



LTN Environmental
Consulting LP

Riparian Assessment –
2690 Queensway

Prepared For

ATPAR Development Ltd.

108-4275 22 Ave

Prince George, BC V2N 3B3

Prepared By

LTN Environmental Consulting LP

1041 Whenun Road

Prince George, BC V2K 5X8

LTN Environmental Contact

Jesse McEwen

Operations Manager

LTN Environmental Project

22P0446

Version: 2

November 2022

This page is intentionally blank

AUTHORSHIP

Team members from LTN Environmental Consulting LP who contributed to preparing this report include:

Jesse McEwen, R.P.Bio..... Primary Author

Hanna Donaldson, R.P.BioSenior Review

TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	METHODS	3
3	RESULTS AND RECOMMENDATIONS.....	4
4	EROSION AND SEDIMENT CONTROL.....	6
5	REFERENCES	8

LIST OF APPENDICES

APPENDIX A	PHOTOGRAPHS.....	A-1
APPENDIX B	ESC BMPS	B-4

LIST OF FIGURES

Figure 1.	Riparian Assessment Study Area Overview.....	2
Figure 2.	Riparian leave strip (20m) from top of bank.	7

LIST OF APPENDIX PHOTOGRAPHS

Appendix Photo 1.	Downstream view showing an instream boulder and a large cottonwood along the top of bank. .	A-2
Appendix Photo 2.	Willows along the top-of-bank and Saskatoon's on the transition to the higher bench.	A-2
Appendix Photo 3.	Grasses on the higher bench.	A-3
Appendix Photo 4	Cottonwood on the Queensway end of the lot.....	A-3

1 INTRODUCTION

The landowner of 2690 Queensway is proposing the development of an apartment complex on the lot. The lot is adjacent to the Fraser River and overlaps the City's Riparian Development Permit Area. Section 8.9 of the City's Zoning Bylaw No. 7850, identifies a 30m offset from top-of-bank (TOB) for the Fraser River so that natural features, function and conditions that support fish life processes are preserved, protected, restored, or enhanced (City of Prince George 2022b). The City will consider a decreased leave strip which has been determined based on a Qualified Professional's assessment. We also acknowledge that Covenant PG9697 on the lot at 2960 Queensway stipulates a 30m floodplain setback.

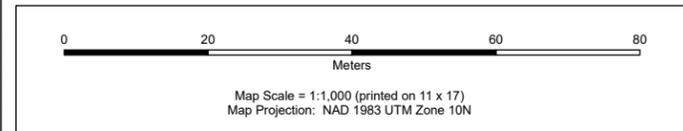
LTN Environmental Consulting LP (LTNE) was retained as a Qualified Professional to conduct a riparian assessment within the lot. The proposed development is a high-density housing building and a paved parking lot. The objectives of the riparian assessment were to determine the value of the riparian area to fish and fish habitat and recommend an appropriate riparian leave strip width.



Figure 1. Riparian Assessment Study Area Overview

Legend

-  Lot of Interest
-  Land Parcel
-  Riparian Protection Development Permit Area



Data Sources

- Inset Basemap, Canada Hillshade: Sources: NRCan, Esri Canada, and Canadian Community Maps contributors.
- Main Basemap, Canada Topographic: Esri Canada
- Main Basemap, World Imagery: City of Prince George
- Main Basemap, World Topographic Canadian Style: City of Prince George, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, NRCan, Parks Canada
- Main Basemap, World Hillshade: Esri, CGIAR, USGS
- Land Parcel, City of Prince George, 2009.
- Development Permit Area, LTN Environmental Consulting LP, 2022.

Disclaimer

LTN Environmental Consulting LP has made every effort to verify this map is free of errors. Data has been derived from a variety of digital sources and, as such, LTN Environmental Consulting LP does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: O. Leblanc	Checked: J. McEwen	Figure 1	Date: 2022-09-26
----------------------	-----------------------	----------	------------------



2 METHODS

The riparian assessment Study Area included the length of the watercourse and riparian area that extended through the lot boundary of 2690 Queensway (Figure 1). A review of existing publicly available data was completed to understand the potential watercourse and aquatic resources in the Study Area. The following data sources were reviewed:

- PG Map (City of Prince George 2022a),

A field assessment was completed to document the existing conditions and identify potential effects of lot development to the watercourse. Within the Study Area, the following information was collected and used to describe the fish habitat potential (i.e., suitability) to support life requisites (i.e., spawning, summer rearing and overwintering) of fish species that may utilize the Study Area (BC Fisheries Information Branch 2001).

- general site description,
- biophysical data (e.g., channel measurements, substrate types and streambank characteristics),
- available cover types, composition, and abundance,
- riparian area description and representative vegetation species, and
- representative photographs illustrating habitat characteristics.

The watercourse top of bank was surveyed by McElhanney within the Study Area in conjunction with the riparian assessment. The top of bank is defined by the City of Prince George as: “the points closest to the boundary of the active floodplain of a watercourse or water body where a break in the slope of the land occurs such that the grade beyond the break is flatter than 3 (horizontal) to 1 (vertical) at any point for a minimum distance of 15.0 meters measured perpendicularly from the break. Where banks are not well defined (as determined by a qualified professional) the top of bank is equivalent to the high water mark.”

3 RESULTS AND RECOMMENDATIONS

The Fraser River at 2690 Queensway is approximately 240m wide and the lot is located on an inside bend. Being such a large river, the assessment was focused on the riparian area of the portion of the river along the lot that could be visually assessed. At the time of assessment, there were very little signs of erosion along the bank and no signs of major erosion. This is typical of inside bends.

While the bulk of the lot is relatively flat there is a drop in elevation along its' edge to a lower bench. This lower bench is approximately 15m wide for the length of the lot. Beyond the bench, the slope declines steeply down to the river channel. The small crest on the lower bench before the steep drop has been defined as the top of bank. The top of bank was determined following the City's 3:1 slope criteria for 15m from the break. Recognizing that a small section of the lot did not achieve this, the identified top of bank also follows the high-water mark as defined by cottonwood trees along the top of the slope break on adjacent lots. The lower bench is vegetated with species such as willows, horsetails, and grasses (Photo 2). As the lower bench transitions to the upper portion of the lot (with similar elevation to Queensway) there are saskatoon bushes present (Photo 2). The upper portion of the lot is grassed throughout with some cottonwoods near the roadside half of the lot (Photo 3 and 4).

The fish habitat along the lot boundary was moderate overall, however, this portion of the river is a migratory corridor for many fish species including salmonids and white sturgeon¹. Spawning habitat for salmonids was poor in the study area as the substrate was dominated by cobbles with fines filling the spaces. White sturgeon spawning is not well documented however they have been documented spawning in water 3-4.5m deep in the Fraser River, these sites have been dominated by boulders and cobbles (Ptolemy and Vennesland 2003) and are unlikely to occur on the river's inside bend along the lot boundary. Rearing habitat was moderate as there were some boulders present that could provide some refuge from flows, but the benefits of these boulders would likely be negligible at higher flows (Photo 1). Vegetation present in the riparian area would provide negligible detritus inputs to the river and only a small amount of cover during high water periods. Overwintering habitat was moderate as the channel becomes deep quickly, however, without many large boulder or large woody debris to provide refuge from flows it is likely less desirable overwintering habitat.

Based on our assessment of the area, and available fish habitat, a 20m average setback from the top of bank (i.e., the crest of the lower bench) would maintain the current riparian habitat values along the Fraser River (Figure 2). The 20m setback is based on an average measurement from the TOB, which is variable depending on the specific measurement along the Fraser River. The setback line was smoothed to provide a buffer that aligned with the topography and maintained the intent of the riparian setback by limiting development beyond the upper bench. Most of the setback distances are between 17.5m and 21.5m, except for the first 5m within the southwest corner where the TOB turns in sharply, at this point the setback is 15-17.5m from the TOB. This allows for the entire lower bench and 2-5m of the upper portion of the lot to be included in the setback. This setback would be inline with or slightly greater than that of the neighboring property. The area immediately adjacent to the identified riparian setback is flat with grasses and provides little to no riparian

¹ Upper Fraser white sturgeon are currently listed as endangered under the Species at Risk Act (SARA)

value. The developer intends to site the building closer to Queensway with the parking lot up to the edge of the setback. Within the setback zone there is no development permitted and existing vegetation should be maintained. However, planting of trees would be encouraged within the riparian zone, especially the area immediately adjacent to the planned parking lot. Clean snow can be stored within the riparian setback area.

A 20 m average leave strip is considered adequate to sustain riparian values due to:

- Negligible detritus contribution to the Fraser River beyond the 20m distance and retention of shrubs that provide small amounts of cover during high water.
- Very little signs of erosion along the bank and no signs of major erosion.
- An erosion and sediment control plan should be prepared prior to surface disturbance of the lot to protect water quality.

4 EROSION AND SEDIMENT CONTROL

For erosion and sediment control it is recommended the following measures are considered during both the construction and post-construction phases of the work:

- There is to be no disturbance to existing riparian vegetation beyond the project footprint. Vegetation that must be removed from within the project footprint should be stockpiled and if possible, replanted within the riparian area.
- The riparian setback will be clearly marked to prevent access (e.g., snow fencing supported by rebar).
- The contractor should manage drainage to avoid sediment laden water from flowing into the riparian area.
- Appropriate sediment and erosion control measures are employed to prevent any sediment laden water from leaving the project footprint. This could include:
 - Any exposed erodible materials and/or surfaces must be appropriately fortified in the event of unanticipated weather or other flow events.
 - Contingency materials including silt fence, poly plastic sheeting and/or tarps should be on site during construction. Attached are some Best Management Practices for ESC
- All fuel and maintenance materials must be appropriately stored; no refueling of equipment will be conducted where there is any chance of a spill or leak entering the Fraser River either directly or through infrastructure such as storm water networks.
- All equipment used in construction must be clean and maintained and inspected for leaks regularly.
- Exposed soils around the property should be stabilized with appropriate grass seed mixture to prevent any erosion or sedimentation of the riparian area post construction.
- Planting of trees is not required, however it is recommended that the developer plant trees on the edge of the upper bench adjacent to the proposed parking lot to increase the riparian value. The lower bench has many native riparian species and should not be disturbed.

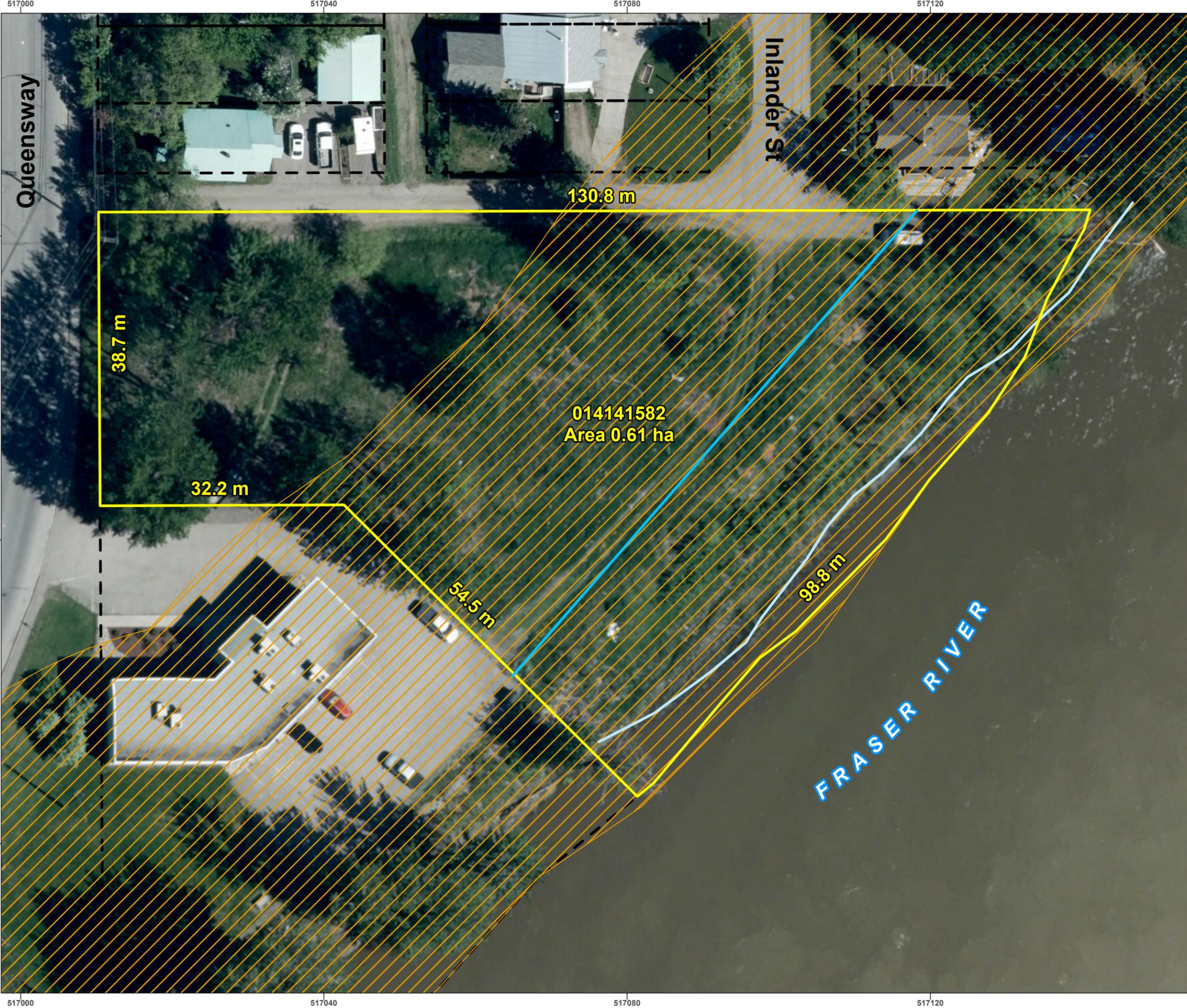
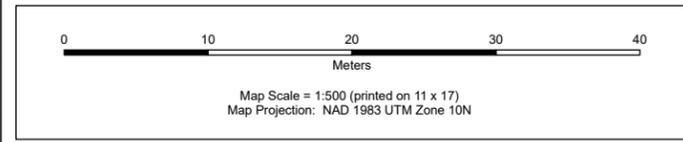
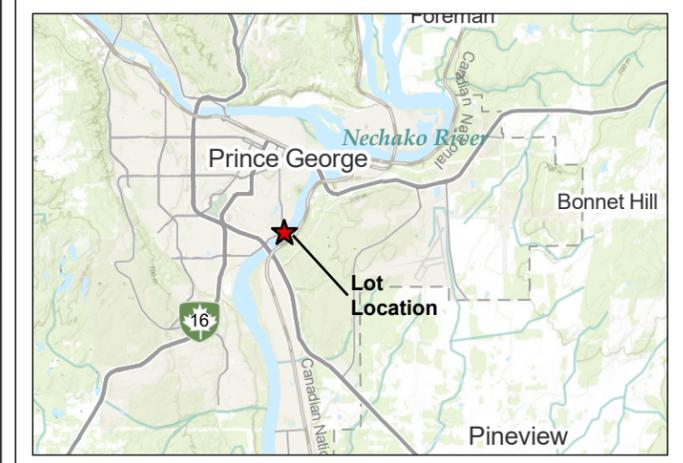


Figure 2. Riparian leave strip from top of bank

- Legend**
- 20 m setback from Top of Bank
 - Top of Bank
 - Lot of Interest
 - Land Parcel
 - Riparian Protection Development Permit Area



Data Sources

- Inset Basemap. Canada Hillshade: Sources: NRCan, Esri Canada, and Canadian Community Maps contributors.
- Main Basemap. Canada_Topographic: Esri Canada
- Main Basemap. World Imagery: City of Prince George
- Main Basemap. World Topographic Canadian Style: City of Prince George, Esri Canada, Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, NRCan, Parks Canada
- Main Basemap. World Hillshade: Esri, NASA, NGA, USGS
- Land Parcel. City of Prince George, 2009.
- Development Permit Area. LTN Environmental Consulting LP, 2022.

Disclaimer
 LTN Environmental Consulting LP has made every effort to verify this map is free of errors. Data has been derived from a variety of digital sources and, as such, LTN Environmental Consulting LP does not warrant the accuracy, completeness, or reliability of this map or its data.

Drawn: O. Leblanc	Checked: J. McEwen	Figure 2	Date: 2022-10-11
----------------------	-----------------------	----------	------------------



Path: L:\PROJECTS\2022\NBC\22P0446_LTNE_2690Queensway_Riparian\22P0446_LTNE_WatercourseAssessment.aprx Layout: 22P0446_Fig2_Lot141582_20220822

5 REFERENCES

BC Fisheries Information Branch. 2001. Reconnaissance (1:20 000) Fish and Fish Habitat Inventory: Standards and Procedures. Resource Inventory Committee.

(<https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/nr-laws-policy/risc/recce2c.pdf>)

City of Prince George. 2022a. PG Map.

(<https://pgmap.princegeorge.ca/Html5Viewer/index.html?viewer=PGMap>)

City of Prince George. 2022b. City of Prince George Zoning Bylaw No. 7850, 2007. Document Number: 551445.

Ptolemy, J. and R. Vennesland. 2003. Update COSEWIC status report on the white sturgeon *Acipenser transmontanus* in Canada, in COSEWIC assessment and update status report on the white sturgeon, *Acipenser transmontanus*, in Canada. Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Ottawa. 1-51 pp.

APPENDICES

APPENDIX A PHOTOGRAPHS



Appendix Photo 1. Downstream view showing an instream boulder and a large cottonwood along the top of bank.



Appendix Photo 2. Willows along the top-of-bank and Saskatoon's on the transition to the higher bench.



Appendix Photo 3. Grasses on the higher bench.



Appendix Photo 4 Cottonwood on the Queensway end of the lot.

APPENDIX B ESC BMPS

EROSION CONTROL

Temporary Cover

- Cover exposed soils with plastic to prevent erosion during precipitation and/or wind events.

Surface Roughening

- Roughening slopes reduces runoff velocities, reduces soil compaction, increases soil infiltration rates and provides micro sites that promote plant growth.
- Can be done by tracking slopes with machinery (creating horizontal grooves) or simply placing logs and woody debris on the slope.

Grass Seeding

- Grasses can provide rapid, long-term protection of exposed soils from rainfall erosion; they will also reduce erosion by slowing runoff velocities, enhancing infiltration, trapping sediment and providing structural support for the soil.
- To immediately protect soils from rainfall erosion, seeded areas should be covered with straw mulch.

Mulching

- Mulching consists of spreading materials such as straw, woodchips, rock or hydroseed mulch over exposed soils.
- Mulch provides short-term protection of soil from rainfall erosion and should be done in conjunction with grass seeding to provide long term protection.

Hydroseeding

- Hydroseeding is an effective way to apply seed and mulch to large areas.
- Hydroseeding involves the use of a portable tank and pump that are used to spray the mixture onto the site.
- Hydroseed mix can be customized to suit the site.
- Avoid adding fertilizer to the mix when applying hydroseed adjacent to watercourses.

SEDIMENT CONTROL

Sandbag Dikes

- Sandbag dikes can be used along the toe of slopes to trap sediment by slowing water velocities.
- They must be placed in a row with ends tightly abutted and stacked to the desired height.
- They must be embedded in the soil at least 10 cm on the uphill side to prevent water from going under the sandbags.

Check Dams

Check dams are constructed in drainage ditches to slow water velocity and reduce ditch erosion. They can be constructed of rocks, logs, sand bags or other materials. Check dams will allow some of the larger suspended sediments to settle out, so they must be properly constructed and maintained. Construction of check dams must ensure that water will not flow under or around the check dam. As such, the upstream portion of the dam must be impermeable and sealed against or embedded into the ditch. Water should only flow over the check dam without causing erosion of the banks of the ditch: the center of the dam must be lower than its edges, which must be lower than the road surface.

Straw wattles

Straw wattles are tubes of compressed straw, wheat or rice, also known as erosion logs. They provide perimeter protection along contours or at the base of slopes, inlets and roadways to reduce soil erosion, runoff and retain sediment. Straw Wattles can also be installed to intercept water running down a slope. Wattles should be installed in a 5 cm trench that is constructed along the contour to prevent runoff from flowing under the wattle. Ends of the wattles should be turned up the slope or attached to the adjacent wattle using heavy twine or plastic locking ties. Wattles should be secured to the slope by wooden stakes placed every 1.2 m across the length of the wattle. Stakes should be driven through the centre of the wattle and into the ground approximately 60 cm, with less than 5 cm projecting above the top of the wattle. A stake must be placed within 60 cm of the end of the wattle. It may be necessary to use a metal rod to create pilot hole for the wooden stakes.

Silt Fencing

- Silt fencing is designed for use along or around slopes.
- Prevents sediment laden runoff from escaping by slowing runoff and allowing sediment to settle out.
- Not for use in ditches or watercourses as it does not filter sediment out of water.
- Must be installed properly to be effective:

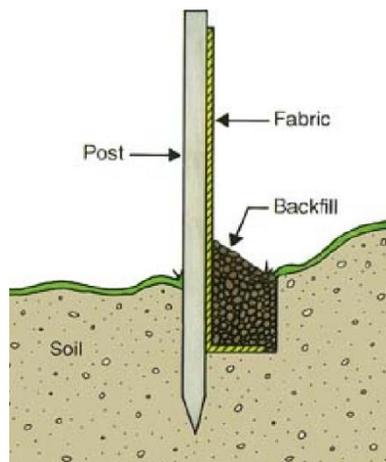
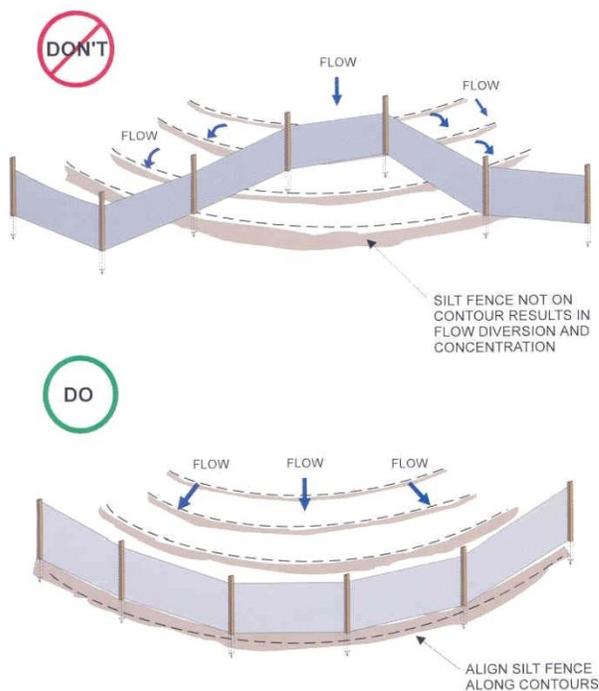


Figure A. Proper silt fence

installation (California Regional Water Quality Control Board 1999).