Windebank Creek Management Plan

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Fraser Valley Conservancy
Placing lands in trust for our future

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Acknowledgements

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Introduction

Background to Acquisition

The Fraser Valley Conservancy (FVC) was established in 1998 as charitable organization to protect land and water for future generations. The FVC's mission is to conserve biodiversity in the Fraser Valley by:

- protecting and preserving land and watercourses that have recognized local and regional ecological value;
- promoting, facilitating, and engaging in land stewardship activities;
- protecting, preserving, and enhancing habitat for native species, including rare and endangered species; and
- protecting and preserving land of recognized local and regional historic value.

The Windebank Creek property is 0.89 ha of riparian corridor habitat along a reach of Windebank Creek, in Mission BC. It is zoned as IPRC (institutional parks, recreation and civic zone) by the District of Mission. On October 28th, 2011, Mission Western Developments Ltd. and the FVC reached an agreement to transfer ownership of the property to the FVC. The FVC agreed to protect the land in perpetuity according to the management wishes outlined in the agreement: to manage the land in a natural state and endeavor to enhance the ecological value over time through native plant re-vegetation, invasive species removal and recreational and ecological monitoring processes. This agreement included the transfer of ownership as well as a donation to the FVC to cover the ongoing costs to monitor and maintain the property. The terms of the transfer agreement were fulfilled February 28th, 2012.

The FVC's vision for Windebank Creek is to restore riparian habitat, protect ecological integrity and biodiversity, and to engage the community in conservation.

Description of Property

Windebank Creek is located in Mission BC (Figure 1). Access to the property is through a gate located at the west end of Logan Avenue. The 0.89 ha property is an important riparian corridor, located within a highly urban environment and is bounded by development on all sides. The property is nestled in the southeast corner of the intersection of Lougheed Highway and the Cedar Valley Connector, both of which are major transportation routes. The property contains Windebank Creek, riparian vegetation and an unmaintained retention pond. Land uses adjacent to the property include commercial and residential developments, along with associated parking lots and roads. The creek enters the property from the northwest through a culvert under the Cedar Valley Connector and exits to the south through a culvert under Lougheed Highway.

As development pressures increase, the habitat values of the property and its connectivity to other green spaces will further enhance its conservation significance. Upslope storm water management, surrounding infill development and downstream land use will all affect the viability of the spawning and riparian habitat this parcel represents.

The property connects headwater tributaries of Windebank Creek to the Fraser River (Figure 2). The creek supports Cutthroat and Rainbow trout populations, Coho and Chum salmon also spawn in this section of the creek. In the summer of 2016, an Oregon forestsnail was observed on the property, which would suggest the property may serve as a potential refuge for species at risk. In addition, the riparian corridor provides habitat for many common wildlife species.

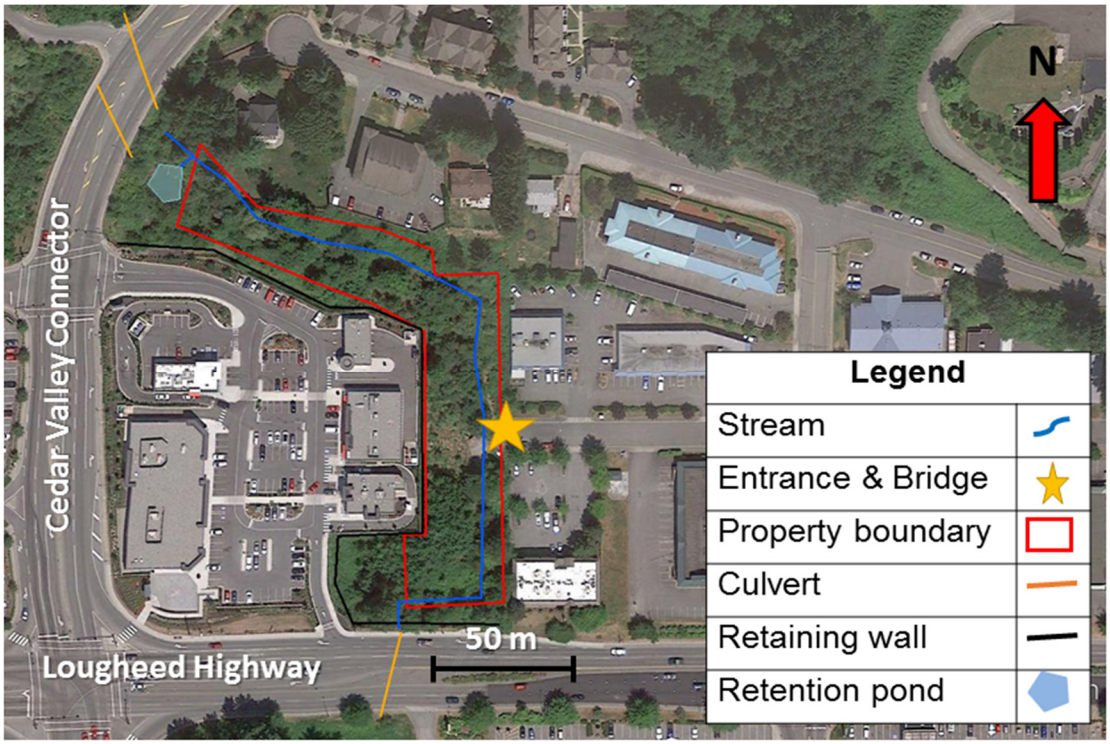

Figure 1: Map of Windebank Creek property.

Figure 2: Windebank Creek watershed. The Windebank Creek property (outlined in red) connects headwater tributaries of Windebank Creek to the Fraser River.

Background and Environmental Values

This property is located in the Coastal Western Hemlock dry maritime (CWHdm) biogeoclimatic zone, which is characterized by warm relatively dry summers and moist mild winters.

The Mission area was inhabited by the Sto:lo people until 1861, when European settlers arrived (District of Mission 2016). In the early 1900s Japanese settlers owned and farmed the area around the current Windebank Creek property, until their land was confiscated by the Canadian government in 1942. In 1995, the creek was diverted from its original course eastwards, to accommodate for commercial development along its western side (Brennan et al. 2016). Between 1995 and 2004 fill was imported to create the footprint for the development site and bring it up to the elevation of the road, this included the construction of a steep retaining wall. The Cedar Valley Connector road was constructed, north of the property from 2005 to 2006. In 2008, Windebank Creek was illegally logged, resulting in 80 % of the riparian vegetation being removed (Figure 3). The Windebank Creek parcel was subdivided off the larger development parcel in November 2011 and donated to the FVC in 2012.

No baseline report was created for this property when it was acquired, due to lack of capacity. There are historic photos of the site clearing on file (some of which have been included in figure 3). The FVC initiated photo-point monitoring of the site in 2014 and the Mission of Streams Streamkeepers group completed baseline measurements of the stream in 2015. These documents serve as the baseline information for this site. A restoration plan containing a history of the property, and partial inventory of flora and fauna was completed by BCIT students in 2016 as part of their applied research project. For more detailed information, refer to the BCIT document Brennan et al. (2016).

Figure 3: Before and after photos of Windebank Creek after the site clearing in 2008. The picture numbers on the orthophoto to the right corresponds to the location where the pictures were taken (1) looking south along the retention wall, (2) looking southwest at the concrete bridge at the entrance of the property and (3) looking south towards Lougheed highway.

As a result of the property being located in an urban environment, with ongoing human disturbances, the invasive species had become dominant by the time the FVC obtained the property. Since 2012, the FVC has removed invasive species at the site at least three times per year (predominantly Himalayan blackberry), and completed numerous native plantings which has resulted in a more biodiverse flora, especially in the southern half of the site. Willow, Red-osier dogwood, Nootka rose and Indian-plum are now well established along the creek, while Black cottonwood, Red alder, Western red-cedar, Salmonberry and Common snowberry are growing along the top of the banks.

Despite significant disturbances over the years and its fragmented setting, Windebank Creek still supports a variety of wildlife species, including raccoons, coyotes, river otter and a diverse range of songbirds. The northern culvert connects the creek to upland forested habitat and the southern culvert connects the property to lowland riparian habitat before the creek reaches the Fraser River foreshore. Providing habitat for wildlife species as the District of Mission continues to develop is important to the ecological integrity and biodiversity of the area.

The property also has the potential to provide valuable habitat for native gastropod species including the Oregon forestsnail and Pacific sideband. The Oregon forestsnail is designated as an endangered species pursuant to the Species at Risk Act (SARA) and is a large land snail with a small range in southwestern BC. The Pacific sideband is another large land snail found in southwestern BC. Both of these species are negatively impacted by habitat loss and fragmentation from development as they have limited dispersal abilities between suitable habitats.

The creek contains some suitable habitat for salmonid spawning. The small retention pond located in the northwestern section of the site is part of the stormwater system built by the District of Mission, but is not an engineered system nor is it maintained by the District. Water flows into this pond through a culvert under the Cedar Valley Connector, and drains into Windebank Creek. The pond's inflow stream delivers an appreciable sediment load, which has created a small delta and is infilling the pond. In 2015/16, the BCIT students assessed the water quality of the pond and found that the temperature, pH and dissolved oxygen were within the suitable ranges for egg incubation and juvenile rearing of Coho salmon (Brennan et al. 2016).

Windebank Creek also supports many abiotic values important to the ecological integrity of the area. The property gradually slopes (downhill from the north) and the creek running through the middle of its length supports a moist microclimate year-round. Functional riparian areas allow for better flood control and provide natural filtration of storm water runoff (Archibald et al. 2009). In addition, the property allows for natural hydrologic processes before the creek is culverted under major roads (Brennan et al. 2016).

Cultural values for this property include supporting natural ecological processes and providing a valuable educational resource; it will serve as an ideal location for conducting community outreach.

Management Issues

Adjacent Land-Uses and Activities

There are many threats to the natural resources of the property. Development practices on adjacent lands will impact the effectiveness of this habitat restoration over time. The site is already fragmented but the riparian corridor, including the creek is an important remaining link to ensure connectivity of the Windebank Creek from the headwaters to the Fraser River.

Over the last 20 years, Windebank Creek has been greatly affected by urban development; historically it has been diverted and channelized, cleared of riparian vegetation, and occupied by trespassers.

Hydrology and Water Quality

Creek diversions, such as occurred for Windebank Creek, can have many impacts, including loss of macroinvertebrate prey for fish, altering the normal sediment erosion and deposition rates, and reducing habitat complexity of the stream that takes years to develop. The area that remains the most impacted by the diversion was the southern reach that runs east to west along Lougheed Highway (**Error! Reference source not found.**). This reach is straight, has no in-stream large wood debris (LWD) or structural diversity which contributes to increased stream velocity and erosion rates. Consequently, this area provides little suitable habitat for salmonids.

Windebank Creek is surrounded by impervious surfaces to the south and east, and a retaining wall to the west, all of these constrain the ability of the creek to handle large volumes of water during heavy rain events. Excess water inputs can cause the creek to overtop its banks within the property. Such flooding events cause bank erosion, sediment deposition, displacement of spawning gravel and new channel creation randomly throughout the site.

Culverts can be problematic in stream ecosystems as they are a fixed feature in an otherwise dynamic system. Windebank Creek flows in and out of the property through two culverts. Currently, the culverts do not impede fish migration. The northern culvert is a modern arch style design that arches over the natural stream bed, and thus likely has minimal impact on salmon migration. The southern culvert is the most restricting due to its smaller diameter, and may inhibit salmon migration during both low when there may be inadequate water depth in the culvert and high flows when the water velocity may be an impediment (Brennan et al. 2016).

Continued development and current storm water management practices upstream of the FVC property impact the water levels in the creek at this site. Reduced water levels or increased likelihood of flash flood conditions that accompany storm water being fed into the creek system, would further negatively impact the creek, associated riparian habitat and access for spawning salmon.

Runoff within urbanized environments can contain elements such as copper and lead, in addition to other contaminants that can be toxic to aquatic life (Archibald et al. 2009); Windebank Creek receives upstream storm water runoff and therefore is exposed to this contamination risk. Similarly, downstream from the FVC property the creek runs through a riparian area which is bounded by Highway 11, Lougheed Highway and shopping malls with large parking lots. These large impervious surfaces collect

oil and heavy metals from vehicles which can contaminate the creek during rain events. Currently, the cumulative impact of contaminants entering the creek from different point sources is unknown.

Invasive Species

Invasive plants often out-compete native vegetation by creating dense thickets that may also cause adverse changes to the microclimates and microhabitats. When FVC acquired the property in 2012, invasive species, in particular Himalayan blackberry, were dominant throughout the property. Invasive control has reduced the footprint of invasive plants, but the work is ongoing. Himalayan blackberry is still the primary invasive plant at the site, and is still present as dense thickets in the northwest section. Bamboo, originating on neighbouring private property, is spreading along the northeastern banks of the creek, while the eastern perimeter of the retention pond is covered with English ivy. The following invasive species have also been documented on the property: aster, reed canary grass, policeman's helmet, Japanese knotweed, morning glory and tansy ragwort.

Visitor Control

As Windebank Creek exists within an urban environment, human use has a continual impact at the site. Homeless camps previously existed within the property, and safety concerns during site maintenance led to the construction of a chain-link fence delineating the property. Trespassing still exists on the District of Mission property bordering Lougheed Highway along the south bank of the creek. This area is used as a temporary gathering location which has resulted in large volume of refuse on the site including drug paraphernalia, sleeping bags, and clothing. The fence is regularly damaged and refuse spills into the FVC side of the property and also ends up in the creek itself. The fencing has minimized unwanted access and littering on the FVC property but requires constant maintenance.

Open public access to this property is deemed detrimental due to the sensitive riparian habitat and the creek itself, especially given the small size of the property. There is no public access to the property and this is maintained through fencing, the retention wall, and blackberries left along the perimeter of the property. FVC encourage access to the public during hosted FVC events on site. There is concrete bridge, over the creek, immediately inside the gated entrance to the property. It serves as an ideal location to gather people and erect tents during community outreach events. It is hoped that by establishing this site as a community event location and regularly maintained area, these activities will further deter the trespassing.

Management Goal and Objectives

As the property is now owned by the Fraser Valley Conservancy, it will be protected from development and managed in a manner that is consistent with the FVC's mission to conserve biodiversity. The management goal is to preserve and protect the ecological integrity and natural values of Windebank Creek in perpetuity.

The FVC's management objectives for the Windebank Creek property are as follows:

- to restore, maintain, and protect natural ecological processes and riparian habitat on the property;
- to increase spawning habitat for salmonids;
- to enhance habitat for native species, monitor for species at risk, and to gain better understanding of the requirements of the species habitat we are trying to conserve;
- to increase public involvement and establish the site as a focal point for environmental stewardship, education, and conservation in the community.

Strategies and Actions

In support of the management goal, to date the following actions have been taken by the FVC:

- fulfilled requirements of property transfer agreement including provision of tax receipts;
- removed garbage;
- completed secure fencing of property perimeter including sensitive habitat signage;
- removed invasive species, in particular focusing on the Himalayan blackberry in the southern portion of the parcel;
- planted over 1100 native plants in the southern section of the property;
- installed 5 bird boxes and 5 mason bee boxes; and,
- initiated annual photo-point monitoring and stream keeper's assessment (module 1).

Specific actions to be undertaken over the next five years to address protecting and enhancing wildlife values, landscape planning, and research.

Protecting and Enhancing Wildlife Values

Management actions to be implemented include:

- maintaining perimeter fencing and monitoring the property to identify unauthorized access and removing garbage from the property as required;
- establishing positive relationships with neighbouring land and business owners;
- eliminating >80% of the invasive plant species throughout the property, and maintaining the invasive control through quarterly monitoring and removal;
- planting native species to help shade out invasive plants and prevent re-infestations;
- complexing the stream habitat using methods that will be resistant to storm surge events including assessing feasibility of converting the retention pond at the north end into off-channel habitat for juvenile Coho;
- installing bird/bat boxes to compensate for local reductions in cavities for nesting;
- establishing an interpretive area on site, including signage and native plant display garden at bridge; and,
- registering a covenant or other protection measure on the land title to ensure the vision for the property is protected in perpetuity.

Landscape Planning

The headwaters of Windebank Creek are located in a suburban residential neighbourhood. The middle reaches flow through densely forested urban ravines prior to entering the property under the Cedar Valley Connector. It leaves the property and passes under the Lougheed Highway where it flows through a low gradient reach highly impacted by retail development. Windebank Creek then becomes a floodplain slough where it joins the Fraser River. Complementary management of Windebank Creek within the larger neighbourhood land-use and considering its connectivity with other parcels of riparian habitat and green spaces could benefit the ecological integrity. This will require support from the District of Mission as well as other local landowners.

Management actions to be implemented include:

- participating in local land use planning processes to ensure future development and storm water management does not continue to negatively impact the habitat;
- collaborating with the District of Mission on management of their parcels, which border the southern and northern ends of the FVC property, with a focus on eliminating trespassers, garbage and controlling invasive plants; and,
- working with the community to improve up and down-stream conditions for migrating salmonids and ensure the availability of suitable spawning areas.

Research

The FVC is committed to helping better understand the species utilizing the property and increase our knowledge of habitat enhancement, with a focus on stream health, birds and pollinators, as well as any species at risk. Research will be consistent with the vision and management objectives of the Windebank Creek property.

Management actions to be implemented include:

- completing surveys for fish, amphibians and pollinators using the site,
- presence absence surveys for gastropods, targeting Oregon forestsnail; and,
- completing inventories of bird species utilizing this habitat.

Management Phases

In order to accomplish the above strategies and actions the FVC will aim to follow the schedule below:

Phase 1: Short Term (1-2 years)

- continue to control invasive plants;
- plant an additional 2000 native plants as needed with a focus on the northern section of the property as it is cleared of invasives;
- continue removal of garbage;
- install bird and bat boxes;
- continue fish, amphibian, gastropod, pollinator and bird surveys to assess presence and health of populations on the property, and provide habitat enhancement recommendation as necessary;
- continue to add complexity to the stream as deemed appropriate;
- establish interpretive area on site, including signage and native plant display garden;
- coordinate with the District of Mission on management of illegal trespassing and invasive species on their property;
- determine infrastructure and right-of-way or easements existing on the property and how they may impact management;
- engage the District of Mission in discussions of land-use planning and stormwater management, both up-and-down stream of the property;
- confirm archeology status of the site; and,
- complete annual review of Management Plan.

Phase 2: Medium Term (3-5 years)

- invasive plants maintained below 80% cover;
- assess feasibility of converting the old detention pond at the north end into off-channel habitat for juvenile Coho;
- evaluate additional opportunities for enhancement;
- explore options for conserving downstream habitat; and
- continue community stewardship activities with a focus on educating the community on the environmental values of the property and how they can help preserve those values.

Phase 3: Long Term (5-10 years)

- continue to conduct yearly monitoring assessments to evaluate success of the riparian restoration efforts and the health and stability of species present on the property, with a focus on salmonids and aerial species;
- continue to promote the site as a focal point for conservation education in the community; and,
- engage the District of Mission in land use and development practices that will be beneficial to Windebank Creek and other community watersheds.

References

Archibald, W., K.J. Buchanan, H. Dhalke, Z. Easton, R. Marjerison, A. Sharma, and S. Shaw. 2009. New paradigm for sizing riparian buffers to reduce risks of polluted storm water: practical synthesis. Journal of Irrigation and Drainage Engineering 135:200-209.

Brennan K., Lewis C., Schellenberg A. 2016. Restoring riparian and aquatic habitat at Windebank Creek in Mission, BC. British Columbia Institute of Technology Report, Burnaby BC, 107 p.

District of Mission. 2016. About district of Mission: History. Retrieved 10 January 2016 from: http://www.mission.ca/about/history/