



REPORT

Cariboo Road Recovery Project

Bastin Hill Road Alignment Environmental Constraints, Regulatory Screening and Construction Mitigation Report

Submitted to:

Tim Blackburn, P.Eng.

Urban Systems Ltd.

Submitted by:

WSP Canada Inc.

Landmark 6, 700-1631 Dickson Avenue, Kelowna, British Columbia, V1Y 0B5

+1 250 860 8424

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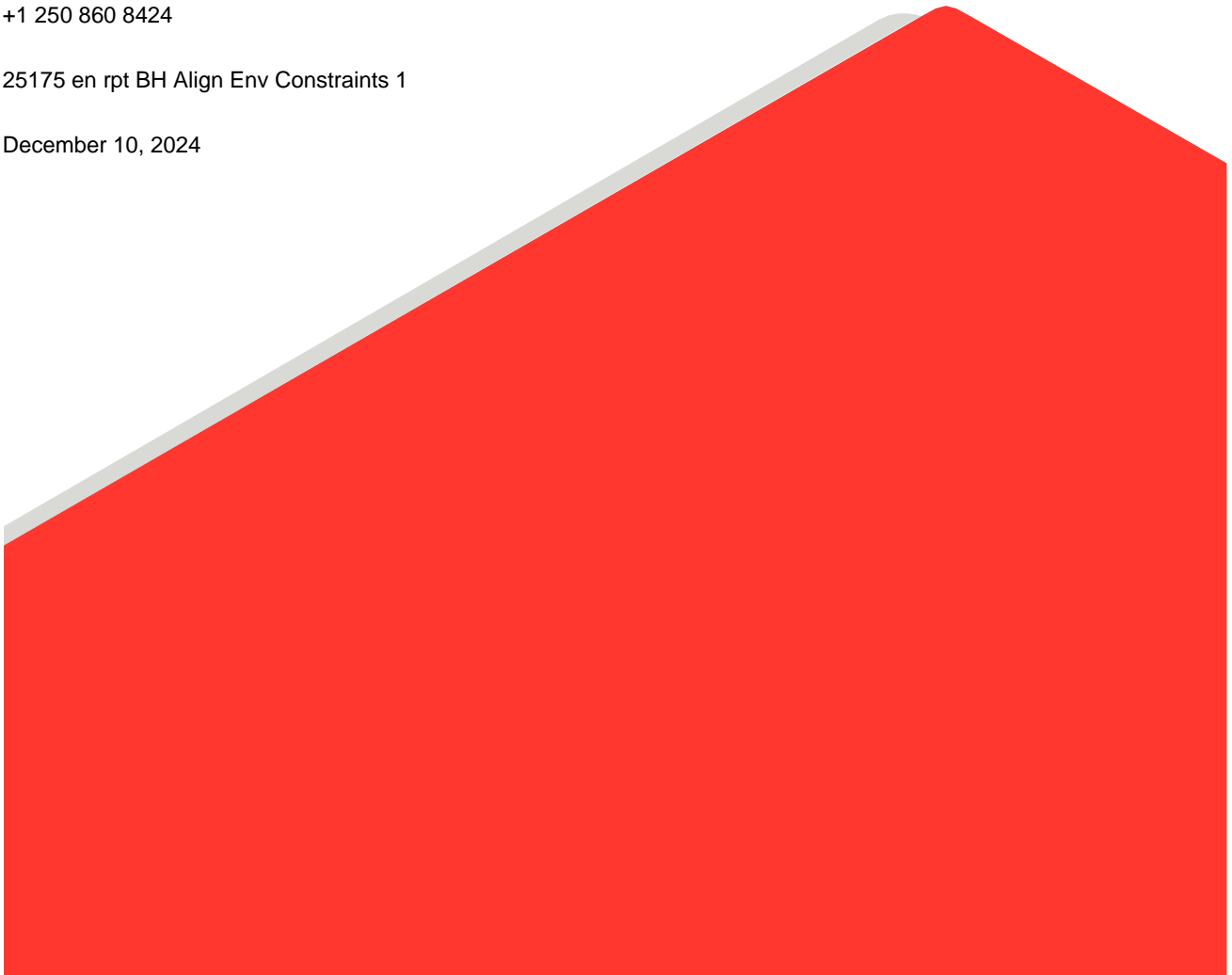


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1.0 INTRODUCTION

WSP Canada Inc. (WSP) has prepared an Environmental Constraints, Regulatory Screening and Recommended Construction Mitigation document for Bastin Road at Bastin Hill alignment (the Project). This Project is one of ten Cariboo Road Recovery Projects (CRRP) to be completed by the British Columbia Ministry of Transportation and Infrastructure (MoTI). The Bastin Road Project is located near Quesnel, BC (the Site), within the Cariboo Regional District, approximately 24 km southeast of the City of Quesnel, BC.

In the spring of 2021, a landslide affected Bastin Road causing slope stability and drainage issues. Bastin Road has been made safe for travel but a long-term solution including slope stabilization, grading and drainage works is being considered (see Figure 1). Proposed Project works have the potential to cause negative effects on terrestrial habitat features at the Project site.

The objectives of this document are as follows: to summarize the biophysical characteristics of the Site and identify any environmentally sensitive areas based on a site survey, describe the environmental regulatory context applicable to the works, describe the potential pathways of effects on the environment, and describe the necessary environmental mitigation measures to be followed during construction. This document also provides suggested minimum content for the Construction Environmental Management Plan (CEMP) to be produced by the Contractor and their Appropriately Qualified Professional (AQP) prior to the initiation of works.

1.1 Project Description

Realignment of Bastin Road along with regrading of the slope above the road are under consideration to mitigate ongoing landslides and slumping at Bastin Hill, above and below the road.

The Bastin Hill Project has two main areas that were considered during environmental field assessment (i.e., the Project area). The environmental assessment areas are shown on Figures 1 and 2 and are as follows:

- **Road Footprint Assessment Area:** The alignment for Bastin Road is still being refined but is anticipated to be slightly downhill (west) of the existing road alignment and will generally follow the existing road alignment (Figures 1 and 2).
- **Material Disposal Area:** It is WSP's understanding that MoTI has recently purchased the property encompassing the Project Area and that locations within the property could be used as a disposal area for material removed from the road slopes within the Project area (Figure 1).

The background review was conducted on the road footprint assessment area and the material disposal area plus a 100 m buffer.

1.2 Project Schedule

Work at Bastin Road is proposed to occur between fall (Q3) 2024 and spring (Q2) 2026.

2.0 ENVIRONMENTALLY SENSITIVE FEATURES

2.1 Desktop Information

The following potentially sensitive environmental features or observation records for species at risk are recorded to occur within 100 m of the Project Area based on a review of publicly available provincial and federal government spatial data sources:

- Unnamed, mapped watercourse, tributary to Quesnel River (Watershed Code 100-458399-184778).
- Central Interior grizzly bear (*Ursus arctos*) population unit, extirpated population (Environmental Reporting BC 2020 and Government of British Columbia [GOV BC] 2023b.). Grizzly bear is provincially blue-listed, and federally listed as Special Concern under SARA.
- The Project Area overlaps critical habitat for the Woodland Caribou (*Rangifer tarandus caribou*) (Southern Mountain Caribou Population) (GOV BC 2023a). However, the Project Area does not overlap current subpopulation ranges (Environment Canada [EC] 2014; GOV BC 2023c). In addition, the Project is not on federally owned land, therefore, no special effort was allocated to assessing this aspect of the Project within the critical habitat area.
- The Project overlaps with Ungulate Winter Range U-5-001 (Gerimi) for mule deer (*Odocoileus hemionus*), conditional timber harvest for transition and deep snowpack zones (BC Ministry of Environment [MoE] 2023; Dawson et.al 2006).

2.2 Field Reconnaissance

A field reconnaissance was conducted on 15 October 2023 by suitably trained and experienced environmental professionals under supervision of a Registered Professional Biologist. Areas potentially affected by the works within the Project Area were searched for year-round protected nests and cavities, and meander transects were completed in accessible areas to search for wildlife habitat, wildlife and wildlife signs. The findings of the field reconnaissance, professional judgement and species knowledge were used to define environmentally sensitive features of the Project Area that are relevant to the Project, require consideration during works, and trigger the need for mitigation during construction to meet relevant federal and provincial environmental legislation.

Photos from the reconnaissance survey can be found in Appendix A.

3.0 RESULTS

3.1 Terrestrial Resources

The following sections summarize available information on ecosystems, ecological communities, vegetation and wildlife that may occur within the Assessment Area based on the desktop review or that were observed during the October 2023 field reconnaissance.

3.1.1 Vegetation

3.1.1.1 Road Alignment Assessment Area

Within the road alignment assessment area, there are three habitat types that were assessed include disturbed road right of way, agricultural field, and forested areas (Figure 2).

The existing road alignment was bordered on either side by mixed forest containing trembling aspen (*Populus tremuloides*), hybrid white spruce (*Picea engelmannii x glauca*), Douglas fir (*Pseudotsuga menziesii*), and paper birch (*Betula papyrifera*). Bastin Road is cut into the hillside and the slope is steep on either side of the road. The downward slope contained more mature trees with dense coverage, whereas the uphill slope contained pole saplings and sparse young trees around the existing erosion areas and mature trees on the top of the bench (Appendix A, Photos 6, 7 and 8).

The agricultural field on the bench above Bastin Road was bordered by a narrow strip of young trembling aspen and hybrid white spruce to the south along Bastin Road (Appendix A, Photos 9 and 10). The field contained grasses (Poaceae family) and red clover (*Trifolium pratense*) (Appendix A, Photo 11). The field is fenced and appeared to be actively farmed with the grass short and cows actively grazing during the assessment. The field extended to the west to the top of the bench that was bordered along the fence line by sparse willow (*Salix* spp.), Douglas fir saplings, rose (*Rosa* spp.), fireweed (*Chamaenerion angustifolium*), and yarrow (*Achillia millefolium*). Below the bench was a steep embankment with signs of erosion (exposed soil and rock and recent rock placement) that led down to Bastin Road; north of the erosion was shrub and immature tree habitat (Appendix A, Photos 6 and 12).

The forested area to the north of the agricultural field was young, mixed forest with a well-developed shrub understory. Along the bench ridgeline above Bastin Road there is a narrow strip of mature hybrid white spruce and Douglas fir trees. Beyond the edge of the bench to the northeast, within the proposed road alignment cut/fill area is younger forest with smaller trees (Appendix A, Photo 13). Trees in this area consisted of similar species as the surrounding area, with trembling aspen, hybrid white spruce, Douglas fir and paper birch. The understory was primarily comprised of thimbleberry (*Rubus parviflorus*), tall Oregon grape (*Berberis aquifolium*), red-osier dogwood (*Cornus sericea*), snowberry (*Symphoricarpos albus*), willow and rose.

3.1.1.2 Material Disposal Area

The existing Bastin Road alignment from the Quesnel River bridge heading east was bordered on either side by mixed forest containing trembling aspen, black cottonwood (*Populus trichocarpa*), hybrid white spruce, Douglas fir, and paper birch.

The proposed material disposal area is accessed by a driveway to a cleared area containing piles of gravel (Figure 2 and Appendix A, Photo 1). The proposed material disposal area, east of the entrance, appeared previously disturbed with exposed rock and young black cottonwood throughout (Figure 2 and Appendix A, Photo 2). Surrounding the entrance and gravel pile area are old black cottonwood trees that had woodpecker cavities and mature trees capable of supporting raptor, heron, other bird nesting and bat roosting sites (Figure 2 and Appendix A, Photos 3,4, and 5).

3.1.1.3 Invasive Plants

There are no recorded observations of invasive plant records within the Project Area (Gov BC 2023c). There are 22 observations of invasive plant species recorded within 5 km of the Site:

- Bull thistle (*Cirsium vulgare*; also observed within the Project Area along the western and northern edge of the agricultural field during the field assessment)
- Burdock species (*Arctium spp.*)
- Common tansy (*Tanacetum vulgare*)
- Curled dock (*Rumex crispus*)
- Field scabious (*Knautia scabious*)
- Hawkweed species (*Hieracium spp.*)
- Hoary alyssum (*Berteroa incana*)
- Leafy spurge (*Euphorbia esula*)
- Meadow goatsbeard (*Tragopogon pratensis*)
- Meadow hawkweed (*Hieracium caespitosum*)
- Orange hawkweed (*Hieracium aurantiacum*)
- Oxeye daisy (*Leucanthemum vulgare*)
- Scentless mayweed (*Tripleurospermum inodoratum*)¹
- Tall hawkweed (*Pilosella piloselloides*)
- Yellow hawkweed (*Hieracium pratense*)

Targeted invasive plant surveys were not completed during the field assessment; however as noted above, bull thistle was observed along the western and northern edge of the agricultural field (i.e., within the Project Area) as well as the exotic plant species Canada goldenrod (*Solidago canadensis*).

¹ Scentless mayweed has several synonyms, including false mayweed, scentless chamomile, false chamomile, and Baldr's brow and is referred to under the Weed Control Regulation as scentless chamomile (*Matricaria maritima*). For the purposes of this report, the latest taxonomy from the BCSEE is used.

3.1.2 Plants and Ecological Communities at Risk

No plants or ecological communities at risk were documented to occur within the Project Area (GOV BC 2023a). A detailed plant assessment was not completed during the field reconnaissance due to the time of year. No plants or ecological communities at risk were identified during the field reconnaissance.

3.1.3 Wildlife

Signs of woodpecker nesting and feeding were observed in mature black cottonwood trees bordering the rock piles at the entrance to the proposed material disposal area (Figure 2; Appendix A, Photos 1, 3, and 4). Pileated woodpeckers (*Dryocopus pileatus*) typically nest in large diameter trees (>40 cm diameter at breast height [dbh]) in wood softened by fungal rot and often near permanent water (Environment and Climate Change Canada [ECCC] 2023a). No woodpeckers were observed during the reconnaissance survey.

There was a band of mixed forested area that separated the aggregate property (agricultural fields) from the proposed material disposal area containing mature hybrid white spruce, Douglas fir trees and black cottonwood trees. This area wraps around the aggregate property and extends to the Quesnel River. It contained mature trees capable of supporting raptor stick nests, pileated woodpecker cavities, and bat roosting habitat.

Along the existing Bastin Road alignment, within the recent slide area, several burrow holes were noted in the upper portion of the bank (Figure 2; Appendix A, Photos 7 and 8). The bank was a near vertical slope of exposed fine material. Holes were approximately 10 cm diameter and appeared to be characteristic of bank nesting bird burrows (potentially bank swallow [*Riparia riparia*] or northern rough-winged swallow [*Stelgidopteryx serripennis*]). Bank swallow are provincially Yellow-listed and Schedule 1 Threatened under SARA and northern rough-winged swallow are provincially Yellow-listed. No individuals were observed at the burrows during the assessment.

The *Migratory Birds Convention Act* (MBCA) affords protection to nests with eggs and/or birds. Additionally, bank swallow occupied burrows are defined as a residence under SARA and provided additional protection from the time when adults are first seen entering or leaving the burrow to the date when a bird is last seen at the burrow (Government of Canada 2019). The general bird nesting period as identified by Environment and Climate Change Canada (ECCC) for open habitat within nesting zone A4 is 19 April through 24 August (ECCC 2023b). Pre-clearing surveys followed by nest exclusion netting installation within the area where burrows were observed should be considered prior to 19 April to avoid nesting within work areas.

No key habitat features were noted within the agricultural field on the bench above Bastin Road. It is anticipated that the field could be frequented by grazing ungulates such as mule deer, elk (*Cervus canadensis*), and moose (*Alces alces*), and other mammals like black bear (*Ursus americanus*), coyote (*Canis latrans*), rabbits and rodents. Deer and moose scat as well as bear hair (in the barbed wire fence around the field) were observed in the field (Figure 2; Appendix A, Photo 18). Ground nesting birds like long-billed curlew [(*Numenius americanus*); yellow-listed in BC and Special concern under SARA and COSEWIC] could use the agricultural field for nesting.

Habitat features observed during the field assessment within the forested habitat north of the agricultural field included small and medium mammal dens found within and beneath coarse woody debris piles throughout (Figure 2; Appendix A, Photos 14, 15, and 16). No dens were confirmed to be occupied. Squirrel middens were also observed (Figure 2; Appendix A, Photo 17). Other wildlife sign observed within the forested area during the site assessment included scat from black bear, deer and elk. The narrow strip of mature hybrid white spruce and Douglas fir trees along the bench ridgeline above Bastin Road (Appendix A, Photo 7) contained mature trees

capable of supporting raptor stick nests, pileated woodpecker cavities, and bat roosting habitat. The trees along the ridgeline appeared to be healthy and not affected by fungal rot. The trees within the north forested area were smaller diameter (<25 cm dbh) young mixed deciduous and coniferous and appeared to be healthy. No nests or potential nesting cavities were observed. However, pre-clearing surveys in advance of tree removal are recommended to avoid disturbance to potential new nests or cavities.

3.1.3.1 Ungulate Winter Range

Ungulate Winter Ranges (UWR) are defined areas of provincial crown land that contain habitat necessary to meet winter requirements of specified ungulate species. UWR # U-5-001, U-5-002 and U-003 – Ungulate Winter Ranges Cariboo Chilcotin Land Use Plan, Transition and Deep Snowpack was legally established in December 2004 with amendment to the order made in 2007 for mule deer (BC Ministry of Environment [MoE] 2007), under authority of sections 9(2) and 12(1) of the *Government Actions Regulation* (B.C. Reg. 582/2004) of the *Forest and Range Practices Act* (FRPA) (BC MoE 2023).

The Project Area falls within UWR # U-5-001. General Wildlife Measures (GWM) are outlined in Schedule 1 of the order within Transition and Deep Snowpack Zones. The Project Area is within Gerimi (dqu_39) with High Habitat Stand Structure and Transition Snowpack Zone (BC MoE 2007). GWM defined in the UWR Order and *Management Plan for Transition and Deep Snowpack Zones* (Dawson et.al 2006) describe UWR-specific restrictions necessary to protect and conserve habitat for the designated ungulate species. GWM 13 states that road construction must not occur within Old Growth Management Areas (OGMAs) in UWR; the Project Area is not within an OGMA.

GWM that would apply to forest harvesting and minor tenures for the intent of non-forest service road construction or maintenance, within the Transition and Deep Snowpack Zones include specific selection harvest approaches which cannot be applied to meet the Project objectives (i.e., multiple harvest passes, and group selection silviculture, retention and spacing treatments for Douglas fir).

The field assessment of the Project Area, specifically within the forested area of the new proposed road alignment, confirmed that the Project Area contains suitable habitat to support mule deer overwintering. Mule deer are primarily migratory, using upper elevation and alpine habitats during the summer and lower valleys and south facing slopes during the winter (BC Ministry of Water Land and Air Protection [MWLAP] 2005, BC Ministry of Environment Lands and Parks [MELP] 1996). Areas of high shrub cover were present throughout comprised of preferred forage species like willow, rose, red-osier dogwood, and snowberry. Tree species important as mule deer forage that were observed included Douglas fir and trembling aspen (MELP 1996). Winter feeding, thermal and security habitat attributes are the factors that support mule deer winter habitat. Areas with well-developed layers of trees and shrubs provide thermal cover and security from predators as well as reduce snow depth (easier movement in shallow snow) (MELP 1996).

4.0 ENVIRONMENTAL REGULATORY CONTEXT

WSP has conducted a screening to confirm the federal and provincial environmental legislation that is applicable to the Project and requires implementation of environmental mitigation measures to maintain compliance during construction (Table 1).

Table 1: Screening of Applicable Federal and Provincial Environmental Legislation

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Applicable?	Description / Relevance to Project
Federal				
Fisheries Act Section 34.4[1] and 35[1]	Fisheries and Oceans Canada (DFO) – The Fish and Fish Habitat Protection Program	<p>The latest iteration of the Fisheries Act came into effect on 28 August 2019.</p> <p>The Act prohibits harmful alteration, disruption or destruction of fish habitat (HADD), and protects against the death of fish, other than by fishing (Government of Canada 1985).</p> <p>If projects in and around fish habitat cannot completely implement the protection measures provided on the DFO website (https://www.dfo-mpo.gc.ca/pnw-ppe/measure-mesures-eng.html), a request for project review (RfR) is required.</p>	Yes, but RfR not required	<p>There are no works in a stream or within area likely to have a direct connection to fish bearing habitat (i.e., the Quesnel River and unnamed mapped watercourse: Watershed Code 100-458399-184778). All projects require due diligence to avoid a HADD of fish habitat.</p> <p>For this Project, all relevant measures to protect fish and fish habitat are expected to be followed (i.e., with the proper implementation of erosion and sediment control measures and spill prevention and response, there should be no pathway of effects to fish and fish habitat in the unnamed watercourse or Quesnel River), and therefore, a request for review is not required for the Project.</p>
		Request for Authorization	No	
Species At Risk Act (SARA) - Schedule 1 Sections 32 (1), 33 and 58(1)	Environment and Climate Change Canada (ECCC) – Canadian Wildlife Service (CWS) or DFO	<p>Protects, provides for the recovery of, and manages aquatic and wildlife species listed under the Species at Risk Act (SARA) and their critical habitats (Government of Canada 2002). Prohibits harm to listed endangered and threatened terrestrial species and their residences on federal land and prohibits harm to listed endangered and threatened aquatic species and their residences in all waters in Canada.</p> <p>Permit under Section 73 of SARA</p>	Yes, but no permit required	<p>The Project location is not on federal lands or within streams with designated critical habitat for aquatic species. On non-federal lands, a SARA Section 73 permit would only be required if a SARA and MBCA-listed bird species has critical habitat parcels designated within project disturbance footprint or there is the potential to affect the nest of an MBCA and SARA listed bird species.</p> <p>Due diligence requires assessment and measures to protect species at risk and their habitat. Species at risk considered to occur within the Project area includes an extirpated population of Grizzly Bear. The project also overlaps critical habitat for the Woodland Caribou (<i>Rangifer tarandus caribou</i>) (Southern Mountain Caribou Population) (GOV BC 2023c). However, the Project Area does not overlap current subpopulation ranges (EC 2014; GOV BC 2023c). The site</p>

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Applicable?	Description / Relevance to Project
				<p>reconnaissance did not find visible evidence of Grizzly Bear or Caribou presence.</p> <p>The field assessment determined the potential for bird nesting along the road alignment (potential bank swallow or northern rough-winged swallow). Bank Swallow occupied burrows are defined as a residence under SARA and afforded additional protection from the date when adults are first seen entering or leaving the burrow to the date when a bird is last seen at the burrow (Government of Canada 2019). The nest burrows on the bank above Bastin Road should be covered with deterrent netting prior to the breeding bird window to avoid nesting within construction areas. Other mitigation could include working during least risk work timing windows to avoid disturbance to occupied nests.</p>
<p>Migratory Birds Convention Act (MBCA) Sections 5.1(2) and 5.2(2) Migratory Birds Regulations (MBR) Section 5 Section 12 (h1)</p>	<p>ECCC - CWS</p>	<p>Disturbance or destruction of migratory birds, their nests or eggs is prohibited (Government of Canada 1994). ECCC recommends that activities be planned to occur outside of the migratory bird nesting period applicable to the project area. If activities extend into the migratory bird nesting, pre-construction nest surveys should be completed prior to construction to identify breeding sign, behaviours and nests. Where nests are identified, setback buffers to minimize disturbance to breeding birds are to be established (ECCC 2020).</p> <p>Damage or Danger Migratory Bird Permit</p>	<p>Yes, but no permit required</p>	<p>The 2022 MBR outlines the protection of nests of 18 migratory bird species (listed on Schedule 1 of the regulation) that reuse nests. Nests for these species are now protected year-round unless they are shown to be abandoned and the Minister is notified.</p> <p>Relevant to this Project is the inclusion of pileated woodpecker on Schedule 1 of the MBR. The updated MBR requires a 36-months (3-year) wait period following confirmation of a pileated woodpecker's abandonment of a nest cavity.</p> <p>For species not listed on Schedule 1, a permit is only required if the MBCA listed bird species nest is removed while actively in use. Tree clearing outside of the breeding bird window avoids this.</p> <p>Due diligence measures to reduce the risk of contravention of the MBCA include surveys to identify pileated woodpecker nest trees, conducting pre-clearing nest surveys if vegetation removal, ground disturbing</p>

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Applicable?	Description / Relevance to Project
				<p>activities or activities affecting bird nests on structures will occur during the breeding bird window, and enacting no-disturbance buffers around active nests. Pre-works nest surveys will be required in the immediate work area prior to initiation of work if within the breeding bird window.</p> <p>Note that this permit application does not cover bird species that are also listed under SARA, in which case additional SARA Section 73 permits may be required.</p>
Provincial				
Water Sustainability Act Section 11 and Water Sustainability Regulation	BC Ministry of Forests (MOF)	Ensures that water quality, quantity (i.e., for licensed users), and riparian habitat are not compromised when there are changes in and about a stream (includes a natural watercourse or source of water supply, whether usually containing water or not, ground water, and a lake, river, creek, spring, ravine, swamp, and gulch, Government of BC 2014a).	Yes, but no approval required	There are no works in or about a stream. All projects require due diligence to avoid effects on water quality, quantity and riparian habitat.
BC Agricultural Land Commission Act Agricultural Land Reserve General Regulation Agricultural Land Reserve Use Regulation	Agricultural Land Commission	Applications for non-agricultural use of ALR lands must be submitted to the ALC.	Yes, the Project works occur on ALR land within the material disposal area (Figure 1)	An application to construct the Project will be submitted to the ALC for review by another consultant within the Project Team.
Wildlife Act, 1996	BC Ministry of Environment and Climate Change (MENV), Environmental Stewardship Division	Protects wildlife and wildlife habitat. Section 34 prohibits possessing, taking or destroying: (i) A bird or its egg. (ii) The nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl.	Yes, but no permit required	A permit under the Wildlife Act is unlikely to be required; however, due diligence requires implementation of best management practices to protect wildlife and their residences. Many bird nests have recommended buffer zones to prevent disturbance during the nesting period. A site reconnaissance evaluated the potential for bird species to nest in the surrounding area. Pre-works surveys by the Contractor's

Applicable Legislation	Government Agency	Permits, Approvals, and Authorizations	Applicable?	Description / Relevance to Project
		<p>(iii) The nest of a bird not mentioned in (ii), when the nest is occupied by a bird or its egg unless authorized under permit.</p> <p>Section 75 describes the requirement to report accidental killing of wildlife:</p> <p>(1) A person who kills or wounds wildlife, other than prescribed wildlife, either by accident or for the protection of life or property, must promptly report to an officer.</p> <p>(a) The killing or wounding.</p> <p>(b) The location of the wildlife.</p> <p>(2) A person who fails to report as required under subsection (1) commits an offence. (Government of BC 1996a).</p>		AQP will still be required to check for active bird nests in the immediate work area if the work is occurring during the breeding bird window.
Environmental Management Act, 2003 Spill Reporting Regulation	BC MENV	Regulates the discharge or emission of effluent, waste or contaminants and requires spill reporting for certain substances. Prohibits causing pollution (Government of BC 2003).	Yes, but no permit required	No permits or approvals are required; however, there is a requirement to report spills. The Spill Reporting Regulation applies to spills of a listed substance, other than natural gas, if the spill enters, or is likely to enter, a body of water, or the quantity of the substance spilled is or is likely to be equal to or greater than the listed quantity for the listed substance.
Forest Act Section 47.4(2)a to cut and remove Crown Timber	BC MOF	Occupant License to cut and remove timber	Required	MoTI may require a license to cut trees.
Weed Control Act Weed Control Regulation	BC MOF	Requires landowner to control, in accordance with regulations, noxious weeds growing or located on land, premises or property occupied by the landowner (Government of BC 1996b). Noxious weeds are defined as plant species listed on Part 1 (Provincial Weeds) of Schedule A of the Weed Control Regulation.	Yes, but no permit required	No permits or approvals are required; however, there is a requirement to limit spread and proliferation of listed species.

5.0 PROJECT – ENVIRONMENT INTERACTIONS

It is important to emphasize and prioritize mitigation measures and practices by which MoTI and the Contractor can avoid the need for additional surveys, environmental approvals, and pathways of effects on the environment (fish, aquatic habitat, wildlife and vegetation communities). The BC provincial Environmental Mitigation Procedures recommend the following hierarchy of preference: (1) avoid, (2) minimize, (3) restore on-site, and (4) offset (off-site or on site) areas with important environmental values (e.g., ecosystems that may support SAR; GOV BC 2014b).

The first priority is to avoid adverse effects on sensitive environmental features. This can be achieved by considering the ability to reduce interactions with wildlife and sensitive habitats by micro-siting to avoid sensitive features (where feasible) and by planning the schedule of Works to avoid sensitive periods. The following sections describe the Bastin Hill Project and interactions with the environment, in consideration of the provincial mitigation policy.

5.1 Aquatic Habitat

Roadside ditches and/or drainages leading from the Project area to the Quesnel River should be considered as potential sensitive receptors from Project activities. Mitigation measures will be required to prevent the following potential effects on fish and aquatic habitat and water quality in the Quesnel River based on the DFO Pathways of Effects diagrams (DFO 2018).

Increase in sediment concentrations – mitigation is required to limit the increase of sediment concentrations in downgradient aquatic habitats. Project activities such as storage of construction materials that contain fines, ground disturbance and use of equipment could result in the migration of suspended sediment to downgradient fish habitat and affect aquatic habitat in the Quesnel River.

Increase in contaminant concentrations – potential to occur from the accidental release of deleterious substances such as oil, grease, fuel, or other pollutants from construction equipment, which can reduce the quality and availability of fish or aquatic habitat in downgradient areas (i.e., Quesnel River). Contaminants can also have direct effects on fish causing lethal or sublethal (physical deformities, affect reproductive success, growth) effects or accumulate in their food sources.

5.2 Terrestrial Habitat

Proposed Project activities have the potential to result in the disturbance of vegetation within the Project Area via the removal of trees and shrubs, accidental introduction and/or proliferation of invasive, non-native plant species and coating of leaves caused by dust and other airborne debris.

5.3 Wildlife

Potential effects on wildlife from the proposed Project activities include:

- Accidental harm/mortality of wildlife, including wildlife species at risk (e.g., birds nesting in trees, ground nesting bird species, bats roosting in trees, mammals denning).
- Accidental destruction of wildlife habitat (e.g., trees and ground with bird nesting, bat roosting, and mammal dens).

- Attraction of wildlife to the work area due to garbage and / or food waste (e.g., bears and birds).
- Increased noise and visual disturbance.

These potential effects on fish, water quality, aquatic and terrestrial habitat and wildlife can be avoided through the implementation of Best Management Practices and mitigation measures as outlined below.

6.0 ENVIRONMENTAL MITIGATION

Potential effects of the proposed Project on environmental resources can be avoided, mitigated, or managed through implementation of recommended measures described in the sections below, which have been developed from the following Best Management Practices (BMP) guidelines, industry standards and other documents:

- DFO's Measures to Protect Fish and Fish Habitat (DFO 2019)
- Land Development Guidelines for the Protection of Aquatic Habitat (Chilibeck et al. 1993)
- Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (2013)
- Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Developments in British Columbia (BC MOE 2014)
- Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia: A companion document to Develop with Care (BC MOE 2013)
- Environmental Best Practices for Highway Maintenance Activities (BC MOTI 2018)
- 2020 Standard Specifications for Highway Construction Volume 1 (BC MOTI 2020a)
- 2020 Standard Specifications for Highway Construction Volume 2 (BC MOTI 2020b)

The mitigation measures described below are intended to be followed by the Contractor carrying out the Project construction. At MoTI's discretion, a detailed Construction Environmental Management Plan (CEMP) shall be developed by the Contractor and their EM. The plan will address Project-specific activities and methods for the construction of the road alignment as required by *Standard Specifications for Highway Construction, Protection of the Environment SS 165 (MOTI 2020a)*.

At MoTI's discretion, an Environmental Monitor (AQP) shall be present during construction to evaluate and report on compliance of the Contractor(s) work procedures and practices with environmental requirements of the Project.

6.1 Air Quality and Dust Control

Air quality, idle reduction and dust control management is a mandatory requirement of MoTI projects and shall be implemented following SS 165.16.02 and as outlined in Table 2. Drivers and equipment operators should employ reduction of vehicle idling. Vehicles and equipment will be operated and maintained according to manufacturer's guidelines and monitored for potential air quality and emission concerns. If required, access routes will be watered to reduce dust generation and cleaned to avoid mud and dust movement into public roads.

Table 2: Air Quality Emissions Management Options and Triggers

Source Description	Options for Emissions Management	Triggers for Management
Construction Vehicles	Avoid engine idling. In colder weather, where possible, use electrical engine heaters rather than idling to prevent engine freeze. Maintain construction fleet vehicles according to manufacturers' guidelines.	Periodic maintenance of construction vehicles. In addition, excessive or consistently black exhaust is a signal that an engine is not operating optimally. If black exhaust is noted, the AQP shall be notified immediately.
Vehicle Traffic Fugitive Dust	On dry days consider watering unpaved access roads that are in frequent use. Where possible, fit 'upswept' exhausts ¹ to construction vehicle fleet. Implementation of a speed limit to slow vehicles and therefore reduce fugitive dust emissions. Cover vehicle loads that are fine grained, especially on windy days. Where access roads join public roads, there is the potential for material to be tracked onto the paved road. If a considerable volume of material is tracked onto a public road, the Contractor will clean the paved road surface by sweeping or using a wet vacuum sweep.	Visual cues would be the primary trigger for mitigative action to be taken with respect to vehicle traffic fugitive dust emissions. If the weather forecast indicates dry weather and strong winds are likely, this is also a trigger for preventative dust management action to be taken.
Heavy Equipment Activities	Move as little material as possible. While placing material, the Contractor will keep drop heights as low as possible. Wet material before handling if possible. Sweep or water roads as necessary for dust control and maintaining public road cleanliness. Implementing a speed limit to slow vehicles and reduce noise generation near residences.	If construction activities are occurring within 300 m of residences and: If visible dust is being generated by activities such as bulldozing, excavation, backfilling; and/or If the weather forecast indicates dry conditions and strong winds are likely. Visual cues would be the primary trigger for mitigative action to be taken with respect to vehicle traffic fugitive dust emissions. If the weather forecast indicates dry weather and strong winds are likely, this is also a trigger for preventative dust management action to be taken.

6.2 Site Access, Mobilization and Laydown Areas

Site access and mobilization will be conducted and planned to minimize ground disturbance within and adjacent to the Project Area, to the extent possible. Equipment and other materials will be brought in using public roads, when possible. Project work activities will be undertaken on MoTI owned land; therefore, permission to enter will not be required.

6.3 Noise Management

Potential effects on wildlife and local residents resulting from noise associated with the Project can be mitigated by implementing the strategies described below:

- The Contractor(s) will act reasonably to reduce noise through the use of "Best Available Control Technology" noise control on construction equipment as well as noise level regulations or guidelines established by WorkSafe BC and other regulatory agencies and jurisdictions having authority for noise levels.
- The Project Area is located within the Cariboo Regional District (CRD). The Contractor will follow noise bylaws including CRD Bylaw #4713 Noise Regulation and Prohibition and limit high noise generating activities to occur between 7:00 AM and 10:00 PM, where possible (CRD 2012).

6.4 Erosion Prevention and Sediment Control

A detailed, site-specific Erosion and Sediment Control (ESC) Plan shall be prepared as a component of the Contractor's CEMP and implemented during Project works. The Contractor(s) ESC measures shall be in compliance with SS 165.04 (BC MOTI 2020a). Specific to this Site, it is recommended that the Contractor implements the following general mitigation measures to minimize the potential migration of sediment outside of the Project area:

- ESC measures (e.g., silt fence, compost socks, etc.) should be installed along the downgradient boundary of the Project area to minimize the mobilization of sediment off site.
- ESC measures (e.g., check dams, straw bales, etc.) should be installed in any roadside ditches that convey surface drainage from within the Project Area downslope to the Quesnel River.
- Soil disturbance should not occur in heavy rain conditions and any soil removed should be placed in a location that ensures that sediment or debris does not migrate outside of the Project area.
- Remove ESC measures once the works are complete and the Site has stabilized.

6.5 Spill and Emergency Response

The Contractor's spill mitigation and response measures in their CEMP shall be in compliance with SS 165.14 (BC MOTI 2020a). The release of deleterious substances, such as hydrocarbons, can impact soil and water quality, aquatic birds, mammals, and fish as well as vegetation and other wildlife found in the Project area. It is recommended that the Project CEMP include the following general mitigation measures to minimize the potential of a release of deleterious substances and guide response to an emergency situation:

- Spill containment kits must be available on every piece of portable or heavy equipment/vehicles and contain sufficient materials for addressing the anticipated maximum spill from a given piece of equipment. Equipment containing ethylene glycol (antifreeze), or other water-soluble chemicals will carry an appropriate number of water-soluble chemical absorbent pads in addition to absorbent pads used for petroleum products.
- All field personnel will be made aware of the location of Emergency Spill Response materials and the procedures necessary to contain spills of any fluid.
- Mobile equipment will be inspected prior to use and daily for signs of leakage. Daily visual inspections will include confirming that all personal protective equipment and other emergency response equipment are in place.
- It is anticipated that fuel trucks will be used to refuel equipment and machinery on site. No bulk fuel will be stored on site during the Project. Where on site fuelling or maintenance of vehicles and equipment is required, the following mitigation measures will be implemented:
 - Spill kits will be readily available during refueling.
 - Personnel will be knowledgeable in the use of spill response materials.
- If the environmental emergency is a spill of a hazardous or deleterious product in quantities equal to or greater than those listed in the Spill Reporting Regulations under the *Environmental Management Act* the AQP will report the release within 24 hours of the event occurring at 1-800-663-3456 (24 hours). Spills that enter a watercourse or water body or if they have the potential to enter a watercourse, water body or drainage ditch, must be reported immediately.

- Be aware of fire hazard ratings during work by regularly checking <http://bcwildfire.ca> for updates. Follow legal and reporting requirements for wildfires.
- Communicate fire prevention techniques during tailboard meetings, which include:
 - Prohibiting smoking near fuel sources, including dry grass, hazardous materials, and dry forests.
 - Installing spark arrestors on combustion sources in areas with Fire Danger Classes III-V (moderate to extreme).
 - Removing debris and litter from work sites.
 - Identify work-related fire ignition hazards such as sparks, catalytic converters, mufflers, open flames, electrical hazards, and cigarettes, and take precautions when using them.
- Have firefighting equipment (e.g., shovels, pulaski or mattocks, full hand-tank pumps, and fire extinguishers) available at work sites, when and where applicable (e.g., during moderate to extreme fire hazard ratings). The location and content of required firefighting equipment is to be inspected and maintained on a regular basis by the Contractor(s).

6.6 Material Storage, Handling and Waste Management

The Contractor's material storage, handling and waste management measures in their CEMP should be in compliance with SS 165.14 and SS165-A (BC MOTI 2020a). Recommended mitigation measures for material storage, handling, and waste management related to proposed road works include:

- Any wastes and hazardous materials, including suspected contaminated or hazardous debris and soils (such as sorbent material, air and oil filters, hydraulic fluids and petroleum products generated during the servicing of equipment) will be stored in an environmentally acceptable location greater than 30 m away from any watercourses or wetlands until disposal at a qualified facility is coordinated. Precautions will include placing the material on plastic or poly sheeting or in appropriate containment to prevent runoff or spills to the environment.
- Suspected contaminated or hazardous materials will be segregated and stockpiled separately a minimum of 30 m from any watercourse or wetland.
- All wastes will be disposed of in compliance with applicable legislation such as the *Environmental Management Act*.
- Food waste and domestic garbage will be collected daily from work and access areas and will be disposed of off site in an appropriate and safe manner. Other construction waste will be collected daily and placed in the appropriate receptacle.
- The Contractor(s) will be responsible for maintaining Safety Data Sheets (SDS) for all potentially hazardous products used during the work.
- On site burial or burning of wastes will not occur.
- Temporary sanitary facilities in the form of portable toilets will be provided, secured so they do not fall over, and located more than 30 m from any waterbody.

6.7 Protection of Water Quality

No work is anticipated to occur within 30 m of any water body. Mitigation measures for the protection of water quality (particularly to avoid effects on the Quesnel River) include the following:

- ESC measures (e.g., silt fence, compost socks, etc.) should be installed along the downgradient boundary of the Project area to minimize the mobilization of sediment off-site.
- ESC measures (e.g., check dams, straw bales, etc.) should be installed in any roadside ditches that convey surface drainage from within the Project Area downslope to the Quesnel River.

6.8 Vegetation and Invasive Plant Management

The Contractor's vegetation and invasive plant management measures in their CEMP shall be in compliance with SS 769 (BC MOTI 2020b). The following mitigation measures should be implemented to prevent, reduce, or manage potential effects on vegetation:

- Natural vegetation should be retained as much as possible. Construction limits should be physically delineated with snow fencing or flagging tape or another visible barrier during construction to minimize disturbance to retained vegetation.
- Limit heavy equipment use to the work area wherever possible to avoid unnecessary disturbance and soil compaction.
- Avoid parking equipment or placing materials within the rooting zone of trees and shrubs (generally to edge of canopy drip line).
- Re-vegetate disturbed areas as quickly as possible after completion of the Project. If possible, plan seeding and planting to allow establishment to occur before the end of the growing season. If there is insufficient time remaining in the growing season for seeds to germinate, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.
- Disturbed areas should be seeded with MoTI's North East General Seed Mix (Table 757A; BC MOTI 2020b).
- The BC *Weed Control Act* imposes a duty on all landowners and occupiers to control designated noxious plants, some of which are of concern throughout the province, and others that are only of concern within specific regional districts. The Contractor should control the introduction and proliferation of invasive plant species by implementing the following:
 - Any imported fill material should be clean and free of any contaminants and invasive species.
 - Vehicles and equipment should be inspected for weeds and mud that may contain seeds prior to mobilizing to the Project, and if required, cleaned prior to entering the Site to reduce the potential for introduction and proliferation of invasive plants.

6.9 Protection of Wildlife and Least Risk Work Windows

The general recommendations to avoid contravening the MBCA, Migratory Birds Regulation, or the BC *Wildlife Act* are as follows:

- If tree clearing or ground disturbance is proposed outside of the least risk windows identified in Table 4 below, a pre-clearing nest survey should be conducted to identify and avoid any active bird nests in the Project area.
- Bank nesting bird (swallow) mitigation should be considered along the exposed banks above Bastin Road (Figure 2). Exclusion can be accomplished by installing tarping or netting covering the steep soil faces, or re-grading or levelling soil slopes to <70°. Geotextile, plastic covers or tarping can be placed over the slope faces; they should be secured to prevent flapping in the wind or allowing access (Ontario Ministry of Natural Resources and Forestry 2017). It is important that any cover material used will not allow entanglement or entrapment. Installation of decoy owls or hawks could also be installed adjacent to active areas, however, this should be considered a 'supplemental measure' and not relied upon as a primary measure (as birds may become accustomed / habituated to them). Exclusion measures should be applied in advance of the breeding bird window (19 April to 24 August) and maintained throughout the duration of the breeding season (ECCC 2023b).
- Construction activities should be avoided in the vicinity of osprey, falcon, eagle, heron and/or other raptor nests with year-round protection. Regardless of tree removal timing, at least one round of a pre-clearing nest survey for raptors and other species with year-round protection is recommended to be completed prior to work (as per the MoTI's Protection of the Environment – Breeding Bird Nest Survey Protocol [MoTI 2023]). If active nests are found, buffer / setback zones shall be enacted based on guidelines outlined in the Develop with Care 2014 BMP (BC MOE 2014b) and the Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia complementary document (BC MOE 2013). Raptor nests in a rural setting typically have a recommended buffer of 100-200 m radius, depending on the species. An additional 100 m breeding season 'quiet' buffer is recommended when the nest is active (BC MOE 2014b).
- Recent updates to the Migratory Birds Regulation (MBR) in 2022 have elevated the importance of early identification of pileated woodpecker nesting cavities (Government of Canada 2022). Dedicated surveys to determine the presence of this species within areas that were identified as having suitable habitat (i.e., mature mixed or coniferous forests or younger forests with numerous large, dead trees **and** presence of large trees >40 cm dbh with heart rot) are recommended in advance of any clearing activities. RIC guidelines indicate that call playback surveys for pileated woodpecker should be conducted within the general breeding bird window of April through late July, but more specifically should be conducted mid-March to mid-April (RIC 1999).
- Buffers should be established based on recommendations of the AQP following identification of a nest and remain in place until the young have naturally and permanently left the vicinity of the nest. It should be noted that some bird species nesting near existing anthropogenic activities may be accustomed to and have chosen to nest within proximity to disturbance. In certain cases, if buffers are not possible due to on site activities, the AQP should conduct monitoring to determine the distance at which migratory birds show signs of stress and recommend additional management measures to avoid contravention of the MBCA.
- Unknown small to medium mammal dens were observed within the forested Road Footprint Assessment Area (Figure 2). Wildlife dens are considered environmentally sensitive areas. Mitigation measures to protect wildlife dens include:

- At all times of the year, pre-disturbance den searches in and around areas ahead of ground disturbing activities should be conducted by the AQP. Active dens should be mapped and flagged in the field with non-disturbance buffers applied.
- A 200 m buffer will be established around active bear, wolf, fox, fisher, badger or coyote den sites. The buffer is to be established immediately upon identification of the active den and shall be retained until the den site is no longer being used by adults or cubs/kits as confirmed by the AQP. The AQP will establish appropriate buffers for all other species with identified active dens and can modify the 200 m buffer dimension by providing a site-specific assessment of the den, the species, and the adjacent work.
- Dens not occupied, as determined by the AQP, will be deconstructed, and backfilled within disturbance areas.

Relevant environmental least risk timing windows are provided in Table 3, with green denoting the least risk window periods, and red denoting the periods when wildlife species are more sensitive to disturbance. To reiterate, nests for raptors and other species (like pileated woodpecker) are protected year-round from removal, even when inactive.

Table 3: Summary of Least Risk Windows for Wildlife including SAR Relevant to the Project¹

Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Migratory Birds												
Passerine (including bank swallow and northern rough-winged swallow)				18					25			
ECCC (Nesting Zone A4)												
Long-billed curlew ²			31					1				
Raptors												
Bald eagle									1			31
Osprey			31						15			
Other raptors		28								1		
Mammals												
Bats (tree maternity roosting)			31							1		

Footnotes:

¹Numbers indicate date of the month when the windows apply. Green cells denote least-risk periods.

²Nesting and breeding window taken from Birds of the World (Dugger, B.D. and K.M. Dugger 2020).

7.0 CONCLUSION

Potential effects on fish, aquatic and terrestrial habitat and wildlife can be avoided through the implementation of Best Management Practices and mitigation measures as outlined in this document. Regulatory applications are not required to DFO under the *Fisheries Act* or to MOF under the WSA but an application is required to the Agricultural Land Commission because the Project works will occur on ALR land (within the material disposal area) (see Figure 1).

This document is intended to provide the Contractor and their AQP with necessary information on mitigation measures to avoid and reduce potential environmental effects of the Project. Overall, if mitigation measures identified in this document and to be provided in greater detail in the Contractor's CEMP are implemented, residual adverse effects of the Project are expected to be negligible.

8.0 CLOSURE

We trust the information contained in this report is sufficient for your present needs. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

WSP Canada Inc.



Emma-Jane Hennings, RBTech
Fish and Wildlife Technician



Rachael Jones, MSc, RPBio
Principal Aquatic Biologist

EJH/RJ/cdg

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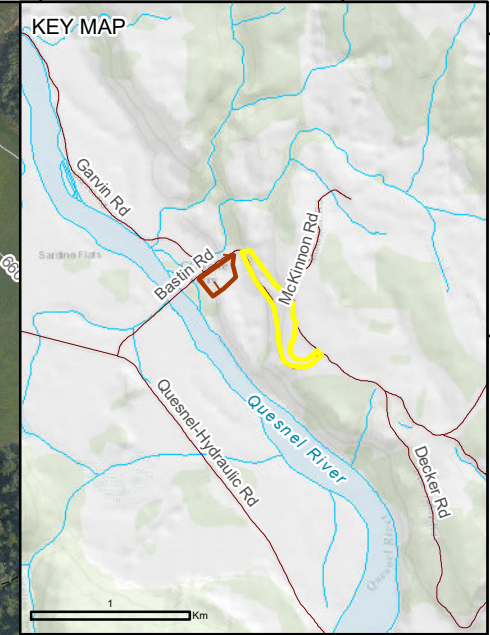
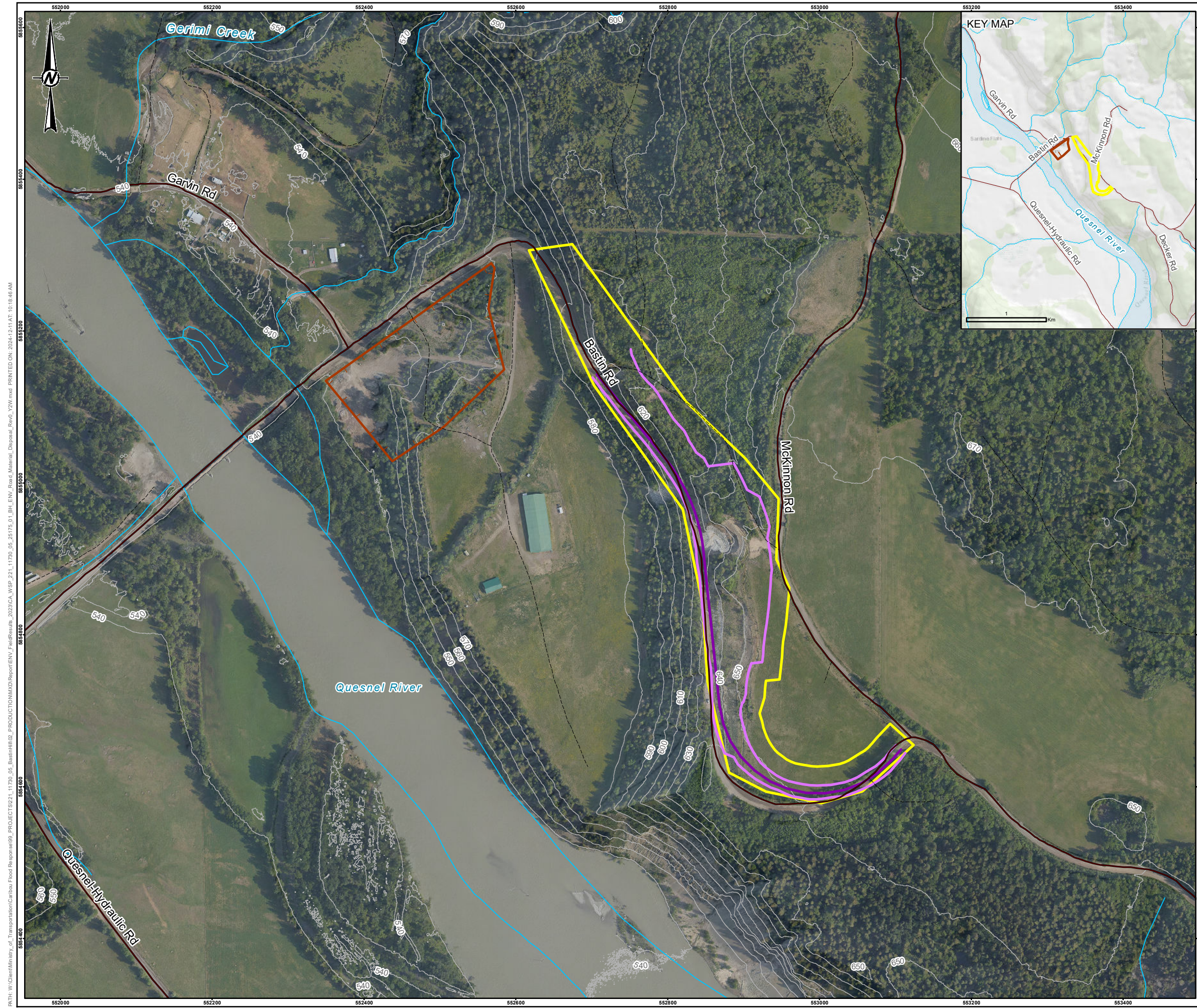
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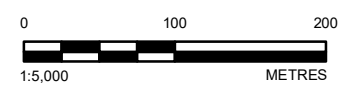
LEGEND

PROJECT COMPONENT

- ROAD TOE
- ALIGNMENT
- ROAD FOOTPRINT ASSESSMENT AREA
- PROPOSED MATERIAL DISPOSAL AREA

BASE DATA

- ROAD - LOCAL
- ROAD - RECREATION / RESOURCE / UNCLASSIFIED
- CONTOUR (10 m)
- WATERCOURSE (1:20,000)
- WATERBODY (1:20,000)



REFERENCE(S)

1. BASE DATA CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENSE - BRITISH COLUMBIA AND CANADA.
2. MAY 2023 IMAGERY PROVIDED BY THE MINISTRY OF TRANSPORTATION.

COORDINATE SYSTEM: NAD 1983 UTM ZONE 10N

CLIENT
MINISTRY OF TRANSPORTATION

PROJECT
CARIBOO ROAD RECOVERY PROJECT - BASTIN HILL

TITLE
2023 ENVIRONMENTAL ASSESSMENT - ROAD FOOTPRINT AND PROPOSED MATERIAL DISPOSAL AREA - ASSESSMENT AREA

CONSULTANT	YYYY-MM-DD	2024-12-11
	DESIGNED	EJH
	PREPARED	JP
	REVIEWED	RJ
	APPROVED	RJ

PROJECT NO. CONTROL REV. FIGURE
 CA-WSP-221-11730-05 07.102 0 1

PATH: W:\Client\Ministry of Transportation\Cariboo Flood Region\09_PROJECT\2021_11730_05_BastinHill\02_PRODUCTION\MXD\ReportENV_Figures\2023CA_WSP_221_11730_05_20175_01_BH_ENV_Road_Material_Disposal_Rev0_12W.mxd PRINTED ON: 2024-12-11 AT: 10:18:46 AM

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

APPENDIX A

Site Photos



Photograph 1: Exposed gravel area with wildlife tree within the proposed material disposal area across from Garvin Road, 15 October 2023.



Photograph 2: Shrub and immature tree habitat in the proposed material disposal area, 15 October 2023.



Photograph 3: Wildlife tree in proposed material disposal area, across from Garvin Road, 15 October 2023.



Photograph 4: Signs of woodpecker feeding and nesting in mature black cottonwood tree in proposed material disposal area, 15 October 2023.



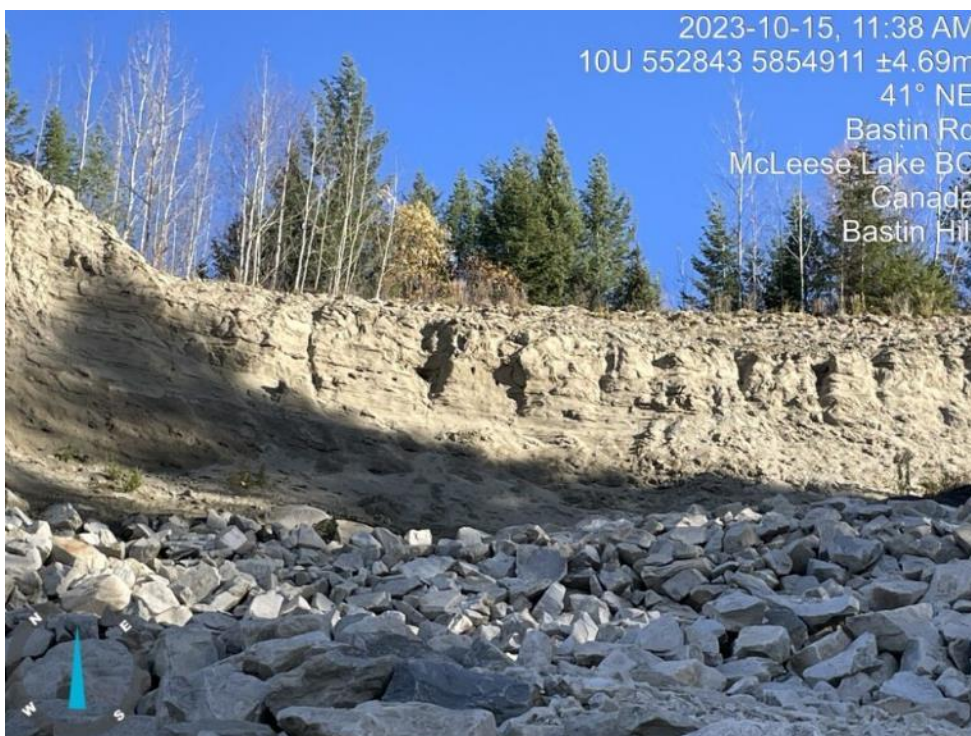
Photograph 5: Mature trees suitable for year-round protected nest species (i.e., raptors and heron) and bat roosting, in proposed material disposal area near the Quesnel River, 15 October 2023.



Photograph 6: Shrub and immature tree habitat west of agricultural field, above Bastin Road, 15 October 2023.



Photograph 7: Current slide condition at Bastin Road, showing mature trees on top of slope, 15 October 2023.



Photograph 8: Bank nesting bird burrows on top of slope on Bastin Road, 15 October 2023.



Photograph 9: View southwest at Bastin and McKinnon roads, edge of agricultural field, 15 October 2023.



Photograph 10: View southwest at Bastin and McKinnon roads, inside edge of agricultural field, 15 October 2023.



Photograph 11: View north at southwest corner of agricultural field, 15 October 2023.



Photograph 12: Shrub and immature tree habitat west of agricultural field, above Bastin Road, 15 October 2023.



Photograph 13: Representative young forest habitat north of the agricultural field, 15 October 2023.



Photograph 14: Representative coarse woody debris within forested area north of the agricultural field, 15 October 2023.



Photograph 15: Mammal burrow in forested area north of the agricultural field, 15 October 2023.



Photograph 16: Mammal burrow in forested area north of the agricultural field, 15 October 2023.



Photograph 17: Squirrel midden in forested area north of the agricultural field, 15 October 2023.



Photograph 18: Bear hair on west fence of agricultural field, above Bastin Hill, 15 October 2023.

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