COMMITMENT

We strive to maintain our credibility by fulfilling our commitments in a transparent, ethical and professional manner. Our success is built on the trust and confidence we earn within our community.

### OUR CORE VALUES

- ▶ **Integration:** Understanding that land, water, air and living organisms are integral parts of any ecosystem, we approach watershed well-being taking into account social, economic and environmental aspects.
- ▶ **Collaboration:** We bring together communities, organizations and agencies, fostering communication with a non-adversarial approach.
- ▶ **Action:** Our goal is to inspire and facilitate action at all levels within a community in stewardship activities that will improve watershed health.
- ▶ **Conservation and Restoration:** Our education and actions are aimed at hands-on conservation, restoration and enhancement projects that contribute to the sustainability of healthy watersheds.
- ▶ **Inclusiveness & Diversity:** We encourage engagement of all Fraser Valley communities and citizens.
- ▶ **Scientific and Traditional knowledge:** We draw on science-based backgrounds and appropriate cultural approaches to analyze, discuss and plan action around our projects.
- ▶ **Respect:** We recognize and respect the needs and obligations of others in our community interactions.

## WATERSHEDS PROVIDE IMPORTANT SOCIAL, ECONOMIC AND ECOLOGICAL VALUES

### SOCIAL WELL-BEING & HUMAN HEALTH

#### Healthy watersheds benefit people:

- ▶ Safe drinking water
- ▶ Provides food for people
- ▶ Enables us to adapt to the impacts of climate change more easily by cooling the air and absorbing greenhouse gas emissions.
- ▶ Healthy forests within a watershed create the fresh air we breathe.
- ▶ Provides recreation opportunities such as parks and trails for people to keep active and enjoy nature.

### ECONOMIC PROSPERITY

#### Healthy watersheds benefit society:

- ▶ Produces energy and supply water for agriculture, industry and households.
- ▶ Forests and wetlands help to prevent or reduce costly climate change impacts. This can include mitigating flooding. Reducing drought and forest fire potentials.
- ▶ Contributes to tourism, fisheries, forestry, agriculture and mining industries.

### ECOLOGICAL HEALTH

#### Healthy watersheds benefit nature, natural processes and biodiversity:

- ▶ Conserves water, promotes streamflow, supports sustainable streams, rivers, lakes, and groundwater sources.
- ▶ Enables healthy soil for crops and livestock.
- ▶ Provides habitat for wildlife and plants (including pollinators, needed for agriculture).



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SECTION 1

INTRODUCTION

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## BACKGROUND

The City of Chilliwack, 2019-2020 Objectives and Measures include the objective of “good stewardship of the environment” through strategies such as protecting riparian areas and waterways, and measures success through the enhancement of fish habitat. As such, Chilliwack is well positioned to make meaningful strides towards creating streams with increased ecological integrity.

A consistent City goal is to facilitate a high quality of life for Chilliwack residents by providing quality parks and recreational opportunities, as well as maintaining, enhancing and promoting the natural beauty of Chilliwack. Reintroducing natural vegetation into urban spaces throughout Chilliwack to enhance salmon habitat furthers this goal, as local residents and tourists alike are drawn to witness spawning salmon. The Chilliwack Greenspace Plan supports the idea, “in a passive greenspace being in or viewing the environment is the recreational experience” and identified the opportunities for the “protection of riparian corridors”, and “preserve wildlife corridors.” The enhancement of salmon streams combines these two values while enabling the City to “ensure it meets the diverse recreational, aesthetic and environmental needs of its residents”.

The enhancement opportunities described in this report will build upon the City’s previous efforts and guide future opportunities to further enhance Chilliwack’s ecological, economical and social capital.

## PROJECT SCOPE

The City of Chilliwack is located within the Stó:lō traditional territory, S’ólh Téméxw, which means “our world, our land.” Represented by the two Stó:lō tribes, the Ts’elxwéyeqw and Pilalt, their historic villages include Cheam, Kwaw kwaw Apilt, and Skwah (Pilalt); and Aitchelitz, Skowkale, Shxwhà:y, Soowahlie, Squiala, Tzeachten, and Yakweakwioose (Ts’elxwéyeqw), and represent rich heritage values on the landscape.

Chilliwack encompasses 261.6 km<sup>2</sup> and is surrounded by mountains on the south and east; fertile agricultural lands on the north, east and west; and the Fraser River to the north. Flowing throughout the municipality are many streams, rivers and wetlands.

Chilliwack is the second largest city within the Fraser Valley Regional District with a population of 91,797, and is projected to surpass 100,000 by 2021. With a growing population and footprint on the landscape, the opportunity to restore and enhance streams, salmon and wildlife habitat will support ecological and community wellbeing into the future. The proposed sites are on land owned by various entities. These plans are conceptual only. No permissions have been sought or received to implement any enhancement work.

## PRIORITY STREAMS

The priority streams for restoration opportunities represents the opportunity to increase the resilience of existing fish populations within priority streams 1 and broaden the fish presence in priority 2 streams. Within these priority streams, there is opportunity to use a multi-species approach to improve salmon and aquatic habitats and improve biodiversity, Table 1 (this page), [Map 1. Priority streams \(page 49\)](#), [Map 2. Known Species at Risk Critical habitats \(page 50\)](#).

Table 1. Priority Streams

PRIORITY STREAMS #1	PRIORITY STREAMS #2
Atchelitz Ditch	Browne Creek (Yarrow Side)
Barrett Creek	Calkin Creek
Big Ditch	Carl Creek West Br.
Chilliwack Creek	Carl Creek East Br.
Dunville Creek	Evans Creek
Elk Creek	Hope Slough
Keith Wilson Roaside Ditch	Marble Hill Creek
Knox Creek	Moore Creek
Luckacuck Creek	Street Creek
Nevin Creek	Wilbers Creek
Patterson Road Creek	
Primary Drainage through 41767 Majuba Hill Rd.	
Salwein Creek	
Street Creek	
Stewart Creek	
Town Creek	
Wilbershaw Creek	

## PROJECT INTENT

This project aims to increase the presence and resilience of wild salmon and biodiversity throughout Chilliwack.

## HOW TO USE THIS DOCUMENT

This report is a planning tool for aquatic habitat restoration and enhancement opportunities throughout key areas within the City of Chilliwack, BC. Each enhancement opportunity has been ranked based on a priority matrix that considers the ecological/biological value and community values, timelines and potential cost. This is not an exhaustive list of opportunities, it is meant to guide restoration and enhancement opportunities and be a dynamic document that balances opportunities, partnerships and improved ecological and community values.

### SECTION 1

You're in this section right now! It's all the introductory navigation details you'll need in order to get the most out of this document.

### SECTION 2

Each site in Section 2 is made up of two pages (samples of which can be seen on the right). The first page contains the conceptual restoration overview, rationale and beneficiaries at a glance; while the second page outlines more of the details. The following page gives further explanation of the site features.

### SECTION 3

This section contains the supporting information and appendices. It includes restoration sites ranking matrix, a glossary of terms, stakeholders list and a variety of other supporting details.



## 1 Section 2, First Page of Each Site

See page eight of this document for the page usage guide.

## 2 Section 2, Second Page of Each Site



# CONCEPTUAL SITE: PAGE FEATURES

Each restoration site in Section 2 will have the following page features:

## 1 Carbon Offset Estimation

Calculations are based on the estimated number of trees planted at each potential restoration site. The number of trees are then put through a calculator to estimate the carbon emission offset per year. The single year estimate is displayed as tons of carbon.

## 2 Ranked Opportunity

Identifies the suggested priority of the proposed restoration sites.

## 3 Restoration Chart

Describes on a scale from low to high the following indications:

- **Timeline to restore**  
Low 0-1 years  
Medium 2-5 years  
High 6-10 years
- **Cost to restore**  
Low <\$10,000  
Medium \$10,000—\$50,000  
High >\$50,000
- **Ecological value**  
Low | Med | High
- **Community value**  
Low | Med | High

## 4 Context Map





This map indicates the position of the proposed site within the greater context of Chilliwack.

## 5 Proposed Design

The map has been created to illustrate the proposed design. All proposed design elements are labeled. Each design represents a unique opportunity to benefit people and nature. Designs are early stage sketches meant to inspire and guide discussion for future implementation.

## 6 Planting Profile

A diversity of trees, shrubs groundcovers and aquatics provides key attributes towards establishing healthy riparian areas. To estimate the carbon offset, each restoration concept features the suggested the percentage of native conifer trees, deciduous trees, shrubs, groundcovers and aquatics to be planted. This breakout will be shown to the nearest percentage. See more about the planting profiles on the next page.

-  CONIFEROUS TREES
-  DECIDUOUS TREES
-  SHRUBS
-  GROUNDCOVERS AND AQUATICS

## 7 Benefits at a Glance

Illustrations quickly indicate the benefits that will be achieved by restoring this habitat.

-  FOOD & HABITAT FOR WILDLIFE
-  SUPPORTS AGRICULTURAL VALUES
-  WILDLIFE VIEWING
-  FLOOD MITIGATION & DRAINAGE
-  SUPPORTS POLLINATORS
-  SUPPORTS FISH & WILDLIFE HABITAT
-  TRAILS & SOCIAL RECREATION

## 8 Navigation Tabs

Quickly navigate to important reference pages by clicking one of the side tabs.



**SINCLAIR WETLANDS**

**WHY**  
The Sinclair Wetlands will connect the community to a 40.5 km loop trail around a quiet pond, where rare western painted turtles bask, salmon and Salish sucker swim and the willows and maple trees stand tall, offering beauty throughout the seasons.

**1** TONS OF CARBON OFFSET: 375A

**2** RANKED OPPORTUNITY: 2

**3** TIMELINE: [Progress indicator]

**4** INVESTMENT: [Progress indicator]

**5** ECOLOGICAL VALUE: [Progress indicator]

**6** COMMUNITY VALUE: [Progress indicator]

**6** PLANTING PROFILE: 15% Coniferous, 73% Deciduous, 73% Shrubs, 15% Groundcovers and Aquatics

**7** BENEFITS AT A GLANCE: [Icons for food & habitat, supports agricultural values, wildlife viewing, flood mitigation, supports pollinators, supports fish & wildlife habitat, trails & social recreation]

**8** [Navigation tabs: CONTENTS, RANKED OPPORTUNITY, FEATURES, SITES, APPENDICES]

**WHERE**  
The conceptual project is located on City of Chilliwack parcel ID GISLINK 0520.41798 and represents 0.96 hectares extending east from the setback dike and pressure release wells just beyond the existing Lewis Slough lateral ditch line.

**HOW**

- Create a new off-channel wetland to support aquatic species (1,761m<sup>2</sup>).
- Create a Western Painted turtle nesting beach.
- Replant the wetland riparian area using both drought and wet-tolerant native plant species (minimum 1,435m<sup>2</sup>).
- Develop a 400m loop trail with a Public Rest Area to connect with the Vedder River Rotary trails.
- Selectively fence off the riparian area to support a wetland viewing opportunity.
- Consider amenities such as park benches, waste receptacle, small kiosk, footbridge.

FRASER VALLEY WATERSHEDS COALITION | CITY OF CHILLIWACK AQUATIC & RIPARIAN OPPORTUNITIES

## PLANTING PROFILE AND HOW IT RELATES TO CARBON DRAWDOWN

### TOWARDS A GREENER FUTURE: GREENHOUSE GAS EMISSIONS (GHG) - CARBON OFFSET ESTIMATION

Trees are great at absorbing carbon in the air and storing it within the roots and soil. Each restoration site provides a general estimate of the potential annual carbon offset as a result of the work. Calculations are based on the estimated number of trees planted at each potential restoration site as represented in the planting profile. The number of trees is put through a calculator and represented as the tons of carbon absorbed per year. To calculate the offset achieved over time, the annual tons can be multiplied by the number of years since being planted. For example, if a project site is planted in 2020 and the goal is to understand the potential tons of carbon stored by 2040 – then the annual tons of carbon can be multiplied by 20 years. The annual cash equivalent of a sites carbon offset can be found in Appendix 1 (page 45). The top five highest ranked sites for climate change offsets can be found in Appendix 2 (page 46).

### PLANTING PROFILE

The planting profile provides a breakdown between the diversity of trees, shrubs groundcovers and aquatic plant species that support healthy riparian and aquatic areas and support a variety of wildlife needs and ecosystem functions. Each restoration conceptual design will have an estimation of anticipated coniferous trees, deciduous trees shrubs, groundcovers and aquatics. This breakout will be shown to the nearest percentage. Plants selected for replanting are those native to the Pacific Northwest. Some common plant species are shown in their respective class category.



CONIFEROUS TREES



DECIDUOUS TREES



SHRUBS




GROUNDCOVERS AND AQUATICS

 CONIFEROUS TREES	 DECIDUOUS TREES	 SHRUBS	 GROUNDCOVERS AND AQUATICS
Can grow between 20m - 80m in height at maturity. Maintains its leaves year-round.	Can grow between 10m - 50m in height at maturity. Often sheds leaves in fall/winter.	Typically grow less than 10 m in height at maturity.	Typically grow less than 5m in height at maturity.
Western Red Cedar	Big Leaf Maple	Thimbleberry	Mountain Heather
Shore Pine	Black Cottonwood	Salmonberry	Kinnikinnick
Douglas Fir	Red Alder	Pacific Ninebark	False Lily of the Valley
Western Hemlock	Oregon Ash	Hardhack	Crimson Red Clover
Sitka Spruce	Pacific Crab Apple	Red Flowering Currant	Sword Fern
Pacific Silver Fir	Paper Birch	Nootka Rose	Lady Fern
Grand Fir	Vine Maple	Snowberry	Bracken Fern
	Red Osier Dogwood	Oceanspray	Bleeding Heart
	Native Willows (Pacific, Scoulers, Sitka, Hooker)	Mock Orange	Red Columbine
	Douglas Maple	Osoberry	Deer Fern
	Choke cherry	Salal	Slough Sedge
	Pacific Dogwood	Red – Black Huckleberry	Small Fruited Bulrush
		Pacific Rhododendron	Hard Stem Bulrush
		False Azalea	Skunk Cabbage
		Black Twinberry	Common Rush
		Red Elderberry	Mertins Sedge
		Saskatoon	Wapato
		Black Hawthorne	Scouring Rush
		Sweet Gale	
		Cascara	
		Oregon Grape	



## BENEFITS: A CLOSER LOOK

The goal of each conceptual restoration site is to provide a variety of benefits to people and nature. Each site identifies the “benefits at a glance.” The table below offers some general examples on how these benefits might be achieved.













						
FOOD & HABITAT FOR WILDLIFE	SUPPORTS POLLINATORS	SUPPORTS AGRICULTURAL VALUES	SUPPORTS FISH & WILDLIFE HABITAT	WILDLIFE VIEWING	TRAILS & SOCIAL RECREATION	FLOOD MITIGATION & DRAINAGE
<p>Designing sites to support specific wildlife habitat needs. This includes:</p> <ul style="list-style-type: none"> <li>➤ Food. Planting specific varieties of trees and shrubs to support wildlife food needs. This can include planting fruit bearing vegetation, adding deciduous plants along waterways that provide leaf, detritus and insects that fall into the streams (feeding fish and aquatic species).</li> <li>➤ Water. All animals need water to survive and some need it for bathing or breeding as well. Sites designed with water retention, accessibility, and conditions.</li> <li>➤ Shelter. Creating habitats that offer unique shelter and cover for wildlife to avoid predation and use during key life-stages such as nesting, breeding, spawning, rearing, overwintering, hunting, and foraging.</li> </ul>	<p>Designing sites to support wild pollinators. This includes:</p> <ul style="list-style-type: none"> <li>➤ Planting a variety of native flowering species that target specific habitat and food requirements, such as nectar for wild pollinators.</li> </ul>	<p>Designing sites to support agricultural values. This includes:</p> <ul style="list-style-type: none"> <li>➤ Reduce crop and field degradation caused by wind, rain and soil erosion by planting hedgerows and windbreaks.</li> <li>➤ Increase pollination that directly benefits agriculture by planting pollinator corridors, and during implementation of fish and wildlife enhancement work, maintaining existing agricultural values, use and conditions (such as planting on the south and west sides of streambanks).</li> </ul>	<p>Designing sites to support specific wildlife habitat. This includes:</p> <ul style="list-style-type: none"> <li>➤ Addressing critical habitat and limiting factors that affect specific species such as addressing habitat fragmentation, hypoxia, and invasive species encroachment. Activities may include invasive species removal, native tree and shrub planting, bioengineering, addressing infrastructure restrictions, creating specific habitat needs such as spawning habitats and addressing barriers to reproduction and survival.</li> </ul>	<p>Designing sites to support Wildlife viewing. This includes:</p> <ul style="list-style-type: none"> <li>➤ Wildlife viewing opportunities can be achieved by developing a variety of sites that support a range of users and a range of accessibility needs, to see nature and wildlife. From bird-viewing platforms, to bridges over known salmon spawning channels and trails near wildlife habitat there is opportunity to connect people to nature as the community grows.</li> <li>➤ Key designs incorporate targeted wildlife to specific habitats during specific life-stages and times.</li> </ul>	<p>Designing sites to support people, culture, and recreation. This includes:</p> <ul style="list-style-type: none"> <li>➤ Developing trails, interpretive signs, wayfinding signs, public amenities, and cultural attributes in connection with official community plans and cultural plans so that sites reflect historic, present and future values of the people and communities. Highlight the landscape and ecological attributes unique to the area.</li> </ul>	<p>Designing sites to support to support flood mitigation and drainage. This includes:</p> <ul style="list-style-type: none"> <li>➤ Designs to incorporate municipal operations and cleanouts – planting in patches “windows” and where applicable, supporting decreased drainage need requirements related to increased shade and reduction of invasion in waterways that restrict conveyance; assessing, and where applicable, upgrading culverts and control structures to allow for greater water conveyance; and creating wetlands that can act as “sponges” absorbing water from fields and stormwater events, thereby reducing stream velocities which could support climate-related emergency services response.</li> </ul>

SECTION 2

# RESTORATION SITES

The following sections represent aquatic and riparian enhancement opportunities at a site level, on land owned by various entities. Each of these sites represent conceptual opportunities to improve a variety of ecological values and offer community values. Permissions have not been sought or received to implement the site conceptual restoration plan.

These fifteen sites have been comparatively prioritized for greatest overall opportunity as indicated by the starred number. Site priorities are dynamic and may change over time. Sites are listed below in alphabetical order, and can be seen on the map of Chilliwack on the following page. Each of the site names on this page and the map on the next page can be clicked to navigate to the opportunity details for that site.

  Atchelitz Creek . . . . . 13	  Hope Slough Blueway . . . . . 29
  Bell Slough McDonald Rd . . . . . 15	  Luckacuck Creek Greenway . . . . . 31
  Big Ditch – Upper Prairie – Yale Rd . . . . . 17	  Nevin & Dunville Creek – Ford Rd. . . . . 33
  Carl Creek West – Sardis Park . . . . . 19	  Nevin Creek. . . . . 35
  Chilliwack Creek & Carl Creek . . . . . 21	  Salwein East-West Wetland . . . . . 37
  Dunville Creek – McElwee Ditch . . . . . 23	  Semiault Creek – Robertson Elementary . . . . . 39
  Dunville Creek – Rosedale . . . . . 25	  Sinclair Wetlands. . . . . 41
  Hope Camp Slough Nature Trust Wetlands . . . . . 27	



# CHILLIWACK



Google Earth



# ATCHELITZ CREEK

## WHY

Atchelitz Creek provides critical habitat for Salish sucker and salmon. Flowing northward towards the Fraser River, it is readily seen at the iconic Heritage Park. Enhancing and planting the riparian area will transform lowland fields and dyke right of ways, into diverse tree and shrub hedgerows, floodplain forests that supports a variety of salmon, native amphibians, and biodiversity, and offers opportunity to apply native wildflower edging to support increased crop pollination. It will offer local opportunity to significantly sequester carbon and support emission offset goals for the municipality "Towards a greener cleaner future."

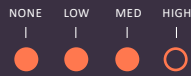


15299  
TONS OF CARBON / YR



3  
RANKED OPPORTUNITY

## TIMELINE



## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located with the dyke area encompassing 8.53 acres. Along the east side of the adjoining properties, 7480 Lickman Road, 7410 Lickman Road, 7248 Lickman Road and 44305 Sumas Central Road, Chilliwack BC. Directly north is Clark Ditch and the Chilliwack Heritage Park. East of the property is Atchelitz Creek. The projects scope is scalable and can be completed over time.

## HOW

- Prior to any works, complete adjacent landowner contact to negotiate crown land use and trade-off's between agricultural use and ecological riparian area buffer.
- Complete pre-planting site prep with a mowing schedule (minimum one-year prior multiple times per year) to reduce invasive blackberry invasion.
- Create agricultural access routes to adjacent parcels to support and maintain agricultural values
- Replant the riparian area using wet-and drought tolerant native plant species resulting in up to 32,113m<sup>2</sup> of replanted area.
- Mulch and amend the silty/loamy/sandy soil to support soil building process, stable banks and healthy plant ecology.



GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Restore and Establish a 30m riparian buffer along the westside of Atchelitz Creek to support salmon, Salish sucker and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Improved crop pollination and windbreaks.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Salmon</li> <li>Great blue heron</li> <li>Native amphibians</li> <li>Wetland birds</li> </ul> </li> <li>Increased wild pollinators.</li> <li>Improved floodplain ecology, hydrology/water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>May improve drainage and conveyance of water – through well shaded waterways reducing invasive aquatic plant growth.</li> <li>Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain through project works.</li> <li>Replanting efforts may reduce soil loss and crop damage from winds.</li> <li>Opportunity to create a native wildflower pollinator edge along the western edge to support agricultural values.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Limited riparian buffer.</li> <li>Reduced canopy cover (lack of shade) detritus and nutrients for aquatic life species.</li> <li>Non-native /invasive plant species.</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>Address – control invasive plants (clipping &amp; mowing).</li> <li>Establish functional riparian area buffers through replanting and bioengineering efforts.</li> </ul>	<ul style="list-style-type: none"> <li>Plant species that provide shade over waterway but at maturity height limit the shading effect on the agricultural lands.</li> </ul>



DESIGN CONSIDERATIONS

- Infrastructure: Currently identified as dyke (dyke management approval)
- Water Licenses
- Drainage conveyance and maintenance requirements
- Current land uses and agricultural values
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Fisheries and Oceans Canada (DFO)
- Crown (Fed Gov)
- Stó:lō Archaeologists and cultural monitors &/or Research & Resource Management
- Fraser Valley Watersheds Coalition
- Landowners /Adjacent landowners/lease holders
- Salish Sucker Recovery Biologist

SUPPORTING PROGRAMS

-  CONNECTIONS: NATURE, PEOPLE AND CULTURE
-  MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC OFFICIAL COMMUNITY PLAN**
- Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities.
    - Parks & Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design

COC GREENSPACE PLAN

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Salish Sucker Recovery Strategy
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# BELL SLOUGH AT MCDONALD RD.

## WHY

Bell Slough supports important salmon and aquatic habitats. This project will enhance the riparian habitat, add agricultural values and enhance a section of the Fraser Valley Regional District Experience the Fraser Canyon to Coast Trail, by establishing heritage-style hedgerows with both small and tall iconic trees to assist in windbreaks and sightlines.

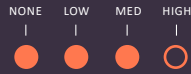


239  
TONS OF CARBON / YR



14  
RANKED OPPORTUNITY

## TIMELINE



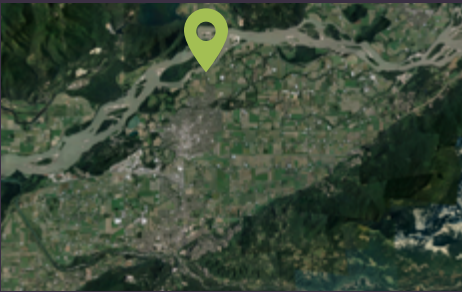
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



Google Earth

## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located on 46463 Ballam Rd., City of Chilliwack. Zoned agricultural, it is 0.55 acres in size. This project's scope is scalable and pending adjacent landowner negotiation regarding existing land use and access, the project can enhance 772m<sup>2</sup> (additional 28%) to be planted, while maintaining low grass edge buffers for sightlines and access routes.

## HOW

- Prior to any works, complete adjacent landowner contact to negotiate municipal land use and trade-off's between agricultural use and ecological riparian area buffer.
- Replant the slough with native plant species (772m<sup>2</sup>).
- Plant tall tree every 10m on center with multi-stem shrubs surrounding tree.



## GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Enhance Bell Slough to benefit salmon and biodiversity by planting native trees and shrubs incorporating a hedgerow style design.</li> </ul>	
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salmon</li> <li>Native amphibians</li> </ul> </li> <li>Increased wild pollinators.</li> <li>Improved floodplain ecology, hydrology/water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>Hedgerows may reduce soil loss and crop damage from winds.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Creek is channelized (straight).</li> <li>Lack of complex aquatic habitat.</li> <li>Extremely limited riparian buffer with little to no canopy cover (shade) detritus and nutrients for aquatic life species.</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>Negotiate municipal land use and trade-off's between agricultural use and ecological riparian area buffer.</li> <li>Plant native trees and shrubs to create hedgerow effect, using iconic species. Consider east agricultural property and choose majority of species that are equal to or less than 30m at maturity.</li> </ul>	

## DESIGN CONSIDERATIONS

- Infrastructure: Existing trail networks, utilities, BC Hydro powerlines, Flood control infrastructure
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP

## ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- BC Hydro (overhead powerlines)
- Stó:lō Archaeologists and cultural monitors &/or Research & Resource Management
- Fraser Valley Watersheds Coalition
- Landowner
- BC Hydro

## SUPPORTING PROGRAMS



MUNICIPAL STREET TREES PROGRAM



CONNECTIONS: NATURE, PEOPLE AND CULTURE

## REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

### COC OFFICIAL COMMUNITY PLAN

- Goal 2. Strengthen Agriculture.
- Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
- Goal 5. Build Healthy Communities.
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Promote attractive design

## REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Stó:lō Heritage Policy
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Government of Canada Climate Change Action



MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM



CIVIC INFRASTRUCTURE: FISH PASSAGE AND WILDLIFE CORRIDORS

# BIG DITCH—UPPER PRAIRIE—YALE RD.

## WHY

Big Ditch supports important rearing, overwintering and spawning salmon habitat and is connected to known Salish sucker habitat within the Hope Slough. This project will enhance the riparian and aquatic habitats and value agriculture by establishing heritage-style hedgerows with small trees to shade the waterway, provide source of aquatic species food, assist in windbreaks and sightlines.

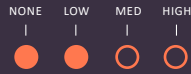


248  
TONS OF CARBON / YR



13  
RANKED OPPORTUNITY

## TIMELINE



## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



Google Earth



## WHERE

The conceptual project is located on crown land that runs perpendicular to Yale Rd., and parallel with Upper Prairie Rd to the property boundary of 9390 Upper Prairie Rd., City of Chilliwack. This projects scope is scalable, and pending landowner interests and approvals, riparian enhancement throughout crown right of way encompassing ~0.48 acres to create the hedgerow style riparian areas can be achieved.

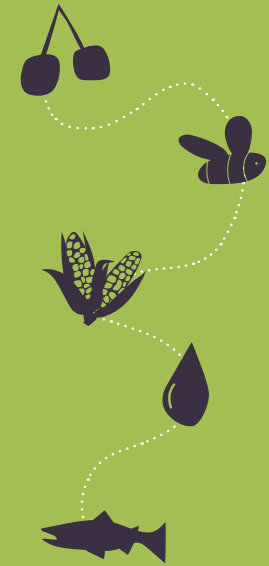
## HOW

- Plant a staggered hedgerow along the northern and southern edges of the creeks to provide shade, windbreaks and wildlife corridors (779 m<sup>2</sup>). Recommended small trees - hedgerow species should be no more than 20m height at maturity, and can occupy the centre of the planting area, with multi-stem low shrubs that can withstand mowing and maintenance on the outside edges of the tree. Consider tree-guarding the small trees so any maintenance work/trimming can visually identify high-value stock.
- This site has a known high concentration of adult salmon. May provide future opportunity to create salmon and wildlife viewing opportunities. Consider building a roadside wildlife-viewing area.

## PLANTING PROFILE



## BENEFITS AT A GLANCE





GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Enhance Big Ditch by creating functional riparian areas.</li> </ul>	
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Salmon</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>Stó:lō culture and archaeology in the floodplain.</li> <li>Hedgerows may reduce soil loss and crop damage from winds</li> <li>Riparian hedgerows can increase the aesthetic values of an area – lend to heritage “feel”</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Limited riparian buffer</li> <li>Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>Non-native /invasive plant species</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>Address – control invasive plants (clipping) prior to planting</li> <li>Address crown land encroachment</li> <li>Plant hedgerows using native species.</li> </ul>	

DESIGN CONSIDERATIONS

- Infrastructure: utilities, BC Hydro powerlines
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- BC Hydro
- Stó:lō Archaeologists and cultural monitors
- Fraser Valley Watersheds Coalition
- Landowner

SUPPORTING PROGRAMS

 MUNICIPAL STREET TREES PROGRAM

 CONNECTIONS: NATURE, PEOPLE AND CULTURE

 MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC OFFICIAL COMMUNITY PLAN

- Goal 2. Strengthen Agriculture.
- Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
- Goal 5. Build Healthy Communities.
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Salish Sucker Recovery Strategy
- Stó:lō Heritage Policy
- Manual FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Government of Canada Climate Change Action

# CARL CREEK WEST—SARDIS PARK

## WHY

The Carl Creek West Branch-Sardis Park Project will enhance existing aquatic salmon, Salish Sucker and Western Painted Turtle (WPT) habitats by naturalizing the stream channel, replanting and infilling the riparian area and adding a nesting turtle beach and basking logs. With proximity to Sardis Elementary School, a small outdoor classroom can be created to support place-based K-12 learning by incorporating a nature trail, a “wild” amphitheatre, interpretive educational signs and safe access to the waterway to view wildlife and fish.

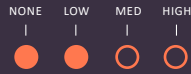


276  
TONS OF CARBON / YR



6  
RANKED OPPORTUNITY

## TIMELINE



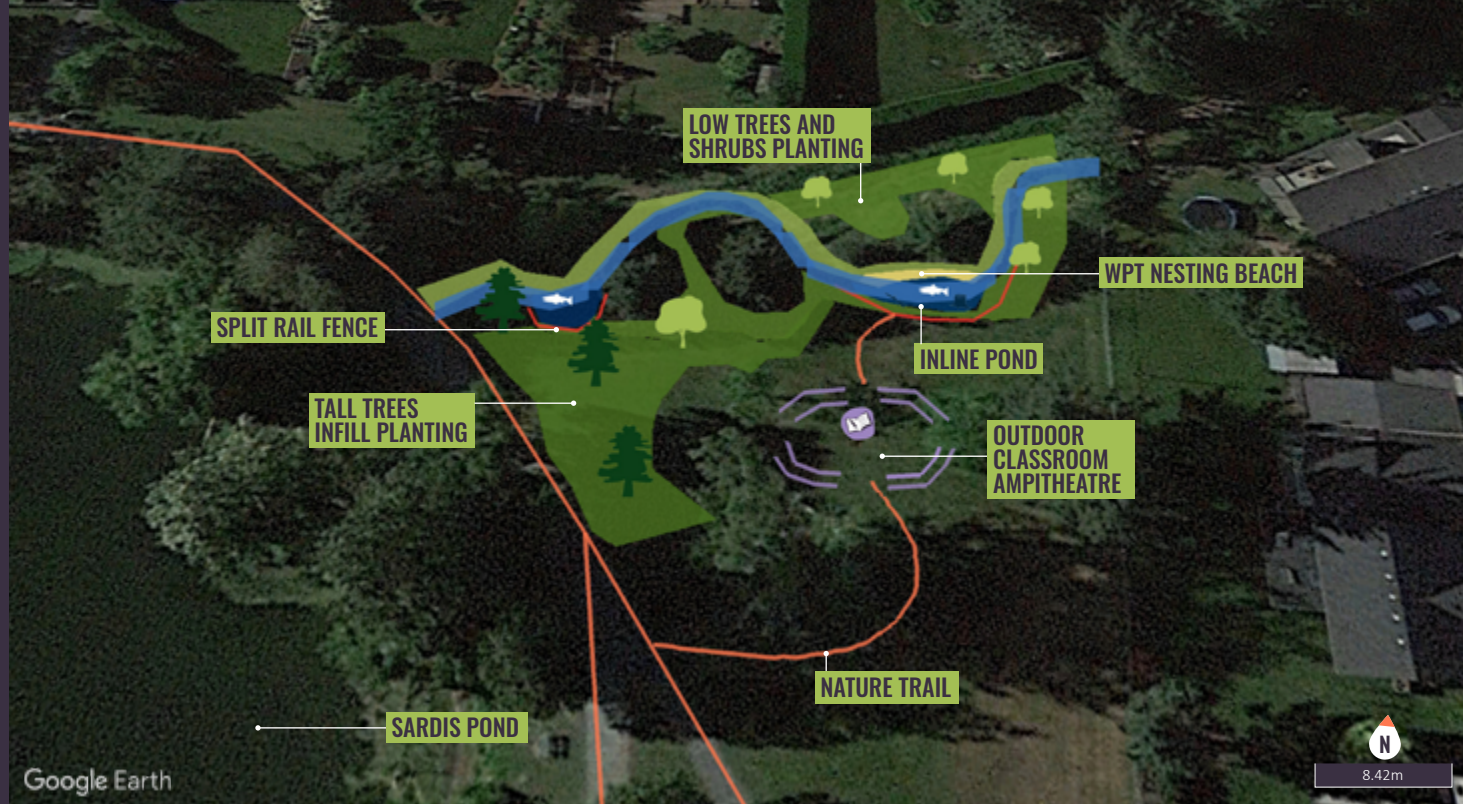
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## WHERE

The conceptual project is located on 6898 School Lane, Sardis Park, City of Chilliwack, at the north-eastern corner of the park, along Carl Creek West branch. The conceptual project encompasses approximately 0.5 acres.

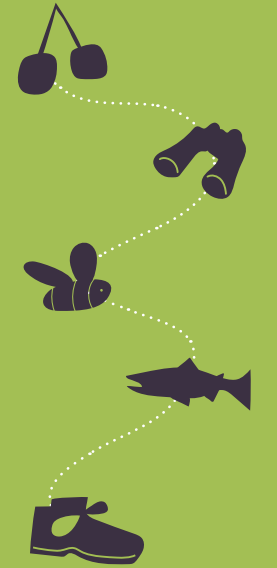
## HOW

- Naturalize and enhance Carl Creek West Branch by adding stream meanders, create one to two inline or off-channel connected pools to support aquatic species (~43m<sup>2</sup>)
- Create two small spawning riffles ~50m connecting the ponds.
- Place basking logs and rootwads into the channel to add complexity and support WPT habitat
- Fence off the inline ponds using split-rail fencing
- Replant the riparian area using wet-tolerant native plant species (minimum 560m<sup>2</sup>).
- Replant large shade trees (~5-8 large iconic trees) with safety and sight line considerations
- Create a small nature trail ~40m that connects the Sardis Pond loop trail to an interpretive outdoor classroom.
- Review existing trash-rack for fish passage and consider open-bottom rounded culvert
- Create a “wild” outdoor amphitheatre using boulders and rounded tree-rings.
- Develop K-12 interpretive signage to support outdoor learning (Salmon lifecycle, hydrology, aquatic bugs, western painted turtle, food web, wetlands, streams).

## PLANTING PROFILE



## BENEFITS AT A GLANCE





GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Naturalize the stream channel of Carl Creek West branch to benefit aquatic species and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Create an outdoor learning space to benefit Sardis Elementary School.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Western painted turtle</li> <li>Salmon</li> <li>Great blue heron</li> <li>Native amphibians</li> <li>Wetland birds</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>Improved public access to recreational sites (Greenways).</li> <li>May offer local Sardis school proximity to outdoor learning opportunities (outdoor curriculum learning K-12).</li> <li>Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Creek is channelized (straight)</li> <li>Lack of complex aquatic habitat</li> <li>Precautions addressing known European Fire Ant invasion at site</li> <li>Limited riparian buffer</li> <li>Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>Some erosion and loss of soil</li> <li>Non-native /invasive plant species (morning glory, blackberry)</li> </ul>	<ul style="list-style-type: none"> <li>No current amphitheatre or nature trail</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>Naturalize, enhance and create complex in-line aquatic pond (wetland) habitats that support key species and biological/floodplain attributes.</li> <li>Address – control invasive plants (clipping)</li> <li>Add a Western Painted turtle nesting beach and basking logs and rootwads.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a small nature trail and outdoor amphitheatre/classroom</li> <li>Develop interpretive signage sharing the ecological and cultural significance of the area.</li> </ul>

DESIGN CONSIDERATIONS

- Infrastructure: Existing trail networks, utilities
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Within known habitat of the Western Painting Turtle (BC CDC occurrence ID#9038).
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Fisheries and Oceans Canada
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Western Painted Turtle Recovery Biologist
- Stó:lō Archaeologists and cultural monitors
- Sardis Elementary School
- Fraser Valley Watersheds Coalition
- Adjacent Landowners

SUPPORTING PROGRAMS



CONNECTIONS: NATURE, PEOPLE AND CULTURE

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC OFFICIAL COMMUNITY PLAN

- Goal 2. Strengthen Agriculture.
- Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
- Goal 5. Build Healthy Communities.
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Public Art
  - Promote attractive design

COC GREENSPACE PLAN

COC TRAIL NETWORK PLAN

- Sardis-Vedder Neighbourhood Trails
- Sardis Park Loop Trail

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Western Painted Turtle Recovery Strategy
- Salish Sucker Recovery Strategy
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# CHILLIWACK CREEK & CARL CREEK

## WHY

The Chilliwack and Carl Creek Project will enhance existing aquatic salmon, Salish Sucker and Western painted turtle (WPT) habitats and develop a safe walking trail along the Chilliwack Creek connecting Twin Creeks Park to the Valley Rail Trail. It provides an opportunity to connect residential neighbourhoods and Skowkale First Nation to safely recreate, view wildlife and enjoy the heritage view of agriculture in the distance.

862  
TONS OF CARBON / YR

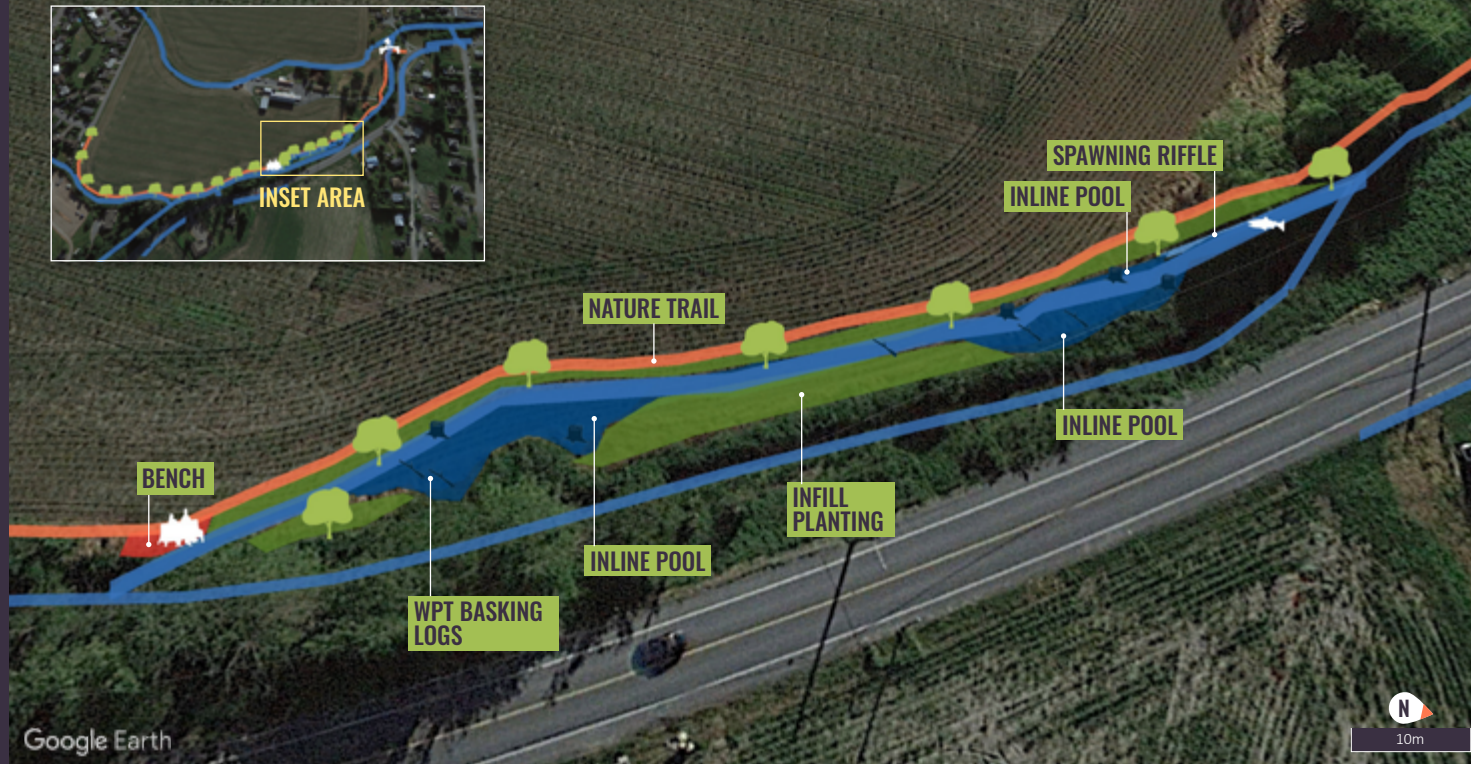
8  
RANKED OPPORTUNITY

**TIMELINE**

**INVESTMENT**

**ECOLOGICAL VALUE**

**COMMUNITY VALUE**



## WHERE

The conceptual project is located on the east side of 7295 Chilliwack River Road, within a municipal road right-of-way (ROW) that encompasses approximately 2.6 acres. Chilliwack Creek is located to the east of the ROW, adjoining Skowkale First Nation IR land No. 10. Enhancements located at the confluence of Chilliwack Creek and Carl Creek near Sepass Place (~500 linear meters of creek).

## HOW

- Enhance Chilliwack Creek and create one to two inline or off-channel connected pools to support aquatic species (~150-200m<sup>2</sup>).
- Create two small spawning riffles ~50 meters connecting the ponds.
- Replant the riparian area using wet-tolerant native plant species (minimum 425m<sup>2</sup>).
- Replant hedgerow-like trees for aesthetic agricultural viewsapes and wind-breaks (~15-20 large iconic trees)
- Consider land-negotiation/trade to create a small single-path ~700m long x 1.5m wide nature trail that connects the south-eastern edge of 7295 Chilliwack River Rd – along Carl Creek from Britton Avenue Twin Creeks Park to the Chilliwack River north-east towards the Skowkale First Nation Fish hatchery.
- Consider potential upgrade of residential driveway access culvert to support greater water conveyance, drainage maintenance and fish passage.
- Add public amenities such as a footbridge and a bench. Consider adding educational and way-finding signage at trailheads.

## PLANTING PROFILE



## BENEFITS AT A GLANCE





GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL

HUMAN: SOCIAL-CULTURAL

GOALS	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
	<ul style="list-style-type: none"> <li>Enhance Chilliwack Creek and Carl Creek to benefit aquatic species and biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>Create a trail that connects Sardis neighbourhoods and Skowkale First Nation to improved, safe and beautiful public spaces as part of the Valley Rail Trail.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Western painted turtle</li> <li>Salmon</li> <li>Great blue heron</li> <li>Native amphibians</li> <li>Wetland birds</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain.</li> <li>May assist in wind-break and improved agricultural integrity values.</li> <li>May improve local drainage and water storage capacity.</li> <li>May reduce municipal road impacts to the creek through replanting-re-alignment efforts.</li> <li>Improved public access to recreational sites (Greenways).</li> <li>May offer local Sardis school proximity to outdoor learning opportunities.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Road ROW constraints</li> <li>Active ROW encroachment for agricultural use</li> <li>Lack of riparian buffer</li> <li>Reduced canopy cover (shade), detritus, and nutrients for aquatic life species</li> <li>Erosion and loss of soil</li> <li>Non-native /invasive plant species</li> <li>Lack of complex aquatic habitat</li> </ul>	<ul style="list-style-type: none"> <li>No current trail network.</li> <li>No formalized public access within the ROW</li> <li>Limited buffer between roadway and waterway</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>Enhance and create complex in-line aquatic habitats that support key species and biological/floodplain attributes. ng logs and rootwads.</li> </ul>	<ul style="list-style-type: none"> <li>Negotiate land access, ROW usage and boundary relocations</li> <li>Develop a small nature trail</li> <li>Develop interpretive signage sharing the ecological and cultural significant of the area.</li> </ul>

DESIGN CONSIDERATIONS

- Infrastructure: Municipal roadway, easements, and upgrades
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Within critical habitat of the Salish Sucker
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Fisheries and Oceans Canada
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Salish Sucker Recovery Biologist
- Western Painted Turtle Recovery Biologist
- Skowkale First Nation
- Stó:lō Archaeologists and cultural monitors
- Fraser Valley Watersheds Coalition
- Landowner

SUPPORTING PROGRAMS

-  CONNECTIONS: NATURE, PEOPLE AND CULTURE
-  MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM
-  CIVIC INFRASTRUCTURE: FISH PASSAGE AND WILDLIFE CORRIDORS

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC GREENSPACE PLAN
- COC TRAIL NETWORK PLAN
  - Sardis-Vedder Neighbourhood Trails
  - Valley Rail Trail
- COC SARDIS NEIGHBOURHOOD PLAN
- COC OFFICIAL COMMUNITY PLAN
  - Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities.
    - Parks and Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Western Painted Turtle Recovery Strategy
- Salish Sucker Recovery Strategy
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# DUNVILLE CREEK— MCELWEE DITCH

## WHY

Dunville Creek - McElwee Ditch supports important salmon and aquatic habitats. This project will enhance the riparian habitat, improve aquatic habitats and add agricultural values by establishing heritage-style hedgerows with both small and tall iconic trees to assist in shading the waterway (keeping the water cool as it flows down from the eastern hillsides), creating agricultural windbreaks and pleasing aesthetic sightlines.

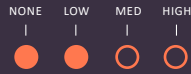


124  
TONS OF  
CARBON / YR



15  
RANKED  
OPPORTUNITY

## TIMELINE



## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located along McElwee Rd between Nevin Rd. and Holt Rd, City of Chilliwack along the west side of the waterway.

## HOW

- Replant McElwee Ditch with native plant species (187.5 m<sup>2</sup>).
- Replanting trees should at maturity not exceed 20m to ensure agricultural values are maintained.
- Consider this site as part of a municipal street trees program.



GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

ECOLOGICAL:  
BIOLOGICAL-ENVIRONMENTAL

HUMAN:  
SOCIAL-CULTURAL

GOALS	<ul style="list-style-type: none"> <li>▶ Plant McElwee Ditch with native riparian trees and shrubs.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>▶ Supports species:                             <ul style="list-style-type: none"> <li>• Salmon</li> </ul> </li> <li>▶ Increased wild pollinators.</li> <li>▶ Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>▶ Creek is channelized (straight).</li> <li>▶ Lack of complex aquatic habitat.</li> <li>▶ Extremely limited riparian buffer with little to no canopy cover (shade) detritus and nutrients for aquatic life species.</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>▶ Plant native trees and shrubs to create hedgerow effect, using iconic species. Consider east agricultural property and choose majority of species that are equal to or less than 20m at maturity.</li> </ul>

▶ Hedgerows may reduce soil loss and crop damage from winds.

DESIGN CONSIDERATIONS

- ▶ Infrastructure: Municipal Roadway
- ▶ Water Licenses
- ▶ Drainage conveyance and maintenance requirements
- ▶ Archaeological / Cultural
- ▶ Detailed substrate analysis
- ▶ Integration COC OCP

ANTICIPATED STAKEHOLDERS

- ▶ City of Chilliwack
- ▶ Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- ▶ Stó:lō Archaeologists and cultural monitors
- ▶ Fraser Valley Watersheds Coalition
- ▶ Adjacent Landowners

SUPPORTING PROGRAMS



MUNICIPAL STREET TREES PROGRAM

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC GREENSPACE PLAN

COC OFFICIAL COMMUNITY PLAN

- ▶ Goal 2. Strengthen Agriculture
- ▶ Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
  - Gravel Extraction & Forest Management Policies:
- ▶ Goal 5. Build Healthy Communities
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- ▶ Stó:lō Heritage Policy Manual
- ▶ FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- ▶ DFO Wild Salmon Policy
- ▶ Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- ▶ Government of Canada Climate Change Action

# DUNVILLE CREEK—ROSEDALE

## WHY

This project will naturalize the existing tributary to Dunville Creek, transform lowland fields into diverse wetlands with a mixed floodplain forest to support a variety of salmon, native amphibians, and biodiversity. It will connect Rosedale Elementary to an outdoor classroom, to support learning by incorporating a nature trail, a “wild” amphitheatre, interpretive educational signs and safe access to the waterway to view wildlife and fish. It offers a potential 0.3 km (300m) loop trail with a prominent hedgerow to offer windbreaks to the surrounding agricultural lands.

1324

TONS OF CARBON / YR

1

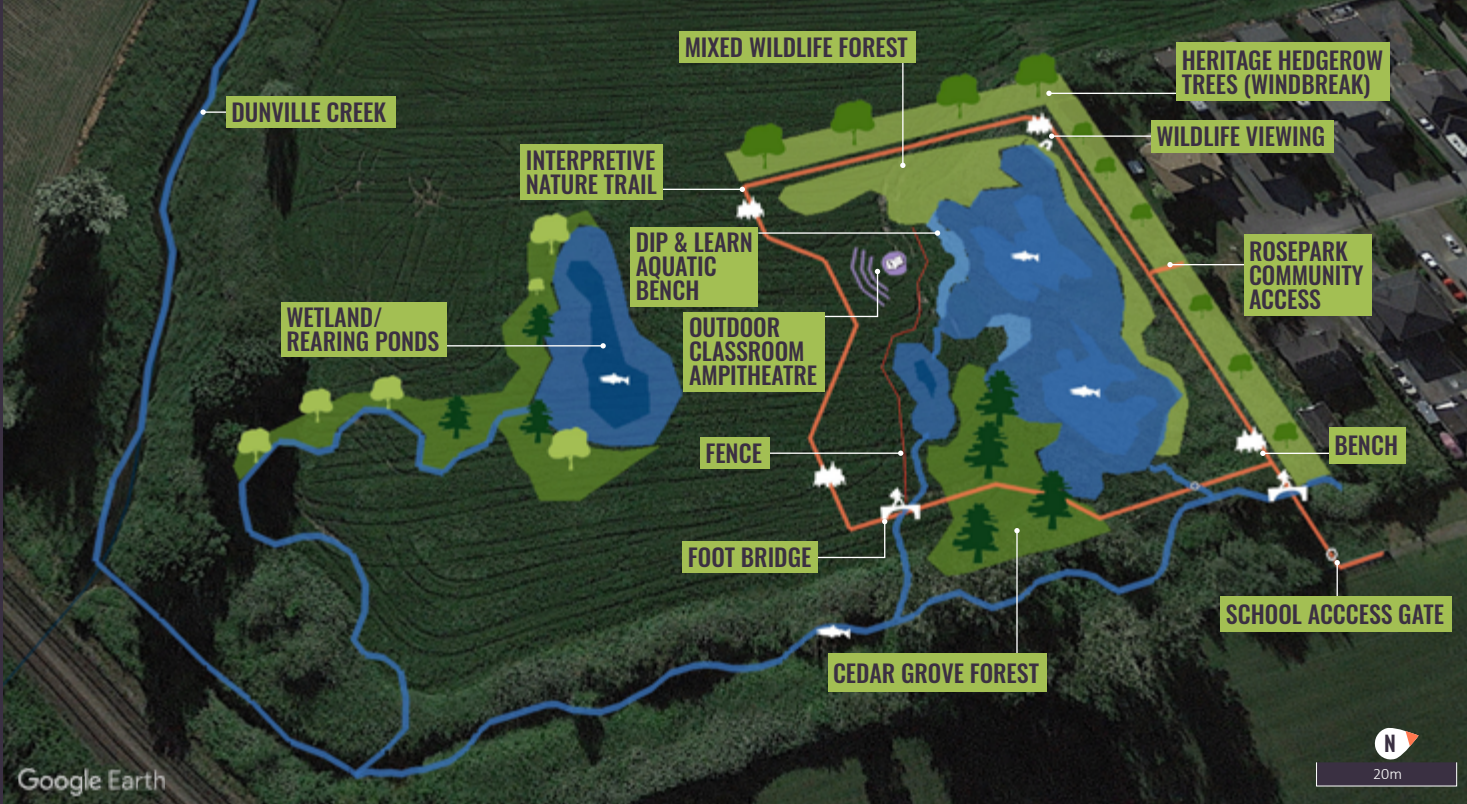
RANKED OPPORTUNITY

## TIMELINE

## INVESTMENT

## ECOLOGICAL VALUE

## COMMUNITY VALUE



## WHERE

The conceptual project is located on 50850 Yale Rd, City of Chilliwack. It is zoned P1 and currently is used by Rosedale Traditional Community School. An easement surrounds the existing channelized tributary to Dunville Creek. The projects scope is scalable and can encompass enhancement opportunities between 2.15 acres to 4.76 acres and can be completed over time.

## HOW

- Naturalize the Dunville Creek tributary by adding stream meanders.
- Create complex wetland habitats: upper wetlands (~1,883 m<sup>2</sup>), lower wetland (~792m<sup>2</sup>)
- Create a connection point from the tributary to the wetlands/off-channel habitat and add connective channels within.
- Place logs and rootwads into the channel to add aquatic complexity
- Replant the wetland and off-channel habitats using wet-tolerant native plant species: upper wetlands (~944m<sup>2</sup>), lower wetland (~813m<sup>2</sup>)
- Plant a hedgerow along the western edge of the property and the north-western edge adjoining Rosepark place (~1184m<sup>2</sup>)
- Selective fence the wetland complexes, and access to the school
- Create a small nature trail ~300m that connects the Rosepark place and Rosedale Traditional Community School to a loop trail and interpretive outdoor classroom – amphitheatre.
- Create a “wild” outdoor amphitheatre using boulders and rounded tree-rings.
- Develop K-12 interpretive signage to support outdoor learning (Salmon lifecycle, hydrology, aquatic bugs, western painted turtle, food web, wetlands, streams).
- Add public amenities such as waste receptacles and park benches

## PLANTING PROFILE



## BENEFITS AT A GLANCE





GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Naturalize the tributary to Dunville Creek by re-establishing flows and creating off-channel wetland complexes to benefit aquatic species and biodiversity. Potential legacy School Forest/wood lot.</li> </ul>	<ul style="list-style-type: none"> <li>Create an outdoor learning space to benefit Rosedale Traditional Community School and surrounding neighbourhood</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Salmon</li> <li>Great blue heron</li> <li>Native amphibians</li> <li>Wetland birds</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>Improved public access to recreational sites (Greenways).</li> <li>Provide Rosedale Traditional Community School access to outdoor learning opportunities.</li> <li>May improve drainage and conveyance of water – flood mitigation.</li> <li>Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain.</li> <li>Hedgerows may reduce soil loss and crop damage from winds</li> <li>No current amphitheatre or nature trail</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Creek is channelized (straight)</li> <li>No current wetland or off-channel habitats exist</li> <li>Lack of complex aquatic habitat</li> <li>Limited riparian buffer</li> <li>Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>Some erosion and loss of soil</li> <li>Non-native /invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>No current amphitheatre or nature trail</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>Naturalize, enhance and create complex in-line aquatic pond (wetland) habitats that support key species and biological/ floodplain attributes.</li> <li>Control invasive plants (clipping)</li> <li>Add logs and rootwads into the wetlands and channels.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a small nature trail and outdoor amphitheatre/classroom</li> <li>Develop interpretive signage sharing the ecological and cultural significant of the area.</li> </ul>

DESIGN CONSIDERATIONS

- Infrastructure: Existing trail networks, utilities, easement, CNR Trackage
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Fisheries and Oceans Canada
- Stó:lō Archaeologists and cultural monitors &/or Research & Resource Management
- Fraser Valley Watersheds Coalition
- Landowners
- Rosedale Traditional Community School
- Chilliwack School Board

SUPPORTING PROGRAMS



CONNECTIONS: NATURE, PEOPLE AND CULTURE

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC GREENSPACE PLAN

COC TRAIL NETWORK PLAN

- Neighborhood trails
- Valley Rail Trail
- ETF

COC OFFICIAL COMMUNITY PLAN

- Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
  - Gravel Extraction & Forest Management Policies
- Goal 5. Build Healthy Communities
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Public Art
  - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Heritage & Culture
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# HOPE CAMP SLOUGH— NATURE TRUST WETLAND

## WHY

Hope Camp Nature Trust wetlands will transform the landscape from once a Brussel sprout farm and lowland fields into diverse wetlands and off-channel habitats with a mixed floodplain forest to support a variety of salmon, native amphibians, and biodiversity.

7068  
TONS OF  
CARBON / YR

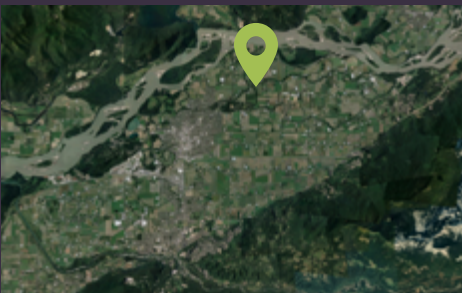
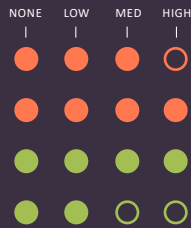
4  
RANKED  
OPPORTUNITY

**TIMELINE**

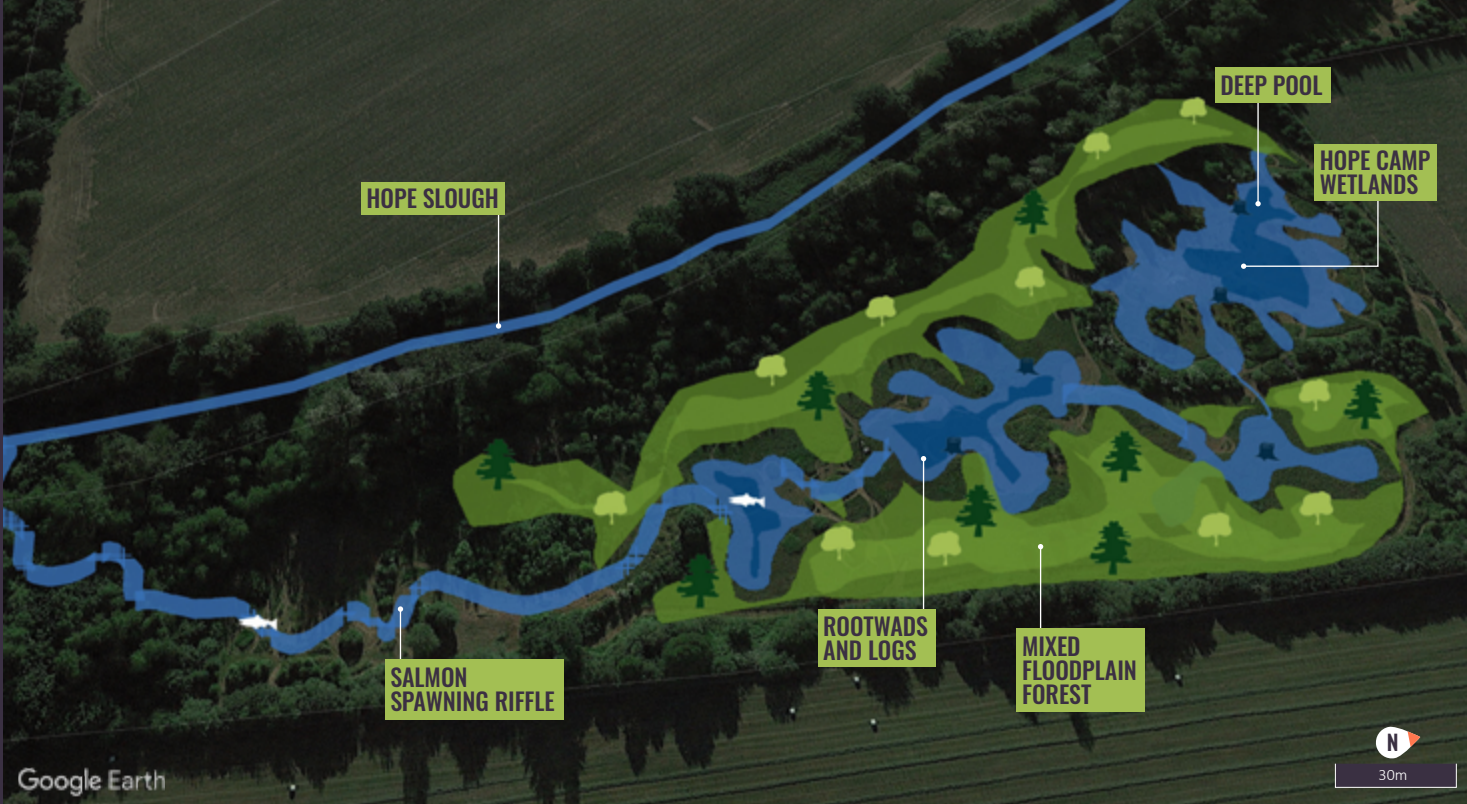
**INVESTMENT**

**ECOLOGICAL VALUE**

**COMMUNITY VALUE**



Google Earth



## WHERE

The conceptual project is located on 47916 Camp River Road, City of Chilliwack. It is owned and managed by the Nature Trust of BC and occupies 21.63 acres of protected conservation values. The projects scope is scalable and can encompass enhancement opportunities ranging from less than 0.25 acres to the entire 21.63 acres and can be completed over time.

## HOW

- Create and restore the complex wetland complexes: (~8,009m<sup>2</sup>) and connected channels (~802m<sup>2</sup>) that connect into the Hope Slough.
- Place logs and rootwads into the channel to add aquatic complexity.
- Use excavated soil material to build microhabitat undulating topography onsite.
- Replant the wetland and off-channel habitats using wet-and drought tolerant native plant species resulting in 8,811m<sup>2</sup> of replanted area.

## PLANTING PROFILE



## BENEFITS AT A GLANCE





GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>▶ Create and restore Hope Camp Slough wetlands and connect to Hope Slough to benefit aquatic species and biodiversity.</li> </ul>	
BENEFITS	<ul style="list-style-type: none"> <li>▶ Supports species:                             <ul style="list-style-type: none"> <li>• Salish sucker</li> <li>• Salmon</li> <li>• Great blue heron</li> <li>• Native amphibians</li> <li>• Wetland birds</li> </ul> </li> <li>▶ Increased wild pollinators.</li> <li>▶ Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>▶ May improve drainage and conveyance of water – flood mitigation.</li> <li>▶ Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain through project works.</li> <li>▶ Replanting efforts may reduce soil loss and crop damage from winds.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>▶ Limited wetland and no off-channel habitats exist</li> <li>▶ Lack of complex aquatic habitat</li> <li>▶ Limited riparian buffer</li> <li>▶ Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>▶ Non-native /invasive plant species</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>▶ Naturalize, enhance and create complex in-line aquatic pond (wetland) habitats that support key species and biological/ floodplain attributes.</li> <li>▶ Address – control invasive plants (clipping)</li> </ul>	

DESIGN CONSIDERATIONS

- ▶ Infrastructure: utilities
- ▶ Water Licenses
- ▶ Drainage conveyance and maintenance requirements
- ▶ Geotechnical and hydrological
- ▶ Archaeological / Cultural
- ▶ Detailed substrate analysis
- ▶ Integration COC OCP
- ▶ Earthwork materials to be used onsite to assist in site recovery and enhancement.

ANTICIPATED STAKEHOLDERS

- ▶ City of Chilliwack
- ▶ Fisheries and Oceans Canada
- ▶ Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- ▶ Nature Trust of BC
- ▶ South Coast Conservation Land Management Program
- ▶ Chilliwack Field Naturalists
- ▶ Stó:lō Archaeologists and cultural monitors
- ▶ Fraser Valley Watersheds Coalition
- ▶ Adjacent Landowners/neighbourhood

SUPPORTING PROGRAMS



CONNECTIONS: NATURE, PEOPLE AND CULTURE

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC GREENSPACE PLAN

COC OFFICIAL COMMUNITY PLAN

- ▶ Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
  - Gravel Extraction & Forest Management Policies
- ▶ Goal 5. Build Healthy Communities
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Public Art
  - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- ▶ Heritage & Culture
- ▶ Stó:lō Heritage Policy Manual
- ▶ FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- ▶ DFO Wild Salmon Policy
- ▶ Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- ▶ Government of Canada Climate Change Action

# HOPE SLOUGH BLUEWAY

## WHY

Hope Slough provides critical habitat for Salish sucker, salmon and wildlife. Enhancing the fields and riparian area will transform this currently seral field with significant encroachment from invasive species into a beautiful mix of floodplain forest trees and shrubs, raingardens and native wildflower grasslands. It will be a place for people to access the waterway, recreate and connect to nature.

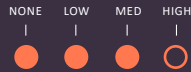


276  
TONS OF CARBON / YR



7  
RANKED OPPORTUNITY

## TIMELINE



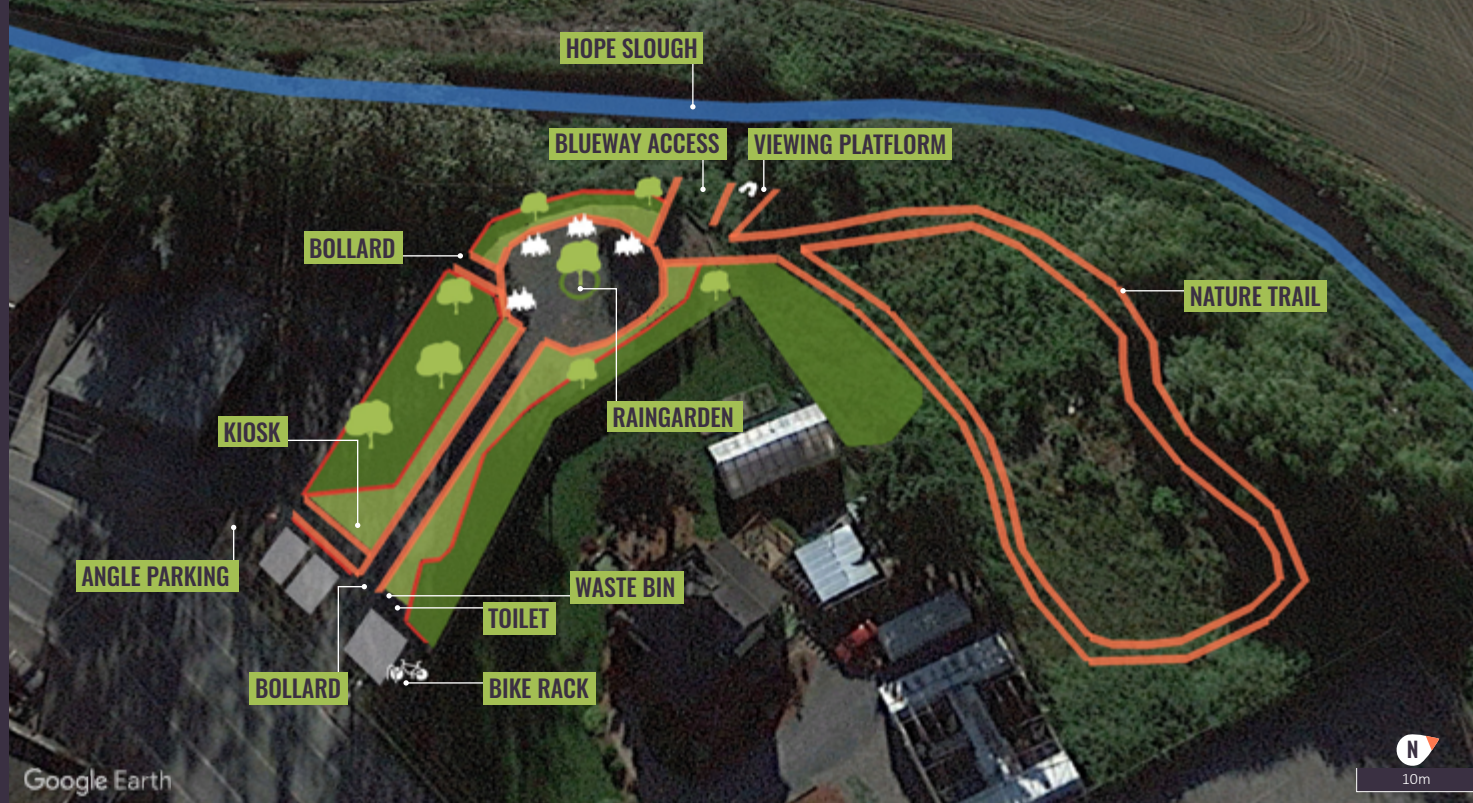
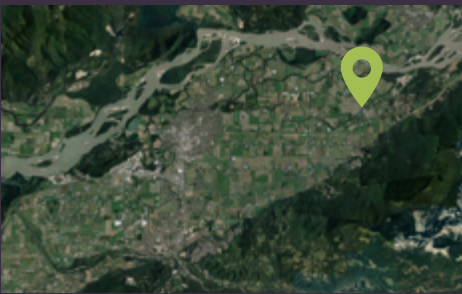
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## WHERE

The conceptual project is located at 51235 Yale Rd, City of Chilliwack. It is a municipally owned property within the Rosedale community. The projects scope is scalable and can be completed over time.

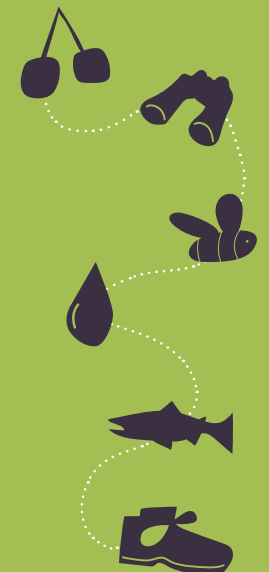
## HOW

- Complete pre-planting site prep with a mowing schedule (minimum one-year prior multiple times per year) to reduce invasive blackberry invasion.
- Complete spot treatment at known invasive Japanese knotweed sites and ensure any works does not disturb these sites.
- Complete replanting of the site to include tree and shrub areas (593m<sup>2</sup>), and low-lying wildflowers (199 m<sup>2</sup>) and create a centre raingarden to support water infiltration.
- Install a split rail fence along the shrub treed layer to protect the plantings
- Mulch and amend the silty/loamy/sandy soil to support soil building process, stable banks and healthy plant ecology.
- Consider adding public amenities such as multiple benches, toilet, an information kiosk, a waste bin, a bicycle rack, create a safe blueway access point through regrading the bank (preference to use natural features such as rocks for stability), and repurpose an old bridge abutment into a small viewing platform.
- On the eastern end of the property, add a small 150 m nature loop trail and add interpretive signs about biodiversity, agriculture, history and culture.
- If possible, add a water line “cleaning station” to encourage canoes/kayakers to wash their vessels (clean drain dry).
- Add three angle parking stalls along Yale Rd E.
- Create two openings in the existing chain-link fence to allow access from the Firehall to the greenspace – increasing overall access for safety and management.

## PLANTING PROFILE



## BENEFITS AT A GLANCE





GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Enhance the riparian area with native trees and shrubs to increase the natural biodiversity and eradicate existing invasive species on the site.</li> </ul>	<ul style="list-style-type: none"> <li>Create Blueway Access point and small interpretive nature trail to benefit the local community.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Salmon</li> <li>Great blue heron</li> <li>Native amphibians</li> <li>Wetland birds</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>May improve drainage and conveyance of water – through well shaded waterways reducing invasive aquatic plant growth.</li> <li>Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain through project works.</li> <li>Opportunity to create a native wildflower pollinator habitat.</li> <li>Raingardens improve water infiltration and recharge.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Invasive species encroachment: Himalayan blackberry, Japanese knotweed – reduce riparian integrity.</li> <li>Soil compaction</li> <li>Proximity to other buildings/ infrastructure.</li> </ul>	<ul style="list-style-type: none"> <li>No currently water access exists.</li> <li>No nature trail exists.</li> <li>Old infrastructure to be assessed or safety prior to repurposing for viewing platform</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>Address – control invasive plants (clipping &amp; mowing)</li> <li>Establish functional riparian area buffers through replanting and bioengineering efforts.</li> <li>Plant raingarden</li> </ul>	<ul style="list-style-type: none"> <li>Create safe blueway access site</li> <li>Create nature trail</li> <li>Create safe parking sites</li> <li>Add public amenities such as benches, kiosk, interpretive signs, bicycle stand and toilet.</li> </ul>

DESIGN CONSIDERATIONS

- Infrastructure: Fire hall, postal office, road right-of-ways, BC Hydro, neighbouring properties.
- Water Licenses
- Drainage conveyance and maintenance requirements
- Current land uses and agricultural values.
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Fisheries and Oceans Canada
- Crown (Fed Gov)
- Stó:lō Archaeologists and cultural monitors &/or Research & Resource Management
- Fraser Valley Watersheds Coalition
- Landowners
- BC Hydro

SUPPORTING PROGRAMS



MUNICIPAL STREET TREES PROGRAM



CONNECTIONS: NATURE, PEOPLE AND CULTURE

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC BLUEWAY ACCESS STRATEGY
- COC GREENSPACE PLAN
- COC NEIGHBORHOOD PLANS
- COC OFFICIAL COMMUNITY PLAN
  - Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities
    - Parks and Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design
- COC TRAIL NETWORK PLAN

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Recovery Strategy for Salish Sucker
- Recovery Strategy for Western Painted Turtle
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# LUCKACUCK CREEK GREENWAY

## WHY

The Luckacuck Creek Greenway project will enhance a section of the Luckacuck Creek Trail as it connects with the Coqualeetza Trail with native wildflowers, trees and shrubs and create a space that connects people to biodiversity and culture by developing a wellness gathering space and interpretive storyboards along the trail.

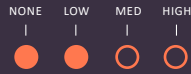


105  
TONS OF CARBON / YR



10  
RANKED OPPORTUNITY

## TIMELINE



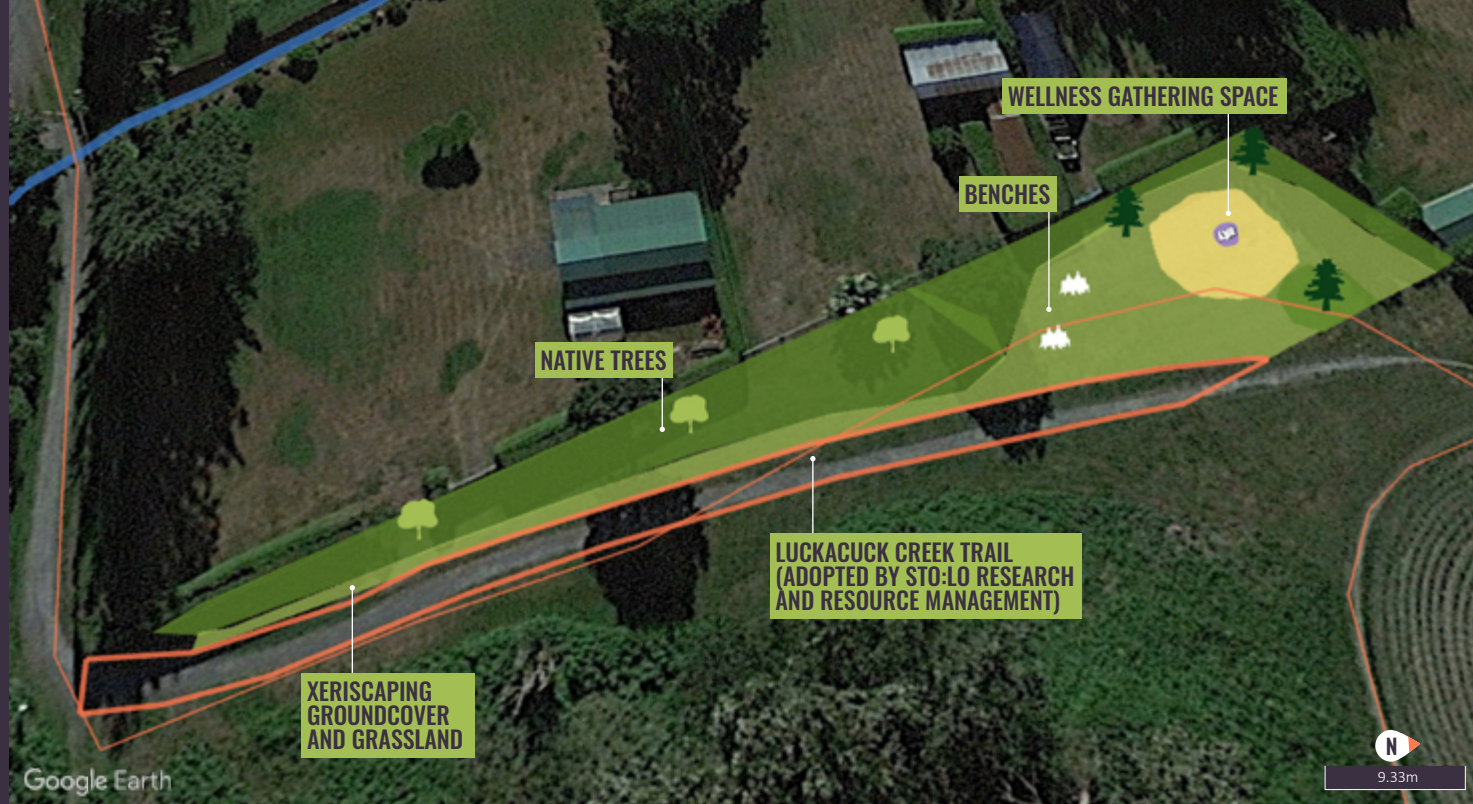
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located within a municipal road right of way that is adjacent to 45351 Haig Drive, 7362 Leary Crescent, and 7382 Leary Crescent on the west, and 7201 Vedder Rd on the east. Within the project site boundary, there is buried sanitary sewer and easements nearby. The project occupies approximately 0.5 acres and the conceptual enhancement opportunity to enhance 539m<sup>2</sup> of shrubs and trees, 606m<sup>2</sup> of wildflower pollinator edging and create a 110m<sup>2</sup> cultural wellness gathering space and storytelling site.

## HOW

- Consult with Stó:lō Research and Resource Management on cultural wellness gathering site and storytelling interpretive signs.
- Develop interpretive signage to support cultural learning and biodiversity.
- Widen and resurface trail to support variety of users and abilities.
- Replant the Luckacuck Trail using native drought-tolerant species 539m<sup>2</sup> and plant a low wildflower grassland and xeriscaping field using a variety of groundcovers including crimson red clover (606m<sup>2</sup>)
- Add public amenities such as two park benches and cultural art.



GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>➤ Add native trees, shrubs and grassland features to improve ecological values at the microscale.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Create an opportunity to provide cultural wellness site, art and interpretive signs to benefit First Nations.</li> <li>➤ Create resting space for public users.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>➤ Supports species:                             <ul style="list-style-type: none"> <li>• Scrub-shrub birds</li> </ul> </li> <li>➤ Increased wild pollinators</li> <li>➤ Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Improved public access to recreational sites (Greenways).</li> <li>➤ Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain.</li> <li>➤ Plantings may reduce soil loss and crop damage from winds</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>➤ Compaction of existing soil</li> <li>➤ Buried utilities and easement restrictions</li> <li>➤ Non-native /invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>➤ No current benches or resting space</li> <li>➤ No known current cultural wellness site</li> <li>➤ No interpretive cultural and/or biodiversity signs</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>➤ Plant native trees and shrubs and limit coniferous species to avoid shading on agricultural lands.</li> <li>➤ Create planting design with First Nations to support wellness site</li> <li>➤ Add native wildflowers and xeriscaping ground covers to increase pollinators and improve trail aesthetics.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Widen and enhance the Luckacuck Creek Trail and create a cultural wellness site (if First Nations agree)</li> <li>➤ Develop interpretive signage sharing the ecological and cultural significant of the area.</li> </ul>

DESIGN CONSIDERATIONS

- First Nation values: Archaeological / Cultural
- Infrastructure: Existing trail networks, sanitary sewer, easement, adopt at rial stewards
- Detailed substrate analysis
- Integration COC OCP

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Stó:lō Archaeologists and cultural monitors
- Stó:lō research resource management
- Fraser Valley Watersheds Coalition
- Adjacent Landowners/neighbourhood

SUPPORTING PROGRAMS



CONNECTIONS: NATURE, PEOPLE AND CULTURE

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC GREENSPACE PLAN
- COC NEIGHBORHOOD PLANS: SARDIS
- COC OFFICIAL COMMUNITY PLAN
- Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities
    - Parks and Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design

COC TRAIL NETWORK PLAN

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# NEVIN AND DUNVILLE CREEK— FORD RD.

## WHY

Nevin and Dunville Creek supports important rearing, overwintering and spawning salmon habitat. This project will enhance the aquatic habitat by creating one small wetland complex and adding instream complexity. It will value agriculture by establishing heritage-style hedgerows with both small and tall iconic trees to assist in windbreaks and sightlines.

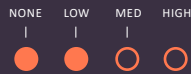


124  
TONS OF  
CARBON / YR



12  
RANKED  
OPPORTUNITY

## TIMELINE



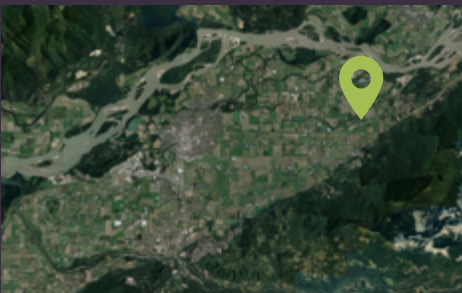
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



Google Earth

## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located on Crown land that bisects 9490 Ford Rd., City of Chilliwack. It is zoned agricultural. This project's scope is scalable, and pending landowner interest and approval, stream naturalization can encompass enhancement opportunities up to 0.5 acres throughout the crown right of way. The current conceptual works is within the existing channel and riparian areas.

## HOW

- Create a rearing wetland “rearing pool” at the confluence of Nevin and Dunville Creek (107m<sup>2</sup>)
- Add some large wood rootwads into the pool.
- Replant the wetland with native plant species (62m<sup>2</sup>)
- Plant a staggered hedgerow along the northern and southern edges of the creeks to provide shade, windbreaks and wildlife corridors (325 m<sup>2</sup>). Recommended hedgerow species should be species should be no more than 20m height at maturity.



GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Enhance Nevin Creek to benefit salmon species through the creation of a rearing pond— wetland and hedgerow establishment.</li> </ul>	
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salmon</li> <li>Native amphibians</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>Stó:lō culture and archaeology in the floodplain.</li> <li>Hedgerows may reduce soil loss and crop damage from winds</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Creek is channelized (straight)</li> <li>No current wetland or off-channel habitats exist</li> <li>Lack of complex aquatic habitat</li> <li>Limited riparian buffer</li> <li>Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>Non-native /invasive plant species</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>Naturalize, enhance and create complex in-line aquatic pond (wetland) habitats that support key species and biological/ floodplain attributes.</li> <li>Address – control invasive plants (clipping)</li> <li>Plant hedgerows</li> </ul>	

DESIGN CONSIDERATIONS

- Infrastructure: utilities, BC Hydro powerlines
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Fisheries and Oceans Canada
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- BC Hydro
- Stó:lō Archaeologists and cultural monitors
- Fraser Valley Watersheds Coalition
- Landowner
- Crown (Fed Gov)

SUPPORTING PROGRAMS

-  MUNICIPAL STREET TREES PROGRAM
-  CONNECTIONS: NATURE, PEOPLE AND CULTURE
-  MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC OFFICIAL COMMUNITY PLAN

- Goal 2. Strengthen Agriculture
- Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
  - Gravel Extraction & Forest Management Policies
- Goal 5. Build Healthy Communities
  - Parks and Greenspace
  - Heritage values
  - Social Wellbeing
  - Public Art
  - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# NEVIN CREEK

## WHY

Nevin Creek supports important rearing, overwintering and spawning salmon habitat. This project will enhance the aquatic habitat by creating one small wetland complex and adding instream complexity. It will value agriculture by establishing heritage-style hedgerows with both small and tall iconic trees to assist in windbreaks and sightlines.

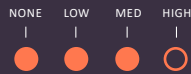


511  
TONS OF CARBON / YR



9  
RANKED OPPORTUNITY

## TIMELINE



## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



Google Earth

## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located on 9008 McElwee Rd, City of Chilliwack. It is zoned agricultural and over half the property's substrate lies within an alluvial floodplain. This project's scope is scalable, and pending landowner interest and approval, stream naturalization can encompass enhancement opportunities up to 22.5 acres in the northernmost area of the property. The current conceptual works is within the existing channel and riparian areas.

## HOW

- Create a rearing wetland in the north-western corner of the property within Nevin Creek (493m<sup>2</sup>)
- Replant the wetland with native plant species (266m<sup>2</sup>)
- Plant a hedgerow along the western and northern edges of the property to provide shade, windbreaks and wildlife corridors (1,411 m<sup>2</sup>)



GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>➤ Enhance Nevin Creek to benefit salmon species through the creation of an off-channel pond – wetland and hedgerow establishment.</li> </ul>	
BENEFITS	<ul style="list-style-type: none"> <li>➤ Supports species:                             <ul style="list-style-type: none"> <li>• Salmon</li> <li>• Native amphibians</li> </ul> </li> <li>➤ Increased wild pollinators</li> <li>➤ Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Stó:lō culture and archaeology in the floodplain.</li> <li>➤ Hedgerows may reduce soil loss and crop damage from winds</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>➤ Creek is channelized (straight)</li> <li>➤ No current wetland or off-channel habitats exist</li> <li>➤ Lack of complex aquatic habitat</li> <li>➤ Limited riparian buffer</li> <li>➤ Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>➤ Non-native /invasive plant species</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>➤ Naturalize, enhance and create complex in-line aquatic pond (wetland) habitats that support key species and biological/ floodplain attributes.</li> <li>➤ Control invasive plants (clipping)</li> <li>➤ Plant hedgerows</li> </ul>	

DESIGN CONSIDERATIONS

- Infrastructure: Existing trail networks, utilities, easement, BC Hydro powerlines
- Water Licenses
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Fisheries and Oceans Canada
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- BC Hydro
- Stó:lō Archaeologists and cultural monitors
- Fraser Valley Watersheds Coalition
- Landowner

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

COC OFFICIAL COMMUNITY PLAN

- Goal 2. Strengthen Agriculture
- Goal 4. Protect the Environment.
  - Water Resource Management Policies
  - Stewardship Policies
  - Gravel Extraction & Forest Management Policies

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# SALWEIN EAST-WEST WETLAND

## WHY

The Salwein East-West Wetland will restore a lowland site, currently undergoing active erosion and degradation into a healthy wetland and streamside forest; and will develop a small recreational rest area that forms part of the Valley Trail. It will enhance critical habitats for rare aquatic species and offer a place for people to rest in nature, watch iconic trains go by and view wildlife.

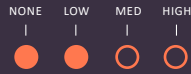


291  
TONS OF CARBON / YR



5  
RANKED OPPORTUNITY

## TIMELINE



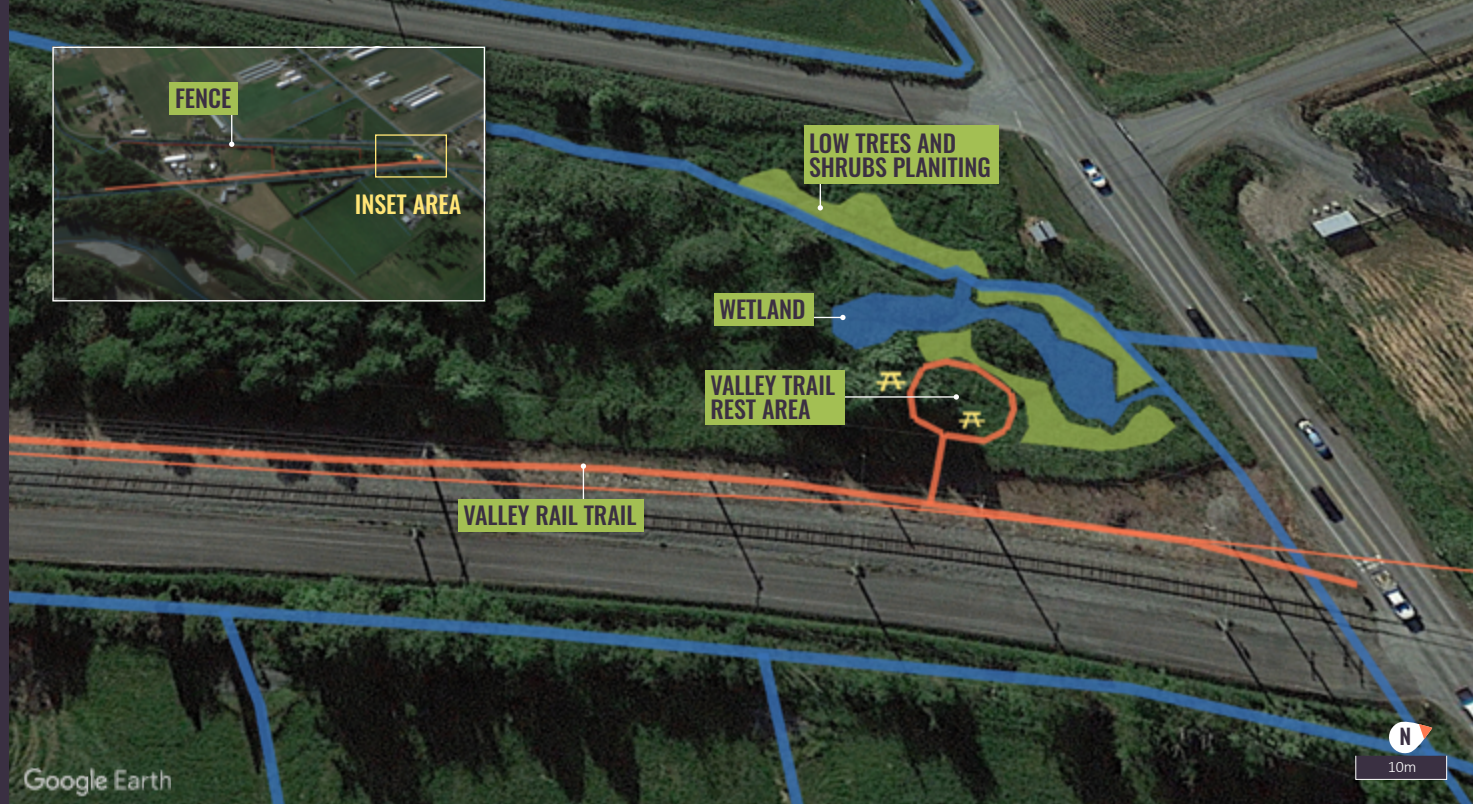
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## WHERE

The conceptual project is located on 5580 Hopedale Road, and road ROW, City of Chilliwack. It falls within the Greendale floodplain, is zoned agriculture and represents 0.47 acres. Forming a triangular parcel, it extends south from Keith Wilson Road and is nestled between Sinclair Road, Hopedale Road and the Southern Rail train tracks. Flowing through the parcel is Salwein Creek (also known as Woodruff Creek), which represents part of the federally listed critical habitat for Salish Sucker.

## HOW

- Restore the off-channel wetlands to support aquatic species 388m<sup>2</sup>
- Replant the wetland and riparian area using wet-tolerant native plant species 390m<sup>2</sup>.
- Selectively fence off the habitat to reduce livestock access and erosion impact.
- Develop a small 112m<sup>2</sup> elevated rest area and include public amenities such benches, picnic table interpretive signage and bike stand, as part of the "Rail Trail."

## PLANTING PROFILE



## BENEFITS AT A GLANCE







GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Restore and improve Salwein creek and wetland from degradation, erosion, encroachment, and invasion to benefit aquatic species.</li> </ul>	<ul style="list-style-type: none"> <li>Create a Valley Trail Rest area that will connect recreational users to the Vedder River Greenway trail, and Rail Trail – providing improved, safe and beautiful public spaces.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Salmon</li> <li>Great blue heron</li> <li>Native amphibians</li> <li>Wetland birds</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved floodplain ecology, hydrology/ water quality and plant diversity.</li> <li>Links to completed downstream restoration projects increasing the overall connection of watershed enhancements.</li> <li>Links to future restoration works (reference: GBHNR Horse Pasture).</li> </ul>	<ul style="list-style-type: none"> <li>Opportunity to support additional monitoring and understandings for Sto:lo culture and archaeology in the floodplain.</li> <li>May assist in wind-break and improved agricultural integrity values.</li> <li>May improve local drainage and storage capacity.</li> <li>Improved public access to recreational sites (Greenways).</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Livestock access and degradation to the existing land/water.</li> <li>Invasive species encroachment: reed canary grass, blackberry, yellow flag iris.</li> <li>Erosion and loss of soil.</li> </ul>	<ul style="list-style-type: none"> <li>No current trail network.</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>Construct/restore aquatic habitats and riparian habitats. Fence off to protect the enhancement efforts.</li> </ul>	<ul style="list-style-type: none"> <li>Build a small rest area along the Valley Rail Trail.</li> <li>Develop interpretive signage sharing the ecological and cultural significant of the area.</li> </ul>

DESIGN CONSIDERATIONS

- Infrastructure: Pump-station, Southern Rail tracks, Municipal roadway
- Water Licenses: #70052 (issued Feb 15, 1991-Woodruff Creek)
- Drainage conveyance and maintenance requirements
- Geotechnical and hydrological
- Archaeological / Cultural
- Within critical habitat of the Salish Sucker
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

SUPPORTING PROGRAMS

-  CONNECTIONS: NATURE, PEOPLE AND CULTURE
-  MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC GREENSPACE PLAN
- COC OFFICIAL COMMUNITY PLAN
- Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities
    - Parks and Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design

COC TRAIL NETWORK PLAN

- Valley Rail Trail

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Recovery Strategy for Salish Sucker
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

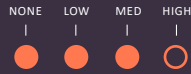
# SEMAULT CREEK— ROBERTSON ELEMENTARY

## WHY

Planting the riparian area along Semault Creek will transform an area invaded by Himalayan blackberry into a mixed forest to support a variety of salmon, Salish suckers, native amphibians including the rare Oregon spotted frog, and biodiversity. It will also offer students and teachers the opportunity to learn and steward a waterway over time.



## TIMELINE



## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## PLANTING PROFILE



## BENEFITS AT A GLANCE



## WHERE

The conceptual project is located on 8580 Southlands Crescent, City of Chilliwack. It is owned by the municipality. The projects scope encompasses enhancement opportunities between 76m<sup>2</sup> to 225m<sup>2</sup> along the creek bank.

## HOW

- Discuss with the Elementary school and School Board access and safety requirements
- Prior to planting, schedule a-year blackberry mowing program to prep the site and reduce invasion rootmass.
- Replant the wetland and off-channel habitats using wet-and drought tolerant native plant species resulting in 255 m<sup>2</sup> of replanted area
- Plant in three or four dense clusters and allow for “windows /gaps” for operations to maintain Semault Creek.
- Consider school-based ongoing maintenance and service program to hand prune and address invasion post planting.



GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Enhance Semiault creek riparian area and reduce invasion from Himlayan Blackberry</li> </ul>	<ul style="list-style-type: none"> <li>Create a learning and service opportunity with the school students about place-based ecological learning.</li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Supports species:                             <ul style="list-style-type: none"> <li>Salish sucker</li> <li>Salmon</li> <li>Native amphibians, including Oregon Spotted Frog</li> </ul> </li> <li>Increased wild pollinators</li> <li>Improved vegetation ecology</li> </ul>	<ul style="list-style-type: none"> <li>Supports student learning.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>Non-native /invasive plant species encroachment.</li> <li>Reduced canopy cover (shade) detritus and nutrients for aquatic life species</li> <li>Steep banks.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure safe access.</li> </ul>
SOLUTIONS	<ul style="list-style-type: none"> <li>Develop a pre-planting mowing site prep to manage invasive plants</li> <li>Plant larger stock native vegetation in clusters</li> </ul>	

DESIGN CONSIDERATIONS

- Infrastructure: school fences
- Access approvals: School board
- Student safety considerations
- Water Licenses
- Drainage conveyance and maintenance requirements
- Archaeological / Cultural
- Detailed substrate analysis
- Integration COC OCP

ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Chilliwack School Board
- Robertson Elementary
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development - Water sustainability and species at risk
- Stó:lō Archaeologists and cultural monitors
- Fraser Valley Watersheds Coalition
- Adjacent Landowners/neighbourhood

REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC GREENSPACE PLAN
- COC OFFICIAL COMMUNITY PLAN
- Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities
    - Parks and Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design

REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Recovery Strategy for Salish Sucker
- Recovery Strategy for Oregon Spotted Frog
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
- Government of Canada Climate Change Action

# SINCLAIR WETLANDS

## WHY

The Sinclair Wetlands will connect the community to a ~0.5 km loop trail around a quiet pond, where rare western painted turtles bask, salmon and Salish sucker swim and the willows and maple trees stand tall, offering beauty throughout the seasons.

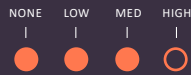


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TONS OF CARBON / YR



2  
RANKED OPPORTUNITY

## TIMELINE



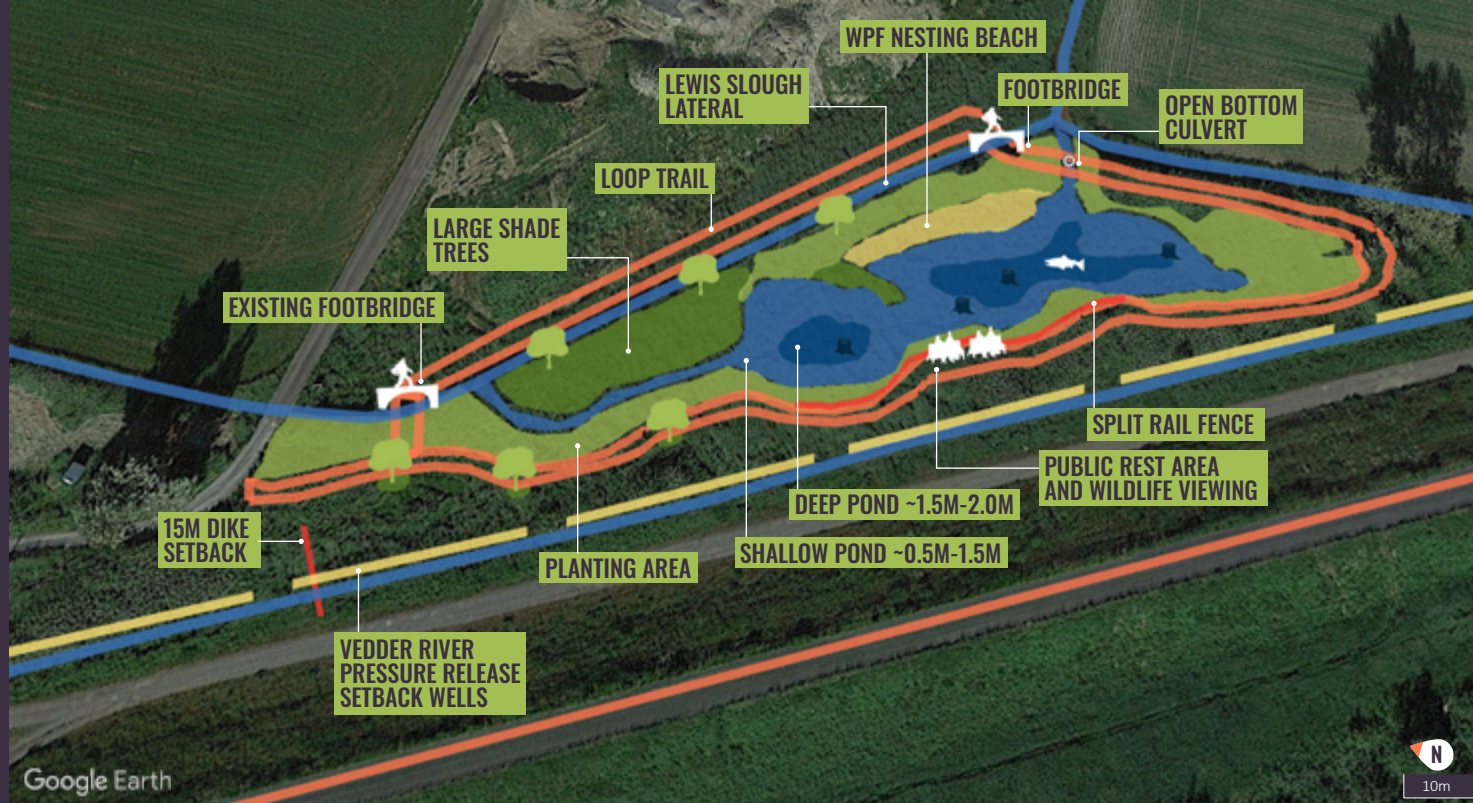
## INVESTMENT



## ECOLOGICAL VALUE



## COMMUNITY VALUE



## WHERE

The conceptual project is located on City of Chilliwack parcel ID GISLINK 0520.41798 and represents 0.96 hectares extending east from the setback dike and pressure release wells just beyond the existing Lewis Slough lateral ditch line.

## HOW

- Create a new off-channel wetland to support aquatic species (1,761m<sup>2</sup>).
- Replant the wetland riparian area using both drought and wet-tolerant native plant species (minimum 1,435m<sup>2</sup>).
- Selectively fence off the riparian area to support a wetland viewing opportunity.
- Create a Western Painted turtle nesting beach.
- Develop a 400m loop trail with a Public Rest Area to connect with the Vedder River Rotary trails.
- Consider amenities such as park benches, waste receptacle, small kiosk, footbridge.

## PLANTING PROFILE



## BENEFITS AT A GLANCE





## GOALS, BENEFITS, CHALLENGES AND SOLUTIONS

	ECOLOGICAL: BIOLOGICAL-ENVIRONMENTAL	HUMAN: SOCIAL-CULTURAL
GOALS	<ul style="list-style-type: none"> <li>Support species:                             <ul style="list-style-type: none"> <li>Western painted turtles</li> <li>Salish sucker</li> <li>Salmon</li> <li>Great blue heron</li> </ul> </li> <li>Improve floodplain ecology.</li> </ul>	<ul style="list-style-type: none"> <li>Create:                             <ul style="list-style-type: none"> <li>A walking trail</li> <li>Wildlife viewing opportunities</li> <li>Areas with shade trees for recreational users</li> <li>A public rest space</li> </ul> </li> </ul>
BENEFITS	<ul style="list-style-type: none"> <li>Assisting wind-break</li> <li>Increase wild pollinators</li> <li>Improved agricultural integrity values</li> </ul>	<ul style="list-style-type: none"> <li>Purpose-built view-scapes for enjoyment and safety</li> <li>Opportunity to support additional monitoring and understandings for Stó:lō culture and archaeology in the floodplain.</li> </ul>
CHALLENGES	<ul style="list-style-type: none"> <li>No existing wetland</li> <li>Lewis lateral stream with little to no riparian area and marginal water quality</li> </ul>	
SOLUTIONS	<ul style="list-style-type: none"> <li>Enhance nesting and basking habitat for federally listed western painted turtle.</li> <li>Improve floodplain habitat through construction of new wetland and replanting riparian area.</li> <li>Fence off, protect, and improve/increase aquatic habitat for salmon, salish sucker and western painted turtle.</li> </ul>	<ul style="list-style-type: none"> <li>Build walking-nature loop trail (~400 m x 2 m wide) with public amenities (benches, signs, waste bins).</li> <li>Connect to the Vedder River Greenway.</li> <li>Improve public space, transforming the site from seral grassy area to natural planted area with beautiful diversity of flowering plant species and shade trees.</li> </ul>



## DESIGN CONSIDERATIONS

- Infrastructure: dike and, pressure release wells setbacks
- Drainage
- Land designation: ALR compliance
- Geotechnical and hydrological
- Archaeological / Cultural
- Within critical habitat of the Western Painted Turtle
- Integration COC OCP
- Earthwork materials to be used onsite to assist in site recovery and enhancement.

## ANTICIPATED STAKEHOLDERS

- City of Chilliwack
- Fisheries and Oceans Canada
- Ministry of Forests, Lands, Natural Resource Operations and Rural Development
- Salish Sucker Recovery Biologist
- Western Painted Turtle Recovery Biologist
- Stó:lō Archaeologists and cultural monitors
- Fraser Valley Watersheds Coalition
- Landowners

## SUPPORTING PROGRAMS

-  MUNICIPAL STREET TREES PROGRAM
-  MUNICIPAL GREENSPACE (ENCROACHMENT) MANAGEMENT PROGRAM

## REFERENCE LINKAGES TO THE CITY OF CHILLIWACK DOCUMENTS

- COC BLUEWAY ACCESS STRATEGY
- COC GREENSPACE PLAN
- COC OFFICIAL COMMUNITY PLAN
  - Goal 4. Protect the Environment.
    - Water Resource Management Policies
    - Stewardship Policies
    - Gravel Extraction & Forest Management Policies
  - Goal 5. Build Healthy Communities
    - Parks and Greenspace
    - Heritage values
    - Social Wellbeing
    - Public Art
    - Promote attractive design
- COC TRAIL NETWORK PLAN
  - Rotary

## REFERENCE LINKAGES TO OTHER GOVERNMENT DOCUMENTS

- Recovery Strategy for Salish Sucker
- Recovery Strategy for Western Painted Turtle
- Stó:lō Heritage Policy Manual
- FVRD Regional Growth Strategy
  - Clean economy
  - Greenspace/Natural areas protection actions
- DFO Wild Salmon Policy
- Wetland Ways: Interim Guidelines for Wetland Protection and Conservation in British Columbia
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SECTION 3

# SUPPORTING INFORMATION & APPENDICES

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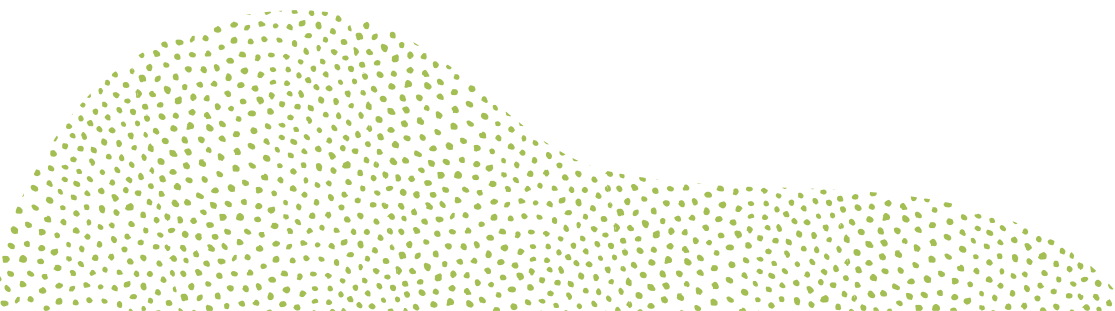


## SUMMARY OF TOP 5 RANKING

<b>#1</b> Dunville Creek – Rosedale Elementary	Significant opportunity to create wetlands and improve aquatic biodiversity/ecology and community recreational values.
<b>#2</b> Sinclair Wetland	Significant opportunity to create wetlands and improve aquatic biodiversity/ecology and community recreational values-tying into existing infrastructure.
<b>#3</b> Achelit Creek	Greatest opportunity for increased riparian planting, GHG offsetting. Limited community-recreational values.
<b>#4</b> Hope Camp Nature Trust Wetlands	Significant opportunity to create wetland and offchannel habitats, replanting and GHG offsetting. Limited community-recreational values.
<b>#5</b> Salwein East-West	Great opportunity to improve aquatic and critical habitats and create community-some recreational opportunities.

## PROJECT SCORING CRITERIA

	EXCELLENT (2)	GOOD (1)	MARGINAL (0)
CONDITIONAL RATINGS	<ul style="list-style-type: none"> <li>No anthropogenic disturbances have altered the site (this includes fire exclusion as an anthropogenic disturbance), no vegetation or soil removal has occurred.</li> <li>No or low introduced species occur at the site.</li> <li>Minimal man-made structures occur at the site (&lt; 2%).</li> <li>The site contains a stream/wetland(s)/wetland complex &gt; 50% coverage of the site and has intact riparian buffer &gt; 50% vegetated.</li> <li>Species composition, stand structure, and site factors identify the mature climax stage of a known rare plant community or natural succession is in progress (i.e. no evidence of management intervention).</li> </ul>	<ul style="list-style-type: none"> <li>No soil removal or disturbance to soil surface has occurred; little or no influence of old road beds or skid tracks, no construction evidence, old selection harvesting only, minimal influence of fire exclusion.</li> <li>Minor cover (&lt;5%) of introduced species occurs at the site.</li> <li>Some man-made structures may occur at the site (&gt; 2% and &lt; 5% of total area of site).</li> <li>There is minimal fragmentation (&lt;5%) of the site and its biological communities.</li> <li>Site contains a stream/wetland(s)/wetland complex &gt; 25% and &lt;50% coverage of the site with intact riparian buffer &gt; 50% vegetated.</li> <li>Species composition and site factors readily identify the younger seral stages of a known rare plant community; recognizable as the plant community although not all characteristics of climax stages may be present or, Natural succession is in progress and natural disturbance regimes are within their range of natural variability (fire, windthrow, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Some anthropogenic disturbances have occurred on site.</li> <li>Significant cover of introduced species occurs at the site (5-20% in forests and riparian systems, up to 50 % in grasslands).</li> <li>Some man-made structures may be present (less than 10% of total area).</li> <li>The site's biological communities have moderate fragmentation (10-25%).</li> <li>The site contains stream/ wetlands/wetland complex &gt;5 and &lt;25% coverage of the site with intact riparian buffer 25-50%.</li> <li>Species composition and site factors indicate the younger stages of a known rare plant community or an older seral stage plant community that has become ingrown; identification reasonably certain.</li> </ul>
VIABILITY RATINGS	<ul style="list-style-type: none"> <li>The landscape surrounding the site has little fragmentation due to anthropogenic influences (no roads, other transportation corridors, rural settlement or urban developments, no industrial activity or recent forest harvesting).</li> <li>The site is connected within a larger landscape to formally protected lands (e.g. Federal or Provincial park/reserve or conservation area where no development or resource extraction is allowed).</li> <li>The surrounding landscape is not formally protected and future development is not foreseen, e.g. access restricts use and there is no known plan to develop or disturb present conditions.</li> <li>The site is of significant size and has the structure necessary to absorb natural disturbances emanating from the surrounding landscape.</li> <li>The site is surrounded by a natural buffer sufficiently large to reduce impact of disturbances and edge effects.</li> </ul>	<ul style="list-style-type: none"> <li>The larger landscape context provides some protection from anthropogenic disturbance (e.g. provincial crown land rather than private land) but effects of natural disturbances and harvesting may influence the site and/or its biological communities (e.g. fire suppression within a landscape previously dominated by frequent fires).</li> <li>There may be up to 25% fragmentation of the surrounding landscape.</li> <li>The site is large enough and has the structure necessary to absorb minor natural disturbances emanating from the surrounding landscape.</li> <li>The site is surrounded by a natural buffer sufficiently large to reduce impact of disturbances and edge effects.</li> </ul>	<ul style="list-style-type: none"> <li>Current management and development of the surrounding landscape may affect the continued existence of the site's values, i.e. removal of vegetation, hydrological changes, invasive species.</li> <li>More than 25% of the surrounding landscape is fragmented and affected by anthropogenic influences.</li> <li>The site is not large enough or has become too altered to absorb minor natural disturbances emanating from the surrounding landscape.</li> <li>The site is connected to a partial buffer which can somewhat reduce impact of disturbances and edge effects.</li> </ul>



GENERAL SITE INFORMATION	SITE NAME	Dunville Creek – Rosedale Elementary	Sinclair Wetland	Achelitz Creek	Hope Camp Nature Trust Wetlands	Salwein East-West	Carl Creek West – Sardis Park	Hope Slough Blueway	Chilliwack Carl Creek	Nevin Creek	Lucackuck Creek Greenway	Semiault Creek – Robertson Elementary	Nevin & Dunville Creek	Big Ditch – Upper Prairie – Yale Rd.	Bell Slough at McDonald Rd.	Dunville – McElwee Ditch
PRIORITIES FOR GREATEST OVERALL HABITAT RESTORATION OPPORTUNITIES & ENHANCED COMMUNITY VALUES*		#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15
LOCATION		50850 Yale Rd.	41798 Vedder Canal	Municipal ROW	47916 Camp River Road	5580 Hopedale Rd.	6898 School Lane	51235 Yale Rd.	7295 Chilliwack River Road	9008 McElwee Rd.	Municipal ROW	8580 Southlands Crescent	Bisecting 9490 Ford Rd.	Parallel with the boundary of 9390 Upper Prairie Rd.	46463 Ballam Rd.	Between Nevin Rd. and Holt Rd.

**Project Parameters**

HABITAT	TYPE OF PROJECT	2 & 3	2 & 3	2	1, 2 & 3	2 & 3	1, 2 & 3	2	1 & 2	2	2	2	2 & 3	2	2	2
Fish passage (1) - Habitat enhancement (2) - Habitat creation (3)																
INSTREAM HABITAT GAIN (M <sup>2</sup> )		2675	1761	0	8811	388	43	0	200	493	0	0	107	0	0	0
RIPARIAN HABITAT GAIN (M <sup>2</sup> )		1757	1435	32113	8811	390	560	792	425	1677	1145	255	387	779	772	187.5
TOTAL HABITAT GAINS M <sup>2</sup> AS A RESULT		4432	3196	32113	17622	778	603	792	625	2170	1145	255	494	779	772	187.5
PRIORITIZES BASED ON TOTAL HABITAT		HIGH	HIGH	HIGH	HIGH	MED	LOW	LOW	LOW	MED	MED	LOW	LOW	LOW	LOW	LOW
CLIMATE CHANGE	TOTAL POTENTIAL GHG CARBON ANNUAL OFFSET (CO <sub>2</sub> tons/year)	1324	3751	15299	7068	291	276	276	862	511	105	118	124	248	239	124
TOTAL POTENTIAL GHG CARBON ANNUAL OFFSET (\$ equivalent/year)		\$42,710	\$121,000	\$493,515	\$228,000	\$9,387	\$8,903	\$8,900	\$27,806	\$16,484	\$3,387	\$3,800	\$4,000	\$8,000	\$7,700	\$4,000
PRIORITIZES BASED ON TOTAL GHG'S		HIGH	HIGH	HIGH	HIGH	LOW	LOW	LOW	MED	LOW	LOW	LOW	LOW	LOW	LOW	LOW

**Project Scoring**

BIO-PHYSICAL SOCIO VALUES	WILLING LANDOWNER? - GAIN ACCESS TO PROPERTY	MAYBE	YES	MAYBE	MAYBE	YES	YES	YES	MAYBE	MAYBE	YES	MAYBE	MAYBE	MAYBE	MAYBE	YES
DOES THE SITE SUPPORT KNOWN SPECIES AT RISK AND/OR ECOSYSTEMS AT RISK?		YES	YES	YES	NO	YES	YES	YES	YES	NO	NO	YES	NO	YES	NO	YES
LINKS TO OTHER RESTORATION-CONSERVATION PROJECTS AND INITIATIVES?		YES	YES	MAYBE	MAYBE	YES	YES	YES	YES	YES	YES	YES	NO	YES	MAYBE	MAYBE
OWNERSHIP <small>private, municipal, crown</small>		MUNICIPAL & CROWN	MUNICIPAL & CROWN	MUNICIPAL & CROWN	PRIVATE	MUNICIPAL & CROWN	MUNICIPAL & CROWN	MUNICIPAL & CROWN	MUNICIPAL ROW & CROWN	PRIVATE & CROWN	MUNICIPAL ROW	MUNICIPAL & CROWN	CROWN	CROWN	MUNICIPAL & CROWN	MUNICIPAL
MUNICIPAL PROGRAMMING <small>Can all or part of this project fall into an existing municipal program? Municipal Street Trees (A) - Municipal Greenspace Encroachment Management (B) - Civic Infrastructure: Fish Passage and Wildlife Corridors (C) - Connections: Nature, People and Culture (D)</small>		D	B&D	B&D	N/A	B&D	D	A&D	B&C&D	N/A	D	N/A	A&B&C	A&B&D	A&B&C&D	A
COMMUNITY VALUE	PROVIDE PUBLIC RECREATION OPPORTUNITIES, EDUCATION, AMENITIES <small>Excellent (2) increased uses, one or more public infrastructure opportunities (e.g. trail development, kiosks, benches) - Good (1) some/maintains existing uses, may or may not include public infrastructure opportunities - Marginal (0) no opportunities exist</small>	2	2	1	0	2	1	2	1	0	1	0	0	0	0	0
SUPPORT FIRST NATION USE <small>1 point if support this value</small>		0	1	0	0	1	0	1	1	0	1	0	0	0	0	0
INCORPORATE FIRST NATION VALUES <small>1 point if support this value</small>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
OPPORTUNITIES TO LEVERAGE FUNDING <small>1 point if support this value</small>		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
TOTAL POTENTIAL SOCIAL CULTURAL VALUE		4	5	3	2	5	3	5	4	2	4	2	2	2	2	2
PRIORITIZES BASED ON TOTAL SOCIAL-CULTURAL VALUE		HIGH	HIGH	MED	LOW	HIGH	MED	HIGH	HIGH	MED	HIGH	LOW	LOW	LOW	LOW	LOW
BIOLOGICAL VALUE	CURRENT CONDITION <small>An integrated measure of the quality of biotic and abiotic factors, structures, and processes within the ecosystems at the site, and the degree to which they affect the continued existence of the ecosystem types. Excellent (2) - Good (1) - Marginal (0)</small>	1	0	0	1	0	1	1	1	1	0	1	1	0	0	0
VIABILITY <small>The long term prospects for continued existence of the elements and ecosystems at the site considering the surrounding landscape. Excellent (2) - Good (1) - Marginal (0)</small>		2	2	1	2	1	2	1	1	1	0	1	1	1	1	1
FUTURE CONDITION <small>Based on change from current to proposed condition after enhancement activities. While project may have low current conditions (0,1) above, the project gets points for potential to improve the productivity. Excellent (2) - Good (1) - Marginal (0)</small>		2	2	1	2	2	2	1	1	1	1	1	1	1	1	1
TOTAL POTENTIAL BIOLOGICAL VALUE		5	4	2	5	3	5	3	3	3	1	3	3	2	2	2
PRIORITIZES BASED ON TOTAL BIOLOGICAL VALUE		HIGH	HIGH	LOW	HIGH	MED	HIGH	MED	MED	MED	LOW	MED	MED	LOW	LOW	LOW

**Overall Score**

OVERALL SCORE (OUT OF 11)	9	9	5	7	8	8	8	8	7	5	5	5	5	4	4	4
HIGH (11-8) - MED (7-4) - LOW (3-0)	HIGH	HIGH	MED	MED	HIGH	HIGH	HIGH	HIGH	MED	MED	MED	MED	MED	LOW	LOW	LOW

\* Does not warrant ability to complete in this order- requires access, partnerships and resources.



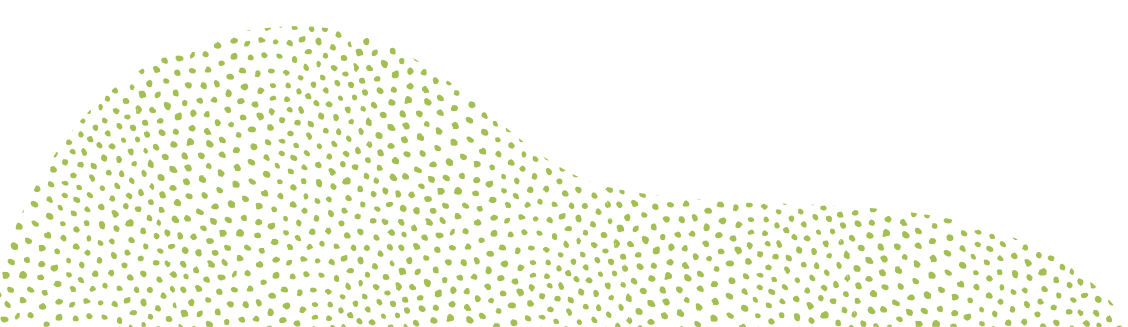
### GREATEST OVERALL COMBINED HABITAT RESTORATION OPPORTUNITIES & ENHANCED SOCIAL AND COMMUNITY VALUES

SITE NAME	Dunville Creek – Rosedale Elementary	Sinclair Wetland	Achelitz Creek	Hope Camp Nature Trust Wetlands	Salwein East-West
RECOMMENDED 5 HIGHEST PRIORITIES FOR GREATEST OVERALL HABITAT RESTORATION OPPORTUNITIES & ENHANCED COMMUNITY VALUES*	#1	#2	#3	#4	#5
RATIONALE	Significant opportunity to create wetlands and improve aquatic biodiversity/ecology and community recreational values.	Significant opportunity to create wetlands and improve aquatic biodiversity/ecology and community recreational values -tying into existing infrastructure.	Greatest opportunity for increased riparian planting, GHG offsetting. Limited community-recreational values.	Significant opportunity to create wetland and off-channel habitats, replanting and GHG offsetting. Limited community-recreational values.	Great opportunity to improve aquatic and critical habitats and create community-some recreational opportunities.
SITE LOCATION	50850 Yale Rd	41798 Vedder Canal	Municipal ROW	47916 Camp River Road	5580 Hopedale Rd

\* Does not warrant ability to complete in this order- requires access, partnerships and resources.

### GREATEST CLIMATE CHANGE GHG POTENTIAL OFFSETS

SITE NAME	Achelitz Creek	Hope Camp Nature Trust Wetlands	Sinclair Wetland	Dunville Creek – Rosedale Elementary	Chilliwack Carl Creek
RECOMMENDED 5 HIGHEST PRIORITIES FOR GREATEST CLIMATE CHANGE GHG POTENTIAL OFFSETS	#1	#2	#3	#4	#5
RATIONALE	Sequester up to 15,299 CO2 tons per year (~\$493,515.00 annually)	Sequester up to 7068 CO2 tons per year (~\$228,000.00 annually)	Sequester up to 3751 CO2 tons per year (~\$121,000.00 annually)	Sequester up to 1324 CO2 tons per year (~\$42,710.00 annually)	Sequester up to 862 CO2 tons per year (~\$27,806.00 annually)
SITE LOCATION	Municipal ROW	47916 Camp River Road	41798 Vedder Canal	50850 Yale Rd	7295 Chilliwack River Road



## GREATEST SOCIAL-CULTURAL OPPORTUNITIES

SITE NAME	Sinclair Wetland	Salwein East-West	Hope Slough Blueway	Semiault Creek – Robertson Elementary	Dunville Creek – Rosedale Elementary	Chilliwack Carl Creek	Luckacuck Creek Greenway
RECOMMENDED 5 HIGHEST PRIORITIES FOR GREATEST SOCIAL-CULTURAL OPPORTUNITIES	#1	#2	#3	#4	#5a	#5b	#5c
RATIONALE	Opportunity to create a Walking-Nature Loop Trail ~400m with public amenities (benches, signs, waste bins). Connection to the Vedder River Greenway.	Opportunity to create small rest area along Valley Rail Trail with public amenities (benches, signs, waste bins). Connection to the Vedder River Greenway.	Opportunity to create small park with natural walking loop trail, access to the Hope Slough and add public amenities (benches, signs, waste bins, toilet).	Opportunity to create a learning and service with the school students about place-based ecological learning.	Opportunity to create a small nature look trail connecting students to Rosedale School and Rose park place. Provide learning and service with the school students about place-based ecological learning.	Opportunity to create trail that connects Sardis Neighbourhood to Skowkale First Nation and build First Nation partnerships	Opportunity to create a cultural wellness site, art and interpretive signs to benefit First Nations and build First Nation partnership.
SITE LOCATION	41798 Vedder Canal	5580 Hopedale Rd	51235 Yale Rd	8580 Southlands Crescent	50850 Yale Rd	7295 Chilliwack River Road	Municipal ROW

## GREATEST BIOLOGICAL OPPORTUNITIES

SITE NAME	Dunville Creek – Rosedale Elementary	Hope Camp Nature Trust Wetlands	Carl Creek West – Sardis Park	Sinclair Wetland	Salwein East-West
RECOMMENDED 5 HIGHEST PRIORITIES FOR GREATEST BIOLOGICAL OPPORTUNITIES	#1	#2	#3	#4	#5
RATIONALE	Opportunity to create and restore aquatic and riparian habitat with excellent future viability conditions benefitting wildlife and biodiversity.	Opportunity to create and restore aquatic and riparian habitat with excellent future viability conditions benefitting wildlife and biodiversity.	Opportunity to create and restore aquatic and riparian habitat with excellent future viability conditions benefitting wildlife and biodiversity.	Opportunity to create and restore aquatic and riparian habitat with excellent future viability conditions benefitting wildlife and biodiversity.	Opportunity to create and restore aquatic and riparian habitat with good future viability conditions benefitting wildlife and biodiversity.
SITE LOCATION	41798 Vedder Canal	5580 Hopedale Rd	51235 Yale Rd	8580 Southlands Crescent	50850 Yale Rd

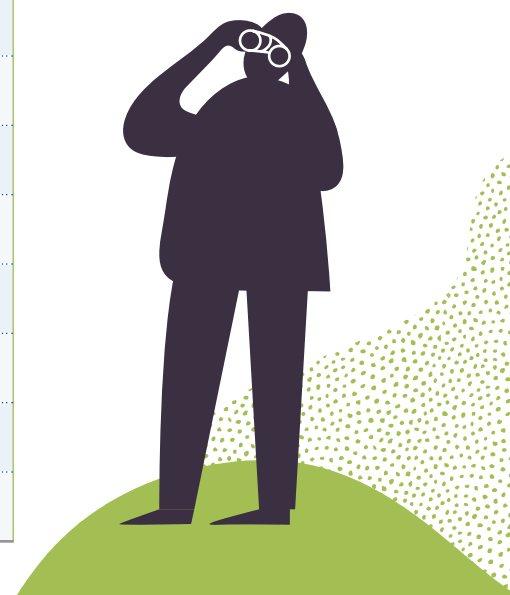


## OPPORTUNITIES BY YEAR AND COST

This section is a guide to support site selection decisions. The Timeline for Implementation table outlines the project sites to pursue over the short (2-year range ~2021-2023), medium (2-5 year range 2021-2026) and long range (5-10 years ~2021-2031). The Cost of Implementation table summarizes the potential costs to build the project from low (<\$10,000), medium (\$10,000 - \$50,000) and high (>\$50,000). These costs represent the anticipated materials and supplies and does not reflect any labour, site preparation or post completion ongoing maintenance needs. The cost of each site should be examined in greater detail in moving from the conceptual plan to workplan. Costs may change overtime in relation to inflation and other market influences.

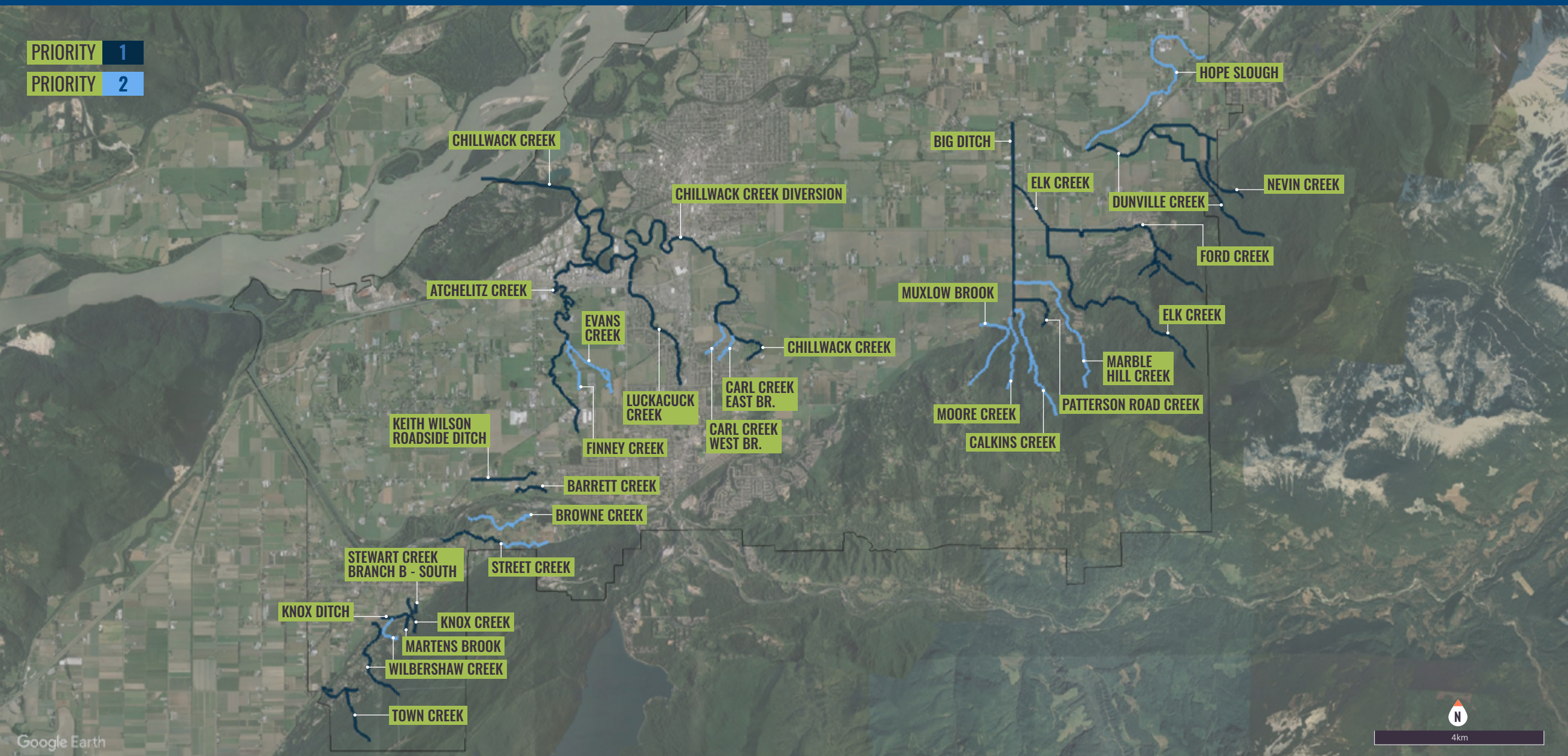
PROJECT SITE	POTENTIAL TIMELINE FOR IMPLEMENTATION			POTENTIAL COST OF IMPLEMENTATION		
	SHORT (2021-2023)	MEDIUM (2021-2026)	LONG (2021-2031)	LOW (<\$10,000)	MEDIUM (\$10,000-\$50,000)	HIGH (>\$50,000)
ATCHELITZ CREEK			✓			✓*
BELL SLOUGH MCDONALD ROAD	✓				✓	
BIG DITCH – UPPER PRAIRIE – YALE RD	✓			✓*		
CARL CREEK WEST – SARDIS PARK	✓				✓*	
CHILLIWACK CARL CREEK		✓				✓
DUNVILLE CREEK – MCELWEE DITCH	✓				✓*	
DUNVILLE CREEK – ROSEDALE		✓	✓			✓*
HOPE CAMP SLOUGH NATURE WETLANDS		✓	✓			✓*
HOPE SLOUGH BLUEWAY		✓				✓
LUCKACUCK CREEK GREENWAY		✓			✓	
NEVIN CREEK	✓			✓		
NEVIN & DUNVILLE CREEK		✓			✓*	
SALWEIN EAST-WEST WETLAND	✓				✓	
SEMAULT CREEK – ROBERTSON ELEMENTARY		✓		✓		
SINCLAIR WETLANDS	✓					✓

\*Represents a scalable project where specific aspects of its enhancement can be completed over time.



PRIORITY 1

PRIORITY 2



Google Earth



4km

PRIORITY 1

- ▶ Atchelitz Creek
- ▶ Barrett Creek
- ▶ Big Ditch
- ▶ Chilliwack Creek
- ▶ Chilliwack Creek Diversion
- ▶ Dunville Creek
- ▶ Elk Creek
- ▶ Ford Creek
- ▶ Keith Wilson Roadside Ditch
- ▶ Knox Creek
- ▶ Knox Ditch
- ▶ Martens Brook
- ▶ Nevin Creek
- ▶ Patterson Rd. Creek
- ▶ Stewart Cr. Branch B- South
- ▶ Street Creek
- ▶ Town Creek
- ▶ Wilbershaw Creek

PRIORITY 2

- ▶ Browne Creek
- ▶ Calkins Creek
- ▶ Carl Creek East Br.
- ▶ Carl Creek West Br.
- ▶ Evans Creek
- ▶ Finney Creek
- ▶ Hope Slough
- ▶ Marble Hill Creek
- ▶ Moore Creek
- ▶ Muxlow Brook
- ▶ Street Creek
- ▶ Wilbershaw Creek





MAP SARS COC

This map shows the variety of known critical functional and/or critical habitat for Provincially and Federally listed species at risk (SAR) throughout the City of Chilliwack. These are represented as colourful polygons and include known occurrences for the following species:

- ▶ Salish Sucker
- ▶ Oregon Forest snail
- ▶ Lewis Woodpecker
- ▶ Coastal Giant
- ▶ Western Painted Turtle
- ▶ Oregon Spotted Frog
- ▶ Williamson Sapsucker
- ▶ Salamander
- ▶ Pygmy Sculpin
- ▶ Pacific Watershrew
- ▶ Streambank Lupine
- ▶ Western Toad
- ▶ Cultus Lake Sockeye
- ▶ Mountain Beaver
- ▶ Tall Bugbane
- ▶ Coastal Tailed Frog



SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	COSEWIC STATUS	SARA	PROVINCIAL
Salish Sucker	<i>Catostomus sp. cf. catostomus</i>	Threatened	S1 threatened	Red S2
Western Painted Turtle	<i>Chrysemys picta</i>	Threatened	S1 Endangered	Red S1S2
Pygmy Sculpin	<i>Cottus aleuticus</i>	Endangered	S1 Threatened	Red S1S2
Cultus Lake Sockeye	<i>Oncorhynchus nerka</i>	Endangered	--	No status/ SNR
Oregon Forest snail	<i>Allogona townsendiana</i>	Endangered	S1 Endangered	Red S2
Oregon Spotted Frog	<i>Rana pretiosa</i>	Endangered	S1 Endangered	Red S1
Pacific Watershrew	<i>Sorex bendirii</i>	Endangered	S1 Endangered	Red S2
Mountain Beaver	<i>Aplodontia rufa</i>	Special Concern	S1 Special Concern	Yellow S4
Lewis Woodpecker	<i>Melanerpes lewis</i>	Threatened	S1 Threatened	Blue S2S3B
Williamson Sapsucker	<i>Sphyrapicus thyroideus</i>	Endangered	S1 Endangered	Blue S3B
Streambank Lupine	<i>Lupinus rivularis</i>	Endangered	S1 Endangered	Red S1
Tall Bugbane	<i>Actaea elata</i>	Endangered	S1 Endangered	Red S1S2
Coastal Giant Salamander	<i>Dicamptodon tenebrosus</i>	Threatened	S1 Threatened	Blue S2S3
Western Toad	<i>Anaxyrus boreas</i>	Special Concern	S1 Special Concern	Yellow S4
Coastal Tailed Frog	<i>Ascaphus Truei</i>	Special Concern	S1 Special Concern	Yellow S4





## CARE & MAINTENANCE

Effective restoration requires monitoring and maintenance to keep the project in good health and ensure it sustains the intended values.

Each restoration and enhancement site will have different care and maintenance requirements once it has been completed. While each site requires unique consideration, some general care guidelines and considerations can be implemented in the planning, execution, and after-care activities to ensure greatest success.

- ▶ **Pre-planning and testing the design:** The goal is to identify clear goals, limitations, and challenges to the success of the site early on and if applicable adjust the design to consider these needs. Some activities may include:
  - Test-pit for water sources
  - Monitor and assess for archaeological sites.
  - Assess soil and water retention capabilities.
  - Assess risks and geohazards.
  - Assess and delineate existing infrastructure, utilities, and associated constraints.
  - Consider planting profiles for greenhouse gas reductions and site suitability (wet-tolerant, drought-tolerant).
- ▶ **Implementation of Restoration and Enhancement Opportunities:** The goal is to implement the pre-planned and assessed sites and incorporate best practices in the implementation. Some suggestions include:
  - Construct with clean machinery and materials/supplies.
  - Adjust project/alignments to reduce possible spread of invasive species.

- When/where applicable, design wetlands and streams with flow consideration for integrated pest-management and nuisance pest management.
- Plant using native plant species, where applicable, incorporate mycorrhizae, soil amendments and herbivory guards to provide the greatest foundation for riparian and aquatic success.
- Incorporate successional pioneering principles towards ecological restoration practices.

- ▶ **Monitoring for Success; after-care planning for ongoing needs:** Often the hardest to find resources for, monitoring and maintenance are key components to ensure long-term success of these projects. The goal is to assess the effectiveness of the restoration and enhancement efforts and the functional changes in the natural, ecological processes and human-social benefits across spatial and temporal scales. Monitoring will enable practitioners to better understand and apply adaptive management strategies to support the intended benefits of the conceptual projects.

**Monitoring** is the act of checking-up on how the project site is doing and documenting the progress. It can include monitoring the condition of the waterway, species usage, riparian growth and/or the public interest and use of the site.

- ▶ **Maintenance** is the act of correcting a deficiency that has been identified during monitoring. Maintenance may be as simple as removing invasive plants that are present or as complicated as re-designing an instream or riparian planting that requires adjustment to achieve the desired results. Maintenance is most easily accomplished if it is performed on a regular basis, and may require a variety of strategies to continue to monitor and maintain these project sites, including but not limited to:
  - Use volunteers, rotarians and other not-for-profit and community groups, develop a community “Stewardship” maintenance program. Activities can include but is not limited to invasive species mechanical maintenance, ongoing planting, pruning and watering, community awareness campaigns, etc.
  - Develop a municipal tree-watering program.
  - Develop a municipal parks, greenways, blueways and trailways assessment program – to ensure public infrastructure is safe, effective and maintains the standard.
  - With stakeholders and other governing bodies, where applicable, establish nuisance pest monitoring and treatment program.
  - With stakeholders continue to monitor and adapt project as needs arise.

## MUNICIPAL PROGRAMMING

Many themes occur across the landscape. Several of which provide opportunity for Municipal programming to support vibrant, healthy waterways and connected communities and neighborhoods.



### Municipal Street Trees Program

Street trees benefit communities! They provide ecological value such as offering wildlife habitat like songbirds nesting spots in the branches; providing shade along waterways and food for fish as the leaves fall into the streams among many others. They also provide societal values including moderating energy consumption, reducing air pollution, decreasing noise pollution, controlling stormwater, establishing agricultural wind-breaks, creating beautiful viewscapes and city aesthetics, increasing property values and supporting mental well-being.

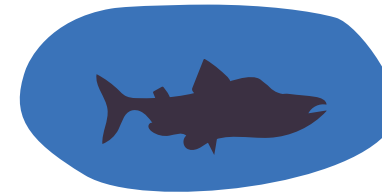
Some of the conceptual plans designed offer opportunity to be inventoried and included into a Municipal Street Tree program, please refer to the matrix on which sites could be incorporated.



### Municipal Greenspace (Encroachment) Management Program

Many City residents have extended their landscaping beyond their property lines to beautify their properties. This encroachment comes in many forms, onto municipal rights-of-way, crownlands, and conservation lands. The challenge of encroachment is that it can lead to habitat degradation and fragmentation. It can also expose people and the community to increased risk of safety hazards, and cause operations and utility access restrictions that result in increased costs to manage and repair.

Striking the balance on encroachment management with landowners is essential. Numerous opportunities exist to enhance and restore habitats in the City of Chilliwack. However, it is recommended that prior to doing so, a municipal led, community-wide review of encroachments in the civic land be completed first. After which, designing an encroachment management program that educates, supports and enforces compliance be considered.



### Civic Infrastructure: Fish Passage and Wildlife Corridors

Throughout the City of Chilliwack, there are many opportunities to work within municipal roads and with private landowners to upgrade culverts, pump-stations, flood-control gates, and bridges as part of a municipal capital works, operation and maintenance program. The benefit of upgrading these engineered structures may result in increase ecological-biological connectivity (such as increased fish and wildlife passage and habitat enhancements), improved drainage and hydrological conveyance, safety, recreational blue-way access use and improved city aesthetics. It is recommended that these infrastructure programs be led by the city with the support of civil engineers and supported by community and stakeholder groups.



### Connections: Nature, People and Culture

Many of the habitat and enhancement opportunities throughout the City of Chilliwack offer opportunity to incorporate First Nation values and use. It is recommended that through the ecological-biological enhancement opportunities, where sites and situations allow, establishing a partnership with local First Nations including **Stó:lo First Nation Bands** and the **Ts'elxweyeqw Nation Band** to add cultural value such as traditional use, archaeological and cultural assessments, art and history sharing among others be considered.



**“At risk:** A designation under the Species at Risk Act. See also, “species at risk”

**Barriers (to recovery):** factors impeding recovery of an ecosystem attribute.

**Biodiversity:** The variety of living organisms. Biological diversity also includes the variety of habitats, ecosystems and natural processes occurring therein.

**Carbon offset:** A reduction in emissions of carbon dioxide or other greenhouse gases made in order to compensate for emissions made elsewhere. Offsets are measured in tonnes of carbon dioxide-equivalent (CO<sub>2</sub>e). One tonne of carbon offset represents the reduction of one tonne of carbon dioxide or its equivalent in other greenhouse gases.

**Carbon sequestration:** the capture and long-term storage of atmospheric carbon dioxide (typically in biomass by way of photosynthesis and tree growth) to reduce the impacts of climate change.

**Conceptual design:** Early phase of the design process. May include the design of interactions, experiences, processes, and strategies. It involves an understanding of the needs - and how to meet them with products, services, and processes. Common items of conceptual design are concept sketches and models.

**Coniferous:** Evergreen trees that typically do not lose leaves and produce cones.

**Critical habitat:** The habitat that is necessary for the survival or recovery of listed extirpated, endangered, or threatened species. It is listed in a recovery strategy or action plan.

**Deciduous:** Trees in which the leaves fall off in autumn and re-grow in spring.

**Degradation (of an ecosystem):** A persistent decline in the structure, function and composition of an ecosystem compared to its former state, generally from frequent or persistent impacts.

**Ecosystem:** A biological environment consisting of all the organisms living in a particular area, as well as all the non-living, physical components of the environment with which the organisms interact, such as air, soil, water and sunlight and form complex food webs, nutrient cycles and energy flows.

**Endangered:** A species that is facing imminent extirpation or extinction.

**Enhance:** To increase or improve in quality, value, or extent.

**Extinction (of a species, family, or other larger group):** Having no living members. No longer in existence.

**Flood mitigation:** The implementation of actions to reduce or eliminate the long-term risk of flood-damage to buildings, other structures and infrastructure. Can involve the management and control of flood water movement, such as redirecting flood run-off through the use of floodwalls and flood gates or other natural environmental engineering options including creating wetlands and recharge areas.

**Greenhouse gas:** Is a gas that absorbs and emits radiant energy within the thermal infrared range. Greenhouse gases cause the greenhouse effect on planets. The primary greenhouse gases in Earth’s atmosphere are water vapor (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and ozone (O<sub>3</sub>).

**Greenhouse gas effect:** The process by which radiation from a planet’s atmosphere warms the planet’s surface to a temperature above what it would be without this atmosphere.

**Habitat:** The site and particular type of local environment occupied by a species or group of species.

**Habitat fragmentation:** The process of dividing a continuous habitat into non-continuous, smaller sub-units.

**Indigenous species:** Species and communities that occur naturally, not as accidental or deliberate introductions, in an area.

**Invasive species:** Species whose introduction or spread threatens the environment, the economy or society, including human health. They can originate from other continents, neighbouring countries or other ecosystems within Canada.

**Management (of an ecosystem):** A broad categorisation that can include maintenance and repair of ecosystems (including restoration).

**Native species:** See also, “indigenous species”

**Natural diversity:** Includes a site’s features, its structures and its ecological functions, at the scales of genes, species, communities and landscapes.

**Natural heritage:** Natural resources that are passed on to future generations.

**Natural regeneration:** Recovery or recruitment of species from a germination or resprouting event. A ‘natural regeneration’ approach to restoration relies on spontaneous or unassisted natural regeneration as distinct from an ‘assisted natural regeneration’ approach that depends upon active intervention.

**Neighbourhood Plans:** Planning documents created to guide development for specific areas of the city that are either intended to accommodate redevelopment, or to create a new neighbourhood. These documents will provide guidance to City staff, the public, and landowners as to what the land can be used for (such as homes, businesses, parks and trails) and how it will be serviced. Must conform with official community plans.

**Permit:** An official document giving someone authorization to do something.

**Population:** A group of organisms of one species, occupying a defined area and usually isolated to some degree from other similar groups.

**Official Community Plan:** Describes the long-term vision of communities. They are a statement of objectives and policies that guide decisions on municipal and regional district planning and land use management. These decisions impact communities’ sustainability and resilience.

**Recovery strategy:** A document that outlines the long-term goals and short-term objectives for recovering a species at risk, based on the best available scientific information.

**Recovery team:** A group of individuals that work together to develop a recovery strategy for an endangered or threatened species. Recovery teams include members of the community, academic institutions, government departments, parks, museums, non-government organizations and other conservation organizations that volunteer their time to oversee recovery and conservation planning and efforts for species at risk.

**Resilience:** The degree, manner and pace of recovery of species after a disturbance or stress, or the potential or capacity for such recovery. This property is developed by natural selection under conditions of exposure of the species to disturbance over evolutionary time scales—and enables a species or population to persist despite disturbance.

**Resilience (of an ecosystem):** The capacity of a system to absorb disturbance and reorganize while still retaining similar function, structure, and feedbacks. Highly dependent on the long-adapted resilience of the species within the ecosystem.

**Restoration:** The process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed.

**Riparian:** The border between land and a river, stream or other body of water.

**Sites:** Are selected and defined on the basis of the ecological requirements of and the threats to target species, communities and landscapes. They are selected independent of current ownership or land use but current protection of sites, either on public or private lands, will influence the selection of representative sites.

**Special concern:** A designation under the Species at Risk Act that indicates a species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

**Species at risk:** Species that are in some danger of disappearing or becoming extinct and that require special attention or conservation measures, as identified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

**Species at Risk Act (SARA):** Canadian legislation that became legal in 2002 that aims to meet Canada’s commitment under the Convention on International Biological Diversity. The goal of the act is to protect species that are at risk of becoming extinct.

**Stewardship:** The monitoring, protection, preservation, maintenance (which may include the restoration, rehabilitation and enhancement) of the natural features of natural areas so they sustain and protect, into the future, the natural ecosystems that define them.

**Substrate:** The soil, sand, rock, debris or water medium where ecosystems develop.

**Succession:** The change from one ecological community type to another. This can be seen where, for example, an agricultural field changes from an open meadow into a shrub land and, if left untouched, eventually forest. Natural disturbances (flooding, ice storms, fire) can stop or reverse succession. As trees, shrubs and organic material are removed, other plants needing open conditions grow. Some habitats, depend on disturbances to maintain them.

**Threatened:** A designation under the Species at Risk Act that indicates a species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

**Watershed:** An area of land that contains a common set of streams and rivers that all drain into a single larger body of water, such as a larger river, a lake or an ocean.

**Xeriscape:** Landscaping method developed especially for arid and semiarid climates that utilizes water-conserving techniques. Typically drought tolerant and require little or no irrigation.

ANTICIPATED STAKEHOLDERS

	Atchelitz Creek	Bell Slough McDonald Road	Big Ditch	Carl Creek West – Sardis Park	Chilliwack Carl Creek	Dunville Creek – McElwee Ditch	Dunville Creek – Rosedale	Hope Camp Slough Nature Wetlands	Hope Slough Blueway	Luckacuck Creek Trail	Nevin & Dunville Creek – Ford Rd	Nevin Creek	Salwein East-West Wetland	Semiault Creek – Robertson Elementary	Sinclair Wetlands
CITY OF CHILLIWACK	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙
MINISTRY OF FORESTS, LANDS, NATURAL RESOURCE OPERATIONS AND RURAL DEVELOPMENT	↙	↙	↙	↙	↙	↙	↙	↙	↙		↙	↙	↙	↙	↙
FISHERIES AND OCEANS CANADA (DFO)	↙			↙	↙		↙	↙	↙		↙	↙	↙		↙
CROWN (FED GOV)	↙		↙			↙			↙		↙	↙			
STÓ:LŌ Archaeologists and cultural monitors and/or Research & Resource Management	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙
FRASER VALLEY WATERSHEDS COALITION	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙
LANDOWNERS	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙	↙
SALISH SUCKER RECOVERY BIOLOGIST					↙								↙		
WESTERN PAINTED TURTLE RECOVERY BIOLOGIST				↙	↙										↙
SKOWKALE FIRST NATION					↙										
SARDIS ELEMENTARY				↙											
ROSEDALE TRADITIONAL COMMUNITY SCHOOL									↙						
ROBERTSON ELEMENTARY														↙	
CHILLIWACK SCHOOL BOARD				↙					↙					↙	
CANADIAN NATIONAL RAILWAY									↙						
NATURE TRUST BC								↙							
SOUTH COAST CONSERVATION LAND MANAGEMENT PROGRAM								↙	↙						
CHILLIWACK FIELD NATURALISTS								↙	↙						
BC HYDRO		↙	↙					↙	↙		↙	↙			



LINKAGES

	Atcheitz Creek	Bell Slough McDonald Road	Big Ditch	Carl Creek West – Sardis Park	Chilliwack Carl Creek	Dunville Creek – McElwee Ditch	Dunville Creek – Rosedale	Hope Camp Slough Nature Wetlands	Hope Slough Blueway	Luckacuck Creek Trail	Nevin & Dunville Creek–Ford Rd	Nevin Creek	Salweir East-West Wetland	Semiault Creek – Robertson Elementary	Sinclair Wetlands
<b>COC OFFICIAL COMMUNITY PLAN:</b>															
<b>Goal 2. Strengthen Agriculture</b>	↕	↕	↕		↕	↕			↕		↕	↕			
<b>Goal 4. Protect the Environment</b> Water Resource Management Policies, Stewardship Policies, Gravel Extraction & Forest Management Policies	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
<b>Goal 5. Build Healthy Communities</b> Parks and Greenspace, Heritage values, Social Wellbeing, Public Art, Promote attractive design	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕		↕	↕	↕
<b>COC GREENSPACE PLAN</b>	↕			↕	↕	↕	↕	↕	↕	↕			↕	↕	↕
<b>COC BLUEWAY ACCESS STRATEGY</b>									↕						↕
<b>COC TRAIL NETWORK PLAN:</b> Neighborhood trails, Valley Rail Trail, ETF				↕	↕		↕		↕	↕			↕		↕
<b>COC NEIGHBORHOOD PLANS:</b> Sardis, Rosedale, Eastern Hillside				↕	↕		↕		↕						
<b>RECOVERY STRATEGIES AND/OR PLANS FOR SPECIES AT RISK:</b>															
Salish Sucker	↕		↕	↕	↕			↕	↕				↕	↕	↕
Western Painted Turtle				↕	↕				↕						↕
Oregon Spotted Frog														↕	
<b>HERITAGE &amp; CULTURE:</b> Stó:lō Heritage Policy Manual	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
<b>OTHER GOVERNMENT PRIORITIES:</b>															
<b>FVRD Regional Growth Strategy</b> Clean economy, Greenspace/Natural areas protection actions	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
<b>DFO Wild Salmon Policy</b>	↕	↕	↕	↕	↕	↕	↕	↕	↕		↕	↕	↕	↕	↕
<b>Wetland Ways</b> Interim Guidelines for Wetland Protection and Conservation in British Columbia				↕	↕	↕	↕	↕	↕		↕	↕	↕	↕	↕
<b>Government of Canada Climate Change Action</b>	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕

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