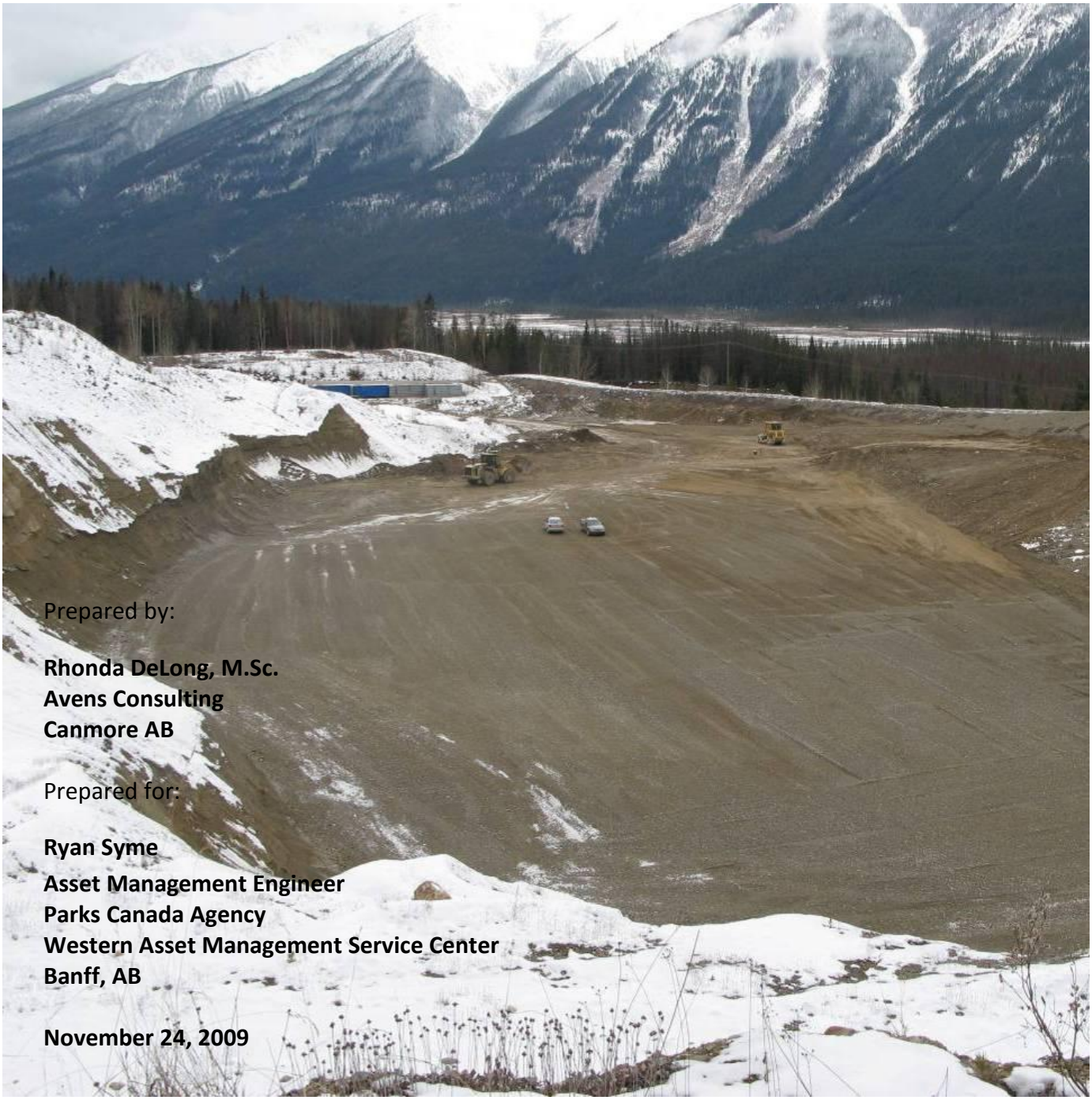
Asphalt Overlay on the TransCanada Highway in Yoho National Park and use of Ottertail Pit for an Asphalt Plant: CEAA Environmental Screening Report



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1. Project

1.1. Purpose and Justification

The purpose of this project is to rehabilitate degraded sections of the TransCanada Highway (TCH) in Yoho National Park (YNP) with a hot asphalt overlay. The asphalt overlay is intended to extend the life of the pavement and improve safety and rideability of the road. The asphalt will be made in a mobile hot asphalt plant which will be set up in the Ottertail gravel pit in Yoho National Park.

The asphalt must be made in a portable plant in the Ottertail pit close to where the paving equipment is operating on the TCH to ensure delivery of required hot asphalt to the paving site. Asphalt made outside the park and transported to the work sites on the TCH would likely cool off to the point where it would be unusable, particularly on cool or rainy days.

1.2. Scope of Project

The project involves two phases that will occur in the winter of 2009 and the summer of 2010. The first phase involves transporting aggregate extracted from Mannix gravel pit in Banff National Park and stockpiling it in the existing Ottertail pit in Yoho National Park. The second phase of the project entails using the stockpiled aggregate to make asphalt concrete pavement in a portable hot-mix asphalt plant in Ottertail pit for use in applying the asphalt overlay to identified sections of the TCH between km 33 and km 45.6 from the east boundary of YNP.

Beginning late fall 2009 approximately 25,000 tonnes of crushed aggregate will be transported from Mannix pit at TCH km 59 to Ottertail pit TCH km 105.5 and stockpiled at the north end of the pit during the first phase of the project. The aggregate will be transported by dump trucks approximately 56 km along the TCH between the two pits. Prior to the initiation of aggregate stockpiling, existing clean fill on the floor of the Ottertail pit will be leveled using a front end loader to prepare a flat surface on which the aggregate can be piled and for the asphalt plant set-up. The footprint of the pit will not be enlarged as a result of this project and consequently no new land will be disturbed and no vegetation will be removed.

In the summer of 2010 this stockpiled aggregate will be mixed with asphalt cement to make approximately 25,000 tonnes of asphalt in a portable asphalt plant set up in the Ottertail pit. The plant will be located at the south end of the leveled area of the pit. The hot asphalt will be loaded into dump trucks, covered and transported to asphalt paving machinery working on the TCH between TCH km 33 and km 45.6 (from east boundary of Yoho National Park) and other locations requiring minor repairs along the TCH in the park.

1.3. Scope of the assessment

The scope of this Environmental Screening encompasses the potential environmental impacts and mitigation measures of hauling of aggregate into the Ottertail pit, the use of the pit for stockpiling materials and for production of asphalt in a portable asphalt plant, and paving the identified sections of the TCH with an asphalt overlay. The extraction of aggregate materials from Mannix pit is covered under a separate Environmental Screening (Reisenleiter 2009).

For the purposes of this assessment the local study area (LSA) for the use of the Ottertail pit is the existing footprint of the pit plus a 100m buffer around the outside of the pit to encompass any potential local effects on wildlife. The regional study area (RSA) is the valley bottom terrain below 1750m in the Kicking Horse Valley between the Kicking Horse Pass and the west park boundary which encompasses the functional wildlife habitat in this steep valley (Figure 1). Cumulative effects to Valued Ecosystem Components will be assessed at the scale of the RSA.

The assessment of environmental effects related to the project involved the following phases:

- Defining the scope of the assessment and Valued Ecosystem Components (VECs).The *Canadian Environmental Assessment Act* defines a VEC as:
  "Any part of the environment that is considered important by the proponent, public, scientists and government involved in the assessment process. Importance may be determined on the basis of cultural values or scientific concern."(Cumulative Effects Assessment Working Group 1999)*;*

- Collection of data from field visit and reviewing existing reports and other data sources;
- Data analysis;
- Identification of potential impacts and mitigation measures, following applicable guidelines and standards and drawing on previous project experience;
- Determination of potential residual impacts after mitigation measures have been applied;
- Safety recommendations to prevent malfunctions and accidents,
- Cumulative impact assessment considering the effect of the project in relation to all other past, present and future projects in the region;
- Design of follow-up, surveillance and monitoring programs.

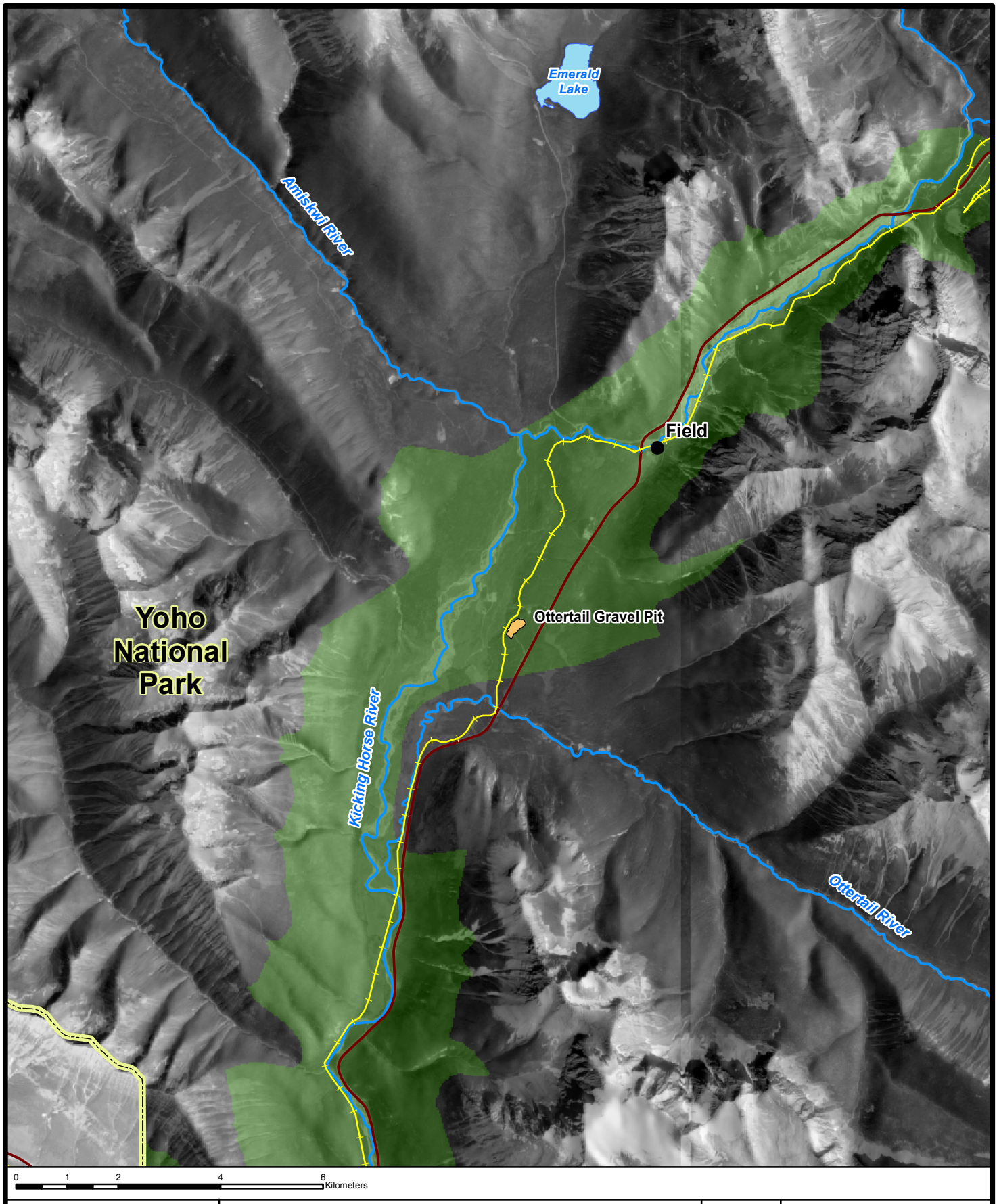

Figure 1

The Kicking Horse River valley and regional study area

Legend

- Ottertail Gravel Pit
- Town
- TransCanada Highway
- Major Rivers
- Railway
- Lake
- Park Boundary
- Elevation below 1750m

Scale
1 : 100,000

Prepared By:
AVENS CONSULTING

Airphoto Date: 2004

Drawn By: Bruce Gleig

Date: November 19, 2009

1.4. Regulatory context and guiding documents

Canadian Environmental Assessment Act

The *Canadian Environmental Assessment Act* (1992) requires the assessment of the potential environmental impacts of projects when the federal government is the proponent, or is providing funding, land, or a permit for a project. Depending on the scope and complexity of the project, environmental impacts of a project are assessed at one of three levels under CEAA: Environmental Screening, Comprehensive Study or Panel Review. This project is being assessed at the Environmental Screening level.

National Parks Act

All projects undertaken in a National Park fall under the *Canada National Parks Act* (2000) which states:

"The National parks are dedicated to the people of Canada for their benefit, education and enjoyment. Subject to this Act and the regulations, all the parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations. Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks."

This EA was written considering both the maintenance of ecological integrity within YNP and the need for a safe well maintained highway that serves park users, residents, and travelers using the TCH.

Yoho National Park Management Plan

The *Yoho National Park of Canada Management plan* (Parks Canada 2000) sets out goals and objectives to manage the park to ensure the long-term viability of sensitive species and to:

> ***3.11.2 Objectives***
> *To maintain viable populations of grizzly bear, wolf, wolverine and other rare or sensitive wildlife vulnerable to displacement by people.*
> *To maintain and, where feasible, restore habitat quality and connectivity for wildlife in the park and on surrounding lands.*
> *To restore long-term patterns of behaviour, distribution and abundance of ungulates.*
> *To reduce human-caused mortality that threaten the viability of wildlife populations in the park and regional ecosystem.*

The management plan also sets out specific objectives for managing human activity and wildlife in the sensitive Kicking Horse wildlife corridor in which the Ottertail pit is located and most of the paving work will take place:

3.12.2 Objectives

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To reduce the footprint of facilities along the lower slopes and valley floor.
To enhance wildlife movement.
To reduce mortality at high-kill areas along the CPR and Trans-Canada Highway.
To improve habitat connectivity at major "pinch-points".

The YNP management plan also establishes the need for maintenance of existing transportation corridors within the park, which is directly related to the scope of the current paving project, in a manner that supports the maintenance or restoration of ecological integrity:

> *Considering the economic and social significance of the CPR and the TCH, and the lack of viable alternatives, these routes will remain in the park. While they are key to the nation-wide transportation of goods, and enable millions of people to appreciate the Rocky Mountain parks, they also have a significant impact on the environment.*
>
> *6.2 Strategic goal*
> *National transportation corridors and secondary roads are managed in a way that supports Parks Canada's commitment to ecological integrity and enables visitors to experience the park.*

B.C. Environmental Management Act

The operation of asphalt plants in B.C. is regulated under the *B.C. Environmental Management Act* (1997). The *Asphalt Plant Regulation* (B.C. Reg. 217/97) sets emissions limits for plants (Table 1), emissions monitoring requirements and stipulates setback requirements for locating asphalt plants. The asphalt plant and operator contracted to produce the asphalt for this paving project must comply with all the sections of this Regulation.

Table 1. Hot Mix Asphalt Plant Emission Limits (source: Schedule B, B.C. Reg. 357/2002, s.7; am. B.C. reg. 199/2007, s.3)

Column 1	**Column 2**	**Column 3**
Parameter	Concentration Limit: • Lower Fraser Valley • Prince George Area • New Plants[b] • Modified Plants	Concentration Limit: • Other Plants
Particulates[a]	90 mg/m^3	120 mg/m^3
Organics[a]	60 mg/m^3 (1 hr average)	120 mg/m^3 (1 hr average)
Opacity	20%	20%
Carbon Monoxide[a]	200 mg/m^3	400 mg/m^3

[a] concentrations in mg/m^3 dry, corrected to 16% 0_2, at 20° C and 101.325 kPa

[b] Manufactured after June 27, 1997

Under this regulation the asphalt plant must meet the following requirments for location:

> *16 (2) A mobile plant operating in a location which has not been previously used for asphalt production must be a minimum of*
>
> *(a) 50 metres from a stream,*
>
> *(b) 300 metres from residences or businesses, and*
>
> *(c) 500 metres from a school in session, hospital or facility used for continuing care as defined in the Continuing Care Act*

The Ottertail pit complies with all these stipulations, as there are no buildings or residences within 1km and the pit is more than 200m from the nearest stream.

1.1. Alternatives to the proposed project

The only alternative to this project is the "no paving option" or not rehabilitating the identified sections of the TCH with an asphalt overlay. This is not a viable alternative because the surface of the highway will continue to degrade further compromising the safety and rideability of the TCH for all users in the degraded sections over time. Given the importance of the TCH as a national transportation corridor and its importance as the only access route into and through the park for park users allowing the highway to deteriorate is not acceptable from a social and human use perspective.

1.2. Alternate means of implementing the project

Transport of aggregate from outside park

One alternate means to implement this project would be to import aggregate from outside the mountain national park system rather than using aggregate from Mannix pit in Banff National Park. An analysis of using aggregate sources from outside the mountain parks near Canmore versus using a source inside the park was done as part of the Mannix pit expansion EA (Reisenleiter 2009). These sources are considerably more expensive per cubic meter of material than those produced in the parks. The closest source of aggregate for this project would be Golden, B.C. which would entail transporting the aggregate the same distance to Ottertail pit as from Mannix pit but with a total cost of likely two times more than using existing sources within Banff National Park. In addition the Mannix pit has been designated as the source of aggregate for use within the Mountain parks.

Transporting aggregate materials from outside the park by rail is another alternative. This option is not feasible as it would require off-loading facility at or near the Ottertail pit which would be prohibitively expensive as well as technically and operationally challenging.

Extraction of aggregate from Ottertail pit

The use of Ottertail pit as the source of the aggregate materials for making asphalt, while possible, is not desirable from an ecological perspective. Ottertail pit is currently a relatively small pit that would have to be expanded significantly to provide the required aggregate. Also there is likely not enough gravel resources in the pit to supply the aggregate for this project in any case. Given its location within the Kicking Horse Wildlife corridor and existing barriers to wildlife movement within the vicinity of the pit, expansion of the pit would be unacceptable as it would reduce the small buffers that exist between the CP ROW, the TCH ROW and the pit. The Mannix pit in BNP has been designated as the source pit for all aggregate required in Yoho, Kootenay and Banff National Parks for the next 10 years. Using one pit concentrates this type of major disturbance to a single location within the mountain park ecosystem.

Production of asphalt outside park

Asphalt could be made outside the park in or near Golden, B.C. where there is existing infrastructure and transported into the park for use in this project negating the need for using Ottertail pit as a site for asphalt production. However, this is not technically feasible as the asphalt must be hot when it is delivered to the paving equipment where it is working along the TCH. The long travel time required to load and transport asphalt to the work sites along the TCH would likely result in the asphalt temperature dropping to the point where it was unusable, especially on cool and rainy days.

1.3. Project Development Procedures

1.7.1. Project Schedule

The transport of aggregate materials from Mannix pit to Ottertail pit could commence as early as December 2009 upon approval of this EA but will likely now happen in April and May of 2010 due to the arrival of winter weather. The production of asphalt and rehabilitation of the specified sections of the TCH with an asphalt overlay will occur over a one month period between May 20th and September 30th dependant on the schedule of the successful paving contractor.

1.7.2. Transport of aggregate and asphalt

All aggregate transported to the Ottertail pit for use in asphalt production will be transported in covered trucks to avoid loss of aggregate from the trucks and to minimize dust. Truck boxes on dump trucks used to transport asphalt to the paving equipment on the TCH will be sprayed with a fine coat of diesel fuel to reduce the occurrence of asphalt sticking to the box. Diesel spraying will take place at Ottertail pit in a bermed containment area lined with an impermeable layer and

15cm of clean gravel. The contaminated gravel will be collected from the traps at the end of the project and either used in the asphalt plant or disposed of in an appropriate facility outside the park.

1.7.3. Portable asphalt plant specifications and fuels

The asphalt plant will be located on the SW area of the pit floor closest to the entrance. The footprint of the plant will be approximately 65m x65m. The area behind the plant to the NE toward the back of the pit will be used for storage of aggregate (Figure 1). All work and machinery travel will be confined to the areas of the pit designated for this project by the Parks Canada representative. All other work associated with this project will occur on the TCH.

The portable asphalt plant used in this project will be fueled by bunker fuel or diesel. The plant will be fitted with a dry bag system to capture emissions and will comply with all the regulations under the *B.C. Environmental Management Act*. Three types of materials will be transported to the pit and stockpiled for use in asphalt production: 16 mm rock, manufactured fines and natural fines. These materials will be mixed together with liquid asphalt cement in the asphalt plant mixing drum and heated to 150C to produce hot asphalt. Once the asphalt is thoroughly mixed it will be placed in a silo and loaded into trucks from the silo according to computerized load weights for each individual truck. The trucks will then deliver hot asphalt to the asphalt paver working on the TCH. The asphalt plant will operate during daylight hours only but a generator will be required to operate 24 hours a day to keep the asphalt oil circulating in the plant.

The toxic and/or hazardous materials used in this project to run machinery and the asphalt plant will be diesel, bunker fuel, gasoline, hydraulic fluids, asphalt emulsions and oils. There will be thousands of liters of fuel consumed during the course of this project.

1.7.4. Waste disposal

All trade waste will be disposed of in an approved waste disposal facility outside the park. Food garbage will be stored in vehicles or a trailer and transported to an approved facility within the park on a daily basis to avoid attracting wildlife to the site. The contractor will provide a portable toilet for the use of the workers during the course of this project which will be placed in an appropriate location in the pit. Human waste will be transported outside the park for disposal at an approved facility.

1.7.5. Disturbance to residents and visitors

Since the Ottertail pit is closed to the public and is a gated facility the daily operations of the asphalt plant and associated activities within the pit should not affect residents and visitors to the park. Traffic on the TCH will be disrupted to some extent during paving operations and there will be some traffic control at the entrance road to pit which may cause minor traffic delays to allow trucks hauling aggregate and asphalt to enter and exit the TCH at the entrance road to the pit. Since the closest public facility is more than 1km away there is unlikely to be any

disturbance to park visitors related to the noise and smells associated with the operation of the asphalt plant in Ottertail pit.

1.4. Project Operational Requirements

1.8.1. Handling and storage of toxic/hazardous materials

The containment, storage, security, handling, use, unique spill response requirements and disposal of empty containers, surplus product or waste generated in the use of any hazardous or toxic products will be in accordance with all applicable federal and provincial legislation. Hazardous or toxic products will be stored no closer than 100 metres from streams, wetlands, water bodies or waterway.

In the Ottertail pit the only surface water that is potentially within 100m is the sewage lagoons which are above the level of the pit floor by approximately 15m. A lined impervious berm covered with absorbent sand or clay will be constructed around all fuel tanks and will be capable of holding 110% of the volume of the tank (Parks Canada 2006). Smaller quantities of fuel or other toxic materials in mobile fuel containers will be stored in the service vehicle at all times or stored in a lockable trailer or shed. On the TCH best management practices will be used for fuelling of machinery and handling of hazardous materials during paving activities (Irwin 2000).

The asphalt plant and aggregate stockpiles will be located in the pit such that there is enough room for a loader to maneuver between the piles and the plant in the event of a spill involving the asphalt plant. An impervious containment berm will be installed under the asphalt storage tank that is 110% of the volume of the tank.

A Spill Response Plan will be prepared by the contractor. The contractor will be required to have spill management kits on-site and all workers will be trained in their use. The contractor will inform the Environmental Surveillance Officer and the Banff Dispatch immediately of any fuel or hazardous material spills.

1.8.2. Waste disposal

All hazardous waste will be disposed of in accordance with all applicable provincial and federal regulations at an approved facility outside the park. Trade waste, hazardous waste, and domestic waste will be kept separate and disposed of in an appropriate matter outside the park. Waste containers will have lids and waste loads will be covered during transport.

1.8.3. Site security

The pit is a gated facility but it is unlikely that the gate will be locked at any point during the project to facilitate delivery of fuel for the asphalt plant at night. Therefore, there will be a requirement to have two of the contractor's staff onsite in Ottertail pit 24 hours a day, 7 days a week to provide site security and to enable delivery of fuel for the asphalt plant on an ongoing basis. These people will also ensure that the oil is circulating at all times in the asphalt plant.

1.8.4. Erosion and runoff control measures

Since all aggregate materials will be stored on the pit floor which is 20-25m below the level of the surrounding land there is no possibility for the stored aggregate materials to erode or be washed out of the pit. During heavy rain events or during spring run-off there is potential for the aggregate piles to settle and spread to a small extent within the confines of the pit but it is unlikely that any material will be unrecoverable.

1.5. Project permit requirements

All project activities shall be consistent with the *National Parks Act* and *Regulations* and Parks Canada's stated policies. Persons responsible for the mobile asphalt plants will comply with all requirements of the *B.C. Environmental Management Act*, its associated regulations and all other applicable laws during asphalt production at Ottertail Pit.

All contractors will require a valid National Parks business permit to carry out project activities. All business and personal vehicles will require park motor vehicle permits or work permits. A Restricted Activity Permit will be required for storage of fuels.

2. Site description and baseline conditions

2.1. Site location

The entrance to Ottertail pit is located approximately 7 km south of Field at km 105.5 on the TCH (from East park gate of Banff National Park) in the Kicking Horse river Valley in Yoho National Park. The pit is 490m to the west of the TCH via an access road and is bounded by the CP rail line ROW to the west (Figure 2). The GPS coordinates for the pit floor where the asphalt plant will be located is 531044E 5688023N (Zone 11, NAD 83) at an elevation of 1175m.

The total footprint of the pit including the other existing facilities (sewage lagoons, waste transfer station and abandoned dump site) is approximately 4 ha. The approximate size of the area to be used for aggregate storage and asphalt production on the pit floor is 1.5 ha.

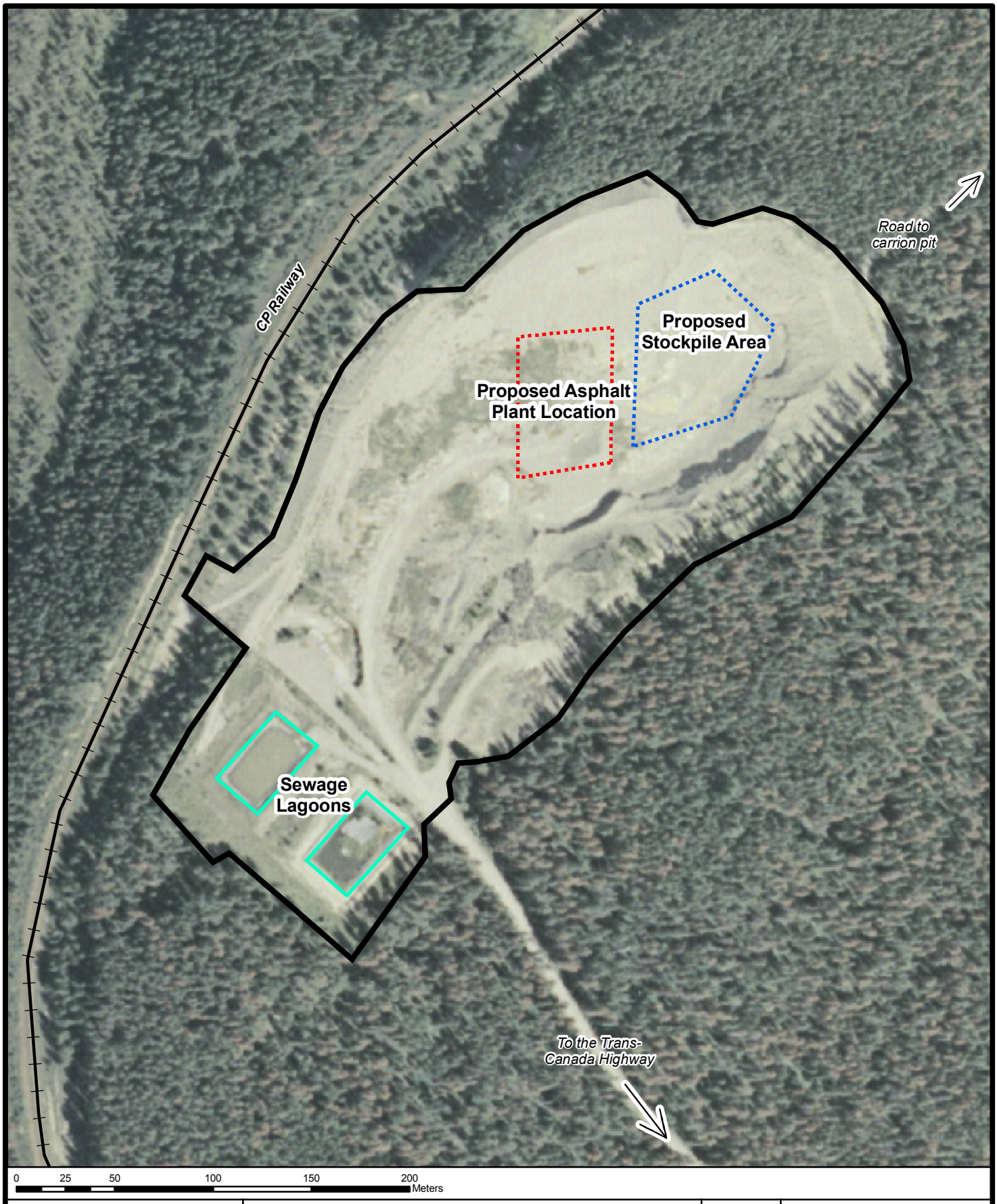

Figure 2

The Ottertail Pit in Yoho National Park

Legend

- Proposed Asphalt Plant Location
- Proposed Stockpile Area
- Sewage Lagoon
- Ottertail Gravel Pit
- Railway

Scale
1 : 100,000

Prepared By:
AVENS CONSULTING

Airphoto Date: 2004

Drawn By: Bruce Gleig

Date: November 19, 2009

2.2. Land use history

The Ottertail pit was first developed as a gravel borrow pit in 1956 for the construction of the TCH (Parks Canada 2007). An incinerator was operated within Ottertail pit from 1970-1973. It was also used used as a trade waste disposal site from 1973 to 1993 and sections of the pit along the south and east edges contain buried vehicles, construction materials (wood, scrap metal, concrete) and salted sand and blast rock from ditch cleaning activities. The carrion pit 200m to the north was used as a landfill site from 1960-1973. Due to the presence of these buried materials the Ottertail pit is classified as a Class 1 contaminated site under the National Classification System for Contaminated Sites (CCME 2008) and is listed on the Federal Contaminated Sites Inventory website (Treasury Board Secretariat 2005).

In 1990 two sewage lagoons and associated septic fields were constructed in the SW end of the pit to process sewage from Outlying Commercial Accommodation and Parks Canada outhouses in the park. The sewage lagoons were closed in 2006 when the Lake Louise wastewater treatment plant was upgraded. Since 2006 all sewage from these sources has been directed to the treatment plant. There is a plan to decommission the lagoons and rehabilitate this part of the pit. The environmental assessment process for this project is underway.

In 2001 three groundwater monitoring wells were installed in the Ottertail pit to monitor contaminants in groundwater originating from the refuse dumped at the site (Parks Canada 2007). The wells were drilled to a depth of 15m but so far water has never been found in any of the wells although they are only monitored intermittently. During drilling very hard layers of silt and clay were encountered, these likely stop or severely impede the flow of any groundwater to lower depths where the wells are situated.

2.3. Climate

With its position west of the continental divide, the climate of Yoho National Park is moderated by warm air masses from the Pacific coast but is still influenced by cold polar air masses which originate in Yukon and Alaska. The result is highly changeable weather in the park with mean annual temperatures of 2.8C and mean temperature in July of greater than 15 C, which is higher than Banff and Lake Louise to the east in Banff National Park. Total annual mean precipitation is approximately 620mm at the Parks Canada Boulder Creek Compound less than 2 km away from the Ottertail pit (Environment Canada 2009). Forty percent or 244mm of the yearly precipitation falls as snow.

The ambient air quality in Ottertail pit is likely the same as that of the surrounding undisturbed land with very low levels of particulates and pollutants mostly originating from vehicles on the TCH given the pit's normally low level of use and its location within a National Park.

2.4. Wildlife

YNP provides habitat for hundreds of species of wildlife including ungulates, large carnivores, small mammals, and birds. The Ottertail pit is situated in the Kicking Horse wildlife corridor which occupies the Kicking Horse Valley between Kicking Horse pass east of Field to the west park boundary. According to the YNP Ecological Land Classification (ELC), Ottertail pit is situated in the DR7 ecosite of the Daer Ecosection (DR) in the valley bottom montane area of the park and has medium diversity and medium to high density of wildlife (Achuff et al. 1994). A brief site visit to Ottertail pit was conducted on November 9, 2009.

The DR7 ecosite provides important habitat for ungulates with moderate densities of elk and very high densities of moose (Achuff et al. 1994). It is also important summer range for deer. The high habitat diversity associated with the DR Ecosites results in high densities of small mammals including red squirrels, long-tailed voles, southern red-backed voles and masked shrews.

There are several large carnivore species that use the Kicking Horse river valley in YNP. The Yoho wolf pack has a large territory of roughly 1000km^2 that includes the Kicking Horse River valley between Glenogle Creek and the town of Field, and tributary valleys including the Amiskwi and Ottertail valleys (Parks Canada 2008a). There is a wolf denning site across the Kicking Horse River from the Ottertail pit less than 1.5 km away (C. McTavish pers.comm.). Parks Canada disposes of road killed wildlife carcasses in a carrion pit (an old landfill site) which is located 200m north of Ottertail pit on the same side of the TCH. The wolves are known to frequent the carrion pit to feed (McTavish 2009). Wolves are sensitive to sensory disturbance when they are denning, usually May to mid-June.

There are an estimated 11-15 grizzly bears that have home ranges in YNP (Parks Canada 2008b). Black bears, lynx and cougars are also known to occur in YNP. The DR7 ecosite, where the Ottertail pit is located, supports a moderate density of small carnivores including marten (Achuff et al. 1994).

The land surrounding Ottertail pit provides medium quality habitat for large carnivores but its location between the CP rail line and the TCH reduces the habitat effectiveness for bears, and wolves in this area with high sensory disturbance and high risk of mortality on the rail line and the highway. Recent data from a remote camera set up near the carrion pit as part of the Carnivore Monitoring Project (McTavish 2009) suggest that wolves, grizzly bears, black bears and coyotes are frequenting the carrion pit and therefore are travelling in close proximity to the Ottertail pit.

There is high diversity and moderate density of breeding birds associated with the DR7 ecosite. Although the pit itself provides no functional habitat for birds, high densities of Dark-eyed juncos and Townsend's Warblers have been recorded in this ecosite as have three-toed woodpeckers, red-breasted nuthatches and pileated woodpeckers (Achuff et al. 1994). Breeding

forest birds are most susceptible to sensory disturbances during nesting and fledging periods (spring and early summer). During other times of the year they would likely be habituated to human-caused sensory disturbances due to the proximity of the CP Rail line and the TCH.

Due to the fact that the nearest natural surface water is a small creek with a steep gradient that is more than 200m away the LSA likely provides little habitat for amphibians.

2.5. Vegetation

The area of the pit that will be used for the asphalt plant and the aggregate stockpiling is currently devoid of vegetation. The previously disturbed areas in the rest of the pit and around the edges of the pit have typical early successional species including yellow mountain avens (*Dryas drummondii*), hairy wild rye (*Elymus innovatus*), willow species (*Salix sp*.), as well as balsam poplar (*Populus balsamifera*), aspen (*Populus tremuloides*) and spruce seedlings that are beginning to colonize the bare mineral soil. The surrounding land in the LSA consists of the C38 lodgepole pine/ buffaloberry/pine grass (*Pinus contorta*/ *Shepherdia canadensis*/ *Calamagrostis rubescens*) vegetation community that is commonly found in the DR7 ecosite with small components of Douglas fir, aspen and balsam poplar also present. The surrounding stands have high incidence of mountain pine beetle attack and consequently over half of the pine in these stands are dead standing trees.

Several patches of the invasive non-native plant Canada thistle (*Cirsium arvense*) were observed around the edge of the pit during the site visit.

2.6. Soils and landforms

The landform of the DR7 ecosite is mainly Ice Contact Stratified Drift B which consists of a random mixture of morainal, glaciofluvial and glaciolacustrine sediments situated on benchlands (Achuff et al. 1994). The soils are mainly well to rapidly drained orthic eutric brunisols with some eluviated eutric brunisols on gently sloping terrain under mixedwood forests.

There is no native topsoil left in the pit as it was all extracted when the pit was formed. The subsoil of the pit floor consists of variably textured silty loam and silt clay loam with some gravel and cobbles. Some of this material is from outside sources that was deposited on the pit floor when the pit was used for dumping clean fill. This is currently being leveled in preparation for the stockpiling of aggregate (Figure 3).

Figure 3. The area of Ottertail pit that will be used for aggregate stockpiling and set up of an asphalt plant.

2.7. Aquatics and hydrological resources

Besides the two man-made cells of the sewage lagoon there is no surface water in or immediately adjacent to the Ottertail pit. There is a small creek (~1m wide) with a steep gradient in a confined gully approximately 240m to the northeast of the Ottertail pit just north of the carrion pit. The Kicking Horse River is approximately 1km to the west in the valley bottom.

Overall the floor of the Ottertail pit appears to be very well drained with no evidence of previous water pooling.

2.8. Cultural features

The Ottertail pit is not a public facility but rather a site used for industrial purposes. Consequently it currently has low aesthetic value. The pit is not visible from the TCH. The nearest public facilities in the park, besides the TCH, is a trailhead parking lot for the Ottertail fire road approximately 1.5 km south on the TCH and the Field townsite is approximately 6.5km to the northeast.

There are no known cultural or archeological resources associated with the pit (Noelle Summers, pers.comm.).

3. Environmental Impacts, Mitigation measures, and residual impacts

3.1 Temporal and spatial boundaries

The temporal boundary for the assessment of environmental effects will be the duration of the two discrete phases of the project in April-May 2010 (aggregate transport and stockpiling) and a one month period between May-September 2010 (asphalt production and paving) until the paving project is complete . The spatial boundary of the assessment of effects is the Ottertail pit plus a 100m buffer (the LSA) and the TCH road surface plus a 100m buffer on both sides of the road.

3.2 Impact significance criteria

The impacts of the project on the VECS were evaluated using a set of criteria outlined by the CEAA and further refined for this project. See table 2 for criteria.

Table 2. Impact significance criteria used to evaluate environmental effects of the project on the VECs.

Criterion		Code	Definition
Direction	Negative	Neg	Impact has undesirable effect on VEC
	Positive	P	Impact has desirable effect on VEC
	Neutral	Neu	Impact has no effect on VEC
Magnitude	Negligible	N	No discernable change from baseline conditions
	Low	L	Change is detectable but is within normal variability of baseline conditions
	Moderate	M	Change is substantially different from baseline conditions but under thresholds
	High	H	Change exceeds thresholds and causes substantial alterations in VECs including loss of species or communities at risk
Geographic extent	Low	L	Impacts restricted to local study area (project footprint)
	Moderate	M	Impacts extend beyond local study area but not beyond regional study area **
	High	H	Impacts extend beyond regional study area
Frequency	Once	O	Occurs one time
	Intermittent	I	Occurs periodically
	Continuous	C	Occurs continuously
Duration	Short-term	S	Impact occurs during asphalt production and paving activities
	Medium-term	M	Impact continues for up to 2 years after asphalt production and paving activities
	Long-term	L	Impact continues for more than 10 years years after asphalt production and paving activities
Reversibility	Reversible	R	Impact is reversible
	Irreversible	I	Impact is not reversible

**Regional study area = Kicking Horse Valley below 1750 m from Kicking Horse summit to West park boundary.

3.3 Air quality

The Valued Ecosystem Component (VEC) for air quality is clean air with minimal compounds that contribute to poor air quality (e.g. poly-cyclic aromatic hydro-carbons, particulate matter and carbon monoxide).

Potential impacts

The source of air pollutants in this project is the asphalt plant itself and the trucks and machinery used to transport aggregate and asphalt to and from the pit as well as within the pit. While there is potential for significant air pollutants from the asphalt plant the emissions from the plant will be filtered out with a dry bag emissions control system which traps most of the pollutants as required by the *B.C. Asphalt Plant Regulation*. Since emissions from asphalt plants are tightly controlled and monitored under the *B.C. Environmental Management Act* (1997) it is anticipated that any emissions which exceed the guidelines will be dealt with promptly.

There will be vehicle emissions and possibly dust produced or created by the machinery and trucks used to haul aggregate and asphalt within the pit and the pit access road.

Mitigation measures

- Asphalt plant and operators must comply with all emissions standards and monitoring requirements as specified under the *B.C. Asphalt plant regulation.*
- Asphalt plant must be fitted with a dry bag emission control system.
- Minimize unnecessary idling of all vehicles and machinery in the pit.
- Employ dust control measures (e.g. water truck) as necessary during dry conditions to minimize dust due to machinery and vehicles in Ottertail pit and the entrance road.

With the implementation of the prescribed mitigation measures it is anticipated that there will be no residual effects of this project on air quality.

3.4 Wildlife

The VECs for wildlife are healthy viable populations of wildlife species that are considered regionally important and known or presumed to require habitat that could be negatively affected by this project. The species and groups of wildlife assessed as VECs for this project will be elk, moose, grizzly bear, black bears, wolves, small mammals and songbirds which together represent the trophic levels and life forms that could be most affected by this project.

Potential impacts

This project is utilizing an existing disturbed industrial area and the TCH for project activities and no new land will be disturbed in the vicinity of the Ottertail pit. Therefore there will be no additional direct loss of habitat and no change in habitat diversity associated with this project. However, there will be temporary loss of functional habitat in the vicinity of the pit during project activities due to sensory disturbance. There is already ongoing sensory disturbance in the vicinity of the pit since it is located directly adjacent to the CP rail line and 500m off of the TCH. However, many animals have likely become habituated to these features on the landscape.

Wary animals including grizzly bears, black bears, wolves and moose will likely be temporarily displaced from the LSA by the increased noise and presence of people and machinery in the pit during the project. There may be some avoidance of the nearby carrion pit by animals habituated to feeding on the carrion placed there throughout the year.

The displacement of large mammals from the vicinity of the pit area may result in more animals crossing the TCH or the CP tracks to avoid this area as they are travelling north-south along the relatively narrow Kicking Horse wildlife corridor or (Figure 1). This could lead to increased mortality of ungulates and large carnivores on the TCH and CP rail. From 1997-2006 222 animals were killed in YNP on the highway including 50 elk, 29 moose, 24 black bears and 16 wolves (Parks Canada 2008a). In the same period 28 animals were killed on the CP rail line, including10 black bears and 4 wolves.

Elk are sensitive to human-caused sensory disturbance during rutting season (September to October). During this period of time the bull elk are highly stressed and additional stresses such as construction disturbance can be detrimental to their health. However, this project is occurring in early winter and summer outside of this window so there is unlikely to be any significant sensory disturbance to elk as a result of this project.

Forest birds are most sensitive to sensory disturbances during nesting and fledging periods. Increased sensory disturbances can cause permanent or temporary habitat avoidance depending on the duration and magnitude of the disturbance, coupled with the sensitivity of the species present. Increased sensory disturbances in the spring and early summer may cause habitat avoidance during breeding and fledging periods, resulting in nest abandonment and increased mortality of the young.

Small mammals are not generally impacted by human caused sensory disturbance in the form of traffic or construction noise (McGregor et al 2008). Small mammal mortality during construction activities is generally caused by crushing of nests and direct morality as a result of heavy equipment. Small mammals in the forest surrounding the pit will not be impacted because machinery will be restricted to the roads and pit area.

There is potential for animals to be attracted to human food and garbage during the project.

Mitigation measures

- The asphalt plant and paving activities will only occur during daylight hours between 0600 and 1900 hours to minimize disturbance to wildlife. The asphalt plant will need to be operating in a standby mode during the night to keep the asphalt oil heated and circulating within the plant. Noise, light and vehicle use should be minimized to the extent possible at night to facilitate wildlife movement in areas surrounding the pit during this period.

- All workers should avoid travelling outside the confines of the pit on foot or by any other means into adjacent forests to minimize sensory disturbance to wildlife utilizing surrounding habitat and the carrion pit.

- No dogs will be allowed on site to avoid disturbing nearby wildlife.

- All food and food related garbage will be stored in a vehicle or trailer where wildlife cannot access it and disposed of off-site in a bear-proof bin within the park or outside the park. No barbeques will be permitted on site.

- All observations of bears or other large carnivores will be reported to the environmental surveillance officer or the Banff Dispatch within 24 hours. Any wildlife which ventures into the pit during the course of this project will be allowed to passively disperse from the pit.

- Toilet facilities provided by the contractor will be pumped out on a regular basis.

- This paving project including the transport of aggregate should occur outside the wolf denning season (May to mid-June) to avoid disturbance to wolves that may be using the den site across the Kicking Horse River and the nearby carrion pit. This would mean that transport of aggregate would ideally occur before May 1st and paving and setup of the asphalt plant would occur after June 15th. This timing restriction would also reduce the disturbance to breeding birds in the vicinity of the pit since the breeding bird window is May1 to July 15.

Residual Impacts

With the implementation of the prescribed mitigation measures it is anticipated that the residual impacts to wildlife will be negligible.

3.5 Vegetation

The VEC for vegetation are healthy native plant communities free of invasive non-native plants.

Potential Impacts

There will be no native vegetation removed or otherwise disturbed during this project since the existing footprint of the Ottertail pit will not be expanded. Therefore impacts to native vegetation communities within the pit are expected to be negligible. There is potential for incidental damage to vegetation along the edges of the pit, along the pit entrance road or on the side of the TCH if vehicles or machinery are parked off the existing disturbed paved or gravel surfaces.

There is potential for spread of existing non-native plant populations to new areas within the footprint of the pit or for new non-native plants to be brought into the pit on machinery or vehicles. The large areas of exposed mineral soil within the pit are very conducive to the establishment of these invasive plants as they are adapted to establishing quickly and aggressively colonizing soil where there is no competition from native plants.

Mitigation measures

- All vehicles and machinery must stay on existing disturbed surfaces within the pit and the pit entrance road to avoid incidental damage to vegetation.
- All machinery must be cleaned prior to coming into the pit to avoid transporting weed seeds and other propagules into the pit.
- Avoid travelling over or otherwise disturbing the existing Canada thistle populations along the edges of the pit with vehicles and machinery to avoid spreading this aggressive non-native plant further within the disturbed areas of the pit.

Residual Impacts

With the implementation of the prescribed mitigation measures it is anticipated that the residual impacts to vegetation will be negligible.

3.6 Soils and landforms

Soils are an integral part of terrestrial ecosystems and are vital in the maintenance and restoration of ecological integrity in ecosystems. The VEC identified for soil is undisturbed native soil that supports good vegetation growth and vigour.

Potential Impacts

The soil resources within the pit have been heavily impacted by previous disturbance and aggregate extraction. There is no native topsoil remaining in the pit where the asphalt plant will be set-up and the aggregate will be stockpiled and no new areas of native soil are to be disturbed during the course of this project.

The potentially contaminated dust captured in the dry bag house system on the asphalt plant has the potential to contaminate soil if it is dispersed onto the ground or buried.

There is some potential for contamination of soil in the event of a spill of fuel or other hazardous material as a result of equipment fuelling, operation and maintenance. However the spill containment systems, and spill response plan required as part of this project should minimize the extent and amount of any contaminated soil.

Mitigation measures

- The asphalt plant must comply with the following guidelines:
    - Asphalt plant regulation under the B.C. Environmental Management Act
    - CCME Canadian Environmental Quality Guidelines - Residential/Parkland and Aquatic Life Standards,
    - CCME Canada Wide Standard for Petroleum Hydrocarbons in Soil - Tier 1 Residential Eco Soil Contact and Generic Residential Eco Soil Contact.
- The asphalt plant operator will be required to dispose of the dust collected from the asphalt plant emission control system outside the park in an appropriate facility.
- Fuelling of machinery or transfer of fuel between fuel delivery trucks and the asphalt fuel tank will only take place in the pit floor area designated for these activities.
- Contractor will provide impervious spill containment systems (lined bermed areas) for large fuel storage areas and for truck box diesel application as outlined (see Section 2.7.2).
- Contractor to have Spill Response Plan in place and all workers must be trained in spill response protocols using a spill kit approved by the ESO. The spill kit will contain enough absorbent material to provide initial response and containment of a spill equal to the volume of a mobile fuel tank. Given that the soil in the pit are well to rapidly drained spills must be cleaned up promptly to avoid movement of hazardous materials into deeper soil layers.
- All equipment and storage containers on the site will be inspected daily for leaks. Drip trays will be used where possible to contain equipment or asphalt plant leaks. If appropriate, any collected material will be run through the asphalt plant or disposed of at an approved facility.
- Routine equipment maintenance will be confined to contained sites designated by the ESO. Used oil, filters, lubricant cartridges and other waste products resulting from

equipment maintenance will be collected on a daily basis and disposed of in an approved facility. Emergency maintenance requirements will be reported to the ESO who will determine an appropriate location for these activities.

- The coat of diesel applied to the truck boxes, to ensure that the asphalt won't stick when it is delivered to the paving equipment, will be applied during dry conditions when there is no rain in the forecast to minimize potential for contaminated run-off from the trucks during wet conditions.

- All trucks transporting aggregate, asphalt or trade waste trucks will be tarped or otherwise covered when hauling these materials to minimize loss of these materials from the truck boxes that could pollute soil or water resources.

Residual Impacts

With the implementation of the prescribed mitigation measures it is anticipated that the residual impacts to soils and landforms will be negligible.

3.7 Aquatic and Hydrological Resources

The VECs for aquatic resources are healthy aquatic ecosystems including wetlands with the full complement of native fish and invertebrate species that reflect the local site conditions and microclimate. The VEC for hydrological resources is the local hydrological drainage regime of surface water features including connectivity of aquatic habitat, instream flows, and groundwater discharge to downstream systems.

Potential Impacts

The potential exists for hazardous materials including fuels and oils to be spilled during the course of this project and for some of that hazardous material to enter the soil and eventually the groundwater through the course rapidly drained soils present in the Ottertail pit. However, the potential for this is very low if all of the prescribed mitigation measures and standard best practices for spill prevention, containment and clean-up are followed. Even in the event of a spill the potential for the contaminant to reach groundwater sources beneath the pit are likely very low given the fact that no water has been found in the groundwater monitoring wells at a depth of 15m below the surface to date (Parks Canada 2007). The presence of hard layers of silt and clay encountered below the surface of the pit during the drilling of the wells also provide an impediment to the movement of groundwater to lower depths where it could move off-site.

The potential for contamination of natural surface water sources as a result of this project is very low given that the nearest creek is 240m away and the Kicking Horse River is approximately 1km away. The bottom of the abandoned sewage lagoons at the south end of the pit sit above the level of the pit floor making it impossible for any spilled contaminants on the pit floor to reach

this water. If a large spill were to occur at the entrance to the pit it is conceivable that some of the material could reach the sewage lagoons as the road is higher than the water level in the lagoons.

Mitigation measures

- Contractor to have Spill Response Plan in place and all workers must be trained in spill response protocols. Spills must be cleaned up promptly to avoid movement of hazardous materials into deeper soil layers and possible groundwater sources.
- Where possible, refueling of paving equipment and machinery on the TCH will take place at least 100 m away from the high water mark of waterbodies.
- Paving equipment will be maintained to prevent leakage of fuel, oil etc.
- Paving equipment will be maintained, repaired or cleaned a minimum of 100 m away from the high water mark of waterbodies along the TCH.
- Work crews will be briefed on working in and around water and during rainfall.
- All paving equipment will be operated as close to the road surface as possible, and not over the edge of the road shoulder to avoid contamination to waterbodies. No spray material will be permitted to enter water, ditches or culverts that lead to water.
- The ESO will identify and flag areas of amphibian habitat within the road sections that will be rehabilitated with the asphalt overlay. Identified amphibian habitat (wetland and dry habitat) will be avoided by paving and spraying equipment. All equipment will be operated as close to the road surface as possible, and not over the edge of the road shoulder to avoid contamination.
- Applying seal coat or line painting will only occur during dry conditions and not during rainfall or within 24 hours of a forecasted rain event..
- See mitigation measures under Section 3.5 Soils and Landform for additional mitigation measures regarding spill containment and prevention.

Residual Impacts

With the implementation of the prescribed mitigation measures it is anticipated that the residual impacts to aquatic and hydrological resources will be negligible.

3.8 Cultural Features

3.8.1 Aesthetics

Potential impacts

This project will create short-term negative impacts to park users on the TCH during the paving activities due to the noise and smells associated with paving activities and the nearby asphalt plant. These impacts are expected to be of short duration and of low magnitude. Impacts of the Ottertail pit operations to aesthetics during this project are negligible given that the pit is ~500m off the TCH with no public access.

Mitigation measures

None required.

3.8.2 Public Facilities

Potential Impacts

Increased truck traffic in and out of Ottertail pit onto the TCH will impact traffic flows on the highway during busy traffic periods. Paving activities will also disrupt traffic with expected lane closures and reduced speed zones in the vicinity of paving equipment. These impacts are expected to be of low magnitude.

Mitigation measures

- A minimum of one lane of traffic flow will be maintained on the TCH at all times during paving activities and highway traffic delays will be limited to a maximum of 10 minutes at a time.
- A public notification program will be undertaken to inform the public of possible traffic delays on the TCH.
- The project manager will ensure that the visitor service centers in Lake Louise and Field are informed of the project including project schedule and possible traffic delays.

3.8.3 Public Safety

Potential Impacts

There will be a positive impact to public safety with the overlay of asphalt on degraded sections of the TCH which will result improved overall safety of the road for motorists.

This project will have minor negative impacts to public safety associated with trucks carrying aggregate and asphalt entering and exiting the TCH onto the Ottertail pit access road. These trucks when loaded will enter and leave the TCH at very low speeds making it potentially hazardous for drivers on the TCH that may have little reaction time due to restricted visibility down the road in the vicinity of the pit entrance. The requirement for traffic delays, lane closures and overnight parking of paving equipment along the TCH during paving of the identified sections may reduce the safety of the highway in affected areas. These effects are short-term in nature and will be resolved when the paving is complete.

There is no public access to the Ottertail pit and it is a gated facility. There will be personnel on-site 24 hours a day that will provide extra security to ensure that no unauthorized persons enter the pit during the project.

Mitigation measures

- A flag person will be utilized at the entrance of the road to control traffic on the TCH at the pit access road to allow trucks to enter and exit the TCH safely.
- Standard traffic control procedures will be employed for paving work along the TCH including flag persons equipped with radios, reduced speed limits and lane closures.
- The contractor will have radio communication with Banff Dispatch.
- Type, spacing and positioning of traffic signs will be in accordance with the *Manual of Uniform Traffic Control Devices.*
- Paving equipment will be stored overnight at existing roadside pullouts where there is a pullout within one kilometer of the work site. The equipment stored in pull-outs will be at least 5m from the paved shoulder of the highway and protected with warning signs and barricades.

3.8.4 Cultural Resources

Potential Impacts

No archeological resources have been identified in or adjacent to the Ottertail pit.

Mitigation measures

Although very unlikely, the discovery of any cultural artifacts during the course of this project within the pit will be reported to the project surveillance officer.

3.8.5 Socio-economic impacts

Potential Impacts

The project will directly provide several hundred hours of employment. Regional businesses are also expected to benefit from the project indirectly through expenditures on materials and supplies and provisions of food and lodging for workers.

Long-term highway maintenance costs related to deteriorating road conditions are expected to be reduced as a result of this project.

Mitigation measures

None required.

Residual Impacts

With the implementation of the prescribed mitigation measures it is anticipated that the residual impacts to cultural resources as a result of this project will be negligible.

3.9 Summary of potential impacts and mitigation measures

Table 3. Summary of potential impacts and mitigation measures on project VECs.

Potential Impact	Impact Characteristics						Key mitigation measures
	Direction	Magnitude	Geographic extent	Frequency	Duration	Reversibility	
Air Quality							
Asphalt plant emissions	N	L	L	I	S	R	Asphalt plant must be fitted with dry bag emissions containment system. Asphalt plants will meet or exceed air quality emissions limits outlined in the B.C. *Environmental Management Act* asphalt plant regulation.
Wildlife							
Grizzly bears and black bears							
Indirect loss of available habitat (sensory disturbance)	N	L	L	I	S	R	Minimize the amount of noise, light and vehicle use at night in Ottertail pit
Human-wildlife conflicts	N	L	L	I	S	R	Store food and garbage in vehicles or lockable trailer and dispose of daily to avoid attracting bears

Potential Impact	Impact Characteristics						Key mitigation measures
	Direction	Magnitude	Geographic extent	Frequency	Duration	Reversibility	
Wolves Indirect loss of available habitat (sensory disturbance)	N	M	L	I	S	R	Avoid carrying out this project during wolf denning season (May 1- June 15) to minimize effects on wolves denning nearby and utilizing the carrion pit Minimize the amount of noise, light and vehicle use at night in Ottertail pit
Elk and moose Indirect loss of available habitat	N	L	L	I	S	R	Minimize the amount of noise, light and vehicle use at night in Ottertail pit Avoid work during rutting season
Songbirds Sensory disturbance leading to lowered fledgling survival	N	L	L	I	S	R	If possible carry out project outside of breeding bird timing window (May 1 – July 15)
Vegetation							
Increase in cover and extent of non-native plants within pit	N	L	L	O	S	R	Avoid travel of machinery through areas with invasive non-native plants at edges of pit Clean all machinery to remove all weed seeds prior to bringing into Ottertail pit
Soils and Landforms							

Potential Impact	Impact Characteristics						Key mitigation measures
	Direction	Magnitude	Geographic extent	Frequency	Duration	Reversibility	
Contamination of soil in Ottertail pit with hazardous material as a result of a spill	N	M	L	O	S	R	Prevent spills through careful handling of all hazardous materials during fuelling, maintenance etc. Contain spills through spill containment berms and drip trays Spill response kits on site and all workers trained in their use Immediate response and clean-up of any spill
Aquatic and hydrological resources							
Contamination of groundwater with hazardous material as a result of a spill in Ottertail pit	N	M	L	O	S	I	Prevent spills through careful handling of all hazardous materials during fuelling, maintenance etc. Contain spills through spill containment berms and drip trays Spill response kits on site and all workers trained in their use Immediate response and clean-up of any spill
Release of hazardous material into roadside surface waterbody during paving activities on TCH	N	L	L	O	S	I	All fuelling, handling and storage of hazardous materials must be carried out at least 100m from nearest waterbody during paving activities or as directed by ESO.

Potential Impact	Impact Characteristics						Key mitigation measures
	Direction	Magnitude	Geographic extent	Frequency	Duration	Reversibility	
Aesthetics							
Decreased aesthetics of TCH environs due to paving operations	N	L	L	I	S	R	No mitigation
Public Facilities							
Disrupted traffic patterns and delays on TCH due to paving operations	N	L	L	I	S	R	Advance public notification of expected delays on TCH Maintenance of one open lane of traffic
Public Safety							
Improved safety of TCH	P						
Reduced traffic safety on the TCH in the vicinity of the Ottertail pit access road due to asphalt and aggregate trucks entering and exiting the pit	N	L	L	I	S	R	Utilize flag persons to slow traffic at the intersection of the Ottertail pit access road and the TCH
Reduced traffic safety on the TCH in the vicinity of the paving equipment	N	L	L	I	S	R	Use standard traffic control procedures for paving work along the TCH including flag persons equipped with radios, reduced speed limits and lane closures. Type, spacing and positioning of traffic signs will be in accordance with the *Manual of Uniform Traffic Control Devices*
Socio-economic							

Potential Impact	Impact Characteristics						Key mitigation measures
	Direction	Magnitude	Geographic extent	Frequency	Duration	Reversibility	
Creation of direct employment and indirect economic benefits to local businesses	P						

4. Cumulative Environmental Effects

The spatial boundaries of the Cumulative Effects Assessment (CEA) is the Upper Kicking Horse River valley which is the RSA.

Past significant disturbances in the Kicking Horse Valley that contribute to cumulative effects on wildlife in the valley include the building of the TCH, the CP railway and the community of Field. These existing linear and other disturbances in the valley have contributed to restricting effective habitat within this relatively narrow valley and to increased wildlife mortality. This project will add incrementally to existing sensory disturbance and habitat displacement for large carnivores and some ungulates in the vicinity of the TCH and CP rail line. However, this effect is expected to only last for the duration of the project at which time the wildlife use of the area surrounding the pit is expected to return to pre-project levels.

The cumulative effects of this project on air quality are expected to be negligible as air quality will return to normal once the project is complete and the asphalt plant and paving equipment are removed. The cumulative effects of this project on native vegetation are expected to be negligible given that no new land will be disturbed as a result of this project. However, there is some potential that the extent and density of non-native plants increases in the Ottertail pit as a result of this project given the high invasibility of the bare mineral soil at his site. If non-native plants do increase at the site this would incrementally add to the overall populations of these plants in YNP.

The cumulative effects of this project on soil, aquatic, hydrological resources is expected to be negligible if all mitigation measures for spill prevention and control are implemented.

5. Surveillance Requirements

A designated Parks Canada environmental surveillance officer should be present during the initial start-up of both aggregate stock piling and during set-up of the asphalt plant in the Ottertail pit to ensure that all mitigation measures are implemented as prescribed and all applicable regulations governing operation of asphalt plants are adhered to. After start-up the ESO will be on-site at least two times per week on a random basis. The ESO will maintain a surveillance log to be included in the project file upon project completion.

6. Monitoring Requirements

Asphalt plant emissions will be monitored as required under the *B.C. Environmental Management Act*. The contractor will be required to submit their most recent emissions test results for paving equipment to ensure they are within the CCME and provincial standards.

7. Knowledge Deficiencies

The effect of this project on local wildlife populations that frequent the adjacent carrion pit is not fully understood. In particular it is not known if this project will cause the wolves using the nearby denning site located across the Kicking Horse River to abandon the site in response to sensory disturbance if the project were to occur during the wolf denning window. In response to high human activity at the Ottertail pit the wolves may avoid using the adjacent carrion pit which may provide an important food source for the wolves during the denning season.

Another knowledge deficiency is how far hazardous materials, particularly fuels with low viscosity, would travel downward in the well drained subsoil of the Ottertail pit in the event of a large spill that breached the containment systems in place. The distance to groundwater sources within the pit is also not fully understood since there are only 3 groundwater monitoring wells in Ottertail pit situated and they are situated near the sewage lagoons and only monitored intermittently.

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