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Town of Edson

Environmental Assessment

Tributary to Bench Creek - Lions Park Bridge Removal (SE-22-53-17-W5M)

Prepared for:
Town of Edson

Project number:
22033

October 2022

DISTRIBUTION:

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LETTER OF TRANSMITTAL

Oct 3, 2022

Ryan Hall
McElhanney Ltd.
100, 402 - 11th Avenue SE
Calgary, AB T2G 0Y4

Dear Mr. Hall:

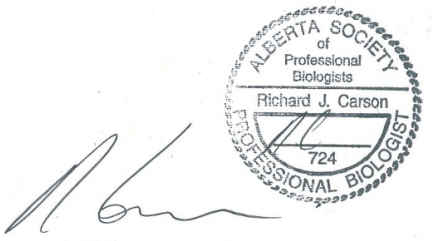
Project No: 22033

Regarding: Town of Edson - Environmental Assessment for a Tributary to Bench Creek - Lions Park Bridge Removal (SE-22-53-17-W5M)

At the request of McElhanney, RC BioSolutions Ltd. has completed an environmental assessment for the proposed removal of a bridge that crosses a tributary to Bench Creek, within the Town of Edson, Alberta. Based on the assessment, recommendations to minimize or eliminate impacts to fish and wildlife that may result from the bridge removal are presented in this report.

If you have any questions or comments regarding the report, please contact our office at your convenience.

Sincerely,
RC BioSolutions Ltd.



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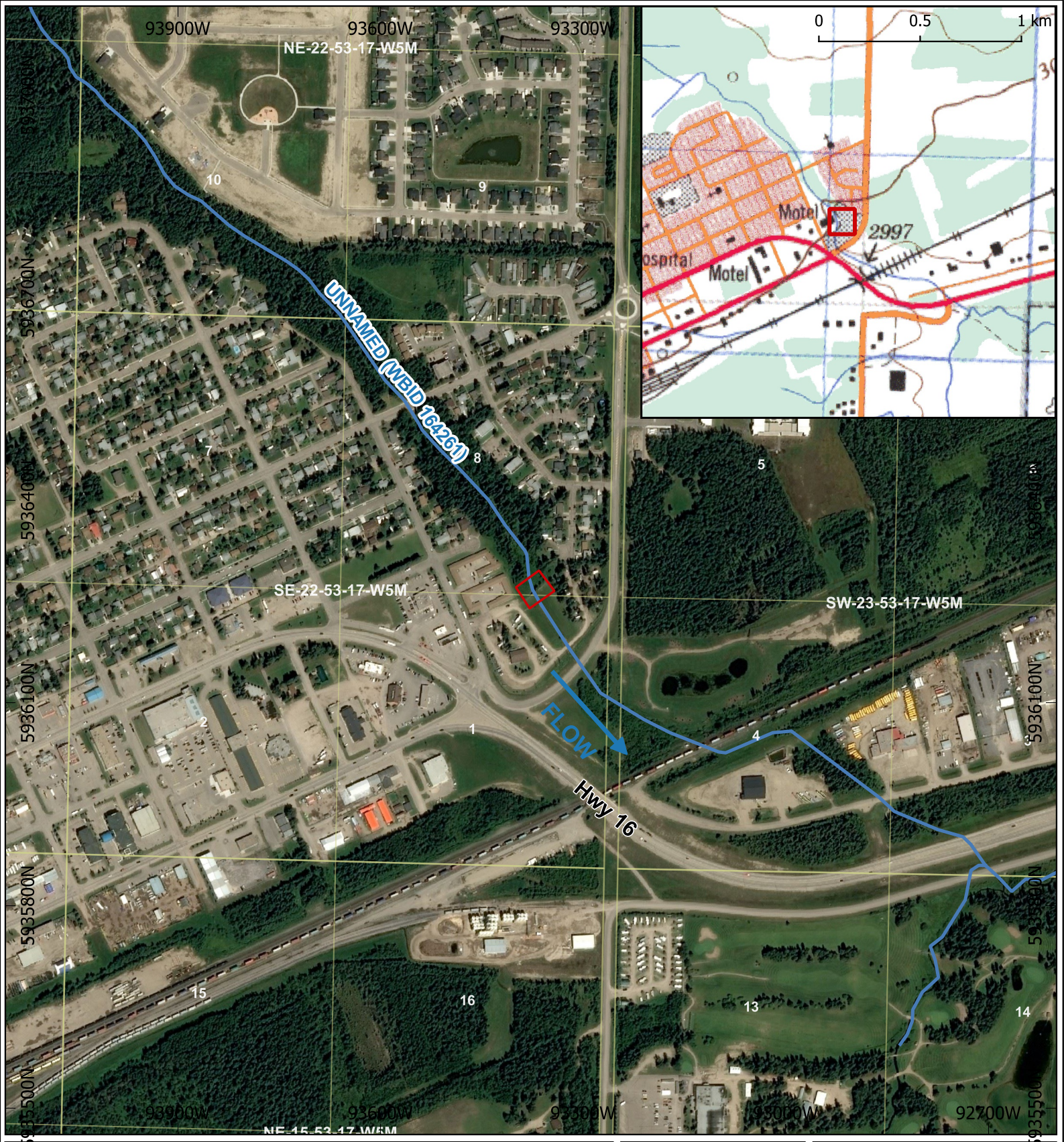
1. Introduction

On behalf of the Town of Edson, McElhanney is planning to remove a bridge over a tributary to Bench Creek, located at SE-22-53-17-W5M, in the Town of Edson, Alberta. The project involves demolition of the existing bridge structure, removal of footings, and reclamation of slopes. The purpose of this environmental assessment report is to describe potential fish and wildlife (including habitat) within the study area, identify any potential impacts to the environment, and provide mitigation measures to reduce or eliminate potential impacts from the project.

2. Study Area

The environmental assessment was conducted where a bridge crosses an unnamed tributary to Bench Creek, within Lions Park in the Town of Edson, Alberta (Figure 1). The study area included the portion of the watercourse that fell within 300 m downstream of the crossing and 100 m upstream of the crossing.



LEGEND

- Crossing Location
- FWMIS Watercourses
- Alberta Township Grid

N

0 50 100 150 m

Scale: 1:7,500
NAD 1983 Alberta 10-TM

Map Sources/Notes:
Alberta Township Map (V 4.1) and FWMIS watercourses obtained from Altalis. Satellite imagery ©2015 Bing.

Edson

Environmental Assessment
Tributary to Bench Creek - Lions Park Bridge Removal (SE-22-53-17-W5M)

Environmental Assessment Study Location

Lead: Richard Carson
Drawn by: Calvin Kluke

Date: 9 Aug 2022
Project #: 22033

Figure No. **1**

RC BioSolutions Ltd.

3. Regulatory Requirements Summary

The guidelines and best practices presented within this report were developed so that the Project can comply with relevant federal and provincial legislature. Relevant, project-specific regulatory requirements are summarized in Table 1.

Table 1. Regulatory Requirements Summary Table.

Government Authority	Act	Permits, Approvals and Conditions
Department of Fisheries and Oceans Canada (DFO)	*Fisheries Act*	• A Request for Review must be submitted for all works below the high watermark in fish bearing waterbodies. Waterbodies are considered to be fish bearing if they contain fish at any time during any given year, or are connected to a waterbody that contains fish at any time during any given year (DFO 2019a). The watercourse, within the study area, qualifies as fish bearing; however work will be completed above the high water mark, therefore, a Request for Review will not be required. • Under the Aquatic Invasive Species Regulations, it is illegal to introduce non-indigenous species into any waterbody. The Alberta *Fisheries Act,* administered by AEP, provides similar protections.
Environment and Climate Change Canada (ECCC)	*Migratory Birds Convention Act (MBCA)*	• Activities should be avoided during key periods, such as the breeding bird season (April 15th to August 31th), to reduce the risk of disturbance or nest destruction. o If activities are to occur within this period, a breeding bird survey will be required prior to the activity. o If activities are planned to occur within this period, where nests may occur, the crossing structure should be netted prior to mid-March to discourage nesting. o Active nests cannot be removed at any time during the breeding bird season. o Authorization from the regional Canadian Wildlife Services Permit Officer, in the form of a Letter of Advice, will be required to remove inactive nests. The Letter of Advice is unlikely to be issued if other mitigation measures have not been attempted (e.g. timing or netting the crossing structure).
	Species at Risk Act (SARA)	• It is in contravention of the SARA to affect individuals, residences, or critical habitat of Schedule 1 listed species. • A SARA permit may be issued, authorizing a person to engage in an activity that may incidentally affect a listed species, provided that all other reasonable alternative have been exhausted. Some activities, such as fish sampling, are unlikely to receive a permit. • DFO is responsible for administering permits under the SARA for projects that may affect aquatic species at risk. DFO examines all projects for aquatic species at risk concerns during the DFO Project Review.
Transport Canada (TC)	*Canadian Navigable Waters Act (CNWA)*	• According to the Navigability Review Tool (Appendix B) provided by the Government of Canada Navigation Protection Program (NPP), the watercourse assessed is not considered navigable for the purposes of the CNWA; therefore, application through the NPP will not be necessary for this project.
Alberta Culture, Multiculturalism and Status of Women	*Historical Resources Act (HRA)*	• All transportation-related projects in Alberta must be submitted for HRA approval, regardless of whether or not the project area is the Listing of Historic Resources. • Conditions outlined in HRA approval letter must be followed for all project-related activities.
Alberta Environment and Parks	*Alberta Public Lands Act*	• A formal disposition application is required for any permanent structures that will be located on Crown land outside of existing dispositions. • A Temporary Field Authorization (TFA) will be required for temporary use on

Government Authority	Act	Permits, Approvals and Conditions
(AEP)		Crown land not covered under formal dispositions.
	Alberta Water Act	• All relevant measures outlined in the *Code of Practice for Watercourse Crossings* (AEP 2019) must be followed for all project-related activities. • Data collection requirements for the Codes of Practice can be found in *Guide to the Code of Practice for Watercourse Crossings, Including Guidelines for Complying with the Code of Practice* (Alberta Environment 2001). • Notification under the Code of Practice for Watercourse Crossings must be submitted at least 14 days prior to construction.
	Alberta Weed Control Act	• Within the *Alberta Weed Control Act* it is the responsibility of the owner to control weeds; however, the Act does not require any permitting or approvals.
	Alberta Wildlife Act	• Permitting and approvals are not always required under the Wildlife Act, but violations can result in fines. Wildlife and wildlife habitat (including plants) should be assessed during field surveys to ensure compliance under this act.

4. Methods

4.1 Watercourse Classification

Correctly classifying watercourses is important in determining fish habitat potential, habitat sensitivity, construction timing, and adequate mitigation measures for construction to reduce or eliminate potential impacts. Watercourses are classified as ephemeral draws or intermittent, small permanent or large permanent watercourses.

Ephemeral draws are typically not considered to contain fish habitat at any time of the year and do not provide significant nutrient, food supplies, or water volume to areas downstream that affect the productive capacity of fish populations. All other watercourses (intermittent, small permanent, large permanent) may have fish habitat throughout portions of, or all of the year, depending on flow characteristics.

All watercourses were assessed using the following methodology; each watercourse was classified as either large permanent (> 5 m average channel width), small permanent (<5 m average channel width), or intermittent. Watercourses classified as intermittent have defined bed and banks throughout the study sections but do not contain continuous flow throughout the year, whereas permanent watercourses have continuous flow throughout the year but may contain subsurface or underground flow within some sections.

The overall sensitivity (low, moderate, or high) of the watercourse to construction activities was determined by classifying the watercourse(s) according to construction activity sensitivity (Class A, B, C, or D), as dictated by the *Code of Practice for Watercourse Crossings* (AEP 2019), in conjunction with assessing the quality of habitat for the three primary fish life history stages (spawning, rearing, and overwintering) and the likelihood of fish using these habitats near the project location. Construction activities within low sensitivity streams will likely have little to no impact on fish and fish habitat. Moderate sensitivity streams may have some impact, but the impact will be local in extent and of short duration. High sensitivity streams could have longer lasting impacts that could impair some life stages.

4.2 Fish and Fish Habitat Assessment

4.2.1 Desktop Assessment

Existing information on fish presence, where available, is provided by the provincial Fish and Wildlife Management Information System (FWMIS). Existing information on the presence of critical habitat, defined in the SARA as “the habitat that is necessary for the survival or recovery of a listed wildlife species”, is provided by the federal aquatic species at risk map (DFO 2021). Where there is insufficient information, sampling is necessary to evaluate fish habitat use and species presence/absence within streams containing adequate water depth.

4.2.1 Field Assessment

Fish sampling was conducted according to methods described in the *Standard for Sampling of Small Streams in Alberta* (AESRD 2013), and was completed using a Smith-Root Type 20B backpack electrofisher.

For each assessment location, the following study sections were established, where possible: one upstream (up to 100 m in length) and one downstream (up to 300 m in length). The downstream section (zone of impact) also encompassed the length of channel that may be directly impacted (footprint) by the proposed project. The GPS coordinates for each fish habitat assessment location were recorded.

At each assessment location, the following habitat information was collected:

- general channel morphology (pattern, confinement, gradient);
- habitat types (riffle, run, pool etc.) (Appendix A);
- wetted width;
- wetted depth;
- flow stage (high, mid, low, dry)
- instream cover (e.g. aquatic vegetation, woody debris, overhanging bank etc.) (Appendix A);
- potential barriers to fish movement (subsurface flow, falls, obstructions);
- sinuosity;
- substrate (boulder, cobble, gravel, fines) (Appendix A);
- stream discharge;
- water quality (dissolved oxygen, pH, conductivity, and water temperature) were collected on watercourses deemed to provide fish habitat;
- general riparian vegetation observation; and,
- stream bank assessment (composition and stability).

Using these data and relating them to physical habitat requirements of various fish species and life history stages found in the area or nearby watercourses, potentially sensitive habitats or areas, such as overwintering and spawning, can be identified.

Spawning habitat availability and quality was determined on a species-specific basis and focused on habitat for those species that are likely and/or known to be in the area or nearby watercourses. For example, salmonid species require appropriate substrate size, low fines fraction, and adequate stream flow and depth during spawning and incubation periods. Rearing habitat, in general, is rated based on stream flows during the open water season, water depth, in-stream cover, and channel definition. Overwinter habitat quality is dependent on continuous stream flow and adequate water depth in winter along with the likelihood of sufficient dissolved oxygen concentration.

The information collected within the watercourse assessment site was used to develop appropriate project-specific recommendations to protect fish and fish habitat.

4.3 Wildlife and Wildlife Habitat

4.3.1 Desktop Assessment

Desktop searches were completed of available online databases and other resources to determine wildlife and sensitive species concerns in the project area. The Fish and Wildlife Management Information System (FWMIS) online database was searched to provide known wildlife occurrences within, and adjacent to, the proposed bridge removal area. The migratory bird nesting period was obtained from Environment Canada's General nesting periods of migratory birds (ECCC 2016). Information gathered during the desktop assessment was used to identify potential sensitive environmental features and to guide the field assessment.

4.3.2 Field Assessment

The field assessment was limited to a reconnaissance-level survey of potential bird and wildlife habitat in the study area, with a focus on those species identified during the desktop assessment. Reconnaissance-level bird and wildlife surveys were completed during the site visit on March 14, 2022. Observations within, and immediately adjacent to, the project footprint were recorded, with respect to important habitat features such as nesting or denning. Vegetation type and species, and aquatic habitat features within the project footprint were recorded. Other relevant wildlife habitat features observed outside of the project footprint during the assessment, as well as pertinent species observations, were also recorded. Information gathered during the field assessment was used in conjunction with the desktop assessment to develop project-specific recommendations to protect wildlife and wildlife habitat.

5. Watercourse Crossing (SE-22-53-17-W5M)

5.1 Watercourse Summary

The unnamed watercourse flows into Bench Creek approximately 1.2 km downstream of the proposed bridge removal location. The unnamed watercourse is an unmapped Class C watercourse on the Alberta Code of Practice 1:500,000 Edson Management Area Map (AESRD 2006), with a Restricted Activity Period (RAP) of September 1 to July 15 (AEP 2019). Section 8(4(c)) of the Code of Practice for Watercourse Crossings states that where an unmapped water body enters a Class C water body, the entirety of the unmapped watercourse is considered to be Class C. Furthermore, section 11(5(b)) states that where an unmapped water body enters a mapped Class C waterbody, the Restricted Activity Period (RAP), for the portion of the unmapped water body that is farther than 2 km upstream from the mouth of the unmapped water body, is the RAP of the nearest mapped waterbody that enters the Class C water body. A Class C watercourse is considered to have moderate sensitivity with habitat areas sensitive enough to be potentially damaged by unconfined or unrestricted activity within the watercourse (Alberta Environment 2001). Summary information of the watercourse and construction plan is found in Table 2.

Table 2. Watercourse, construction, and fish habitat summary for the unnamed tributary to Bench Creek.

Watercourse Summary		
Watercourse Name		Unnamed tributary to Bench Creek
Watercourse Type		Small permanent
Legal Description		SE-22-53-17-W5M
UTM Co-ordinates (NAD83)		Zone 11U, 538980 E, 5937878 N
Water body Code of Practice Classification		Class C
Alberta Code of Practice Restricted Activity Period		September 1 - July 15
Construction Summary		
Construction Method		Isolation (if water present)
Contingency Watercourse Crossing Method		Open cut (if watercourse dry)
Construction Timing		Fall 2022
Fish Habitat Summary		
Assessment Date		August 3, 2022
Average Bankfull Width		0.86 m
Stream Flow Stage		Low
Overall Fish Habitat	Spawning	Poor
	Rearing	Poor
	Overwintering	Nil
Potential for Fish Presence	Open water season	Sport fish – Low; Non-sport fish – Poor
	Winter	Sport fish – Nil; Non-sport fish – Low
Overall Habitat Sensitivity to Construction		Low

5.2 Fish and Fish Habitat Assessment

5.2.1 Desktop Assessment

According to the provincial FWMIS database (searched August 2022), no fish have been sampled to date in the unnamed tributary to Bench Creek. No critical habitat, for any SARA listed aquatic species, is known to occur in the project area (DFO 2021).

5.2.2 Field Assessment

5.2.2.1 Fish Species Presence

On Aug 3, 2022, a section of channel that extended 80 m downstream and 50 m upstream of the proposed bridge removal location was sampled for fish using a backpack electrofisher for 361 seconds electrofishing on-time. Fishing was restricted to discontinuous areas of sufficient depth. No fish were captured or observed during the electrofishing survey.

5.2.2.2 Fish Habitat: Upstream of Crossing Location

Upstream of the bridge removal location (Photographs 1 and 2), the channel was confined and took on an irregular meandering morphology. The channel was generally well defined and stage of flow at the time of assessment was low. Mean wetted width and water depth were 0.36 m (range: 0.24 – 0.57 m) and 0.05 m (range: 0.03 – 0.09 m). The mean bankfull width was 0.53 m (range: 0.28 – 0.70 m) and the mean bankfull depth was 0.41 m (range: 0.38 – 0.42 m). Within the section of channel upstream of the bridge location, habitat consisted predominantly of Class 3 runs. The substrate was primarily composed of fine materials, with partially embedded gravel present in several sections. Instream cover consisted of abundant overhanging vegetation (primarily grasses), moderate amounts of undercut banks, and trace instream vegetation. Riparian vegetation was composed of abundant grasses, in addition to occasional shrubs and trees. The banks were generally vertical and composed of fine materials.

5.2.2.3 Fish Habitat: Proposed Bridge Removal Location

The existing bridge at the crossing location (Photograph 3) was a 3 span timber pedestrian bridge approximately 15 m in length. Channel and wetted width below the bridge were 0.51 m and 0.49 m, respectively. Channel and water depth were 0.42 m and 0.19 m, respectively. Habitat type below the bridge was a Class 3 (<0.5 m depth) flat. Dominant substrates were fines, with a moderate amount of embedded cobble. Fish cover consisted of moderate-abundant overhanging vegetation and trace amounts of instream vegetation. Riparian vegetation was primarily composed of grasses.

Water quality parameters measured at the existing bridge location included pH (7.49), conductivity (697 µS/cm), water temperature (16.0 ˚C) and dissolved oxygen (4.0 mg/L, 45% saturation). Water quality measurements were within the tolerance range low dissolved oxygen tolerant species (e.g. brook stickleback or fathead minnow) common in the region (Newbury and Gaboury 1993; Scott and Crossman 1998).

5.2.2.4 Fish Habitat: Downstream of Crossing Location

Downstream of the bridge removal location (Photographs 4 to 6), the channel remained confined, with a low degree of sinuosity. Approximately 80 m downstream of the pedestrian bridge, the stream flows through a 1700 mm culvert of approximately 67 m in length that runs under a roadway (2nd Avenue, Edson). The watercourse then flows southeast through a forested area before entering an underground tunnel for approximately 460 m until its confluence with Bench Creek.

Similar to upstream, the channel was generally well defined. The channel and wetted width averaged 1.06 m (range: 0.51 – 0.89 m) and 0.84 m (range: 0.49 – 0.70 m), respectively. Mean channel depth was 0.35 m (range: 0.16 – 0.42 m). Mean water depth was 0.14 m (range: 0.06 – 0.19 m). Habitat consisted primarily of Class 3 flats and runs with occasional small sections of riffles. Substrates were composed of moderate-abundant fine materials with moderate amounts of cobble and trace gravel and boulders. Fish cover from the crossing to approximately 60 m downstream consisted of abundant overhanging grasses (80%). Further downstream, fish cover was abundant, consisting of overhanging grasses, shrubs and trees, small and large woody debris, and boulders. Similar to upstream, the banks were generally vertical and composed of fine materials. .

5.2.2.5 Fish and Fish Habitat Summary

The potential for sport fish presence in the watercourse was regarded as low during the open water season and nil in winter. Downstream sport fish habitat appeared more suitable than upstream due to greater channel size and water flow, and access to courser substrates in the downstream reach (i.e., >60 m downstream). However, lack of water depth and stream flow was a limiting factor throughout the study area. Lack of water depth and stream flow is also expected to limit winter refuge in both upstream and downstream reaches.

Non-sport fish presence in the study area was regarded as poor during the open water season and low in winter. Water depth, instream cover and water quality are expected to be adequate for non-sport fish species common in the region (e.g., brook stickleback). However, no fish were captured or observed through sampling efforts, and the study area appeared to lack winter refuge. Spawning habitat quality was generally considered poor throughout most of the study area. The upstream study area contained poor quality spawning substrate types, including fines and embedded gravel. Downstream spawning habitat quality was considered poor to moderate based on a limited presence of unembedded gravel and cobble required for various fish species to successfully spawn.

Rearing habitat quality was considered poor throughout the study area based on abundant fish cover and adequate stream velocity. However, rearing habitat quality was limited by a general lack of water depth and presence of pool habitat.

Overwintering habitat was considered nil to poor, as the study area lacked any deep pools, and stream flows are expected to be greatly reduced, leaving little to no winter refuge.

Overall, sportfish habitat within the study area is considered to be poor quality, and non-sportfish habitat considered poor to moderate. Based on the above information, this watercourse has low sensitivity to instream construction activities for both sport fish and non-sport fish species.

5.3 Wildlife and Wildlife Habitat

5.3.1 Desktop Assessment

According to the FWMIT (searched September 2022), the project area does not occur within the ranges of any sensitive species. A one-kilometer area, centered on the watercourse crossing, was searched within the database, showing no confirmed observations of sensitive species in the area. The results of the database search are not intended as a final statement on the presence or absence of species within the area, or a substitute of on-site surveys.

The restricted activity period for breeding birds in this region (Nesting Zone B5) occurs from April 30th to August 31st (ECCC 2016).

5.3.2 Field Assessment

No bird nests were observed under the bridge structure. Bird habitat in the immediate area of the project footprint included tall grasses and shrubs in which small songbird species may nest.

No federally (SARA/COSEWIC) or provincially listed species were encountered during the field assessment conducted on August 3, 2022.

Photograph 1. Approximately 40 m upstream of the bridge crossing, looking upstream.

Photograph 2. Approximately 20 m upstream of the bridge crossing, looking downstream.

Photograph 3. Downstream side of bridge crossing, looking upstream.

Photograph 4. Approximately 40 m downstream of the bridge crossing, looking upstream.

Photograph 5. Approximately 80 m downstream of the bridge crossing, looking upstream.

Photograph 6. Approximately 170 m downstream of the bridge crossing, looking downstream.

Proposed Works, Potential Effects, Mitigation and Monitoring

5.3.3 Description of Proposed Works

The proposed project involves the complete removal of the existing three-span timber pedestrian bridge structure, followed by reclamation of the slopes. The proposed bridge removal will not require any in-water work (work below the ordinary high water mark), however some disturbance to the slopes above the high water mark will occur.

5.3.4 Potential Effects of Construction Activities

5.3.4.1 Impacts to Fish and Fish Habitat

Increased sedimentation into watercourses from disturbed upslope areas can have detrimental effects on fish and fish habitat. Suspended sediments impede gill function and thus compromise a fish's ability to exchange gas within the water column and can affect vision and predator/prey interactions. Also, settleable sediments can reduce the effectiveness of habitat by filling interstitial spaces in substrates smothering eggs and emerging alevins, cutting off their access to oxygenated water.

5.3.4.2 Impacts to Wildlife and Wildlife Habitat

Direct habitat loss will result from any vegetation clearing associated with construction activities within the footprint and removal of the bridge. Wildlife sensory disturbance and habitat avoidance may occur during construction as a result of increased human activities (equipment operation, site inspections and increased traffic). Indirect habitat loss from sensory disturbance has the potential to persist through construction, but is not anticipated to continue or increase after completion given the existing sensory disturbance which is present from the road traffic.

5.4 Mitigation

The following recommendations can mitigate the potential impacts listed above.

5.4.1 Fish and Fish Habitat

- **Equipment working in or near water** – All equipment must be thoroughly cleaned and checked for proper mechanical operation (e.g. free of leaks) prior to initiating work in or near a watercourse. Biodegradable oils and lubricants should be used for all equipment entering the watercourse. To prevent the spread of AIS, particularly whirling disease, all project related equipment must be decontaminated according to relevant protocols found in AEPs Decontamination Protocol for Work In or Near Water (AEP 2020a). The project location falls within a Yellow Zone on the most current AEP map of Whirling Disease Decontamination Risk Zone (AEP 2020b), posing moderate risk. As such, protocols outlined in *Appendix D: Decontamination Instructions For Industrial And Construction Operations* (AEP 2020a) must be followed and records kept for decontamination of any

project-related equipment, if necessary. Project-related equipment must be clean when arriving on site.

- **Timing** – The timing of construction can mitigate many potential impacts. The aquatic RAP for this watercourse is September 1 - July 15, however, due to the occurrence of poor quality fish habitat near the project location and work occurring above bed and banks of the watercourse, construction activities occurring within the RAP are not predicted to cause harm to fish or fish habitat.

- **Construction Method** – An isolation technique is recommended to reduce sedimentation from construction activities, if water flow is present. A coffer dam or barrier composed of non-earthen material will be used to separate the work area from flowing water. Sandbags and plastic should be on-site to plug any leaks around the isolation structure. See the Canadian Association of Petroleum Producers *et al.* (2012) for more information on isolation techniques.

- **Sedimentation Control Measures** – disturbed areas upslope of stream banks should be replaced or rebuilt once construction is complete, such that slope stabilization is maintained and potential sedimentation and erosion is minimized. To mitigate any potential sedimentation from construction area, it is recommended that any exposed ground be stabilized with coconut matting to protect against short term sedimentation from runoff (silt fence may also be used). In addition, willow cuttings and rip rap should be installed along the bank to promote quick re-vegetation and long term stabilization of the banks. See Appendix C for the Temporary Erosion and Sediment Control Plan.

In addition to the above, all relevant measures outlined by DFO (2019b) in “Measures to Protect Fish and Fish Habitat” and the general best management practices for instream work, found in Section 6 of this report, should be followed.

Construction work using the recommended methods and practices, described herein, should cause no significant impacts on fish or fish habitat at the construction site or downstream. Adherence to these recommendations while undertaking all project activities will meet the requirements of clause (a) in Part 1, Schedule 2 of the *Code of Practice for Watercourse Crossings* (AEP 2019) and will avoid causing HADD of fish and fish habitat, in compliance with the *Fisheries Act* (DFO 2019a).

5.4.2 Wildlife and Wildlife Habitat

If construction activities are to occur within the restricted activity period for breeding birds in this region (Nesting Zone B5), from April 30 to August 31 (ECCC 2016), a breeding bird survey and nest sweep of the existing bridge structure and surrounding proposed disturbance area will be required no more than one week prior to construction activities commencing. If construction is anticipated to occur after August 31, nests may be removed unless birds are observed using the nest, in which case the nest regains an active status and must not be removed.

Given the limited size of the project footprint, and if appropriate mitigation measures are implemented, the impacts to wildlife can be minimized and are expected to be minor in extent and short in duration.

5.1 Monitoring

Environmental monitoring should be conducted by a QAES for all instream construction that occurs when water is present. Monitoring is conducted to identify sources of sedimentation and to assess immediate effects on the aquatic environment (AEP 2019). Monitoring is also part of due diligence, especially in regard to streams with potentially highly sensitive fish habitats or those that are considered highly important to people.

5.2 Residual Impacts

After the application of all mitigation measures and best practices, no residual impacts are anticipated for fish and wildlife or their habitat. No fish habitat will be altered from the current condition (project footprint below the ordinary high water mark). Considering the above, there is not expected to be any adverse effect on the productive capacity of any fish species that resides in the watercourse, and therefore, the project will not cause the death of fish or the harmful alteration of fish habitat.

5.3 Summary

An environmental assessment of the proposed bridge removal work was undertaken to provide input and recommendations from RC BioSolutions Ltd., a QAES and qualified wildlife biologist. Through the assessment, potential impacts to fish and wildlife (including impacts to habitat) were identified and addressed with appropriate mitigation measures and best practices recommended.

Measures and practices presented within this report were developed to satisfy legislative requirements to adhere to the relevant Alberta Code of Practice, and to avoid causing the death of fish and harmful alteration, disruption and destruction of fish habitat for all proposed project activities.

The following permitting related items are recommended:

- An Alberta *Water Act* Code of Practice Notification Form must also be submitted to AEP two weeks (14 days) prior to commencing construction.

The following construction related items are recommended:

- If the bridge and/or vegetation removal will occur from April 30 to August 31, a bird nest sweep should be completed no longer than 7 days prior to vegetation removal to comply with the *Migratory Birds Convention Act*.

6. Best Management Practices

6.1 Instream Work

The following general practices should be followed when conducting instream construction (with isolation):

1 *Pre-construction* – To minimize erosion potential, pre-construction clearing and grading should be kept to a minimum and existing roads, cut lines, trails, etc. should be used where possible. Adjacent to streams, trees and shrubs should be salvaged, where possible, and replanted during reclamation. Within 50 m of each bank, the construction ROW should be kept to a minimum. Unnecessary machinery and equipment should not be located within the riparian zone, or at a minimum of 10 m from the channel, to maintain an undisturbed vegetation buffer along the edge of the watercourse. All vehicles, equipment and machinery scheduled to work in and/or along a watercourse should be inspected and found to be clean, free of leaks and in good working condition. All wash water run-off and/or harmful materials must be appropriately controlled to prevent entry into the watercourse including the riparian zone. Refuelling of machinery should occur at least 100 m from the watercourse (AT 2009).

2 *Minimize the duration of instream work* – another consideration for minimizing impacts from instream work is considering the length of time instream work will be required.

3 *Sedimentation control planning* - Appropriate types and amounts of equipment, materials and trained personnel must be available at the work site at all times during the entire construction period to control potential sedimentation resulting from the works. Silt fences should be installed downslope of all exposed cuts and around spoil piles to reduce sediment from entering a watercourse.

4 *Secondary containment* - Any gasoline powered equipment such as pumps and generators must be entirely enclosed or set within a secondary containment structure that is large enough to completely contain all harmful materials should a spill, leak or overflow occur.

5 *Spill containment* - A spill containment kit should be kept on site and should be capable of handling petroleum products in flowing waters, as well as have the capacity to handle twice the potential volume of a spill.

6 *Rebuilding stream channel* - Channel and bank shape are critical to the integrity of the watercourse and watershed and should be rebuilt in such a way that the natural shape of the channel is replicated.

7 *Re-vegetation* - All exposed cuts should be re-seeded and re-planted with grasses and shrubs. Other bank protection methods include willow cuttings, vegetated geo-grids, live crib walls and tree revetments. Other permanent measures include anchoring erosion control materials (coco-matting, straw matting, geotextile fabric) to the ground surface of exposed areas, and armouring the banks with rock material (rip-rap) (may require prior DFO approval).

8 *Post construction clean-up -S*tockpiles of exposed soil formed during construction that are not used in the rebuilding of the bed or banks should be removed from the site to an area where they will not re-enter a watercourse.

9 *Post construction inspection* – Immediately following the competition of all construction activities and clean-up, the site should be inspected to document the existing condition. The site should be inspected again after the next annual high water event to identify any erosion issue.

7. References

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8. Glossary of Terms

Average Channel Width	Up to six measurements taken within each assessment area, from top of left bank to top of right bank, at right angles to water flow and excluding vegetated islands. Banks are defined as the lowermost extent of permanent rooted terrestrial vegetation.
Average Wetted Width	Up to six measurements within each assessment area of water surface at right angles to the water flow.
Bankfull Depth	Depth from the top of the bank to the channel bottom of the channel. It is measured using a line drawn from the top of the left to the top of the right bank. A meter stick is then used to measure the distance from the string to the channel bottom.
Bankfull Width	Channel width between the tops of the most pronounced banks on either side of a stream reach. Rooted vegetation to rooted vegetation.
Bank Height	Elevation from surface water level to level of bankfull width
Boulder	Channel substrate > 256 mm.
Channel Morphology	Structure and form of a stream channel.
Channel Width	The distance across a stream or channel as measured from bank to bank near bankfull stage. Same as bankfull width.
Clay	Substrate size < 0.002 mm.
Cobble	Substrate size 64 to 256 mm.
Confinement	Degree to which the lateral movement of a river channel is limited by relic terraces or valley walls.
Crossing Site	Proposed location at which the watercourse will be crossed. Unless otherwise stated, assumed to be approximately 20 m in width.
Crown Closure	The percentage of stream-side riparian vegetation that projects over the stream channel and is higher than 2 m above the water surface. This is estimated from ground survey.
Deep Pool	Pool of water within a watercourse with adequate flow in the winter that may provide potential overwintering habitat for fish.
Discharge	Flow of a watercourse calculated using stream wetted width, depth, and velocity (m^3/s)
Ephemeral Watercourse	Watercourse with water flowing only periodically throughout the year such as during or immediately after rainfall, snowmelt or springs. Little or no channel development is present and the channel is usually vegetated (Fisher et al. 1989). Fish and fish habitat assessments are typically not conducted for ephemeral watercourses as they do not meet the definition of a water body under the Alberta Codes of Practice and they do not contain fish habitat at any time of the year.
Fines	Substrate size < 2 mm.
Fish and Wildlife Management	Stores fish and fish habitat data derived from various data collections within Alberta.

Information System (FWMIS)	
Gradient	The slope or rate of drop per unit of length.
Gravel	Substrate size 2 – 64 mm.
Intermittent Watercourse	Watercourse with water flowing only periodically throughout the year (during or immediately after rainfall, snowmelt). Distinct channel development is present with defined bed and banks. Channel is usually non-vegetated.
Large Permanent Watercourse	Watercourse with water flowing continually throughout the year. Distinct channel development consisting of well-defined bed and banks. Channel is typically non-vegetated with a width greater than 5 m and often contained within a large valley with a well-defined floodplain.
Left Upstream Bank (LUB)	The bank on the left side of the watercourse when looking upstream.
Operational Statements (OPS)	Alberta Operational Position Statement for Pipeline Crossing Methods in Alberta provided by Department of Fisheries and Oceans
Organic	Partially decomposed animal and/or plant materials.
QAES	Qualified Aquatic Environment Specialist as per the Alberta Codes of Practice.
RIC Standards	Standards set by the BC Fisheries Information Service Branch for the Resources Inventory Committee as set in the Reconnaissance (1: 20 000) Fish and Fish Habitat Inventory: Standards and Procedures (April 2001).
Right Upstream Bank (RUB)	The bank on the right side of the watercourse when looking upstream.
ROW	Pipeline or road right-of-way
Sand	Substrate size 0.06 to 2 mm.
Silt	Channel substrate 0.002 to 0.06 mm in size.
Small Permanent Watercourse	Watercourse with water flowing continually throughout the year. Distinct channel development consisting of well-defined bed and banks. Channel is typically non-vegetated with a width ranging between 0.5 to 5.0 m and often contained within a small valley with a well-defined floodplain.
Sportfish	Species of fish sought by recreational anglers.
Stage	State of current discharge, amount of water passing through the channel at time of observation.
In Stream Cover	Any structure in the wetted channel or within 1 m above the water surface that provides hiding, resting, or feeding places for fish.
Water Body	As defined by the Alberta Codes of Practice, a water body consists of a watercourse with distinct channel development consisting of defined bed and banks whether or not water is continuously present. This definition does not include ephemeral watercourses, fish bearing lakes, or fens and muskeg without distinct channel development (defined bed and banks)
Watercourse Classification	Class A. Highest sensitivity; habitat areas are sensitive enough to be damaged by any type of

	activity within the water body; known habitats in water body critical to the continued viability of a population of fish species in the area.
	Class B. High sensitivity; habitat areas are sensitive enough to be potentially damaged by any type of activity within the water body; habitat areas important to continued viability of a population of fish species in the area.
	Class C. Moderate sensitivity; habitat areas are sensitive enough to be potentially damaged by unconfined or unrestricted activities within the water body; broadly distributed habitats supporting local fish species populations.
	Class D. Low sensitivity; fish species as defined under the Code of Practice are not present.
Wetland	Transitional lands between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. For this classification, wetlands must have one or more of the following three attributes: (l) at least periodically, the land supports mainly hydrophytes (aquatic plants), (2) the substrate is mainly undrained hydric (moist) soil, and (3) the substrate is saturated with water or covered by shallow water at some time during the growing season each year.
Wetted Width	Width of the wetted portion of the stream channel.

Appendix A

Fish Habitat Rating System

Table A-1. Habitat Type, Cover Features, and Hydraulic Control Definitions (Northern River Basins Study 1994).

HABITAT TYPE DESCRIPTIONS					
Habitat Type	**Water Depth**	**Water Velocity**	**Flow Characteristics**	**Substrate**	**Surface**
Riffle (RF)	<0.5 m	High (0.5 to 1.0 m/s)	Turbulent	Coarse	Irregular Broken
Class 1 Run (R1)	>1.0 m	Moderate to high (0.05 to 1.0 m/s)	Moderate turbulence	Coarse	Irregular Rarely broken
Class 2 Run (R2)	0.5 to 1.0 m	Moderate to high (005 to 1.0 m/s)	Moderate turbulence	Coarse	Irregular Rarely broken
Class 3 Run (R3)	<0.5 m	Moderate (0.05 to 0.75 m/s)	Moderate turbulence	Coarse	Irregular Rarely broken
Class 1 Pool (P1)	>1.0 m	Low, variable (0.05-0.3 m/s)	Low turbulence, some back eddy	Variable	Smooth
Class 2 Pool (P2)	0.5 to 1.0 m	Low, variable (0.05-0.3 m/s)	Low turbulence, some back eddy	Variable	Smooth
Class 3 Pool (P3)	<0.5 m	Low, variable (0.05-0.3 m/s)	Low turbulence, some back eddy	Variable	Smooth
Class 1 Flat (F1)	>1.0 m	Low (<0.05 m/s)	Laminar	Fines	Smooth
Class 2 Flat (F2)	0.5 to 1.0 m	Low (< 0.05 m/s)	Laminar	Fines	Smooth
Class 3 Flat (F3)	<0.5 m	Low (< 0.05 m/s)	Laminar	Fines	Smooth
Cascade (CA)	<0.5 m	Highly variable (0.5 to 1.5 m/s)	Very turbulent	Very coarse	Irregular, broken
Rapids (RA)	>0.5 m	High (>1.0 m/s)	Very turbulent	Very coarse	Irregular, broken
Chutes (CH)	<0.5 m	High (>1.0 m/s)	Shooting	Bedrock	Irregular
Snye (SN)	Variable	None (0)	None	Variable, high in Fines	Smooth
COVER FEATURES					
Woody Debris (WD)		Large or small, in stream woody debris			
Overhanging Bank (OB)		Undercut, overhanging bank			
Overhanging Vegetation (OV)		Overhanging terrestrial vegetation (within 1 m of water surface)			
Aquatic Vegetation (AV)		Dense, well distributed aquatic vegetation providing cover			
Boulder Garden (BG)		Dense, well distributed boulders or large cobble providing cover			
HYDRAULIC CONTROLS					
Falls (FA)	Vertical drop, usually impassable to fish				
Ledges (LG)	Bedrock outcrops forming hydraulic controls				
Log Ledge (LL)	Large woody debris forming a hydraulic jump, typically with a scour pool beneath				
Beaver Dams (BD)	Beaver dams				
Log Jam (LJ)	Accumulation of woody debris across channel with water flowing through				

Table A-2. Substrate Types and Description (Resource Inventory Committee 2001)

Type	Bedrock	Boulder	Cobble	Gravel	Fines
Abbreviation	BR	BL	CB	GR	FN
Size (mm)	n/a	>256	64-256	2-64	<2

Table A-3. Substrate Embededdness Rating (Platts *et al*. 1983)

Rating	Percent Coverage with Fines
1 (low)	0-25% of surface covered with sediments
2 (moderate)	25-50% of surface covered with sediments
3 (mod to high)	50-75% of surface covered with sediments
4 (high)	75+% of surface covered with sediments

References

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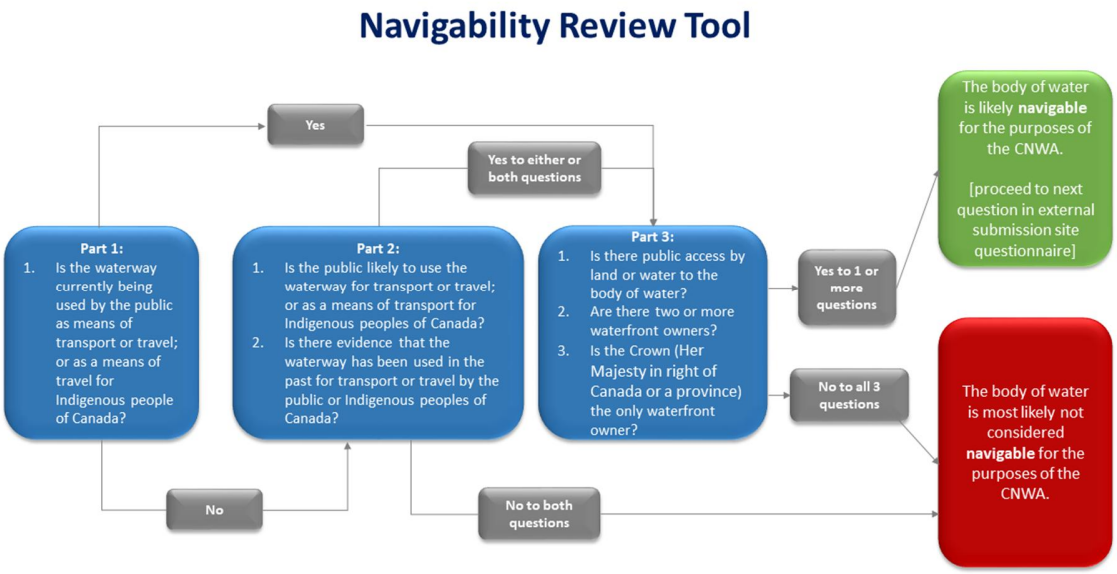
Appendix B

Transport Canada Navigability Review Tool



Available at: https://wwwapps.tc.gc.ca/Prog/3/NWAR-RLEN-E/Content/EN_Decision_Tree.png

Appendix C

Temporary Erosion and Sediment Control Plan

Erosion and sediment control measures will be put in place to minimize sediment transport into the waterbody and reduce dust during various phases of the Project. Erosion and sediment control measures will be maintained until disturbed ground has been re-stabilized, suspended sediment has re-settled to the bed of the waterbody, and runoff water is clear.

The temporary erosion and sediment control plan for the Project comprises the following mitigation measures:

- Instream work will be minimized.
- Conduct all in-water works, undertakings or activities in isolation of open or flowing water to reduce the introduction of sediment into the watercourse.
- Monitor the watercourse to observe signs of sedimentation during all phases of the work, undertaking or activity and take corrective action.
- Work will be temporarily suspended in the event of weather that could increase the potential for erosion and sedimentation.
- Erosion and sediment control measures (e.g., silt fencing) shall be properly installed prior to commencing work that may result in sediment entering the watercourse. See BMP #1 (AT 2011), below, for specific instruction on silt fence installation.
- Only materials free of fines and debris shall be used for construction.
- Erosion and sediment control measures will be regularly inspected until disturbed ground has been re-stabilized.
- Damaged erosion and sediment control structures will be repaired immediately.
- Non-biodegradable erosion and sediment control structures will be removed once the site is stabilized.
- Disturbance to the banks of the watercourse will be minimized.
- The site will be stabilized and reclaimed to pre-construction conditions as quickly as possible. This will involve seed planting to promote re-vegetation, using an appropriate seed mix for the project location.
- Excavated materials and debris will be placed above the ordinary high-water mark, and in such a way that they do not enter the watercourse.
- Surface drainage controls will be implemented, if required.

Permanent erosion and sediment control for the Project will consist of the installation of rip-rap near the bridge piers, to inhibit erosion and increase the life of the bridge structure. See BMP#14 (AT 2011), below, for specific instructions on rip-rap installation.

References

Alberta Transportation (AT). 2011. Erosion and Sediment Control Manual. Queen's Printer. Edmonton, Alberta.

Silt Fence Sediment Control	B.M.P. #1

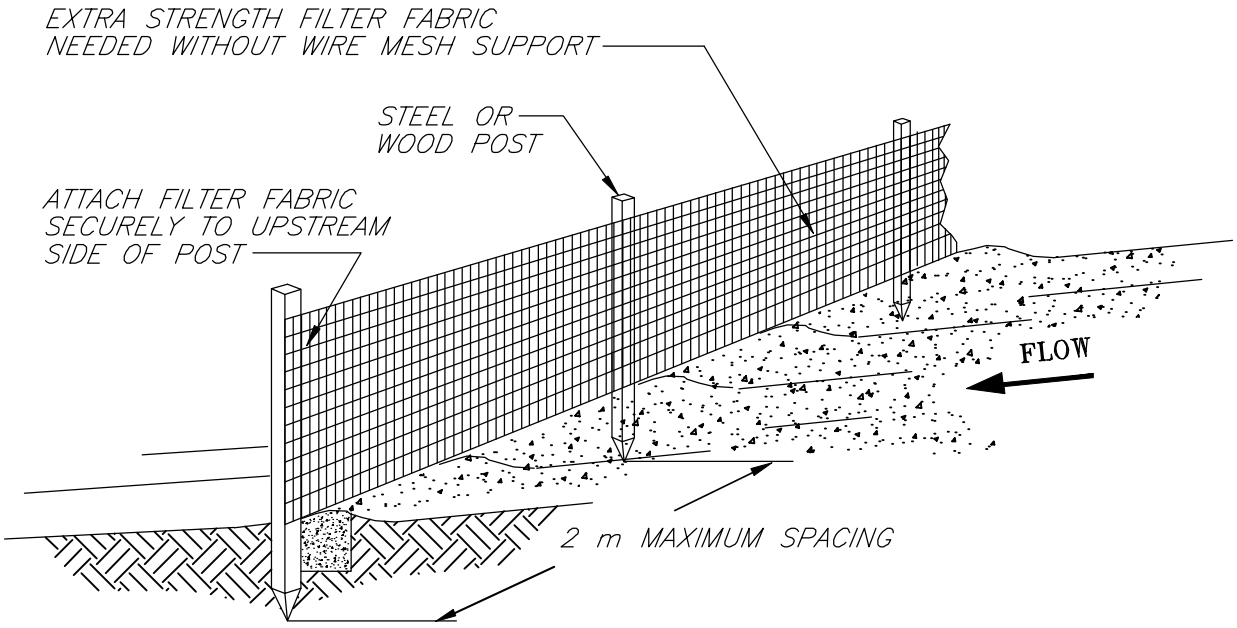
- Sediment build up should be removed once it accumulates to a depth of 0.2 m
- Remove fence after vegetation is established
- Deactivate fabric by cutting-off top portion of fabric above ground; bottom trenched-in portion of fence fabric can be left in-ground thus minimizing ground disturbance

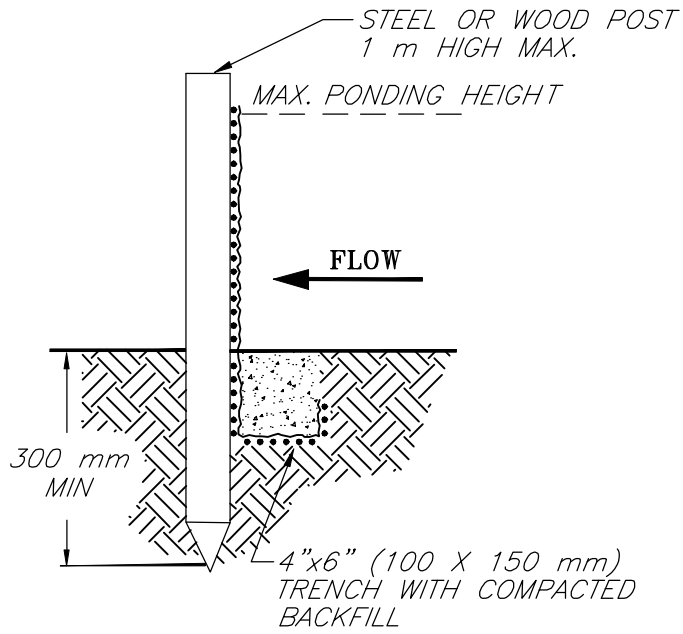
Similar Measures

- Straw Bales
- Rock Barrier
- Permeable/Synthetic Barriers

Design Considerations

- For a silt fence system to work as a system, the following factors should be considered:
  a) quantity – adequate number and frequency of fence for efficient ponding and sedimentation
  b) installation – workmanship
  c) compaction – backfill and trenching of fabric
  d) support – posts adequately embedded, appropriate selection of post material and spacing
  e) attachment – secure fabric to post
- Install silt fences in a 'J' hook or 'smile' configuration





TRENCH METHOD DETAIL

NOTES:

1. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
2. INSPECT AND REPAIR FENCE DAILY AND AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN ACCUMULATED SILT REACHES 200 mm.
3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA WILL NOT CONTRIBUTE SEDIMENT OFF-SITE.
4. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

NOT TO SCALE

SILT FENCE

(TRENCH METHOD)

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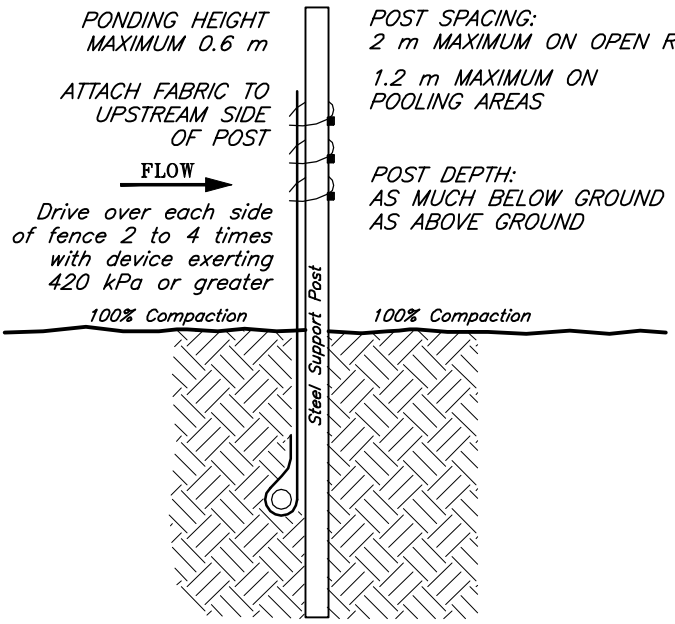
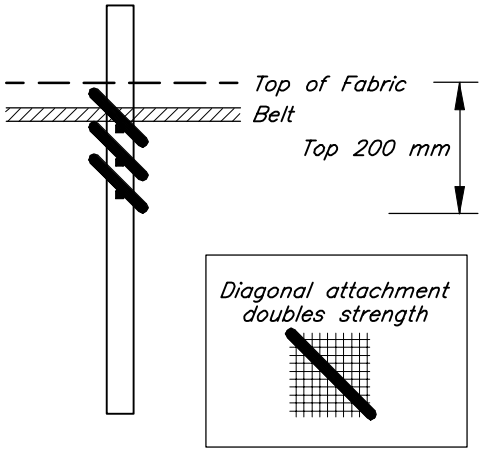


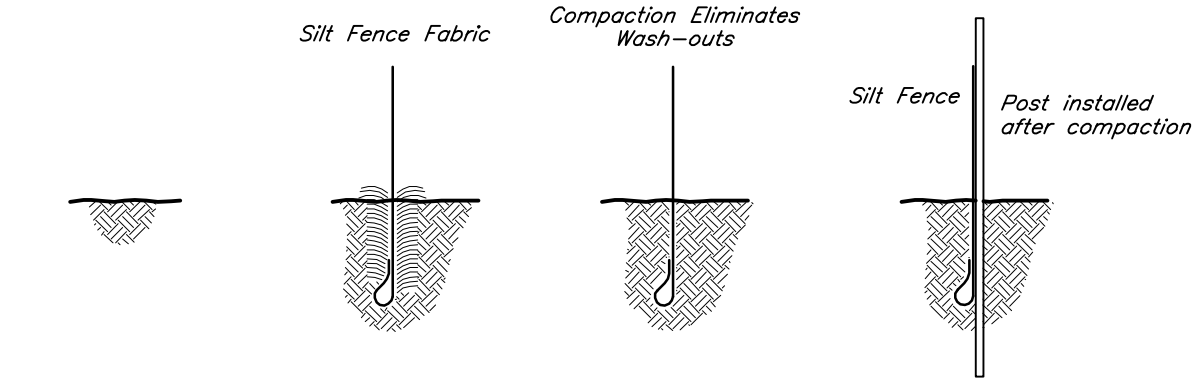
NO MORE THAN 0.6 m OF A 0.9 m FABRIC
IS ALLOWED ABOVE GROUND



ATTACHMENT DETAILS:

- Gather fabric at posts, if needed.
- Utilize three ties per post, all within top 200 mm of fabric.
- Position each tie diagonally, puncturing holes vertically a minimum of 25 mm apart.
- Hang each tie on a post nipple and tighten securely.
- Use cable ties (50 lbs) or soft wire.

MECHANICAL (SLICING) METHOD



a) Before Installation

b) During fabric insertion. Disrupted soil.

c) After Compaction. Greater stability.

d) Completed Installation

MECHANICAL (SLICING) METHOD INSTALLATION SEQUENCE

NOTES:

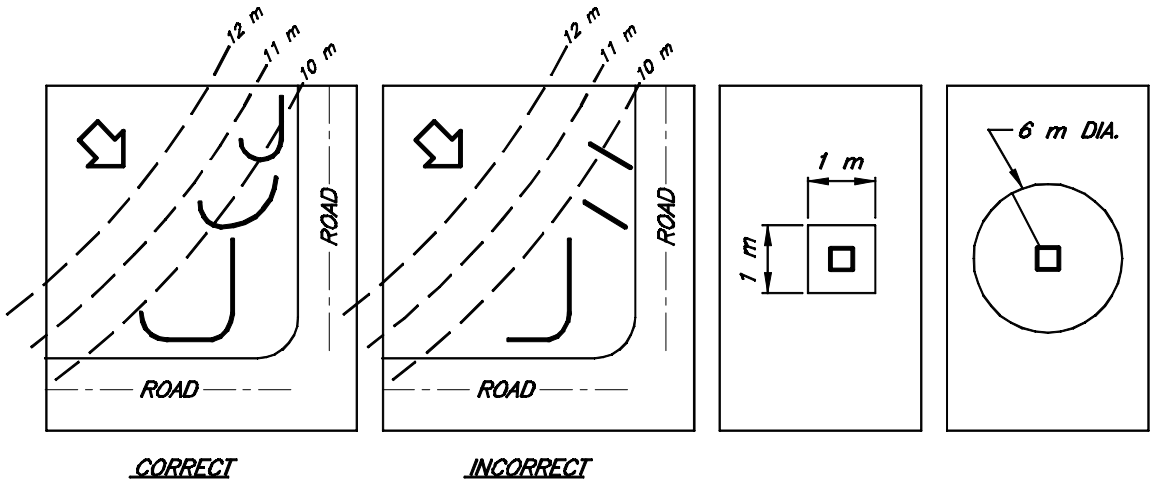
1. INSTALLATION MACHINE MUST ALLOW CONTINUOUS SLICING AND EMBEDMENT OF GEOTEXTILE INTO GROUND WITH MINOR GROUND DISTURBANCE.
2. INSTALLATION MACHINE TYPES WILL VARY WITH MANUFACTURER.
3. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

NOT TO SCALE

SILT FENCE

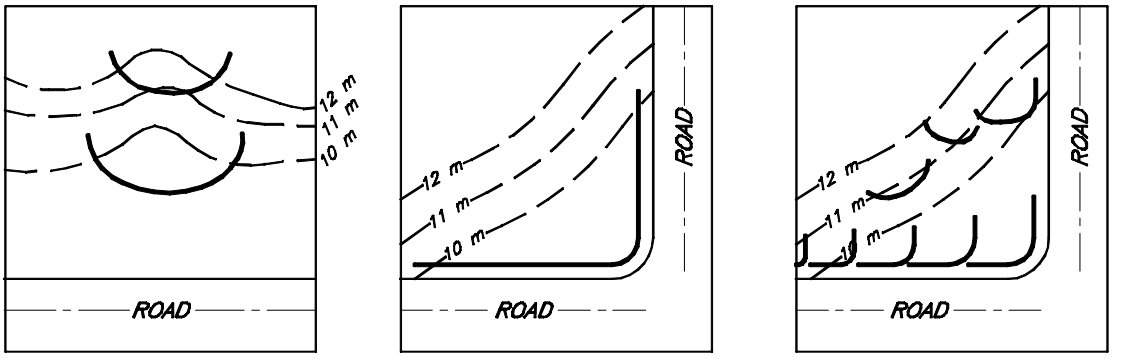
(MECHANICAL METHOD)

SOURCE: CARPENTER T. 2000



"J" CONFIGURATION

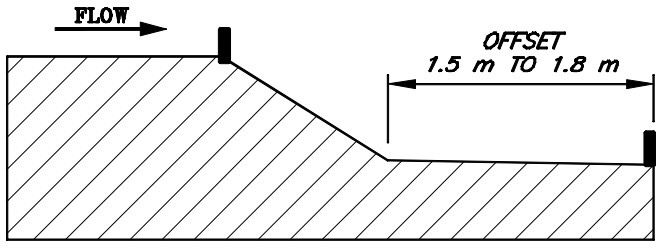
SILT FENCE BARRIER AT STORM INLET



"SMILE" CONFIGURATION

AVOID LONG INSTALLATION

COMBINATION OF "SMILE" AND "J" CONFIGURATIONS



LOCATION AT TOP AND BOTTOM OF SLOPE

NOT TO SCALE

NOTE:

1. THIS FIGURE IS PROVIDED FOR GUIDANCE ONLY AND DOES NOT CONSTITUTE A DESIGN. A SITE SPECIFIC DESIGN IS REQUIRED FROM DESIGNER/ENGINEER.

SOURCE: CARPENTER T. 2000

SILT FENCE
(CONFIGURATION PLAN)