McElhanney

CANADA BEST MANAGED COMPANIES

Technical Memo Phase 2: Highway 97 Cottonwood Slide Project, Quesnel, BC

January 2024 | Revision R0

Submitted to: Ministry of Transportation and Infrastructure
Prepared by McElhanney Ltd.

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Revision Summary

Revision Number	Revision Date	Description
R0	2024-01-17	First Draft

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Contents

Appendices

Acronyms Used

AQP	Appropriately Qualified Professional
BC	British Columbia
BMPs	Best Management Practices
CEMP	Construction Environment Management Plan
DFO	Fisheries and Oceans Canada
EIA	Environmental Impact Assessment
EM	Environmental Monitor
ESC	Erosion and Sediment Control
MSE	Mechanically Stabilized Earth
MBCA	Migratory Birds Convention Act
MOE	Ministry of Environment
NTU	Nephelometric Turbidity Units
QEP	Qualified Environmental Professional
ROW	Right of Way
SARA	Species at Risk Act
SBPIS	Standards and Best Practices for Instream Works
SDS	Safety Data Sheets
SPEA	Streamside Protection and Enhancement Areas
TDG	Transportation of Dangerous Goods
TSS	Total Suspended Solids
WSA	Water Sustainability Act

1. Introduction

This Technical Memo (report) was undertaken for the Ministry of Transportation and Infrastructure (MoTI) (the Client) in support of the proposed works for the Highway 97 Cottonwood slide construction, Phase 2 of the road alignment. The project is located along Highway 97, approximately 20 km north of Quesnel, British Columbia (BC) (*Figure 1*). The slide has been impacting Highway 97 and the Canadian National Railway (CN) upslope of the Highway since 2020. Triton Environmental Consultants (Triton) have completed a previous desktop review for this project: *Preliminary Environmental Sensitivities for the Highway 97 Cottonwood Slide Project* (2021). The majority of the background information for the project area is within Triton's report.

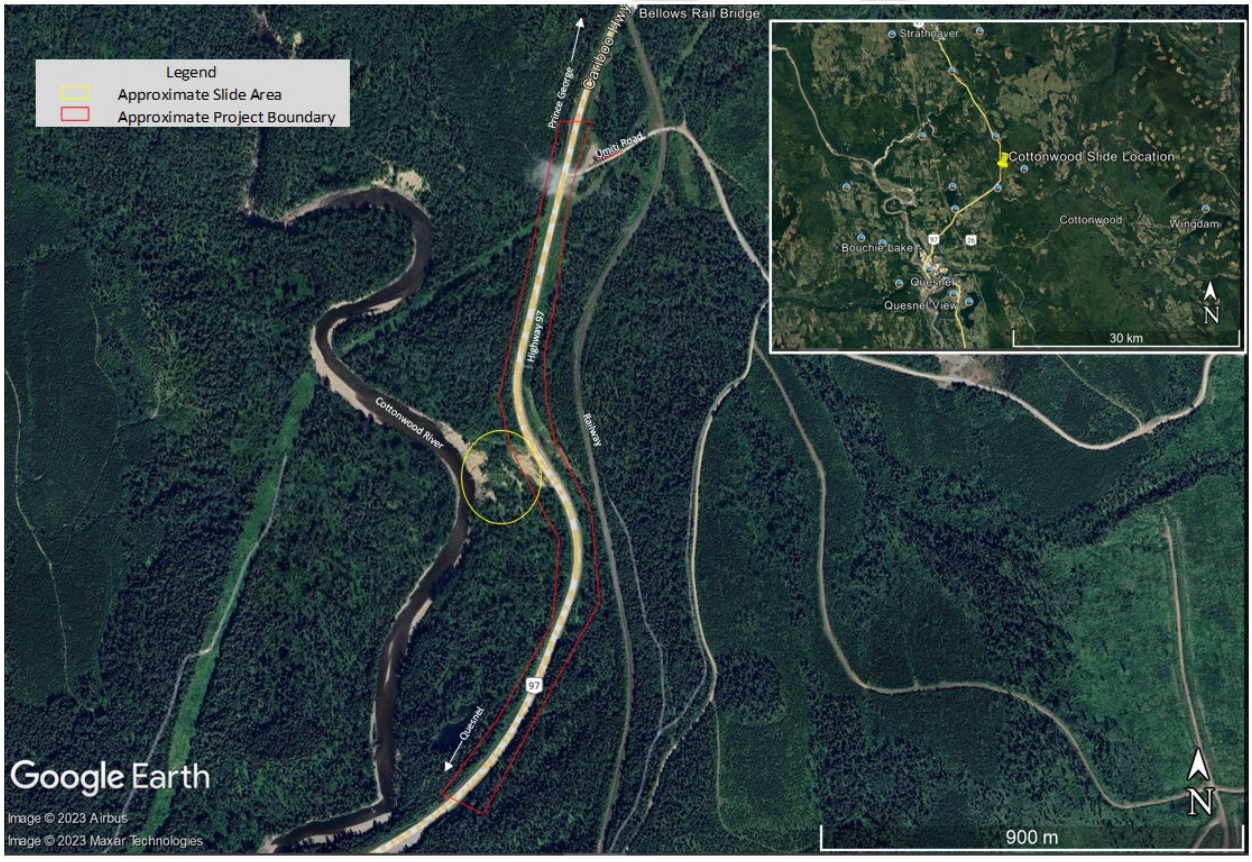

Figure 1. The Project location approximately 20 km from Quesnel with proposed construction area (outlined in red) (Google Earth 2023).

2. Project Description

To repair the Cottonwood Slide area a few phases of work were required. As of 2023 the instream work in the Cottonwood River has been completed. At this stage the proposed work includes repairs and slight realignment of Highway 97 for approximately 1.5 km. This report will be an addition to the existing

information provided in Triton's 2021 report, as an alignment was chosen, a site visit completed by a biologist and Appropriately Qualified Professional (AQP), and it will note any updated desktop information. Supplemental information is included in the appendices with Photographs in *Appendix B*, Detailed Engineering Design *Appendix C,* and Triton's Environmental Report as *Appendix D*.

3. Environmentally Valuable Resources

Triton's 2021 report includes much of the information on the environmentally valuable resources in the project area including information on fish and fish habitat, vegetation, invasive species, species at risk, and other wildlife. This section will elaborate on the site visit, and any new information that is to be added to Triton's report.

3.1. SITE VISIT

An onsite environmental assessment was completed in November 2023 by a McElhanney Environmental Professional (RP Bio) and AQP. The site visit focused along the northern section of the alignment on the east side of Highway 97 where much of the realignment will occur. The proposed project area is mostly within the existing Highway 97 alignment or has been previously disturbed to some extent along the side of the existing Highway 97.

Within the project area was the existing highway and previously disturbed areas not populated by the coniferous trees dominating the neighboring areas. Vegetation species present within the proposed alignment at the time of the visit included reed canary grass (*Phalaris arundinacea*), alder (*Alnus* spp.), trembling aspen (*Populus tremuloides*), red osier dogwood (*Cornus sericea*), moss species, black cottonwood (*Populus trichocarpa*), and bunchgrass species. A wildlife tree was identified with multiple holes bored into the tree, but no nests. Although relatively natural there were no significant environmental concerns to limit the proposed construction.

3.2. DESKTOP UPDATES

A review of Habitat Wizard was completed to ensure no new occurrences had been mapped since 2021 at the time of Triton's report. In this review it was noted that critical habitat for the federally listed species Woodland Caribou (Southern Mountain Population) (*Rangifer tarandus*) was onsite (BC MOE, 2023). Caribou are red[1] listed in BC, and are Threatened[2] under Schedule 1 of the Species at Risk Act. Although the project area is mapped as critical habitat, existing permanent features such as roads, trails, and buildings are not considered components of critical habitat, even if they are within the mapped polygons (GOV, 2014). As the alignment of the highway is shifting minimally the works are unlikely to impact critical habitat for caribou. In addition, the project area is along the very edge of the critical habitat polygon, making occurrences and presence of critical habitat features less likely. It would likely be possible to rule out the project area as critical caribou habitat. Best management practices (BMPs) should be applied during construction for Caribou to ensure potential impacts to this species are mitigated. BMPs are included in Section 5.2.1.1.

[1] Red listed: a native species, subspecies or ecological communities that have, or are candidates for, extirpated, endangered or threatened status in BC.
[2] Threatened: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

4. Applicable Environmental Legislation

The BMPs presented in this technical memo are intended to meet the requirements of applicable legislation enforced by several legal authorities and their regulatory agencies. The Ministry of Forests (MoF) is the provincial body responsible for the management of fish, and wildlife, and the Ministry of Water Land and Resource Stewardship (MWLRS) for vegetation, and land-based resources. Fisheries and Oceans Canada (DFO) and Environment and Climate Change Canada hold the equivalent responsibilities at a federal level. Relevant legislation and guidance documents are outlined in the following sections.

Applicable environmental legislation was reviewed to determine potential permitting requirements to facilitate the work. All work must comply with the conditions of regulatory agency approvals and permits obtained to proceed with construction activities.

No permits were identified as being necessary for the proposed workplan.

4.1. FEDERAL

4.1.1. Fisheries Act

The Federal *Fisheries Act* (Canada 1985) and supporting policies aim to protect and manage all fish and fish habitats by providing protection against the death of fish, other than by fishing and the harmful alteration, disruption, or destruction of their habitat. The *Fisheries Act* regulates activities that affect fish or fish habitat including permanent alteration or destruction of habitat and deposition of deleterious substances into fish-bearing waters. **No work is proposed near water for the proposed construction**.

4.1.2. Species at Risk Act

Federal lands are subject to the protection of species listed under Schedule 1 of the *Species at Risk Act* (*SARA*) as extirpated, endangered, or threatened (Canada 2002). It is an offence to kill, harm, harass, capture, or take an individual, and that species has legal protection related to the species' residence and critical habitat as specified in *SARA*. Potential habitat for *SARA* protected species in and around the site should be considered, including for woodland Caribou that have critical habitat within the project area. Adherence to this Act can typically be achieved by implementing BMPs during construction. **BMPs for caribou should be applied for the duration of construction.**

4.1.3. Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) (Canada 1994) prohibits the disturbance, destruction, or possession of migratory birds, their nests, or eggs. Migratory bird habitat is protected under the MBCA which prohibits the deposit of oil, oily waters, or other substances harmful to migratory birds in any areas that they frequent.

Vegetation clearing within the bird breeding window may be required. **The contractor's AQP or local Indigenous Communities under a Letter Agreement shall be engaged to complete a pre-clearing or pre-construction survey, if clearing or ground disturbance is to occur within the bird breeding season for the A4 zone (April 18 to August 18) to ensure that no birds, their eggs and/or their active nests are disturbed.**

4.2. PROVINCIAL

4.2.1. Wildlife Act

The Provincial *Wildlife Act* (BC 1996b) is the primary provincial statute which provides broad protection to all wild vertebrates. Section 34 protects birds and their nests during the bird breeding season as well as the nests, nest trees and eggs of certain species designated species all year.

Adherence to this Act can typically be completed using BMPs. Vegetation clearing outside of the bird breeding window is recommended. The provincially designated bird breeding least risk window for passerines is September 1 to February 28 (MOE 2014). Clearing of vegetation during the bird breeding season, will require an active nest survey by a AQP to determine that no breeding birds or their nests will be impacted by the clearing. Providing that there are no active nests on the site or presence of nests which have year-round protection, or if clearing is conducted outside of the bird breeding window, no specific permitting will be required. The provincial Wildlife Act Designation and Exemption Regulation (BC 2014a) outlines exemptions from permitting required under the *Wildlife Act* for nuisance wildlife.

Anticipating that wildlife "sweeps" and establishment of work zone isolations will suffice based on available habitat and project complexity, salvage permits for listed amphibians should be obtained by the AQP overseeing construction with ample and sufficient time to allow for permit processing. In this manner, additional samplers may be added to the permit, such as those AQPs hired by the contractor to complete the works.

4.2.2. Water Sustainability Act

Changes in and about a stream require either a Notification or an Approval from the MWLRS. Notifications for minor works to the Province under Section 11 of the *Water Sustainability Act* (BC 2014b) require a 45-day lead time prior to the commencement of construction. Instream works that require Approvals for watercourse alterations can take up to 18 months. Compliance is required with all terms and conditions outlined by applicable provincial and federal legislation, by a provincial Habitat Officer, and by applicable best management practice guidance documents. **No in water works are proposed for this phase of construction and therefore no permitting is required.**

4.2.3. Weed Control Act

The Provincial *Weed Control Act* (BC 1996a) regulates control of designated noxious plant species. The Act imposes a duty on all landowners and tenants to control designated noxious plants on their property. Should invasive species be encountered within the Project footprint, they must be handled, buried and/or transported in such a way as to prevent spread and proliferation into other areas and disposed of at an authorized facility.

5. Mitigation and Best Management Practices

Mitigation strategies to reduce negative impacts associated with the proposed work are recommended in the following sections. A more detailed Construction Environmental Management Plan (CEMP), specific to the contractor's approach, should be completed by the contractor's AQP and accepted by MoTI prior to the commencement of construction.

5.1. VEGETATION MANAGEMENT

All necessary vegetation and tree clearing will be the responsibility of the Contractor and as such the following BMPs will be in place prior to and during this construction activity.

5.1.1. Tree and Vegetation Protection and Removal

When removing trees and vegetation the Contractor will ensure that the following BMPs will be implemented:

- Only trees and areas that have been approved for construction will be cleared.
- Areas will be clearly marked, protected by temporary fencing, and conserved.
- Strategic scheduling of clearing activities to minimize areas of erodible soil surfaces at any given time while pursuing works to completion as quickly as possible once started.
- Limit the extent of vegetation clearing as much as possible.
- Ensure that equipment used for vegetation removal complies with BMPs for deleterious substance control.
- Schedule vegetation removal within the window of least risk for breeding birds, wherever possible.

5.1.2. Noxious Weeds and Invasive Plant Handling

According to the Triton report (2021) invasive species onsite included field scabious (*Knautia arvensis*), spotted knapweed (*Centaurea biebersteinii*), Canadian thistle (*Cirsium arvense*), common tansy (*Tanacetum vulgare*), and oxeye daisy (*Leucanthemum vulgare*). Photographs of the invasive species are included below and the credit for all photographs is to the Invasive Species Council of BC (2024).

Photograph 1. Field Scabious

Photograph 2. Spotted Knapweed

Photograph 3. Canadian Thistle

Photograph 4. Common Tansy

Photograph 5. Oxeye Daisy

Due care should be taken to protect the Site and surrounding area from the introduction of invasive plants during construction. Mitigation measures in the Contractor's CEMP should include at minimum:

- All equipment brought on site is thoroughly cleaned (e.g., remove dirt from other work sites that has accumulated on the tracks, undercarriage, tires) prior to arrival and departure.
- Keeping equipment and vehicles clean to prevent tracking of soil on or off site,
- Providing fill and topsoil clean of seeds of invasive species, and
- Treatment of nearby infestations.
- Stabilize bare soils and prevent the establishment of invasive species in newly disturbed areas. If vegetative cover is used to stabilize bare soils, the use of only locally appropriate native species is recommended.

- Check clothing and footwear for seeds or plant matter and, if materials are detected, remove and segregate as to not infest the area.
- Use established roads/tracks to prevent access to potentially weed infested areas.
- Areas requiring clearing and grubbing should be screened for the presence of invasive plants. If invasive species are identified, they should be flagged, removed, segregated, and transferred under cover to a facility capable of accepting such material (i.e. transfer station).
- Know the origin of gravel or other fill used and that it is free of invasive plant species, invasive plant seeds, or rhizomatous plant parts. Avoid using fill from known sites of invasive plant infestation.
- Areas of known locations of noxious weeds will be clearly marked to prevent unintentional disturbance.
- Noxious weeds and invasive plant species that are encountered and are to be removed prior to construction activities, including all roots and shoots, per BMP. Above ground plants are to be bagged to prevent spread or disbursement and removed from site for incineration at an approved facility, and roots will require excavation for most noxious weed species as well. An invasive species management plan is recommended.

A full list of noxious and undesirable weeds and exotic / introduced plants and control measures are available from the BC Ministry of Agriculture as mandated by the provincial BC *Weed Control Act* (BC 1996b).

The Contractor will include species specific management measures in their CEMP. The development of long-term objectives and priorities is needed to address effective invasive species management.

5.1.3. Site Restoration

Where appropriate, disturbed areas should be revegetated to prevent surface erosion upon completion. Temporary surface protection may be warranted, as outlined in the subsequent section. All temporary controls (non-biodegradable) must be removed prior to demobilizing from the site.

5.2. WILDLIFE AND WILDLIFE HABITAT MANAGEMENT

Construction of the project will require the implementation of provincial guidelines and BMPs to comply with federal and provincial environmental protection legislation. It is recommended that the Contractor hire an AQP to monitor works to mitigate potential risk to wildlife, and the general environment. **A wildlife sweep of the immediate area (site plus 100 m) should be conducted prior to construction by an AQP.** Any important wildlife features including, active nests, mineral licks, and hibernacula must be marked, and appropriate minimum buffer distances established (e.g., 30 m around active songbird nests). In addition to the use of buffered setbacks, timing restrictions for the species identified must be considered.

Prior to any disturbance within riparian areas (the beaver pond), a work zone should be established and isolated with sediment fencing, as directed by the Contractor's AQP, which may serve dually for sediment control and wildlife isolation (e.g., amphibian and reptile exclusion). The CEMP will outline appropriate mitigations measures for work zone isolation as well as the species targeted in wildlife sweeps. Salvage activities must be undertaken only under **valid wildlife handling permits** received from the appropriate agencies.

5.2.1. Wildlife Interactions

A zero-tolerance policy regarding the feeding of wildlife should be implemented to reduce interactions or conflicts. All domestic and food waste must be securely stored in an appropriate bin (to minimize odours and limit accessibility) until it is possible to safely dispose of it at an approved waste disposal site. The wildlife should not be harassed, including yelling, or trying to engage in order to get a photograph. Follow posted speed limits to avoid wildlife/vehicle collisions.

If necessary, steel plates will be placed over any excavations to be left open overnight. If any wildlife becomes trapped in an excavation despite the presence of the plates, work will be delayed until the wildlife can be captured and safely relocated to a suitable location outside the work site. Wildlife handling and removal will require a call to the Conservation Officers Service (Provincial) at 1-800-663-7867, or a local animal protection society (for dogs and other domesticated animals) or other qualified wildlife professional.

5.2.1.1. Woodland Caribou

Woodland Caribou are red-listed and a protected species in BC. Construction personnel need to be familiar with this species and be able to identify them if present onsite. If any Caribou are observed during construction they should be left alone, and a stop work order put in place until the Caribou have passed. In the case of an interaction or presence of Caribou the contractor's AQP, and MoTI should be notified. Prescence of Caribou onsite may trigger development of a mitigation plan. If critical habitat is not ruled out on the site the following BMPs should be followed (MFLNRO, 2014):

- No work during the critical calving and overwintering period of January 15 to July 15.
- Avoid/minimize surface disturbance, vegetation clearing, forest harvesting and development activities that directly reduce or impact abundance of arboreal or terrestrial lichens.
- Maintain known and potential wildlife features (mineral licks and associated wildlife trails) in a natural state and ensure caribou have access to them.
- Protect and avoid degradation to wetland habits.
- Reduce project related noise.
- Have a QEP onsite during construction activities.
- Implement a program to monitor wildlife sightings and ensure that a stop work order is in place in the event that caribou are observed within the development area.
- Restore habitat as soon as possible following development.
- Facilitate the re-establishment of lichens in appropriate habitat.
- When clearing land, prevent establishment and spread of invasive species by re-vegetating disturbed areas as soon as possible using native plants.

5.2.2. Least Risk Timing Windows for Breeding Birds

Vegetation clearing and loud noises (e.g., operating heavy equipment) has the potential to disturb breeding or migratory birds, raptors, or other wildlife. To mitigate potential effects to wildlife and achieve compliance with the BC *Wildlife Act* the following timelines are to be considered:

- The general bird-breeding season is April 18th to August 18st of any year.
- The raptor-breeding window spans January 1st to August 31st (MOE 2013).
- Nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons, and burrowing owls are always protected (Section 34 *Wildlife Act*).

BMPs outlined in 'Develop with Care' (MOE 2014a) recommend that construction activities that may disturb breeding birds and their nesting activities be conducted outside of the bird-breeding season to avoid disturbance of nesting birds. Further, activities that may molest or disturb birds or their eggs constitutes a violation of provincial statutes.

Prior to any new works, including ground disturbance, during the bird breeding season, an AQP shall perform nest surveys to identify active bird or protected nests within and adjacent to project areas requiring the removal of trees or vegetation.

If an active bird or protected nest is found within a designated area, a nest management plan may be prepared by the AQP for works in the vicinity of the nest, providing protection of the nest through buffers and/or by instituting appropriate exclusion windows for project activities. If an active nest is found on the periphery of a designated area, active monitoring of the nest / breeding bird / raptor may be warranted to determine levels of distress and compliance with applicable statutes.

5.2.3. Herptile Protection

The *Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia* (2014) provides BMPs for the protection of herptiles, which include amphibians and reptiles. Injury and mortality to herptiles which may enter the work zone during construction can be mitigated through the installation of exclusion fencing. This would reduce access to the work zone where activities are occurring that could harm wildlife. This fencing can also function to prevent sediments from entering the riparian area which could potentially harm the amphibians that may utilize the area. Fencing is not mandatory but should be considered if frequent observations of reptiles or amphibians occur during construction. Any incidental wildlife that could be injured from heavy equipment should be relocated out of the work zone.

5.3. EROSION AND SEDIMENT CONTROL

Clearing and grubbing increases the potential for erosion and sedimentation control (ESC) issues if exposed soils are left unabated. Construction staging, BMPs, and ESC measures are required for this Project.

The Contractor is to prepare a Site-specific ESC Plan outlining appropriate ESC measures and procedures for the work. The ESC plan must be **implemented prior to engaging in any work** in an area that may result in the discharge of sediment-laden water.

The project ESC plan should identify measures and BMPs to be implemented for the management of erosive soil surfaces and to prevent runoff of sediment laden water from the Project Site. The Contractor will ensure that ESC measures are implemented prior to starting any construction related activity. The ESC Plans and implementation will be adjusted as needed to achieve regulatory compliance.

The Contractor will follow BMPs for ESC and will follow a specific multi-phase plan developed specifically for this project. In general, ESC measures will employ BMPs in accordance with the 2020 Standard Specifications for Highway Construction (MoTI, 2020), and Standards and Best Practices for Instream Works (MWLAP 2004).

5.4. SOIL MANAGEMENT

Management of excavated materials includes proper handling procedures. The following protocols have been designed to manage soils, including temporary surface protection and storage of overburden.

5.4.1. General Soil Handling

- Remove and segregate subgrades for later restoration purposes, if applicable to site and work conditions.
- If necessary, clean soil may be taken off site to an appropriate facility for reuse.

Material stockpiles should be located away from any storm sewer inlets and waterbodies. Stockpiles left on site for more than 24 hours or during inclement weather should be covered with properly affixed plastic sheeting to prevent erosion and runoff of sediment.

5.4.2. Chance-Find Contaminated Soil Procedure

Any soils contaminated by odour, visible staining, debris, or sheen are to be segregated, handled as contaminated soil, and immediately shipped to a previously authorized licensed disposal facility with appropriate tracking paperwork. The disposal facility is to analyze the suspect soils for potential contaminants and treat appropriately.

5.5. SURFACE AND GROUNDWATER MANAGEMENT

Contaminants from a diesel spill and sediment from erosion can impact water quality for fish, wildlife, and human health. Surface water runoff may potentially be generated if soil surfaces disturbed during the project works. Disturbance to areas outside the project area must be avoided/minimized to reduce the need for surface water management.

The Contractor shall be prepared to manage construction water (water generated during the works on the Site) that may contain sediment, grout, or other constituents from wet weather, groundwater seeps, and surface water runoff. Construction water cannot be allowed to discharge to any watercourses or drainages in accordance with the relevant water quality guidelines. Water quality in the Cottonwood River and wetlands at the north end of the project footprint need to be protected from potential impacts during construction.

The contractor's CEMP will provide options for water management and identify potential discharge locations. These measures must ensure that no harmful material can enter any waterbodies surrounding the project area as a result of project activities. Project specific mitigation measures, including appropriate figures, shall be detailed in the CEMP.

Water discharges to the storm system from a construction site must meet federal, provincial, and municipal standards for release for turbidity, pH, and potential contaminants.

5.6. WATER QUALITY MONITORING PLAN

The water quality of nearby watercourses has the potential to be impacted by construction activities. The Federal *Fisheries Act* (Canada 1985) legislates that no deleterious substances may be released into fish-bearing waters. A substance is deleterious if it is harmful to fish or wildlife, if it limits the use of fish by humans, or if, by going through some process of degradation, it harms the soil or water quality (for example, oxygen-depleting wastes) (MOE 2014a). A substance is also deleterious if it exceeds a level prescribed by regulation.

Surface water quality and construction water runoff must be discharged in compliance with all applicable legislation, regulations, standards, and guidelines for the protection of the aquatic environment.

Areas under federal jurisdiction are to achieve compliance with the standards outlined in the *Canadian Water Quality Guidelines for the Protection of Aquatic Life* (CCME 1999). Lands within provincial jurisdiction follow the standards for the protection of aquatic life outlined in the *Working Water Quality Guidelines for British Columbia* (MOE 2017) and the BC *Approved Water Quality Guidelines* (BC 2017).

Construction activities requiring effective application of measures to protect water quality include:

- Accidental spill of deleterious substances such as uncured concrete, concrete wash water, fuel, oil, antifreeze / glycols, asphalt millings, or other spills from equipment working near storm sewer inlets.
- Runoff from erodible surfaces and stockpiles has the potential to enter storm sewer inlets potentially discharging 'deleterious' substances into the environment.
- Non-natural discharge of water, including surface water generated within Project limits, shall be compliant to the federal water quality guidelines for discharge into aquatic habitat.

5.7. MATERIAL STORAGE, HANDLING AND WASTE MANAGEMENT

The Contractor must follow BMPs to allow for identification, labeling, safe handling, storage, transport and appropriate disposal of construction and hazardous materials utilized and wastes generated by the Project. The Contractor must manage all non-hazardous construction-related debris (e.g., metals, concrete, asphalt, stripped organic material, waste wood, organic material) appropriately. The CEMP should outline BMPs for the storage, handling, and management of waste materials during Site preparation and construction activities. The potential laydown areas should also be indicated on a figure in the CEMP.

6. Spill Procedure and Mitigation

6.1. SPILL MANAGEMENT

The Contractor shall implement measures to avoid or minimize potential contamination of the soil, groundwater, and surface water (overland flow) because of project works and other operations including refueling of equipment. A detailed Spill Protection/Spill Response Plan will be developed by the Contractor and should include the following spill prevention measures:

- To the extent possible, use and/ or storage of paint, primers, fuels, rust solvents, degreasers, grout, poured concrete or other chemicals should be planned 30 m from a watercourse.
- When unavoidable activities near water use substances that are potentially deleterious, appropriate mitigation measures must be implemented so that these chemicals do not enter the water.
- Develop a response plan that is to be implemented immediately in the event of a sediment release or spill of a deleterious substance and keeps an emergency spill kit on site.
- Ensure that building material used in a watercourse has been handled and treated in a manner to prevent the release or leaching of substances into the water that may be deleterious to fish.
- Report any spills of sewage, oil, fuel, or other deleterious material whether near or directly into a water body.

- Ensure clean-up measures are suitably applied so as not to result in further alteration of the shoreline.
- Clean up and appropriately dispose of the deleterious substances.
- Maintain all machinery on site in a clean condition and fee of fluid leaks to prevent any deleterious substances from entering the water.

The Contractor's CEMP should identify project activities and locations where additional mitigations are required to protect water resources from leaks and spills. Storage and handling guidelines for controlled substances should also be addressed.

To assist the Contractor with the formulation of the Spill Response Plan, the following six steps for spill response have been provided as a guideline. Further technical assistance may be needed from a qualified professional.

Spill Response Steps

1. SAFETY FIRST
2. STOP THE FLOW (when possible)
3. SECURE THE AREA
4. CONTAIN THE SPILL
5. NOTIFY / REPORT (Emergency Management BC Program 1-800-663-3456)
6. CLEAN UP (Circumstances may dictate another sequence of events)

All environmental incidents or near-misses are reported to MoTI within 24 hours of the incident occurring, through an Environmental Incident Report (EIR).

During an emergency spill event, personnel that is responsible for/or witnesses the spill (the Spill Observer) will be responsible for activating the spill notification procedures (*Figure 2*).

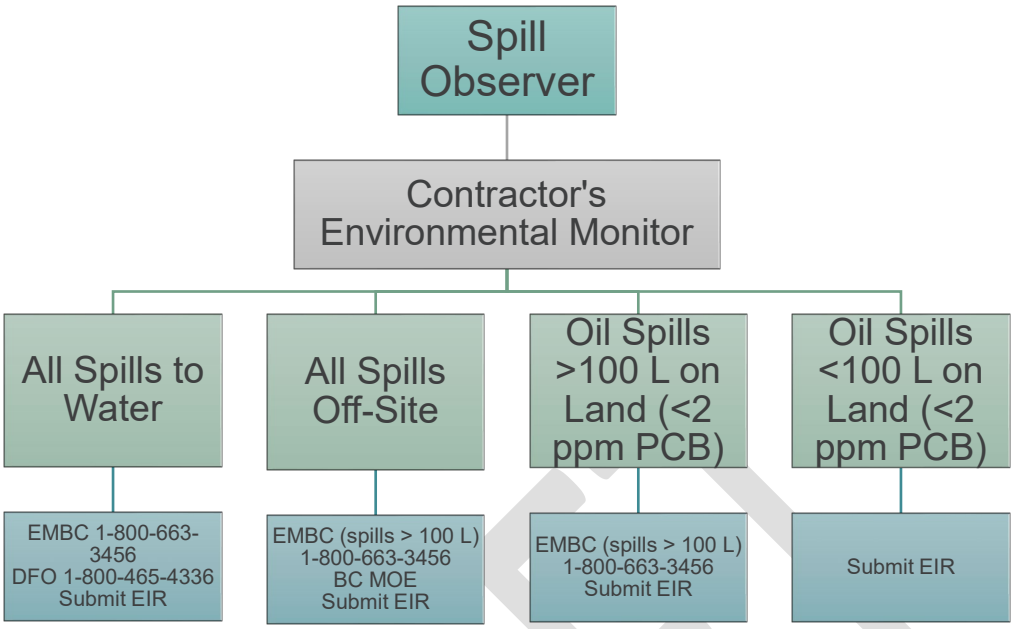

Figure 2. Spill Reporting Notification Chart

6.2. AIR QUALITY AND DUST CONTROL

The Contractor will conduct construction operations in as efficient a manner as possible to reduce double handling of materials thereby limiting the risk of dust production. Mechanical sweeping (with vacuum) will be used to keep dust and mud under control as per the approved ESC plans. Other potential air quality and dust control measures include:

- Minimizing equipment emissions by operating equipment at optimum-rated loads.
- Minimizing stockpile handling.
- Equipping haul trucks with a moveable fabric bed cover to be utilized to keep the wind off loads.
- Implementing erosion and sediment control BMPs to mitigate air contamination from windswept material.
- Utilizing block heaters rather than engine idling to prevent engine freeze.
- Prohibiting burning of refuse or other material related to the work site.

6.3. NOISE MANAGEMENT

Construction activities, including excavation and hauling of materials using heavy equipment can result in the production of noise which may disturb wildlife. The Contractor will ensure that no unnecessary noise is created during its work on the project.

In addition, unnecessary noise can be mitigated through the implementation of BMPs. The following list contains several noise reduction BMPs that will be implemented by the contractor during all phases of construction:

- Maintain equipment in good working order.

- Implement “Best Available Control Technologies” on equipment such as silencers and mufflers.
- Establish a speed limit to slow vehicles and mitigate noise generation.
- Keep within the noise limits as per municipal by-laws.

6.4. ARCHEAOLOGICAL CHANCE FIND

Due to anthropogenic disturbance within the project footprint, archaeological finds are not expected. However, the following procedures will be followed by the Contractor on the chance discovery of items believed to be of archaeological interest, artifacts, or other kinds of heritage resources. Procedures to mitigate impacts to heritage resources, which include the discovery of stone artifacts, shell deposits, rock paintings, and old pit or building structures, are to:

- Stop work in that immediate area.
- Notify the EM and the Client.
- Protect the discovery by staking or flagging the location of the find, covering it with plastic and surrounding it with protective fencing.
- Notify the designated Provincial Archaeologist and the responsible parties for additional instructions (create and refer to the Emergency Contact List).

The following procedures will be followed by on the chance discovery of suspected human remains:

- Stop work in that immediate area.
- Notify the responsible parties and request that they contact the local RCMP detachment.
- Protect the discovery by covering it and flagging it.
- Avoid disturbing the area, erect a visual barrier to deter further disturbance.
- All onsite are to treat the remains with full dignity and respect.

7. Closing

This report has been prepared with information available at the time of writing. Should any questions arise, please do not hesitate to contact the undersigned.

Yours truly,

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APPENDIX A

Statement of Limitations

Statement of Limitations

Use of this Report. This report was prepared by McElhanney Ltd. ("**McElhanney**") for the particular site, design objective, development and purpose (the "**Project**") described in this report and for the exclusive use of the client identified in this report (the "**Client**"). The data, interpretations and recommendations pertain to the Project and are not applicable to any other project or site location and this report may not be reproduced, used or relied upon, in whole or in part, by a party other than the Client, without the prior written consent of McElhanney. The Client may provide copies of this report to its affiliates, contractors, subcontractors and regulatory authorities for use in relation to and in connection with the Project provided that any reliance, unauthorized use, and/or decisions made based on the information contained within this report are at the sole risk of such parties. McElhanney will not be responsible for the use of this report on projects other than the Project, where this report or the contents hereof have been modified without McElhanney's consent, to the extent that the content is in the nature of an opinion, and if the report is preliminary or draft. This is a technical report and is not a legal representation or interpretation of laws, rules, regulations, or policies of governmental agencies.

Standard of Care and Disclaimer of Warranties. This report was prepared with the degree of care, skill, and diligence as would reasonably be expected from a qualified member of the same profession, providing a similar report for similar projects, and under similar circumstances, and in accordance with generally accepted environmental and scientific judgments, principles and practices. McElhanney expressly disclaims any and all warranties in connection with this report.

Information from Client and Third Parties. McElhanney has relied in good faith on information provided by the Client and third parties noted in this report and has assumed such information to be accurate, complete, reliable, non-fringing, and fit for the intended purpose without independent verification. McElhanney accepts no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions or errors in information provided by third parties or for omissions, misstatements or fraudulent acts of persons interviewed.

Effect of Changes. All evaluations and conclusions stated in this report are based on facts, observations, site-specific details, legislation and regulations as they existed at the time of the site assessment/report preparation. Some conditions are subject to change over time and the Client recognizes that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site may substantially alter such evaluations and conclusions. Construction activities can significantly alter soil, rock and other geologic conditions on the site. McElhanney should be requested to re-evaluate the conclusions of this report and to provide amendments as required prior to any reliance upon the information presented herein upon any of the following events: a) any changes (or possible changes) as to the site, purpose, or development plans upon which this report was based, b) any changes to applicable laws subsequent to the issuance of the report, c) new information is discovered in the future during site excavations, construction, building demolition or other activities, or d) additional subsurface assessments or testing conducted by others.

Independent Judgments. McElhanney will not be responsible for the independent conclusions, interpretations, interpolations and/or decisions of the Client, or others, who may come into possession of this report, or any part thereof. This restriction of liability includes decisions made to purchase, finance or sell land or with respect to public offerings for the sale of securities.

APPENDIX B

Photographs

Photo 1. Open area at northeast side of alignment.

Photo 2. Open area at northeast side of alignment.

Photo 3. Cottonwood slide area along the banks of the Cottonwood River.

Photo 4. Umiti Road with the cleared laydown area in the background.

APPENDIX B: HIGHWAY 97 COTTONWOOD SLIDE

Photos taken: By Patty Burt, November 2023

APPENDIX C

Engineer Design Drawings

BRITISH COLUMBIA

Ministry of Transportation and Infrastructure

PROJECT NO. 26243-0001

HIGHWAY No. 97

COTTONWOOD HILL

DRAFT 100% DETAILED DESIGN - JAN. 10, 2024

DRAFT

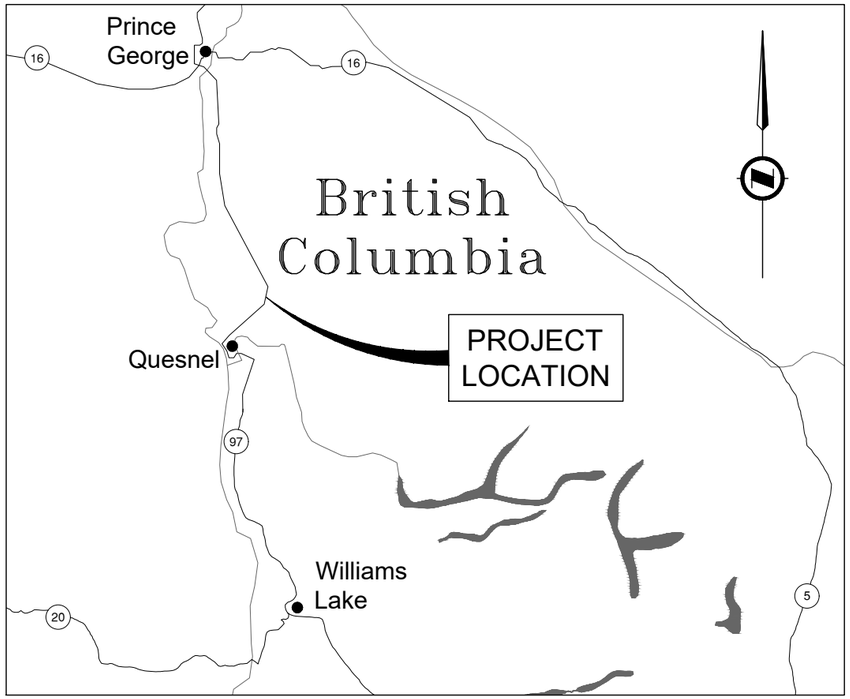
IAN PILKINGTON, CHIEF ENGINEER

DIGITALLY SEALED & SIGNED TENDER DRAWING PACKAGE
FOR SIGNATURES, REFER TO TENDER DRAWING PACKAGE APPROVAL FORM

ENGINEERING DIRECTOR	REGIONAL EXECUTIVE DIRECTOR
DATE	DATE

DRAWING NUMBER	REV
R2-1249-000	

Jan. 9, 2024 - 04:18 PM P:\2023\02-SK\SK00 - CAD Files\00_Cottonwood\Drawing\Production\000_CoverKey\Plan\Legend\SK00KP-22-0000



LOCATION MAP
N.T.S.

DRAWING INDEX

R2-1249-001 to 002	KEY PLAN AND LEGEND
R2-1249-101 to 105	PLANS
R2-1249-201 to 204	PROFILES
R2-1249-301 to 309	TYPICAL SECTIONS
R2-1249-351 to 352	DISPOSAL SITE DETAILS
R2-1249-401 to 404	GEOMETRICS AND LANING
R2-1249-601 to 604	SIGNING AND PAVEMENT MARKINGS
R2-1249-701 to 704	DRAINAGE PLANS
R2-1249-751	CULVERT SECTIONS
R2-1249-801 to 805	CREST UNLOADING DETAILS

PROVINCE OF BRITISH COLUMBIA
MINISTRY OF TRANSPORTATION & INFRASTRUCTURE

SOUTHERN INTERIOR REGION

PROJECT NO. 26243-0001

HIGHWAY No. 97

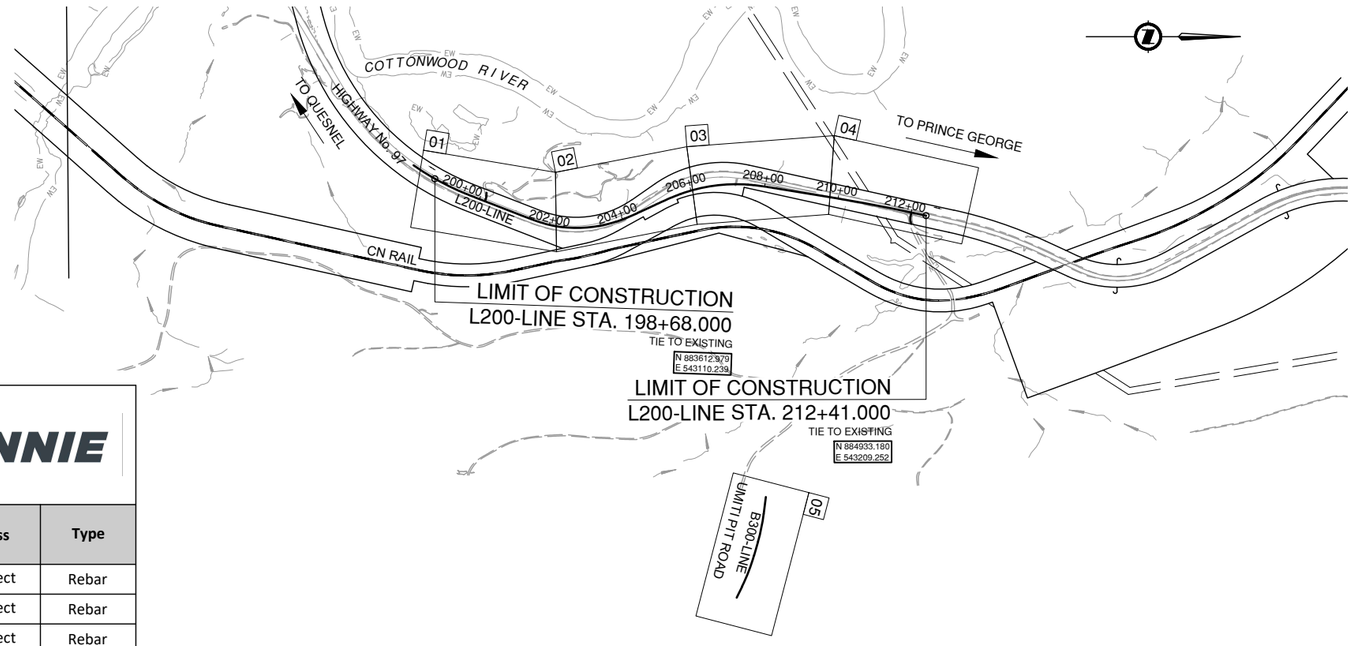
COTTONWOOD HILL

STA. 198+68.000 - STA. 212+41.000

1.37 km

LANDMARK KILOMETRE INVENTORY SEGMENT 1151

km 13.91 to km 15.28



KEY PLAN
N.T.S.

Date: 2023/04/28 | **Origin:** 82C256 confirmed with NRCAN PPP Solution

Project: Cariboo Hwy 97 - Cottonwood Survey | **Tack Point:** G15189-23 | ACSF: 0.999511

Horizontal Datum: UTM Z10 NAD 83 CSRS | **Latitude:** 53° 06' 07.39166''

Vertical Datum: HT2_0 geoid using CGVD28 datum | **Longitude:** -122° 21' 16.31379''

Point ID	Local		Orthometric Height	UTM		Ellipsoidal Height	C.S.F.	Class	Type
	Northing	Easting		Northing	Easting				
G15177-23	884354.811	543090.249	764.212	5884354.548	543090.310	750.851	0.999505	Project	Rebar
G15179-23	884575.332	543122.832	764.743	5884574.962	543122.877	751.386	0.999505	Project	Rebar
G15184-23	884103.317	543230.845	751.407	5884103.177	543230.837	738.046	0.999507	Project	Rebar
G15189-23 (TACK POINT)	883817.876	543215.160	738.144	5883817.876	543215.160	724.778	0.999509	Project	Rebar
G15195-23	883140.404	542519.363	703.725	5883140.735	542519.703	690.329	0.999514	Project	Rebar
G15197-23	883456.735	543004.586	720.011	5883456.912	543004.689	706.633	0.999512	Project	Rebar
G15200-23	884876.149	543204.848	761.389	5884875.632	543204.853	748.039	0.999506	Project	Rebar

All local coordinates are derived by first scaling from the Tack Point and then removing the millionth digit from the Northing

Notes:

* The CGG2013a Geoid uses the CGVD2013 vertical datum and the HT2_0 Geoid uses the CGVD28 vertical datum

* Corridor control can be derived from robust network adjustments using sources such as Mascot, active, and/or PPP for valid absolute accuracies.

* Project control originates from a corridor point and closes to a network confined within the specific project to provide survey grade relative accuracies.

* "name"static brass cap monuments-year. "G" static tag #-year. "K" multi epoch rtk, "P"closed total station traverse.

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MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

SCALE AS SHOWN
CAD FILENAME 000KP-22-0880.DWG
DATE 2024-01-09
FILE NUMBER 22-0880

REV	DATE	REVISIONS	SIGNATURE

KEY PLAN
HIGHWAY NO. 97
COTTONWOOD HILL

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE	JAN. 2024
QUALITY CONTROL	R.J.	DATE	JAN. 2024
QUALITY ASSURANCE	C.L.	DATE	JAN. 2024
DRAWN	T.K.	DATE	JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
26243-0001	2	R2-1249-001	

LEGEND

AERIAL UTILITIES (EXISTING)

- Anchor / Guy Wire
- High Tension Pole
- High Tension Tower (HT)
- Power Guy Pole
- Power / Phone Guy Pole
- Power Pole with Transformer
- Power / Phone Pole with Transformer
- Power / Phone Pole
- Telephone Pole
- Telephone Guy Pole
- Pedestal (B.C. Tel.) (PED)
- Telephone Booth

SURVEY (EXISTING)

- Standard Iron Pin
- Reference Point (WT)
- Aluminum Post
- Angle Iron Post
- Standard Brass Cap Monument (MON)
- Concrete Post Monument (MON)
- Dominion Iron Post
- Unmarked Measured Point
- Rock Post Monument (MON)
- Non- Standard Round Iron Post
- Non-Standard Square Iron Post
- Detail Hub (etc.)
- Spot Elevation

DETAIL (EXISTING)

- Septic Field
- Concrete Pillar
- Guard Post (Post)
- Piling (Piling)
- Gate Post (GP)
- Swamp
- Road Sign
- Well
- Tree
- Decorative Tree
- Delineator Post (DP)
- Flag Pole (FP)
- Mail Box (MB)
- Top of Bank

DRAINAGE (EXISTING)

- Catch Basin / Manhole
- Culvert Outlet (CO)
- Culvert Inlet (CI)
- Culvert Headwall
- Drainage Grate
- Manhole
- Catch Basin
- Culvert Kink
- Asphalt Spillway

METERS (EXISTING)

- Service Meter (SV)
- Water Meter (WM)
- Valve (V)
- Water valve (WV)
- Fire Hydrant (FH)
- Gas Valve (GV)
- Observation Well (OW)

UNDERGROUND (EXISTING)

- Filler Cap (FC)
- Fuel / Gas Pump (FP)
- Fuel Tank (FT)
- Septic Tank (ST)
- Underground Marker (UM)
- Breather / Vent Pipe (BP)

ELECTRICAL (EXISTING)

- Traffic Signal Control Box
- Electrical Outlet
- Junction Box (JB)
- Kiosk
- Lamp Standard (LS)
- Traffic Signal
- Traffic Counter

LEGAL LINETYPES (EXISTING)

- Section / District Bdy.
- Parcel Boundary / Old road R/W
- Quarter Section
- Easement
- Agricultural Land Reserve

MAN MADE FEATURES LINETYPES (EXISTING)

- Crown of Existing Road
- Edge of Pavement
- Concrete Barrier
- Dirt Road / Driveway
- Fence
- Gravel Road / Driveway
- Hedge / Bush / Tree Line
- Railway
- Retaining Wall
- Guard Rail
- Paint Lines - Solid
- Paint Lines - Dashed

UNDERGROUND UTILITIES LINETYPES (EXISTING)

- Gas Main (G)
- Oil (OIL)
- Sanitary Sewer Line (SAN)
- Storm / Sewer Drain (S)
- Electrical Cable (UE)
- Miscellaneous (UG)
- Telephone Cable (UT)
- Water Main (W)
- Culvert

OVERHEAD UTILITIES LINETYPES (EXISTING)

- High Tension Wire

HYDRAULIC LINETYPES (EXISTING)

- Creek / Ditch / Stream
- Edge of Water (EW)
- Major Catchment Boundary
- Sub-Catchment Boundary

GEOTECHNICAL (EXISTING)

- Pavement Core With Label — PV07–01
- Test Pit With Label — TP07–01
- Drill Hole With Label — DH07–01

DRAINAGE (PROPOSED)

- Catch Basin
- Deck Drain
- Manhole
- Asphalt Spillway
- Ditch Inlet Structure
- Ditch Block (DB)
- Cleanout (CO)
- Asphalt Swale
- Subdrain
- Special Ditching
- Culvert Endwall with Riprap Apron
- Culvert Endwall
- Culvert Outfall with Riprap Apron
- Riprap
- Erosion Control Mat
- Culvert
- Box Culvert

SIGNS (PROPOSED)

- Road Sign (Single Pole) (P)
- Road Sign (Double Pole)
- Post Mounted Delineator (DP)
- Commercial Message Sign

LEGAL LINETYPES (PROPOSED)

- Highway Right of Way
- Easement (L.T.C.)
- Statutory Right of Way (S.R.W.) (S.R.W.)

CONSTRUCTION DETAILS LINETYPES (PROPOSED)

- Berm
- Clearing and Grubbing (CL & GR)
- Pavement Sawcut Line
- Surplus Excavation Disposal Area
- Surcharge Area

SURFACE (PROPOSED)

- Centerline Alignment
- Edge of Pavement
- Concrete Barrier
- Slope Stake Line (C, C/F, F)
- Fence
- Retaining Wall
- Paint Lines - Solid
- Paint Lines - Dashed
- Curb Line
- Trail

PAVEMENT TREATMENT (PROPOSED)

- Pavement Removal

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SCALE 0 10 1:1000 50m

CAD FILENAME 000KP-22-0880.DWG
DATE 2024-01-09
FILE NUMBER 22-0880

REV	DATE	REVISIONS	SIGNATURE

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

LEGEND
HIGHWAY No. 97
COTTONWOOD HILL

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE	JAN. 2024
QUALITY CONTROL	R.J.	DATE	JAN. 2024
QUALITY ASSURANCE	C.I.	DATE	JAN. 2024
DRAWN	T.K.	DATE	JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
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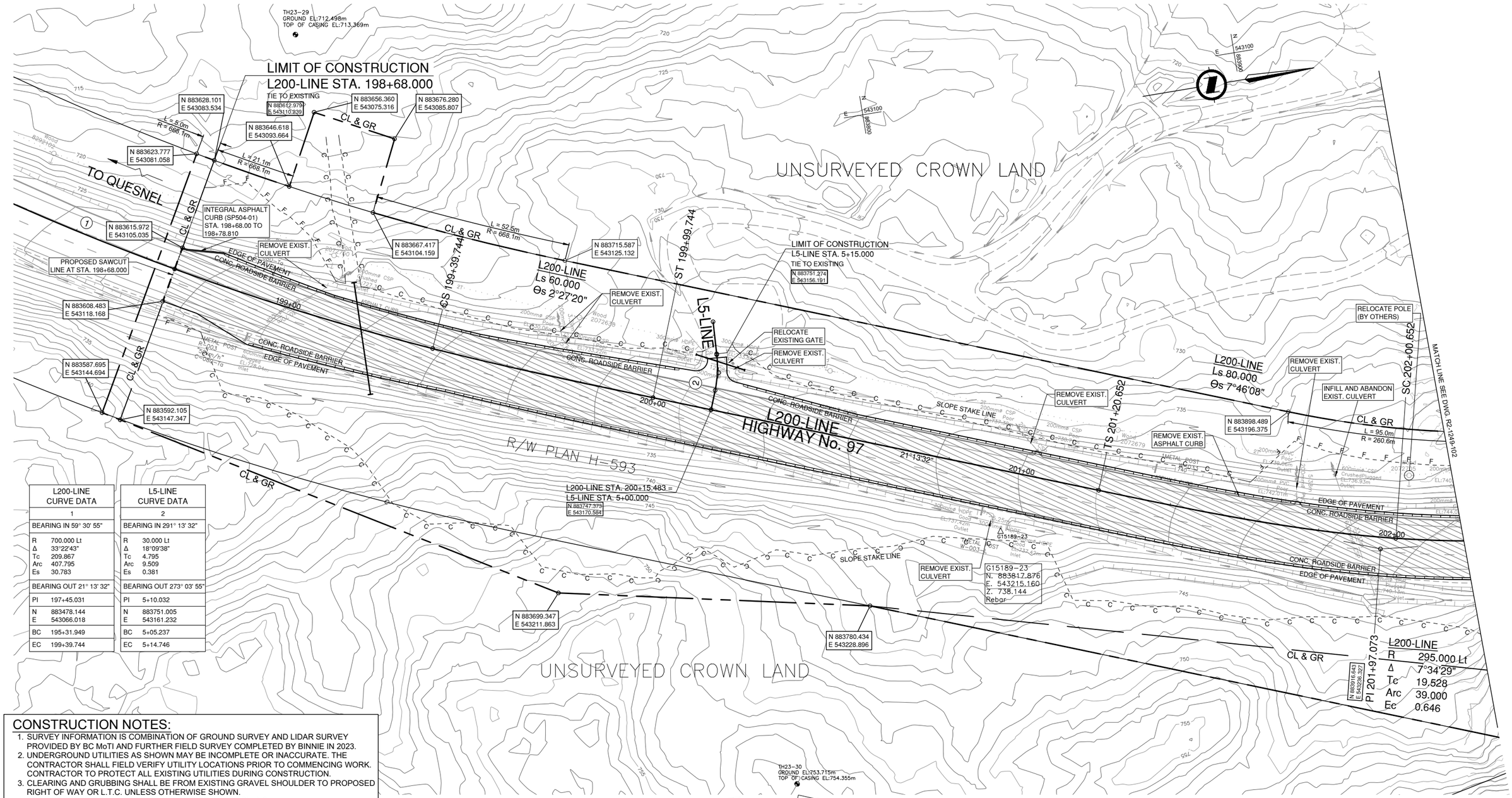


L200-LINE CURVE DATA	
1	
BEARING IN 59° 30' 55"	
R	700.000 Lt
Δ	33°22'43"
Tc	209.867
Arc	407.795
Es	30.783
BEARING OUT 21° 13' 32"	
PI	197+45.031
N	883478.144
E	543066.018
BC	195+31.949
EC	199+39.744

L5-LINE CURVE DATA	
2	
BEARING IN 291° 13' 32"	
R	30.000 Lt
Δ	18°09'38"
Tc	4.795
Arc	9.509
Es	0.381
BEARING OUT 273° 03' 55"	
PI	5+10.032
N	883751.005
E	543161.232
BC	5+05.237
EC	5+14.746

CONSTRUCTION NOTES:

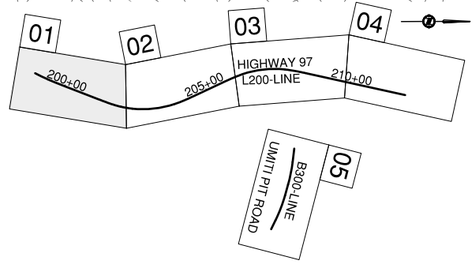
1. SURVEY INFORMATION IS COMBINATION OF GROUND SURVEY AND LIDAR SURVEY PROVIDED BY BC MoTI AND FURTHER FIELD SURVEY COMPLETED BY BINNIE IN 2023.
2. UNDERGROUND UTILITIES AS SHOWN MAY BE INCOMPLETE OR INACCURATE. THE CONTRACTOR SHALL FIELD VERIFY UTILITY LOCATIONS PRIOR TO COMMENCING WORK. CONTRACTOR TO PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
3. CLEARING AND GRUBBING SHALL BE FROM EXISTING GRAVEL SHOULDER TO PROPOSED RIGHT OF WAY OR L.T.C. UNLESS OTHERWISE SHOWN.
4. FOR PROPOSED DRAINAGE FEATURES SEE DRAINAGE PLANS.
5. EXISTING SIGN REMOVAL AND RELOCATES ARE SHOWN IN THE SIGNING AND PAVEMENT MARKING DRAWINGS.

FOR PLANS SEE DWG. R2-1249-101 to 105	CLEARING AND GRUBBING TOTAL THIS SHEET: 2.0625 ha
FOR PROFILES SEE DWG. R2-1249-201 to 204	FOR SIGNING AND PAVEMENT MARKINGS SEE DWG. R2-1249-601 to 604
FOR TYPICAL SECTIONS SEE DWG. R2-1249-301 to 309	FOR DRAINAGE PLANS SEE DWG. R2-1249-701 to 704
FOR DISPOSAL SITE DETAILS SEE DWG. R2-1249-351 to 352	FOR CULVERT SECTIONS SEE DWG. R2-1249-751
FOR GEOMETRICS AND LANING SEE DWG. R2-1249-401 to 404	FOR CREST UNLOADING DETAILS SEE DWG. R2-1249-801 to 805

LEGEND

PAVEMENT REMOVAL

SURCHARGE EXTENTS



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SCALE 0 5 1:500 25m

CAD FILENAME 100PL-22-0880.DWG
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BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

PLAN

HIGHWAY No. 97
COTTONWOOD HILL
STA. 198+68.000 TO STA. 202+18.730

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE	JAN. 2024
QUALITY CONTROL	R.J.	DATE	JAN. 2024
QUALITY ASSURANCE	C.L.	DATE	JAN. 2024
DRAWN	T.K.	DATE	JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
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B10-LINE CURVE DATA	
3	
BEARING IN	329° 24' 31"
R	600.000 Rt
Δ	4°51'43"
Tc	25.472
Arc	50.913
Es	0.540
BEARING OUT	334° 16' 13"
PI	11+10.769
N	884232.581
E	543134.450
BC	10+85.298
EC	11+36.210

B20-LINE CURVE DATA	
4	
BEARING IN	299° 42' 46"
R	285.000 Rt
Δ	20°03'20"
Tc	50.395
Arc	99.760
Es	4.421
BEARING OUT	319° 46' 06"
PI	20+51.279
N	884172.428
E	543098.043
BC	20+00.883
EC	21+00.643

UNSURVEYED CROWN LAND

TH23-17 GROUND EL:717.531m

TH23-23 GROUND EL:716.809m TOP OF CASING EL:717.765m

B20-LINE STA. 21+03.135 = B21-LINE STA. 21+16.500 N 884212.804 E 543063.864

LIMIT OF CONSTRUCTION B21-LINE STA. 21+29.730 N 884204.259 E 543093.784

N 884209.280 E 543040.826

TH23-25 GROUND EL:761.488m TOP OF CASING EL:762.235m

N 884146.433 E 543077.885

SEE DWG. R2-1249-801 TO 805 FOR CREST UNLOADING DETAILS

B21-LINE

CL & GR

LIMIT OF CONSTRUCTION B11-LINE STA. 11+97.220 N 884225.561 E 543056.121

TH22-15 TOP OF CASING EL=739.49m

LIMIT OF CONSTRUCTION B22-LINE STA. 22+00.000 N 884187.304 E 543118.864

CPT-B22-07 TH22-15 NO CASING

LIMIT OF CONSTRUCTION B21-LINE STA. 21+00.000 N 884223.461 E 543076.481

B20-LINE

L200-LINE
Ls 80.000
Θs 6°44'26"

B20-LINE STA. 20+00.000 = B22-LINE STA. 22+22.426 N 884147.011 E 543142.580

TH23-26 GROUND EL:766.894m TOP OF CASING EL:767.754m

RELOCATE POLE (BY OTHERS)

G15184-23
N. 884103.317
E. 543230.845
Z. 751.407
Rebar

N 884119.734 E 543129.347

TH21-02 6" Steel Pipe

REMOVE EXIST. CULVERT

LIMIT OF CONSTRUCTION B22-LINE STA. 22+42.119 N 884144.178 E 543139.460

B10-LINE STA. 11+38.221 = B11-LINE STA. 11+23.514 N 884257.539 E 543122.520

B11-LINE

B22-LINE

ST 204+63.027

R/W PLAN H-593

LIMIT OF CONSTRUCTION B12-LINE STA. 12+00.000 N 884134.648 E 543165.441

CL & GR

CS 203+83.027

RELOCATE POLE (BY OTHERS)

TH22-10 6" Steel Pipe TOP OF CASING EL=753.45m WITH ELEC OUTLET & DATA COLLECTOR

RELOCATE POLE (BY OTHERS)

11+00

3

L200-LINE
R 295.000 Lt
Δ 7°34'29"
Tc 19.528
Arc 39.000
Ec 0.646

BC 202+39.662

REMOVE EXIST. CULVERT

INFILL AND ABANDON EXIST. CULVERT

L200-LINE
R 340.000 Lt
Δ 24°09'34"
Tc 72.764
Arc 143.366
Ec 7.699

B10-LINE STA. 10+00.000 = B12-LINE STA. 12+06.252 N 884137.229 E 543190.822

N 884084.295 E 543197.655

N 884127.560 E 543196.152

REMOVE EXIST. ASPHALT CURB

REMOVE EXIST. CULVERT

B10-LINE

LIMIT OF CONSTRUCTION B11-LINE STA. 11+00.000 N 884267.897 E 543143.765

TH23-27 GROUND EL:767.772m TOP OF CASING EL:768.432m

REMOVE EXIST. ASPHALT CURB

TH-22-14 6" Steel Pipe TOP OF CASING EL=756.25m

LIMIT OF CONSTRUCTION B12-LINE STA. 12+16.027 N 884142.204 E 543119.343

205+00

CONC. ROADSIDE BARRIER

EDGE OF PAVEMENT

SC 205+71.113

INTEGRAL ASPHALT CURB (SP504-01) STA. 205+64.741 TO 211+00.000

MATCH LINE SEE DWG. R2-1249-101

MATCH LINE SEE DWG. R2-1249-103

L = 95.0m
R = 260.6m

L = 94.95m
R = 260.6m

CL & GR

N 883991.274 E 543214.139

N 884005.304 E 543226.716

N 884037.502 E 543224.078

EDGE OF PAVEMENT

CONC. ROADSIDE BARRIER

5°52'55"

METAL POST R-004 "50km/h"

SLOPE STAKE LINE

HIGHWAY No. 97

L200-LINE

203+00

204+00

TH23-28 GROUND EL=753.936m TOP OF CASING EL=754.730m

6" Steel Pipe TH21-04

G15184-23

REMOVE EXIST. CULVERT

PI 203+35.160

N 884054.573 E 543250.537

334°58'55"

REMOVE EXIST. CULVERT

REMOVE EXISTING SURVEY STRUCTURE AND FOUNDATION

L200-LINE
Ls 80.000
Θs 5°12'31"

CL & GR

N 884275.931 E 543193.890

N 543200 E 884290

BRITISH COLUMBIA RAILWAY
DL 11268
PLAN CG243
PID: 015-288-838

BRITISH COLUMBIA RAILWAY
DL 5194
PARCEL A
PID: 015-146-642

PROTECT EXISTING TEST HOLE INSTRUMENTATION

TH22-11 TOP OF CASING EL=768.24m

SLOPE STAKE LINE

N 884149.199 E 543264.770

TS 204+91.113

N 884022.079 E 543282.790

N 883955.634 E 543297.140

N 883996.098 E 543288.401

CLEARING AND GRUBBING
TOTAL THIS SHEET: 3.5743 ha

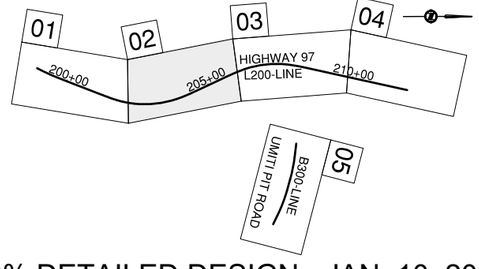
FOR CONSTRUCTION NOTES SEE DWG. R2-1249-101

FOR PLANS SEE DWG. R2-1249-101 to 105	
FOR PROFILES SEE DWG. R2-1249-201 to 204	FOR SIGNING AND PAVEMENT MARKINGS SEE DWG. R2-1249-601 to 604
FOR TYPICAL SECTIONS SEE DWG. R2-1249-301 to 309	FOR DRAINAGE PLANS SEE DWG. R2-1249-701 to 704
FOR DISPOSAL SITE DETAILS SEE DWG. R2-1249-351 to 352	FOR CULVERT SECTIONS SEE DWG. R2-1249-751
FOR GEOMETRICS AND LANING SEE DWG. R2-1249-401 to 404	FOR CREST UNLOADING DETAILS SEE DWG. R2-1249-801 to 805

LEGEND

PAVEMENT REMOVAL

SURCHARGE EXTENTS



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SCALE 0 5 1:500 25m

CAD FILENAME 100PL-22-0880.DWG
DATE 2024-01-09
FILE NUMBER 22-0880

REV	DATE	REVISIONS	SIGNATURE

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

PLAN

HIGHWAY No. 97
COTTONWOOD HILL
STA. 202+18.730 TO STA. 206+04.482

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE JAN. 2024
QUALITY CONTROL	R.J.	DATE JAN. 2024
QUALITY ASSURANCE	C.L.	DATE JAN. 2024
DRAWN	T.K.	DATE JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
26243-0001	2	R2-1249-102	

Jan. 9, 2024 - 12:27 PM P:\2022\22-0880\03 - CAD Files\05 Cottonwood\Drawing\Production\100_Plans\100PL-22-0880

UNSURVEYED CROWN LAND

SRW PLAN EG2154

MATCH LINE SEE DWG. R2-1249-102

MATCH LINE SEE DWG. R2-1249-104

N 884325.586
E 543072.422

CL & GR

L = 132.5m
R = 322.3m

G15177-23
N. 884354.811
E. 543090.249
Z. 764.212
Rebar

PI 206+67.314

N 884359.899
E 543108.047

SURVEY MONITORING PRISM

N 884457.141
E 543073.753

N 884332.114
E 543094.533

REMOVE EXIST. ASPHALT CURB

N 884379.650
E 543089.556

N 884410.991
E 543091.026

SURVEY MONITORING PRISM

N 884451.565
E 543096.604

R/W PLAN H-593

HIGHWAY No. 97

CL & GR

G15179-23
N. 884575.332
E. 543122.632
Z. 764.743
Rebar

REMOVE EXIST. CULVERT

CLOSE

SLOPE STAKE LINE

N 884553.389
E 543118.497

EDGE OF PAVEMENT

CONC. ROADSIDE BARRIER

207+00

208+00

INTEGRAL ASPHALT CURB (SP504-01)
STA. 205+64.741 TO 211+00.000

L200-LINE

N 884623.622
E 543128.278

209+00

9°20'23"

N 884369.169
E 543167.674

N 884447.433
E 543159.680

L200-LINE
Ls 80.000
Θs 5°12'31"

CS 207+54.962

ST 208+34.962

REMOVE EXIST. CULVERT

SURCHARGE EXTENTS SEE DWG. R2-1249-304 TO DETAILS

L200-LINE

R	440.000 Rt
Δ	23°56'25"
Tc	93.286
Arc	183.849
Ec	9.780

BRITISH COLUMBIA RAILWAY
DL 5194
PARCEL A
PID: 015-146-642

BRITISH COLUMBIA RAILWAY
DL 11268
PLAN CG243
PID: 015-288-838

UNSURVEYED CROWN LAND

01 02 03 04 05

200+00 205+00 HIGHWAY 97 L200-LINE 210+00

B300-LINE UMITI PIT ROAD

CLEARING AND GRUBBING
TOTAL THIS SHEET: 1.8547 ha

FOR CONSTRUCTION NOTES SEE DWG. R2-1249-101

FOR PLANS
SEE DWG. R2-1249-101 to 105

FOR PROFILES
SEE DWG. R2-1249-201 to 204

FOR SIGNING AND PAVEMENT MARKINGS
SEE DWG. R2-1249-601 to 604

FOR TYPICAL SECTIONS
SEE DWG. R2-1249-301 to 309

FOR DRAINAGE PLANS
SEE DWG. R2-1249-701 to 704

FOR DISPOSAL SITE DETAILS
SEE DWG. R2-1249-351 to 352

FOR CULVERT SECTIONS
SEE DWG. R2-1249-751

FOR GEOMETRICS AND LANING
SEE DWG. R2-1249-401 to 404

FOR CREST UNLOADING DETAILS
SEE DWG. R2-1249-801 to 805

LEGEND

PAVEMENT REMOVAL

SURCHARGE EXTENTS

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CAD FILENAME 100PL-22-0880.DWG
DATE 2024-01-09
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BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

PLAN

HIGHWAY No. 97
COTTONWOOD HILL
STA. 206+04.482 TO 209+77.414

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE	JAN. 2024
QUALITY CONTROL	R.J.	DATE	JAN. 2024
QUALITY ASSURANCE	C.L.	DATE	JAN. 2024
DRAWN	T.K.	DATE	JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
26243-0001	2	R2-1249-103	

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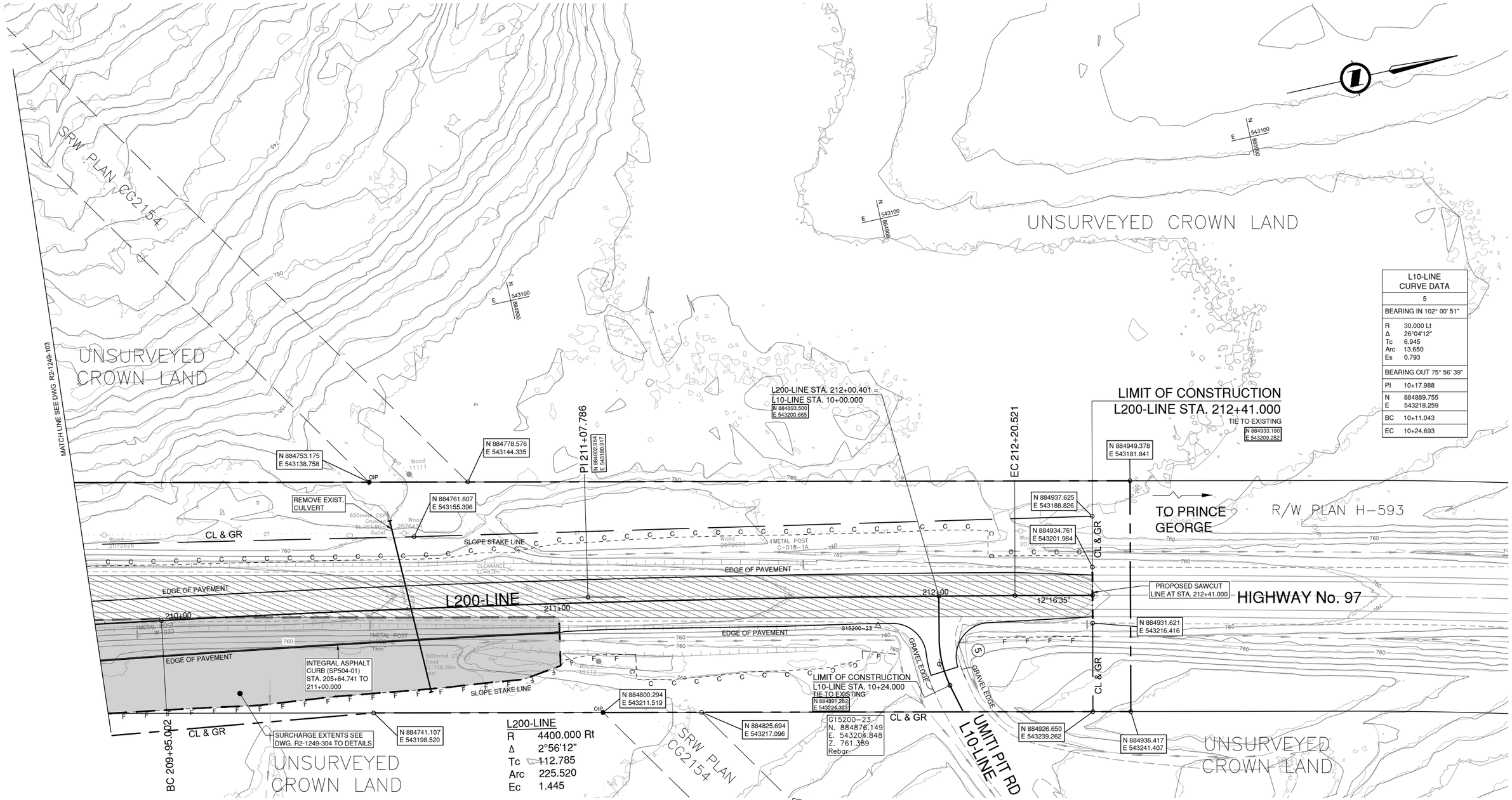

CLEARING AND GRUBBING
TOTAL THIS SHEET: 0.9204 ha

FOR CONSTRUCTION NOTES SEE DWG. R2-1249-101

FOR PLANS SEE DWG. R2-1249-101 to 105	
FOR PROFILES SEE DWG. R2-1249-201 to 204	FOR SIGNING AND PAVEMENT MARKINGS SEE DWG. R2-1249-601 to 604
FOR TYPICAL SECTIONS SEE DWG. R2-1249-301 to 309	FOR DRAINAGE PLANS SEE DWG. R2-1249-701 to 704
FOR DISPOSAL SITE DETAILS SEE DWG. R2-1249-351 to 352	FOR CULVERT SECTIONS SEE DWG. R2-1249-751
FOR GEOMETRICS AND LANING SEE DWG. R2-1249-401 to 404	FOR CREST UNLOADING DETAILS SEE DWG. R2-1249-801 to 805

LEGEND

PAVEMENT REMOVAL

SURCHARGE EXTENTS

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SCALE 0 5 1:500 25m

CAD FILENAME 100PL-22-0880.DWG
DATE 2024-01-09
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REV	DATE	REVISIONS	SIGNATURE

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

PLAN
HIGHWAY No. 97
COTTONWOOD HILL
209+77.414 TO 212+41.000

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE	JAN. 2024
QUALITY CONTROL	R.J.	DATE	JAN. 2024
QUALITY ASSURANCE	C.L.	DATE	JAN. 2024
DRAWN	T.K.	DATE	JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
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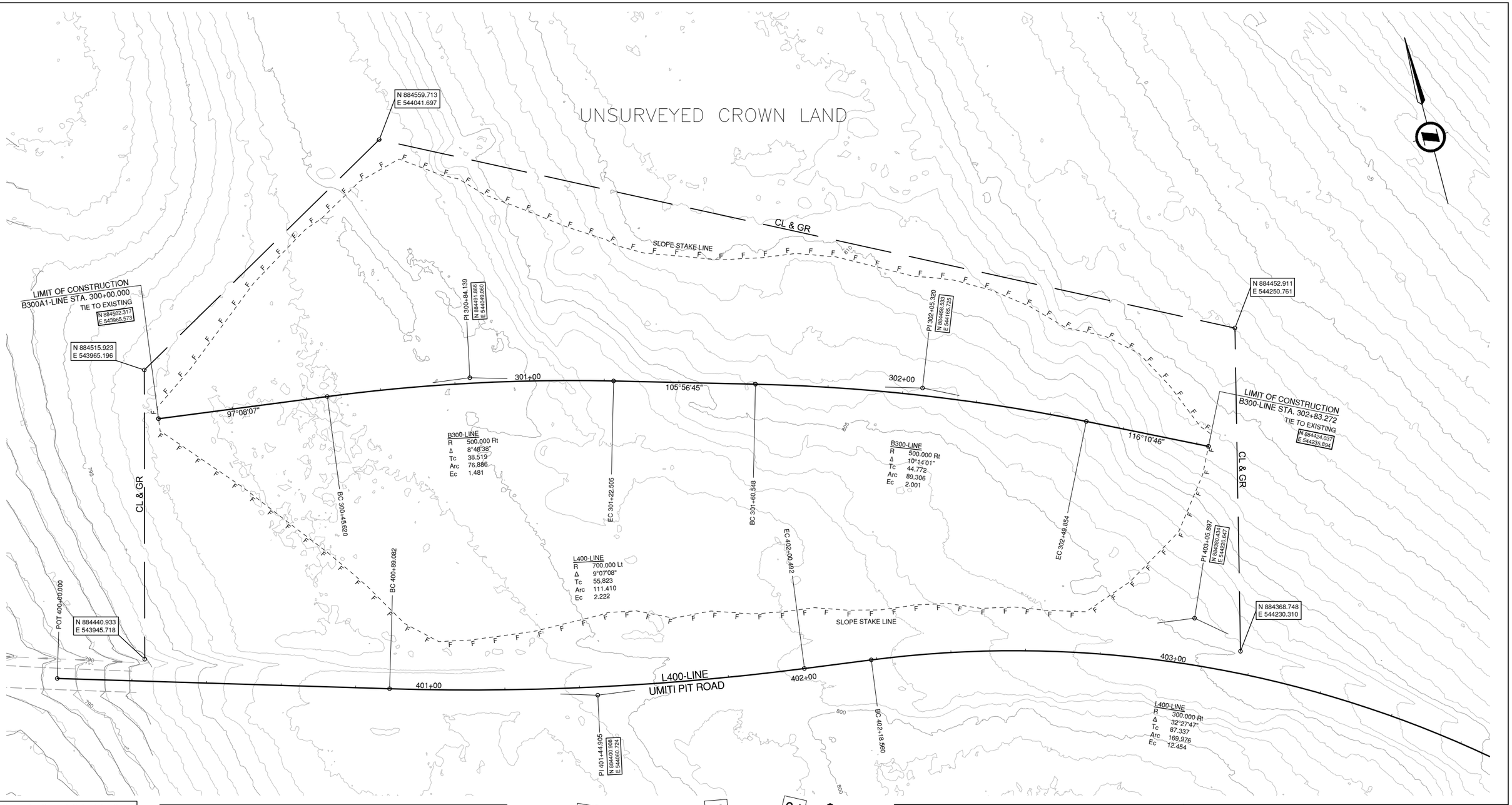


CLEARING AND GRUBBING
TOTAL THIS SHEET: 3.2424 ha

FOR CONSTRUCTION NOTES SEE DWG. R2-1249-101

FOR PLANS
SEE DWG. R2-1249-101 to 105

FOR PROFILES
SEE DWG. R2-1249-201 to 204

FOR SIGNING AND PAVEMENT MARKINGS
SEE DWG. R2-1249-601 to 604

FOR TYPICAL SECTIONS
SEE DWG. R2-1249-301 to 309

FOR DRAINAGE PLANS
SEE DWG. R2-1249-701 to 704

FOR DISPOSAL SITE DETAILS
SEE DWG. R2-1249-351 to 352

FOR CULVERT SECTIONS
SEE DWG. R2-1249-751

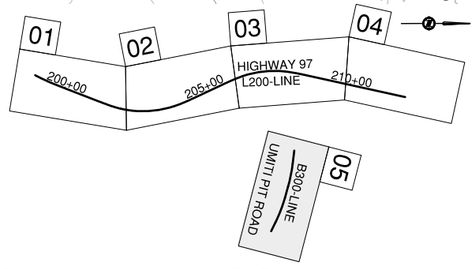
FOR GEOMETRICS AND LANING
SEE DWG. R2-1249-401 to 404

FOR CREST UNLOADING DETAILS
SEE DWG. R2-1249-801 to 805

LEGEND

PAVEMENT REMOVAL

SURCHARGE EXTENTS



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CAD FILENAME 100PL-22-0880.DWG
DATE 2024-01-09
FILE NUMBER 22-0880

REV	DATE	REVISIONS	SIGNATURE

BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE
SOUTHERN INTERIOR REGION
HIGHWAY ENGINEERING AND GEOMATICS

PLAN
HIGHWAY No. 97
COTTONWOOD HILL

NOT FOR CONSTRUCTION

CALVIN LUI
ENGINEER OF RECORD
DATE

DESIGNED	R.J.	DATE	JAN. 2024
QUALITY CONTROL	R.J.	DATE	JAN. 2024
QUALITY ASSURANCE	C.L.	DATE	JAN. 2024
DRAWN	H.I.	DATE	JAN. 2024

PROJECT NUMBER	REG	DRAWING NUMBER	REV
26243-0001	2	R2-1249-105	

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APPENDIX D

Triton Environmental Report

TRITON
Environmental Consultants

Date: October 25, 2021

Reference: 10745/P5212 Highway 97 Cottonwood Slide

Attn: Jill Carruthers, Environmental Coordinator - MOTI;
Scott McKenzie, Project Manager - MOTI

Re: Preliminary Environmental Sensitivities for the Highway 97 Cottonwood Slide Project

Dear Mr. McKenzie and Ms. Carruthers

The Cottonwood River Slide area is located along Highway 97, approximately 20 km north of Quesnel, British Columbia (BC). The slide is currently impacting Highway 97 and the Canadian National Railway (CN) upslope of the highway. This area has been moving over the years, but more movement has occurred in the spring of 2020 requiring some mitigation on the highway to keep it open. Since the spring of 2020, there have been two more periods of slide acceleration; in the fall of 2020 and the spring of 2021 that have also resulted in highway repairs and mitigation at the railway (BGC Engineering Inc. 2021).

Triton Environmental Consultants Ltd. (Triton) was retained by the Ministry of Transportation and Infrastructure (Southern Region; MOTI) to support the design team tasked with designing a new road alignment and possible river crossing as part of the Cariboo Recovery Program.

The Highway 97 Cottonwood Slide Project (the Project) area encompasses the footprints that may be disturbed based on the location of various preliminary options (road alignments and river crossings) as depicted by the following five options generated by Parsons Inc. (Parsons) in the Technical Memorandum Draft Conceptual Design Multiple Account Evaluation (2021):

- Option 1: Eastside of Highway 97 and crossing CN railway on skew
- Option 2: Eastside of Highway 97 and crossing CN railway perpendicular
- Option 3: Westside of Cottonwood River along floodplain/valley tying to Highway 97 at Bellos Underpass
- Option 4: Eastside of Highway 97 under CN railway with new bridge over Cottonwood River
- Option 5: Westside of Cottonwood River above hydro line and tying to Highway 97 north of Bellos Underpass

This is a brief report describing the existing conditions and potential environmental sensitivities that may be encountered within the footprint. As the preferred option has not yet been determined, the review for environmental sensitives is very high level and no field work has been conducted. This report was compiled using online provincial and federal databases/information and information provided to Triton by the design team members.

Site Conditions

The Highway 97 Cottonwood Slide area runs north/south along the eastern side of Highway 97 north of the Cottonwood River. This area has a variety of terrain, including valley bottom and floodplain areas along the river and then steeper forested sections upslope. The section of road affected by the slide is located on the right, or eastern, valley wall above the Cottonwood River, and the highway is approximately 180 m upslope from the river.

The western side of the Cottonwood River is primarily forests with the BC Hydro power line right-of-way on an upper bench and various access roads that access previously harvested areas.

There are other slides occurring on the valley walls further downstream which are affecting the river's path and causing erosion of opposite banks and flooding of various mid-channel island and bars.

Aquatics

The main watercourse of concern is the Cottonwood River, which flows into the Fraser River located approximately 35 km downstream from the bridge. Within the footprint area of the various options, there are five other tributaries to the Cottonwood River with Bellos Creek being the only other named creek. Bellos Creek is located just north of the footprint areas however, it has been included in this report as it is known fish bearing (BC MOECCS 2021). If any work is required to this crossing and road segments in this area, water quality and fish habitat will need to be considered.

One wetland area (Watershed Code: 100-478686-200539) was noted during the desktop assessment (BC MOECCS 2021), which is located on the western side of the highway and is drained by a small stream into the Cottonwood River approximately 700 m downstream of the bridge.

Fisheries information available for the streams present in the area is provided in Table 1.

Table 1: Streams within the Draft Project Area.

Stream	***Watershed Code***	***Fish Species Present***
Cottonwood River	100-481100	Rainbow Trout (*Oncorhynchus mykiss*) Coho Salmon *(Oncorhynchus kisutch)* Chinook Salmon (*Oncorhynchus tshawytscha*) Peamouth Chub (*Mylocheilus caurinus*) Longnose Dace (*Rhinichthys cataractae*) Largescale Sucker (*Catostomus macrocheilus*) White Sucker (*Catostomus commersonii*) Northern Pikeminnow (Ptychocheilus oregonensis) Redside Shiner (*Richardsonius balteatus*)
Unnamed stream 1 (flow east and flows into main river 70 m upstream of bridge)	100-478686-205907	Unknown
Unnamed stream 2 (flows west and flows into main river 80 m downstream of bridge)	100-478686-204735	Unknown
Unnamed stream 3 (flows east into river 4.1 km downstream of bridge)	100-478686-17869	Rainbow trout
Unnamed stream 4 (may not be impacted by Option 5 but is closest to it)	100-478686-185617	Unknown
Unnamed stream 5 (Options 3 and 5 cross this stream as it flows west into river)	100-478686-196591	Unknown
Bellos Creek (flows west towards Cottonwood River under Highway 97, 1.8 km north of CN overpass.	100-478686-175502	Rainbow trout

Rare and Endangered Fish Species

Bull Trout in the Fraser River watershed are part of the Pacific population group (Population 26) and are Blue-listed in British Columbia and listed as a species of special concern by the Committee on the Status of Endangered Wildlife on Canada (COSEWIC). It is likely that adult Bull Trout occasionally migrate into tributaries to the Fraser River, however, no record of them using the Cottonwood River was found.

White Sturgeon (*Acipenser transmontanus*) in the Fraser River mainstem are part of the upper Fraser River population (Population 5), which has recently been revised to include

all Fraser River watershed White Sturgeon that occur upstream from Hell's gate (previously, this included the upper, middle, and Nechako River populations; BC MOECCS 2021[1]). White Sturgeon, upper Fraser River population are Red-listed in BC, and all White Sturgeon populations are listed as Endangered on Schedule 1 of SARA. Given the Project should not affect the Fraser River, the White Sturgeon is not considered a concern for this Project.

Terrestrial

The Project area is located within the dry warm Horsefly subzone of the Sub-Boreal Spruce (SBSdw1) Biogeoclimatic Ecosystem Classification (BEC) zone (BC MOECCS 2021). Climax forests in this area are dominated by Hybrid white spruce (*Picea engelmannii* x *glauca*), subalpine fir (*Abies lasiocarpa*), and Douglas Fir (*Pseudotsuga menziesii*), whereas seral forests in this variant are dominated by Douglas-fir, lodgepole pine (Pinus contorta), trembling aspen (*Populus tremuloides*), and/or paper birch (*Betula papyrifera*) (Meidinger et al 1991). The forested areas where the slide has occurred is a mix of coniferous and deciduous forest types closer to the river.

A brief search on the Conservation Data Center[1] found only one Blue-listed plant that has the potential to be found in the SBSdw1 BEC zone, which is the American sweet-flag (*Acorus americanus*). This species has been found north of Quesnel near Ten Mile Lake (BC MOECCS 2021) and as such, there is potential for it to be in the footprint area. However, given the plant prefers riparian and wet marshy areas, it has been given a moderate/low potential to be found along the proposed alignments.

The Invasive Alien Plant Program (IAPP) within the BC Ministry of Forest, Lands, Natural Resource Operations and Rural Development (MFLNRORD) compiles information on the distribution and identification of invasive species in the province of BC. A desktop search of available data identified five invasive plants that have been identified in the area:

- Field Scabious – *Knautia arvensis*
- Spotted Knapweed – *Centaurea biebersteinii*
- *Canada Thistle – Cirsium arvense*
- *Common tansy - Tanacetum vulgare*
- *Oxeye Daisy - Leucanthemum vulgare*

Project activities should take invasive species precautions when working in the area.

Three rare plant ecosystems have the potential to occur in SBSdw1 BEC zone and, therefore, the Project area:

[1] [BC MOECCS 2021] British Columbia Conservation Data Centre and Species and Ecosystem Explorer. 2021. BC Ministry of Environment, Victoria, BC. Accessed October 2021 from: BC Species & Ecosystems Explorer - Province of British Columbia (gov.bc.ca)

- Scrub birch / water sedge (*Betula nana / Carex aquatilis*)
- Douglas-fir - hybrid white spruce / thimbleberry (*Pseudotsuga menziesii – Picea engelmannii x glauca / Rubus parviflorus*)
- Douglas-fir - lodgepole pine / clad lichens (*Pseudotsuga menziesii – Pinus contorta / Cladonia spp.)*

The scrub birch / water sedge is associated with fens and wetland areas, none of which are expected to be disturbed by the Project; however, the other two ecosystems are upland and could occur within the Project area as they are found on hill crests and upper slopes (Delong 2003[2]). Presence would need to be confirmed during field assessments once design options are short-listed.

Wildlife

A search of the BCSEE web utility for listed wildlife species in the SBS BEC zone of the Quesnel Natural Resource District resulted in the identification of one amphibian, one reptile, seven mammals, 42 birds, and 17 invertebrates with the potential to occur in the Project area.

There are a number of these that will not be found in the area (and examination of the habitat requirements of the remaining species reduced the number due to the lack of potential habitat). As a result, 27 species remain that have the possibility of being within the area (Table 2).

Table 2: Wildlife Species with potential of being in the Project Area

Common Name	***Scientific Name***	***BC Listing***	***SARA Listing***
Band-tailed Pigeon	*Patagioenas fasciata*	*Blue*	SC
Barn Swallow	*Hirundo rustica*	*Blue*	SC
Bay-breasted Warbler	*Setophaga castanea*	Red	NL
Black throated green warbler	*Setophaga virens*	Blue	NL
Broad-winged Hawk	*Buteo platypterus*	*Blue*	NL
Cap May Warbler	*Setophaga tigrina*	Blue	NL
Common Nighthawk	*Chordeiles minor*	Yellow	TH
Evening Grosbeak	*Coccothraustes vespertinus*	Yellow	SC
Fisher	*Pekania pennanti*	No Status	NL
Great Blue Heron	*Ardea heodias*	*Blue*	NL
Grizzly Bear	*Ursus arctos*	*Blue*	SC
Jutta Arctic	*Oeneis jutta*	*Blue*	NL
Lewis' Woodpecker	*Melanerpes lewis*	*Blue*	TH
Little Brown Myotis	*Myotis lucifugus*	Yellow	EN

[2] DeLong, S. 2003. A Field Guide to Site Identification and Interpretation for the Southeast Portion of the Prince George Forest Region. B.C. Min. For., Res. Br., Victoria, B.C. Land Manag. Handb. 51. http://www.for.gov.bc.ca/hfd/pubs/docs/Lmh/Lmh51.htm

Common Name	Scientific Name	BC Listing	SARA Listing
Northern Myotis	*Myotis septentrionalis*	Yellow	NL
White-throated Swift	*Aeronautes saxatalis*	*Blue*	NL
Northern Goshawk	*Accipiter gentilis atricapillus*	*Blue*	NL
Olive sided Flycatcher	*Contopus cooperi*	*Blue*	TH
Rough-legged hawk	*Buteo lagopus*	*Blue*	NAR
Rusty Blackbird	*Euphagus carolinus*	*Blue*	SC
Short-eared owl	*Asio flammeus*	*Blue*	SC
Swainson's Hawk	*Buteo swainsoni*	*Red*	NL
Western Toad	*Anaxyrus boreas*	Yellow	SC
Western Grebe	*Aechmophorus occidentalis*	Red	SC
Wolverine	*Gulo gulo*	No Status	SC
Winter wren	*Troglodytes hiemalis*	Blue	NL
Yellow-breasted Chat	*Icteria virens*	*Red*	EN

*** NAR – Not at risk; NL – Not listed; EN – Endangered; SC – Special Concern; TH – Threatened**

While not listed in the CDC list, there may be potential for Bank Swallows (*Riparia riparia*) or small mammals to be nesting or denning in the exposed faces of the steep, exposed slopes along the Cottonwood River.

Certain areas on the north side of the Cottonwood River and west of Highway 97 are within the U-7-013 Ungulate Winter Range under the Forest and Range Protection Act. From initial mapping, it appears that none of the options will impact this ungulate winter range.

Environmental Considerations

As the Project progresses and alignment options determined, additional searches, including field assessments, should be performed as species are added and removed from the CDC frequently. Site assessments are also required to look for any sensitives that this desktop review has identified or may have missed. Site assessments will also be very important in determining the best crossing structure and facilitate appropriate permitting. Completion of an aquatic and terrestrial resources assessment report that expands on the information provided in this letter is recommended once a design option has been chosen as it will help with permitting and production of subsequent reporting (i.e. environmental management plan).

Overall, terrestrial environmental sensitivities in the area are generally minimal and can be mitigated following best management practices. Some terrestrial recommendations for consideration include:

- A site assessment, or modified environmental assessment, should be performed to assess the proposed development route looking for the listed sensitive ecosystems, as well as nests and wildlife trees. Any raptor stick nests present are protected year-round under the *Wildlife Act*.

- Veteran trees and large diameter snags (>30 cm diameter at breast height) should be retained where possible and where safe to do so, as well as a 15 m buffer of live trees to minimize potential damage to root systems. If snags are to be removed, this should be done prior to spring before they are used for nesting and possible bat roosting.
- Works within the bird nesting window will require full bird and bird nest sweeps before any tree or brush clearing can commence (Bird Window A4: April 18 – August 18). If clearing must occur within the window, a bird nest survey conducted by a Qualified Environmental Professional is recommended prior to clearing to identify active nests and establish protective setbacks.

Aquatic sensitivities are greater for the Project given the work will occur in and around the Cottonwood River and presence of fish and fish habitat. To minimize impacts to the Cottonwood River, the following recommendations should be considered when designing bridge structures and determining highway alignments:

- Proximity to the Cottonwood River will be a concern during the construction of any new bridge approaches/alignment given the valley slopes and the crossings themselves. The aquatic habitat and water quality can be negatively affected by unmanaged sediments during construction and afterward while the land is recovering. As such, good sediment control plans and revegetation plans should be in place before construction.
- Stream/river crossings will require planning and may require Section 11 Change Use Approvals and Department of Fisheries and Oceans (DFO) Request for Review. Depending on the crossing structure and alignment, DFO may require the project to be Authorized under the Federal *Fisheries Act* and, if so, a more comprehensive application would be required, as well as the identification of compensation/offsetting sites. Obtaining Authorizations can take time and could be a critical path item.
- A clear span bridge would be preferable to avoid any instream works. But if a clear span bridge option is not feasible, it would be beneficial to reduce the number of spans, therefore minimizing the number of instream piers. Less piers equates to less disturbance to the stream bed and fish habitat.
- If instream piers are needed, the overall instream disturbance is expected to not cause serious harm to fish and fish habitat, provided the footprint for the piers are minimized to the greatest extent possible and the construction approach utilizes best management practices.
- Minimize the introduction of deleterious substances to the river by limiting the number of bridge deck drains that drain over the wetter perimeter. If possible, have the deck drain to the ends of the bridge.
- If possible, conduct instream works during the Reduced Risk Work Windows for Fish and Fish Habitat for the Cottonwood River of July 15 to August 15 which is the

default fish window when both fall and spring spawners are present within a system.

- Additional streams or crossings within the footprint area should be field assessed in case unmapped watercourses are present.

In addition to the above, other general mitigation measures, as with any other project, will be applicable. This includes, but is not limited to:

- Concrete Management Plans (bridge/culvert works);
- Erosion and sediment control plans;
- Wildlife chance encounter plans; and
- Archaeological Chance find plans.

Other plans as per the *2020 Standard Specifications for Highway Construction*, Ministry of Transportation and Infrastructure, Section 165 will be required. Specifically:

- Development of a Construction Environmental Management Plan (CEMP);
- Designation of the Cottonwood River as an "Environmentally Sensitive Area" if works are to occur within 100 m;
- Environmental monitoring if works occur:
    - within the Environmentally Sensitive area;
    - if any listed species is found during the bird sweeps/wildlife sweeps;
    - if any inclement weather occurs during or immediately after the project completion; and
- Any other requirement the MOTI deems important.

The scope of the Project, the overall footprint, and activities will have an impact on the environment; however, by adopting best management practices and mitigation measures, the effects can be minimized as much as possible.

If you have any questions, please contact the undersigned at tmerriman@triton-env.com or (250) 562-9155.

Sincerely,
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