Parks Canada Basic Impact Analysis

Ya Ha Tinda Road Repair

1. PROJECT TITLE & LOCATION

Ya Ha Tinda Road Repair

2. PROPONENT INFORMATION

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3. PROPOSED PROJECT DATES

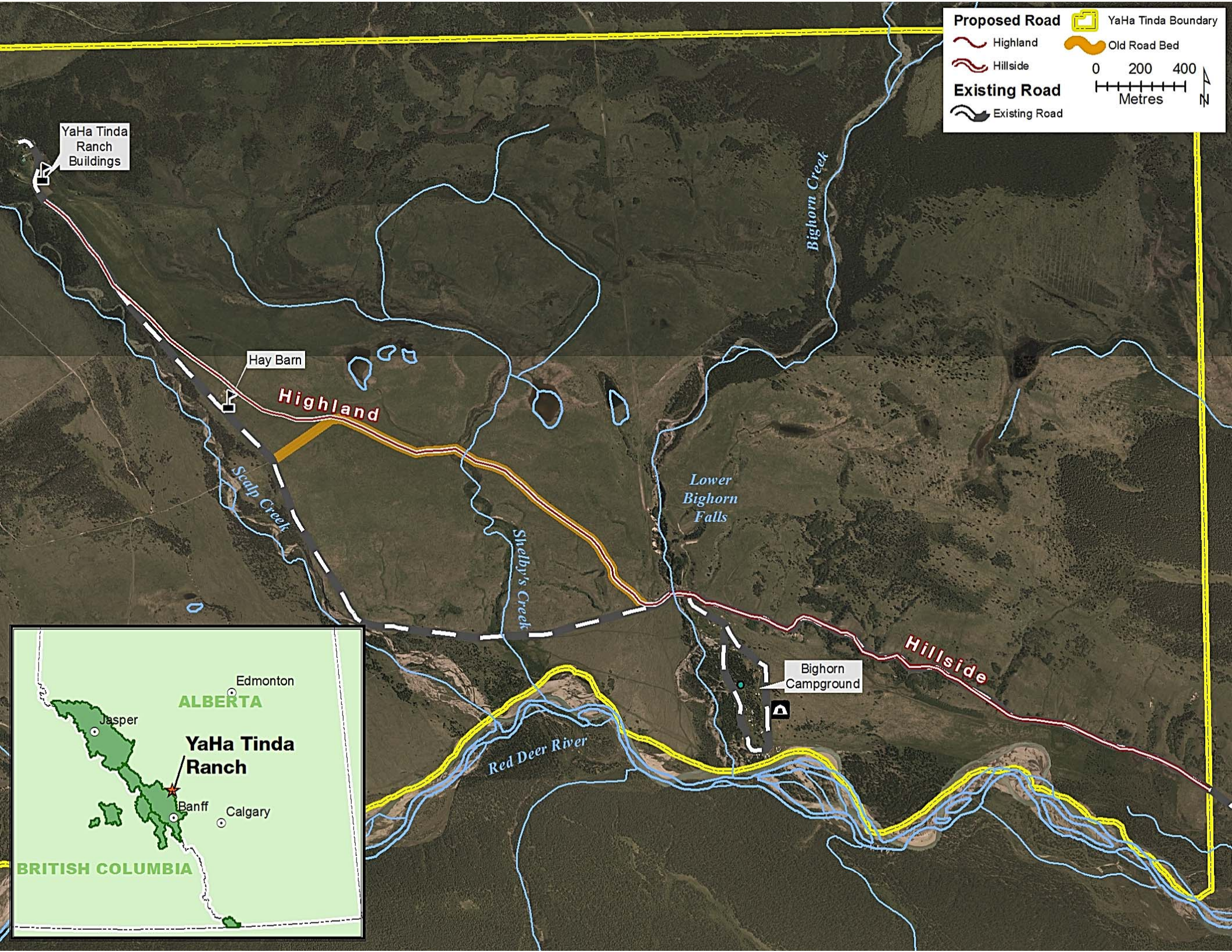
Planned commencement: August 2017
Planned completion: October 2017

4. INTERNAL PROJECT FILE

BNP-001027

5. PROJECT DESCRIPTION

The Ya Ha Tinda Ranch (the ranch) is owned and operated by Parks Canada. It is the only federally operated working horse ranch in Canada. Horses are wintered and trained at the ranch to be used as working horses for patrolling and protecting Canada's Western National Parks. It is located approximately 65 km west of Sundre, AB and approximately 10 km east of the Banff National Park boundary (Figure 1).


Proposed Road
Highland
Hillside
Existing Road
Existing Road
YaHa Tinda Boundary
Old Road Bed
0 200 400
Metres
N
YaHa Tinda Ranch Buildings
Hay Barn
Highland
Scalp Creek
Shelby's Creek
Bighorn Creek
Lower Bighorn Falls
Hillside
Bighorn Campground
Red Deer River
Edmonton
ALBERTA
Jasper
YaHa Tinda Ranch
Banff
Calgary
BRITISH COLUMBIA

The ranch area is home to an abundance of wildlife including grizzly bear, wolf, cougar, moose, deer, bighorn sheep and elk. Within the ranch is Bighorn Campground, which serves as a staging and camping area for visitors using the extensive trail system accessible from the ranch. Most of the visitors bring horses with them. As it is an active working ranch, staff are regularly coming and going and operating tractors, trucks, quads and other equipment on the property.

Photo 1 – Ranch horses

There is a single, 6.5 km long access road into the ranch. The first half of the road from the ranch boundary to the Bighorn Campground was constructed by excavating into the side of the hill slope generally following the random shape of the hillside (Parsons 2014). This “hillside” section of road receives more use than the latter half, or “highland” section of the road (from the Bighorn Campground to the ranch proper), because it carries all of the traffic accessing the Bighorn Campground (Figure 1). The riding surface of the entire road has been formed by several years of compaction (due to use) of the underlying native conglomerate material. The road is maintained by occasionally passing a grader blade over the native material to smooth it out. During wet weather the road collects the drainage and turns muddy providing difficult driving conditions. In an effort to improve drainage on the hillside road, shallow ditches on the uphill side are occasionally reshaped using a grader blade. However, natural erosion of the hill slope continuously fills these shallow ditches requiring ongoing maintenance.

Several sections of the hillside road are excavated well into the hillside creating some very steep to near vertical walls of native material (Parsons 2014). In these areas there is no opportunity to construct a formal drainage ditch on the uphill side of the road as the uphill side continues to erode in a downhill direction. There are also areas of this road which demonstrate visible signs of slumping occurring on the existing hillside above the roadway. This continuous movement and slumping creates an ongoing maintenance issue for this road and presents a risk of a potential significant slope slide that could encompass the entire road. There are several sections where the near vertical uphill cut could be relieved down to a safe 2H:1V slope by cutting back into the slope, however over most of the length of this road this would not be achievable, because the excavation would “chase” the slope all the way up the hillside (Parsons 2014).

There is also evidence of a number of springs and water seepage through the face of the slope on the uphill side of the hillside road (Parsons 2014). These water sources are keeping several sections of the uphill side of the road wet and somewhat impassable, reducing the active road width and increasing instability in the uphill slopes. The road has very narrow sections and sharp corners where vehicles cannot safely pass one another. Throughout much of the hillside section, the downhill side of the road consists of slopes downwards as steep as 45 degrees (1H:1V). There is no protection for vehicles at the top of these steep slopes.

The highland portion of the road has been constructed by removing the topsoil by blading it to the side with a grader (Parsons 2014). The road is maintained by occasionally passing a grader blade over the native material to smooth it out. This has left the road lower than the surrounding land in most areas resulting in poor drainage and muddy sections during wet weather.

Flooding in the spring of 2013 caused significant bank erosion and slope failure along Scalp Creek - a tributary of the Red Deer River that a large segment of the highland portion of road parallels. This slope failure has moved to within metres of the road in places and the near-vertical slopes are unstable and dangerous (Photos 2 and 3). The erosion of the banks is progressively encroaching on the road and the significant elevation difference between the creek and road has created a dangerous situation where movement of the bank could take out the road at the top of the bank (Parsons 2014).

Photo 2 – Look NW at steep, unstable banks between ranch road and Scalp Creek

Photo 3 – Looking SE at steep, unstable banks between ranch road and Scalp Creek (Parsons 2014)

The purpose of this project is to provide a greater level of driver safety to those that access the ranch and the Bighorn Campground and to relocate those segments of road that are at risk of being lost to slope failure caused by flooding events. A number of alignment options were considered for the relocation of the highland road. The chosen alignment makes use of an abandoned road bed over approximately half of its length and will run through grazed pasture over the other half. The road and new fence alignments have been chosen with the aim of minimizing disturbance to native grasslands and areas of archaeological interest, as well as minimizing the loss of functional pasture areas.

Work proposed for the hillside portion of road includes (see drawings in Appendix A):

- Installation of road signage to improve driver expectancy and safety;
- Installation of guard railing to improve driver safety on small-radius horizontal curves;
- Extension of existing culverts and installation of additional culverts to improve downhill drainage;
- Excavation of right-of-way and placement of fill to reduce road cross-slope;
- Daylighting (uphill slope grading) to direct slope run-off to ditches and culverts to improve downhill drainage and reduce erosion of ditches; and
- Road re-surfacing with gravel overlay.

Work proposed for the highland portion of road includes (see drawings in Appendix A):

- Re-alignment of roadway to move away from unstable creek slopes;
- Excavation and fill placement as necessary along an existing, abandoned roadbed to meet the geometric requirements of the new access road;
- Tie in of re-aligned road to existing access road at the Ranch proper and Bighorn Creek bridge;
- Re-alignment of existing and construction of new fencing to maintain functional pasture areas based on the new road alignment; and
- Road surfacing with gravel overlay.

Following completion of the proposed new highland road alignment, the existing highland road alignment will be closed to vehicle traffic. It will continue to be used as a horse trail but will not be maintained for vehicle use. Gates and boulders will be put in place to prevent vehicular use of the former road alignment,

while allowing access for recreational horse users and the existing horse outfitter operation that passes through the ranch.

Construction is proposed to commence on the highland portion of the road in August 2017 with staging out of the Hay Barn area. Construction on the hillside portion of the road will commence in September 2017 in order to avoid work on the access road to the Bighorn Campground in the busy summer season. Some staging within the campground footprint may occur after the Labour Day weekend. Construction is proposed to be completed by end of October 2017. Operational access to the ranch will be maintained throughout construction.

6. VALUED COMPONENTS LIKELY TO BE AFFECTED

The Ya Ha Tinda Ranch is owned by Parks Canada, and is used to raise and train horses for use in the mountain parks, and to overwinter the horse herd (Eastcott 1987). The Ranch is located along the Red Deer River in western Alberta, immediately outside the eastern boundary of Banff National Park but is considered a natural area of significance because of its proximity to the park and the highly significant resources within it (Achuff et al. 1986).

The area enjoys a climate quite remarkable and unique in the region (Morgantini 1995). Due to the effect of the surrounding mountains on air flow, the area enjoys mild, dry weather (rain shadow effect). Cloud cover does not develop to the extent that it does over the surrounding mountains. Strong westerly winds (Chinooks) that funnel along the Red Deer River Valley keep the valley floor largely snow free in winter.

The Ya Ha Tinda is one of the very last relatively unspoiled representatives of the Montane Ecoregion in Alberta (Morgantini 1995). This Ecoregion is the least extensive in Banff National Park. Furthermore, due to its occurrence along the Bow, North Saskatchewan and Howse River valleys, it is the Ecoregion most impacted by human activities and developments (highways, townsites, railroad, etc.). The Ya Ha Tinda is one of the very few Montane areas that has not experienced extensive development. The complex geomorphology of the area, its bedrock controlled topography, its location and its characteristic weather patterns combine to make the Ya Ha Tinda area a unique and important ecosystem.

Collection of biophysical baseline data for this project was undertaken through a literature review (see references in Section 17) and through a number of brief field visits for ground truthing purposes. Field visits included the following:

Field visits for the first alignment option (not selected as the final alignment in order to avoid impacting valuable archaeological and native grassland resources):

- 27 August 2015; and
- 15 September 2015.

Field visits for the final route alignment (terrestrial and aquatic habitat characteristic review, non-native invasive vegetation identification):

- 12 and 13 July 2016;
- 31 August 2016; and
- 23 to 25 February 2017.

Additional specialist advice was also contracted in relation to:

- Breeding birds; and
- Native grassland restoration.

6.1 Soils and Landforms

The rolling, hummocky physiography of the Ya Ha Tinda area reflects a complex glacial history that goes back to Late Wisconsin, 10,000 to 12,000 years ago, when the Red Deer River region was covered by the massive cordilleran Rocky Mountain ice sheet (Morgantini 1995). It funneled within the Red Deer River Valley and extended from the Continental Divide to some 35 km east of the Ya Ha Tinda Ranch. During the slow *in situ* melting of the main ice mass, hummocky material was deposited along the valley sides and floor.

The landforms and surficial material mapped for the Ya Ha Tinda show the "hillside" portion of the access road (between the east boundary of the ranch and the Bighorn Campground) as being located primarily on coarse textured, calcareous tills and colluvial scree on very steep valley and ridge walls of bedrock-controlled topography. Comparatively, the highland portion of the road, including the proposed realignment, is located on gently rolling till plain with fine silty veneer. The Bighorn Creek crossing is mapped as small linear stream, braided channels and floodplains with silt to cobble-size materials.

The soils on the Ya Ha Tinda have been described and classified by McGillis (1977) and include a wide range of soil types, from Organic and Gleysolic in poorly drained and frequently water saturated sites, to Gray Luvisols in well and moderately well drained areas (Morgantini 1995). The majority of soils have a fine, silty loam texture of possible aeolian origin (Seel 1992) and most have developed on glacial till and weathered bedrock material (Morgantini 1995). Brunisols are the most common and widely distributed. According to McGillis (1977), the grassland east of Scalp Creek, where the existing road and proposed road realignment are located, is generally underlain by well-developed and productive Orthic Black and Eluviated Black Chernozems on glacial till/loam. Soils within the historical and current channel beds of Scalp Creek, Bighorn Creek and the Red Deer River are mapped as Orthic Regosol-Coarse Outwash Fine Sandy Loam and/or Gravel.

6.2 Vegetation

The vegetation communities mapped on the "hillside" portion of the Ya Ha Tinda access road comprise High Productivity Grassland (chernozemic, till plain) with pockets of Aspen Forest (Morgantini 1995). The highland portion of the access road, including the proposed realignment, is mapped as High Productivity Grassland (chernozemic, till plain), with an area of Cultivated Field in the pasture area closest to the ranch buildings.

Vegetation types of natural significance in Banff National Park that occur at the Ya Ha Tinda Ranch include the following (Achuff et al. 1986):

H6: *Koeleria cristata - Artemisia frigida - Unum lewisii* (junegrass - pasture sage - wild blue flax)

The H6 vegetation type is dominated by junegrass *(Koeleria cristata)* with pasture sage *(Artemisia frigida),* wild blue flax *(Unum lewisii),* everlasting *(Antennaria nitida)* and gaillardia *(Gaillardia arlstata)* also important. Unvegetated bare soil is common. It occupies dry, level to moderately sloping sites on fluvial, morainal and eolian landforms. Besides the role of fire, active deposition of eolian loess may be an important factor in maintaining H6.

C16: *Populus tremuioides/ Elymus innovaius - Lathyrus ochroleucus* (aspen/hairy wild rye - peavine)

Aspen *(Populus tremuloides)* dominates the C16 vegetation type. The understory often contains shrubs of buffaloberry *(Shepherdia canadensis),* prickly rose *(Rosa acicularis)* and juniper *(Juniperus communis)* and the herb-dwarf shrub layer is dominated by the grasses hairy wild rye *(Elymus innovatusi*) and pinegrass *(Calamagrostis rubescens).*

A more detailed description of the grassland, shrub and aspen forest communities intersected by the proposed road repair and realignment is provided below.

6.2.1 Grassland

The condition of the native grassland range, shrub encroachment and the demise of rough fescue as the dominant grass species in the area, have been extensively debated (Morgantini 1995). Controversy has focused on the availability of forage for either elk or horses. The range has been subject to heavy grazing pressure from the winter-spring continuous presence of 180 to 200 horses, the periodic presence of some 500 to 2,000 elk, and periodic outbreaks of grasshopper populations.

There has been no systematic attempt to study and identify in detail the grassland communities on the Ya Ha Tinda Ranch. However, due to concerns about range condition and about the impact of heavy grazing by horses and elk, the floristic composition of the grassland has received a lot of attention (Flook 1960, Scotter 1975, McGillis 1977, Seel and Wiebe 1988a, 1988b, 1989, Seel et al. 1988).

Looman (1969) described the grassland as a modified *Stipetosum comatae* variant of the *Festuco-Stipetum richardsoni* association. The presence of this association in the Ya Ha Tinda is considered an "azonal occurrence", since it is located at an altitude "well above the lower limits of Fescue grassland anywhere" (Looman 1969). Its occurrence is accounted for by the existence of unique climatic conditions. The grassland has a prominent and locally abundant low shrub layer of shrubby cinquefoil (*Potentilla fruticosa*). This shrub is an important vegetational component of fescue grasslands (Moss and Campbell 1947, Weerstra 1986). In the south-east corner of the Ya Ha Tinda Ranch, in a low area east of Bighorn Creek and below the access road, there is a cultivated field consisting mainly of brome grass (Morgantini 1995). The attempt to grow tame hay occurred in the early 1950's. Another attempt to grow tame brome grass was made in the vicinity of the Ranch buildings in the late 1950's. Both attempts were not pursued.

In 1972, Stringer, while studying the grasslands of Banff, Jasper and Waterton Lakes National Parks, established one sampling location in the Ya Ha Tinda and classified it as a *Koeleria-Geum triflorum* grassland. Hooker's oat grass (*Helictotrichon hookeri*), and Kentucky bluegrass (*Poa pratensis*) were the codominant grass species. Rough fescue was considered common, but not dominant.

McGillis (1977) reported June grass (*Koeleria machranta*) as the codominant or subdominant grass species in the Ya Ha Tinda Ranch fescue dominated grassland. Other grass species such as Hooker's oat grass, wheat grass (*Agropyron* spp.), mat muhly (*Muhlenbergia richardsonis*), awnless brome (*Bromus inermis*) and sedges (*Carex* spp.) are present, and are locally abundant (McGillis 1977, Seel and Wiebe 1988b) depending on site-specific conditions. Forb species are also abundant and are represented, among others, by pussytoes (*Antennaria* spp.), locoweed (*Oxytropis* spp.), oldman's whiskers (*Geum triflorum*) and cinquefoil (*Potentilla* spp.).

During the summers of 1987 and 1988, Seel et al. (1988) surveyed the grassland on the valley floor and found very little rough fescue in the area. The authors did not attempt a quantitative assessment of species' presence, frequency and abundance. However, based on their reconnaissance, they concluded that, in the grassland between Scalp Creek and Bighorn Creek, and immediately east of Bighorn Creek, brome grass was the dominant grass species, with Hooker's oat grass, June grass and hairy wildrye (*Elymus*

innovatus) subdominant. The only fescue grassland was found in the most westerly section of the Ranch (Seel 1992).

The apparent decline of rough fescue on the Ya Ha Tinda Ranch is seen as an indication of overgrazing and/or of grazing on early spring growth (Seel and Wiebe 1988a, Seel 1992). In the 1970s almost the entire Ya Ha Tinda elk herd migrated 25-50 km west to summer in BNP. Recent research shows that the migratory portion of the elk herd is declining faster than would be expected based on population declines alone, and the number of elk summering on the grasslands is now greater than 30 years ago (Hebblewhite 2006, Spaedtke 2009).

In response to concerns about the fescue grasslands, six exclosures were established by Parks Canada at Ya Ha Tinda in fall 2000 for initiating studies on the integrity of the fescue grassland with and without grazing (Merrill et al. 2007). Exclosure sites were selected to represent the range of grassland productivity and types of elk use on the ranch at the time. Sites were designated as primary (chernozemic, till plains) and secondary (brunisolic, alluvial fan, outwash) productivity based on soils (Seel and Wiebe 1988). Three major differences were apparent in community structure as a result of grazing (Merrill et al. 2007). First, there was a change in graminoid composition with an increase in *Festuca campestris* inside the exclosures and a concomitant decrease in *Bromus spp*., *Agropyron spp*. and *Helictotrichon hookeri* relative to outside the exclosures. Total graminoid cover did not differ inside and outside the exclosures because of these opposing trends. Second, grazing maintained a higher diversity and mean cover of forbs outside the exclosure relative to inside the exclosures. In particular, six forb genera exhibited significant declines without grazing: *Anemone*, *Aster*, *Campanula*, *Cerastium*, *Hedysarum*, and *Oxytropis*. The exception was at the West Lakes exclosure, which appears to be on the most xeric site. Third, bare ground decreased and litter, both standing dead and fallen litter, increased inside the exclosures relative to outside the exclosures. This effect was visually obvious from fence-line comparisons.

Studies by Willoughby and Alexander (2000) and Willoughby (2001) also examined the effects of grazing on the grassland communities at the Ya Ha Tinda Ranch, as well as the Harrison flats area of the province, both of which have extensive areas of rough fescue grassland that support large herds of elk. In an effort to determine how these disturbed grasslands were ecologically related to the other undisturbed rough fescue dominated community types the Ya Ha Tinda and Harrison transects were reordinated with the summarized species lists of the undisturbed Rough fescue-Hairy wildrye, Bog birch/Rough fescue/Bearberry and Rough fescue-Tufted hairgrass community types.

There is a distinct grouping of the Ya Ha Tinda plots into two community types. The first type was described on grasslands east of Scalp Creek. These transects were dominated by shrubby cinquefoil, rough fescue or sedge, junegrass, fringed brome, old man's whiskers and early yellow locoweed and represent the Rough fescue-Sedge-Junegrass community type (Willoughby 2001). This community type was the most extensive grassland community described in the Ya Ha Tinda area. The other community type was described west of Scalp Creek near the Ya Ha Tinda ranch buildings. The transects in this community were dominated by shrubby cinquefoil, sedge, junegrass, Kentucky bluegrass, showy locoweed and cut leaved anemone. These transects represented a Sedge-Junegrass community type.

In contrast the Harrison flats transects were the most similar to the summarized Rough fescue-Hairy wildrye community and were dominated by shrubby cinquefoil, rough fescue, sedge, junegrass, old man's whiskers and early yellow locoweed. The dominant species on the Harrison transects are very similar to the dominant species at the Ya Ha Tinda, but the cover of rough fescue averaged 35% at Harrison flats in comparison to only 10% at the Ya Ha Tinda.

The Rough fescue-Hairy wildrye dominated community is found on submesic to mesic, well drained sites. This community can also be found on south facing slopes in lower slope positions where some moisture accumulates (Willoughby and Alexander 2000). In the absence of grazing and fire it appears this community type will eventually succeed to conifer forest (Willoughby and Alexander 2000), but the time frame for complete tree invasion appears to be greater than 60 years. Willoughby and Alexander also found that increased grazing pressure by domestic livestock leads to a decline in rough fescue and other native species and allows species like Kentucky bluegrass and dandelion to dominate the site to form a Kentucky bluegrass-Sedge dominated community type.

Initial analysis of the Ya Ha Tinda ranch and Harrison flats rough fescue dominated grasslands indicated that these grasslands were very different from the other undisturbed rough fescue dominated types. Work by Looman (1969), found that these grasslands supported a large elk herd during the winter when they remained snow free. It would appear that this heavy dormant season grazing has altered the community structure so that these grasslands do not resemble the other undisturbed or grazed Rough fescue-Hairy wildrye community types. Bailey et al. (1992) found that heavy dormant season grazing lowered plains rough fescue cover and allowed species like junegrass, sedge, slender wheatgrass, fringed sage and pussytoes to increase in the Aspen parkland. They also found that forage production was significantly lower under heavy dormant season grazing compared to the ungrazed control. They concluded that heavy dormant season grazing was having the same impact on the community as a light June grazing treatment. It would appear that the heavy grazing by wildlife during the winter is having a similar effect on the majority of the Ya Ha Tinda grasslands.

The other Ya Ha Tinda grassland community type (Sedge-Junegrass) that was described by Willoughby (2001) was found in an area where the Ya Ha Tinda ranch feeds hay to horses during the winter. The horses also graze this area early in the spring. This grazing pressure has allowed Kentucky bluegrass to invade onto this community type and it would appear that this community type is succeeding to a community that is similar to a number of the grazed transects of the rangeland reference areas to the east of the ranch in the Red Deer river valley (Willoughby and Alexander 2000).

It would appear that the grasslands of the Ya Ha Tinda represent grazing disclimax community types. If excluded from grazing these grasslands would likely succeed to a community type that is similar to the undisturbed Rough fescue-Hairy wildrye dominated type.

6.2.2 Shrub

Shrub habitats within the project area comprise 1) drier-to-mesic, upland shrubby habitats, with more open ground cover, and less dense woody cover; and 2) riparian wetland shrub habitats, with dense vegetation. In the drier sites, shrub composition is dominated by willow, but with dwarf birch and shrubby cinquefoil as sub-dominant species (Morgantini 1995). Vegetation structure of the driest sites generally suggests suppressed growth, resulting in a moderate density, and low shrub height (Morgantini 1995). Mesic sites may see a mix of willow and dwarf birch growing in moderate to high density, with high vertical structure (Morgantini 1995). Riparian shrub sites which may exist in the impacted area of the project likely exist as dense dwarf birch with a sedge herb layer. These richer sites provide denser growth.

6.2.3 Mixed Forest

Small groves of aspen (*Populus tremuloides*) and balsam poplar are found along drainage channels, occasionally interspersed with shrublands, and on south-west facing slopes, such as the slope on which the “hillside” portion of the road is located. These deciduous forests consist mostly of closed stands of

aspen with occasional balsam poplar, white spruce (*Picea glauca*) and lodgepole pine (*Pinus contorta* var. *latifolia*) (Morgantini 1979). In the shrub layer, willow (*Salix spp.*), buffaloberry (*Shepherdia canadensis*), shrubby cinquefoil and prickly rose (*Rosa acicularis*) are locally abundant. The herb layer is dominated by a dense mat of hairy wildrye with the frequent presence of aster and hedysarum (*Hedysarum sulphurescens*). In less well drained sites, balsam poplar is co-dominant.

6.2.4 Rare Plants

No rare plants were identified during field visits to the project area conducted on 27 Aug and 15 Sep 2015, and 12/13 July and 31 Aug 2016, however no systematic survey for rare plants across the Ya Ha Tinda Ranch has been conducted. A species list from 7 vegetation plots located on the Ya Ha Tinda Ranch, established and monitored from 2001 to 2004 by Hebblewhite (2006), for his thesis *Linking Predation Risk and Forage to Ungulate Population Dynamics*, was compared with the 2015 Alberta Conservation Information Management System (ACIMS) tracked species by Montane Ecoregion (S1 and S2 ranked species) and did not turn up any listed species. ACIMS records that do exist for rare plants in the vicinity of the Ya Ha Tinda ranch road repair project, along with their potential to be affected by the project, are listed in Table 1.

6.2.5 Non-native / Invasive Plant Species

Parks Canada's records for priority weed species at the Ya Ha Tinda Ranch (as of September 2016) are listed in Table 2.

Table 2 – Priority weed species at the Ya Ha Tinda Ranch

Priority*	Common name	Latin name	Site Description
1	Common Tansy	*Tanacetum vulgare*	Between the entrance to Ya Ha tinda and the Bighorn Campground this plant is on the left side of the access road on the edge of the road.
2	Tall Buttercup	*Ranunculus acris*	Bighorn Campground
2	Tall buttercup	*Ranunculus acris*	Out hiking trail to Scotch camp
2	Tall buttercup	*Ranunculus acris*	Horse corral closer to bunk house
2	White Cockle	*Silene latifolia*	Bighorn Campground
2	White Cockle	*Silene latifolia*	Main Pasture
2	White Cockle	*Silene latifolia*	Horse corral closer to bunkhouse
3	Wild caraway	*Carum carvi*	Roadside, on ranch side of the bridge just after campground access.
3	Wild caraway	*Carum carvi*	Bighorn campground
3	Mustard	*Sisymbrium sp.*	Bighorn Campground

* Priority 1 = Very high priority for control: Invasive plants in this category currently occupy small scattered areas. Control measures have a high probability of success in eliminating local populations, reducing population size and range and limiting spread.

Priority 2 = High priority for control: Invasive plants in this category may have large populations widespread over extensive areas. Control measures have a moderate probability of success in eliminating local populations, reducing population size and range and limiting spread.

Priority 3 = Moderate priority for control: Control measures have a low probability of elimination due to the large range and population size, but control may limit spread or reduce some populations.

Table 1 – Rare plant occurrence records in the vicinity of the Ya Ha Tinda Ranch road repair project (ACIMS)

Species Common Name	Species Scientific Name	Provincial Listing (ACIMS)	COSEWIC Status	SARA Status	Where observed at the YHT	Habitat	Potential to be affected?
Vascular							
Limber pine	*Pinus flexilis*	S3	Endangered	n/a	There is an undated ACIMS record for the NE corner of the ranch.	Rocky ridges and steep rocky slopes, south and/or west facing - typically grows alone.	**No**. Aerial and ground surveys conducted in 2016 at the YHT ranch did not find any Limber Pine individuals. Appropriate habitat not affected by the project.
Soft cinquefoil	*Potentilla pulcherrima*	S1	n/a	n/a	Eagle Creek area, east end of YHT (1983).	Prairie grasslands and open woods.	**Possibly** – highest potential in relatively undisturbed grassland and open wood area.
Lake Louise arnica	*Arnica louiseana*	S2	n/a	n/a	Eagle Creek area, east end of YHT (1982).	High elevation in alpine tundra and rocky outcrops.	**Possibly** – highest potential in relatively undisturbed grassland and rocky areas.
Greenland primrose	*Primula egaliksensis*	S2	n/a	n/a	All of the drainage channels on the ranch (2001).	Marshy grounds, wet meadows and shores in alpine and subalpine; elsewhere in wet meadows and on wet, calcareous lakeshores and riverbanks.	**Possibly** – highest potential in wet areas (wetlands, adjacent to creeks and drainages).
Nonvascular							
Fan ramalina	*Ramalina sinensis*	S3	n/a	n/a	SE of ranch (1971).	Twigs and branches of various trees and shrubs.	**Unlikely** – no records for this species within YHT and minimal tree/shrub removal is proposed.
Rock pimples	*Staurothele areolata*	S1	n/a	n/a	Mid-section of Bighorn creek at Barrier Falls (1985).	On rocks near water (forms rock crusts – functions in rock weathering).	**Unlikely** – no new disturbance areas are proposed in appropriate habitat.
Jelly flakes lichen	*Collema undulatum var. granulosum*	S2S3	n/a	n/a	Mid-section of Bighorn creek at Barrier Falls (1985).	Mossy rocks (nitrogen fixer).	**Unlikely** – no new disturbance areas are proposed in appropriate habitat.
Assimilative dot lichen	*Micarea assimilata*	S2	n/a	n/a	In the vicinity of Bighorn Creek (1973).	High-elevation species, growing on detritus of *Selaginella* (spikemosses or lesser clubmosses) and other plants in meadows with very sparse, short vascular plants. They bind soil and detritus, decreasing erosion especially in windy areas.	**Unlikely** – no new disturbance areas are proposed in the vicinity of Bighorn Creek.

6.3 Wildlife

The presence of the Montane Ecoregion in the area accounts for a rich biological diversity, and for the occurrence and abundance of wildlife communities that, with the exception of large mammals, have been little documented.

6.3.1 Elk

The Ya Ha Tinda Ranch area in winter supports most of the elk population of the northern half of Banff National Park, even though it represents less than 4% of the elk year-round range (Morgantini 1984, Skjonsberg 1993). The elk population in the Ya Ha Tinda region is only marginally affected by human activities and, hence, it still exhibits ecological and behavioural patterns that are more representative of wild elk. The only other elk population in Banff National Park ranges within the Bow River valley (Skjonsberg 1993) and its ecology and behaviour are affected by residential, recreational and transportation developments.

The migratory behaviour of the elk that winter in the Ya Ha Tinda is not only ecologically significant, but it also has an historic value, as it is seen as a vestige of the original dispersal of elk after their re-introduction in the late 1920's. Its educational and scientific value is unmatched in the Canadian Parks system. In the Province of Alberta, the Ya Ha Tinda is considered one of the two most important elk winter ranges (ERCB 1994).

6.3.2 Bighorn Sheep

The Ya Ha Tinda Ranch area is also of considerable importance for bighorn sheep. It provides critical winter range for a population that may range as far west as Divide Creek, Tyrrell Creek, and Gable Mountain, 15 to 25 km into Banff National Park. Three distinct winter ranges have been identified. One range is represented by the low elevation south-west facing slopes north of the Ya Ha Tinda Ranch; a second range comprises the west facing slopes near Eagle Creek, while a third range is found on the high elevation slopes south of the Red Deer River. Bighorn sheep occur frequently on the valley floor. Small bands can be occasionally seen grazing on the open grassland. Sheep are also attracted to mineral licks along the steep banks of Scalp Creek, and by licks found in the dense shrub meadows on the valley floor. Frequently, bighorn sheep are observed near the Ranch buildings licking on the salt blocks left for the horses by Ranch personnel.

6.3.3 Deer

Habitat selection by mule deer in winter and spring was studied by Morgantini (1979) in 1975-76. Mule deer were found to be widely distributed among several vegetation communities. They occurred in areas with a high vegetational heterogeneity, and were mostly associated with deciduous forests, lodgepole pine-buffaloberry communities and with open grassland and gentle slopes. During his study, Morgantini also photo documented the occurrence of mule deer-white tailed deer hybrids (Alberta Fish and Wildlife Files). Consistent with past studies, recent remote camera surveys (2013-2014) show both mule and white-tailed deer to occur throughout this region, with extensive use by mule deer (Steenweg et al. 2015).

6.3.4 Moose

There is very limited information on moose presence and distribution in the Ya Ha Tinda Ranch region. Alberta Fish and Wildlife estimated the population in the Red Deer River region (WMU 418) in 1994 at about 50 animals (E. Bruns, Regional Wildlife Biologist, Alberta Fish and Wildlife, pers. comm.).

6.3.5 Carnivores

Wolf (*Canis latrans*), cougar (*Felis concolor*), black bear (*Ursus americanus*) and grizzly bear (*Ursus arctos*) are common in the region. Though there is limited knowledge of their abundance and distribution, recent and intensive remote camera monitoring accomplished between May 1 to October 31 (2013-2014) throughout the Ya Ha Tinda ranch (Steenweg et al. 2015) provides for some empirical data on species occurrence and distribution within this region.

The Ya Ha Tinda Ranch region is home to a pack of wolves that range across the National Park boundary following the abundance and movements of large ungulates. Since the 1970's, wolves have been known to range from the Clearwater River, through the Ya Ha Tinda Ranch, south to Ribbon Flats and the Panther River valley in Banff National Park. Most recently, Banff National Park staff are monitoring a pack of approximately 5 to 8 individuals found to range the Red Deer River region, including areas within the Ya Ha Tinda Ranch. Remote camera surveys found wolves to occur widely throughout the region (Steenweg et al 2015).

Recent remote camera surveys detected cougar throughout the area of the ranch and were detected at 33% of the total camera locations. While no targeted studies have described grizzly bear population dynamics within the Ya Ha Tinda ranch area, recent remote camera surveys found this species to occur widely across the region and were detected at 57% of the camera locations (Steenweg et al 2015). Black bears were also observed during this camera-based study but were largely distributed in the east portion of the ranch area and were detected at only 22% of the camera locations (Steenweg et al. 2015).

American marten (*Martes americana*), weasel (*Mustela spp.*) and coyotes (*Canis latrans*) are common in the Ya Ha Tinda Ranch region, but little is known about their abundance, ecology and distribution. Based on data presented by the Ecological Land Classification of Banff National Park (Holroyd and Van Tighem 1983), it is likely that other species such as lynx (*Lynx canadensis*), red fox (*Vulpes velox*), american badger (*Taxidea taxus*) and the rare wolverine (*Gulo gulo*) are also present. The potential for badger presence is based on badgers being observed in the 1940's at Scotch Camp, along the Red Deer River, 10 km inside the boundary of Banff National Park (Holroyd and Van Tighem 1983). In that area, badger diggings were also reported above and across the River. The potential for wolverine presence is based on wolverine signs being reported along the Red Deer River valley at the boundary of Banff National Park (Achuff et al. 1986). However, there is no other information on their occurrence. No potential den sites or scat have been observed during field surveys of the proposed road works.

6.3.6 Birds

There has never been a systematic bird survey conducted in the Ya Ha Tinda Ranch region. However there are a number of sources of known and potential bird species lists as follows:

- Historical records from Clark and McTaggart-Cowan (1940s);
- Achuff et al. (1986) indicated that the Ranch may contain three of the four distinct bird communities that are typically associated with the Montane Ecoregion:
    - Community 1: Poplar Forest;
    - Community 9: Montane Shrub Wetland; and
    - Community 13: Montane Grassland.
- Between November 1988 and August 1989, Ramstead (1989) observed and recorded 44 bird species.
- Songbird recordings from transects at the Ya Ha Tinda Ranch in 2015.

A review of the above information, along with data from provincial and federal databases and other resources, was conducted by an experienced wildlife biologist contracted to Parks Canada. The full report is provided in Appendix B. A total of 105 breeding bird species were identified as having likely potential for nesting at the ranch. From this list, 46 species were identified as potentially being affected by the project. Four of these are species at risk:

- Olive-sided flycatcher;
- Short-eared owl;
- Common nighthawk; and
- Rusty blackbird.

Habitat associations of bird species potentially affected by the project are summarized in Table 3.

Table 3 – Habitat associations of bird species potentially affected by the project

Habitat Type	Count of Species	Number of SARA Schedule 1 Species
Grassland	7	2
Shrub	17	0
Mixed Forest	18	1
Road-cut	3	0
Wetland	3	1

6.3.7 Amphibians, Reptiles and Other Small Mammals

Despite the ecological significance of the area, there are no published data on the presence or abundance of amphibians, reptiles, and other smaller mammal species. Distribution of the Columbian ground squirrel (*Spermophilus columbianus*) encompasses the Ya Ha Tinda Ranch area and some evidence of burrowing activity was observed by Parks Canada staff along the proposed new highland road alignment, just north of the Hay Barn (Figure 1), as well as in some of the hillside road cuts (although not in areas proposed to be disturbed as part of this project).

6.4 Aquatic Resources

The Special Resources of Banff National Park (Achuff et al. 1986) states that Bighorn Falls is considered a feature of natural significance.

Very little data are available on fisheries in the Ya Ha Tinda region (Morgantini 1995). The Red Deer, Clearwater and Panther Rivers, as well as the tributary streams, are known to support viable populations of gamefish. However, information pertaining to species occurrence, population dynamics and habitat is limited (McCart and Jones 1975, Fitch 1975, Stelfox 1981).

The Red Deer River provides an important migratory corridor for bull trout (*Salvelinus confluentis*) and mountain whitefish (*Prosopium williamsonii*). Resident trout populations may be found in deep sheltered pools. Cut-throat (*Salvelinus spp.*) and rainbow trout (*Salmo gairdnarii*) have also been reported, but are very rare. In 1983, in order to increase sport fishing opportunities, Alberta Fish and Wildlife released 34,000 cut-throat trout in the Red Deer River east of the Ya Ha Tinda Ranch. It is not known whether this species has established a migratory corridor into the Ya Ha Tinda Ranch region. Based on the fish species with potential to occur at the Ya Ha Tinda Ranch, the in-stream work window with least risk for impacting sensitive life stages is 16 August to 31 August.

Brook trout (*Salvelinus fontinalis*) have been reported in the upper reaches of the Panther River. During the summers of 1972 and 1973, Fitch (1975) surveyed and thoroughly described the physical characteristics and fisheries habitat of several streams in the upper Red Deer and Panther River valleys. Within the Ya Ha Tinda Ranch area, Fitch noted that the gamefish population in Scalp Creek consisted of bull trout. This population was restricted to the first 2.5 km of the stream by bedrock chutes and water falls. It appeared limited by the sterile nature of the stream, extreme fluctuations in flow, lack of deep pools, lack of adequate shelter, lack of bank cover, and swift water velocities. In the Bighorn Creek, the section below the waterfalls was also considered marginal for supporting a trout population due to a lack of shelter, bank cover and, possibly, food. With regard to Eagle Creek, immediately east of the Ranch, even though Fitch (1975) found some trout, the stream was considered "totally unsuitable" to provide fish habitat due to its extremely high gradient, its bedrock nature, the nature of the flow, lack of food organisms, exposed banks and extreme fluctuations in flow.

Dogrib Creek is a tributary to the Panther River, and is the only other stream surveyed by Fitch (1975) in the Ya Ha Tinda region. In this stream, the trout population was found to be largely restricted to the lower section due to high gradient further upstream. However, even in the lower section, fish habitat was considered marginal. The 1972 to 73 surveys in the Ya Ha Tinda region were not conducted during the spawning season. Nonetheless, since in other areas similar streams support spawning migrations from larger rivers, all streams surveyed were thought to be used for spawning (Fitch 1975). Fitch (1975) concluded that "the importance of these streams lies not in their individual merits, but in their combined contribution to the larger river system." Scalp Creek, Bighorn Creek, Eagle Creek and Dogrib Creek contribute high quality water on which downstream fisheries depend.

The current alignment of the highland road crosses another creek, locally named Shelby's Creek, approximately 325 m upstream of its confluence with the Red Deer River (Figure 1). Two culverts carry the creek flow under the existing road alignment, but there are frequent problems with the culverts becoming blocked and the creek flooding the road at this location. The proposed new highland road alignment will cross Shelby's Creek approximately 1 km further upstream. The old road bed at this location also has two culverts to carry the creek flows under the old road bed (Photos 4 and 5). There is no fisheries data for Shelby's Creek, however the creek appears to have suitable habitat for fish (Photos 6 and 7).

Photo 4 – Double culvert carrying Shelby's Creek under the old road bed/proposed new highland road alignment

Photo 5 – Looking WSW at old road bed (culvert crossing just out of view at right)

Photo 6 – Shelby's Creek

Photo 7 – Shelby's Creek

6.5 Species of Conservation Concern and Listed Species at Risk

Species that are known to occur or have the potential to occur within the project area at the Ya Ha Tinda Ranch that have been assessed by COSEWIC as Special Concern, Threatened or Endangered and those that are listed under Schedule 1 of the Species at Risk Act (SARA) are listed in Table 4 below. Their potential to be affected by the project is discussed further in Section 7.5.

Table 4 – Species at Risk with the potential to occur at the Ya Ha Tinda Ranch

Common Name	Scientific Name	Alberta Status	COSEWIC Status	SARA Status	Observation Records at YHT	Habitat
Amphibians						
Western (boreal) toad	*Anaxyrus boreas*	Sensitive	Special Concern	-	One toad observed adjacent to Shelby's Creek between the current road bed alignment and former road bed alignment 07 June 2017.	Can be found up to elevations of about 2,300 metres (about 7,500 feet); It is generally found near ponds, streams, or lakes.
Mammals						
American badger	*Taxidea taxus*	Sensitive	Special Concern	-	Morgantini (1996) noted that based on data in the ELC for BNP, it is likely that the American badger occurs at the Ya Ha Tinda Ranch but there is no other information on their occurrence.	Dens (burrows) are essential to the badger, serving as sites for diurnal (daytime) activity, food storage, birthing, and as the focus for foraging activities.
Grizzly bear	*Ursus arctos*	At Risk	Special Concern	-	Observation records at Ya Ha Tinda recorded on AB FWMIS website; Observations on remote cameras at the ranch (Steenweg 2015)	From prairie to forested landscape, open slopes and alpine tundra.
Little brown myotis	*Myotis lucifugous*	Secure	Endangered	Endangered	Horne (2013) noted that the buildings at the Ya Ha Tinda Ranch could potentially be used by bats.	Colonies of this species are common and may be found in buildings and hollow trees.
Northern long-eared myotis	*Myotis septentrionalis (syn. M. evotis)*	May be At Risk	Endangered	Endangered	Horne (2013) noted that the buildings at the Ya Ha Tinda Ranch could potentially be used by bats.	Preferred habitat appears to be coniferous cover high in the mountains of British Columbia and Alberta; These bats probably roost in trees in the summer.
Wolverine	*Gulo gulo*	May be At Risk	Special Concern	-	Morgantini (1996) noted that wolverine inhabit the Ya Ha Tinda Ranch region but that little is known of their abundance and distribution.	Prefers large areas of remote wilderness, wooded foothills and mountains.
Birds						
Bank swallow	*Riparia riparia*	Secure	Threatened	-	No records, but based on data in the ELC for BNP this species has potential to occur.	Freshwater, Grassland
Barn swallow	*Hirundo rustica*	Sensitive	Threatened	-	Yes, observed by Ramstead (1989).	Freshwater, Grassland
Common nighthawk	*Chordeiles minor*	Sensitive	Threatened	Threatened	Yes, observed by Ramstead (1989).	Grassland, Urban.
Olive-sided flycatcher	*Contopus cooperi*	May be At Risk	Threatened	Threatened	Yes, observed by Ramstead (1989).	Forest.
Rusty blackbird	*Euphagus carolinus*	Sensitive	Special Concern	Special Concern	No records, but based on data in the ELC for BNP this species has potential to occur.	Swamp/Marsh, Riparian.
Short-eared owl	*Asio flammeus*	May be At Risk	Special Concern	Special Concern	Yes, observed by Ramstead (1989).	Grassland, Swamp/Marsh.

Common Name	Scientific Name	Alberta Status	COSEWIC Status	SARA Status	Observation Records at YHT	Habitat
Fish						
Bull trout	*Salvelinus confluentus*	At Risk	Threatened	-	Observation records at Ya Ha Tinda recorded on AB FWMIS website; Morgantini (1996).	Creeks and rivers.
Westslope cutthroat trout*	*Oncorhynchus clarkii lewisi*	At Risk	Threatened*	Threatened*	Observation records at Ya Ha Tinda recorded on AB FWMIS website; Morgantini (1996).	Creeks and rivers.

* Listings only apply to genetically pure populations.

6.6 Cultural Resources

The Ya Ha Tinda region contains evidence of human occupation that goes back to the last Ice Age (Morgantini 1995). The cultural-historical records in the area "hold evidence for multiple human occupations that may extend back 10,000 years and, thus, have a bearing upon the compelling archaeological question about the initial peopling of North America" (Francis 1993). In 1993, the archaeological sites on the Ya Ha Tinda Ranch were placed on Park Canada's National Threatened Sites List.

The recorded history of the area goes back to the early 1900's, to the times of the first wardens of Canada's National Parks (Morgantini 1995). Between 1917 and 1930, the Ya Ha Tinda Ranch was the Warden District Headquarters for Banff National Park. It was also used by Banff National Park to winter horses. Since 1930, the Ranch has been used by Parks Canada to breed, train and overwinter horses used by the Warden Service of western Canada National Parks for backcountry patrol. Every winter between 170 and 200 horses are transported to the Ranch where they remain from October to the middle of May.

Overall, the Ya Ha Tinda Ranch has a high concentration of pre-contact sites, reflecting its prime location in the grassy montane along the Red Deer River (Langemann 2015). There are Early Prehistoric period campsites at James Pass and along Scalp Creek, which were occupied 8 – 9,000 years ago. There are also sites dating from more recent periods, including stone circles and cairns. The site density along the north shore of the Red Deer River continues in Banff NP, particularly in the open meadows at Scotch Camp and McConnell Creek, and at major creek confluences. Some of these sites contain housepit depressions, showing that people from the BC Interior were coming into the Red Deer, as well as people from the Plains. The Red Deer River valley was a major travel corridor through the mountains, a place where people from different cultural traditions would have met, as well as being a destination in its own right. The sites within the Ya Ha Tinda Ranch should be understood as part of this site concentration and long pattern of human use.

In July 2015, an archaeological overview assessment (AOA) was undertaken for the road repair and realignment by Parks Canada archaeologist Gwyn Langemann. At that time, the proposed highland road realignment was not planned to make use of the old road bed and instead was proposed to follow an entirely new alignment through grassland and pasture set back several hundred metres from the Scalp Creek embankment. The AOA provided the following observations:

- There have been several intensive archaeological surveys of the Red Deer River in Banff NP and the Ya Ha Tinda Ranch; the area is well-known.
- The Red Deer River valley throughout Banff NP and the YHT has been a major travel corridor, and a focus for pre-contact occupation, for the last 10,000 years.
- Parks Canada has made an intensive inventory of archaeological sites in the YHT, and there was a regular program of site monitoring; as a result there is a good understanding of the distribution of archaeological sites on the landscape.
- However, most of the YHT sites are known from surface features and shovel testing; very few have been actually excavated or completely reported, and so we do not completely understand the full spatial and temporal distribution of archaeological resources present at each site.

- Excavations in the province at James Pass east of the YHT show a significant 10,000 year old occupation, and sites within the YHT above Scalp Creek are almost as early; artefacts were found below the distinctive Mazama volcanic tephra layer, which dates to 6850 years ago. Radiocarbon dates of about 7110 and 9910 years ago were obtained from bone at site 1626R, and a date of 5840 on bone from 1608R.
- There is a concentration of sites along Scalp Creek and Bighorn Creek, on the higher montane terraces above the flood plain. There is a high potential for finding previously unknown archaeological sites anywhere in this montane terrace.
- We know there are many archaeological sites on the east bank of Scalp Creek, including sites with at least 60 cm deep deposits and 9900 year old occupations.
- Sites along the high eroding bank of Scalp Creek were monitored and tested in 1992 and 1993, as the problem of erosion has long been recognized. Severe erosion continues to damage the pre-contact sites along the creek bank.
- Most sites are pre-contact, but there are historic corrals and cabins relating to the early historic use of the YHT by outfitters such as the Brewsters.
- The existing road passes very near to about two dozen known archaeological sites.

The 2015 AOA recommended that consideration be given to using the old road bed alignment in order to minimize new disturbance. The AOA also recommended that if the existing road is to be rehabilitated, then care must be taken not to disturb the archaeological sites and historic features (such as the old Brewster corral) immediately adjacent to the road.

The AOA was followed by an Archaeological Impact Assessment of the proposed road alignment. Field assessments in fall 2015 included a systematic surface inspection of the project area and a series 29 shovel tests with soil screening along the center line of proposed road alignment. Two new sites were found and additional shovel tests were excavated at 5 m intervals perpendicular to the center line to see if the route could be adjusted. Based on the results of this field work, further mitigative excavations were recommended at the two new sites, 10 m square at each location to be placed within the proposed road right-of-way and the area to be affected by cut/fill and ditching.

These recommendations were implemented through a contract with Turtle Island Cultural Resource Management Inc., also in fall 2015. The excavations resulted in some highly significant finds from the Middle Prehistoric Period.

Following this work, the proposed alignment was re-visited and the recommendations from the original AOA were incorporated into the project design, with the finalized road alignment making use of the old road bed in order to minimize disturbance to cultural resources, particularly the concentrations of resources along the montane terrace above Scalp Creek.

6.7 Visitor Experience

6.7.1 Access and Recreation

There is a single, 6.5 km long access road into the ranch. The first half of the road from the ranch boundary to the Bighorn Campground, the hillside section, receives more use than the latter half, or highland section of the road (from the Bighorn Campground to the ranch proper), because it carries all of the traffic accessing the Bighorn Campground (Figure 1). The Bighorn Campground serves as a staging and camping area for visitors using the extensive trail system accessible from the ranch. Most of the visitors bring horses with them. It is operated by the Friends of the Eastern Slopes Association.

There is also a horse trip outfitter, Outpost at Warden Rock, that accesses their backcountry lodge via the Ya Ha Tinda Ranch, typically departing with horses, wagons and stage coaches from the Bighorn Campground and using the ranch road to access the Scalp Creek crossing (Photo 8).

Photo 8 – horse drawn wagon heading for the Scalp Creek crossing

6.7.2 Public Safety

The riding surface of the entire road has been formed by several years of compaction (due to use) of the underlying native conglomerate material. During wet weather the road collects the drainage and turns muddy providing difficult driving conditions. There is also evidence of a number of springs and water seepage through the face of the slope on the uphill side of the hillside road. These water sources are keeping several sections of the uphill side of the road wet and somewhat impassable, reducing the active road width and increasing instability in the uphill slopes.

The road also has very narrow sections and sharp corners where vehicles cannot safely pass one another. Throughout much of the hillside section, the downhill side of the road consists of steep slopes downwards as steep as 45 degrees (1H:1V). There is no protection for vehicles at the top of these steep slopes.

Flooding in the spring of 2013 caused significant bank erosion and slope failure along Scalp Creek - a tributary of the Red Deer River that a large segment of the highland portion of road parallels. This slope failure has moved to within meters of the road in places and the near-vertical slopes are unstable and dangerous. The erosion of the banks is progressively encroaching on the road and the significant elevation difference between the creek and road has created a dangerous situation where movement of the bank could take out the road at the top of the bank.

7. EFFECTS ANALYSIS AND MITIGATION MEASURES

An Environmental Protection Plan (EPP) will be prepared by the contractor describing in detail how the mitigation measures outlined in this report will be implemented during the project. The EPP must be prepared by a qualified professional that is experienced in the development of such plans. The EPP must be submitted for review by the Parks Canada Environmental Surveillance Officer (ESO) at least two weeks prior to work commencing. The EPP will include:

- An access plan that outlines the proposed access route(s), types of equipment to be used for various phases and locations/sizes of lay-down areas in order to prevent/minimize disturbance to vegetation and soils. This will include details on how the work limits will be marked out and what procedures will be employed to ensure trespass outside these limits does not occur and to ensure that the environment is not impacted or damaged by works or construction equipment beyond the work limits.
- An Erosion and Sediment Control (ESC) Plan that details appropriate work methods, proposed erosion control methods and containment methodology for works in proximity to water bodies and drainage features. No release of sediments into any water body in levels that are deleterious to fish or fish habitat is permitted.
- An Emergency Response Plan that outlines procedures to follow in the case of a spill or other type of emergency (wildlife encounter, fire, equipment malfunction/failure), including appropriate spill kit requirements and spill and emergency response contacts. The Spill Response Plan will detail the containment and storage, security, handling, use and disposal of all hazardous materials, including empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment.
- Provisions to reduce human-wildlife interactions.

7.1 Soils and Landforms

7.1.1 Potential Effects

The total disturbance footprint for this project outside of existing operational road footprint is expected to be approximately 63,245 m^2, most of it occurring over the 3 km length of proposed new road alignment. The permanent new road bed footprint will be approximately 16,535 m^2. The remaining 46,710 m^2 of disturbance footprint (ditch lines, work areas, cut and fill slopes) is expected to be restored with salvaged native topsoil and native vegetation. Over half of the proposed new road alignment will make use of an old road bed. As such, the permanent displacement of native soils will be limited to approximately 6,990 m^2.

Potential effects to soils and landforms as a result of the project comprise:

- Wind and water erosion of exposed soils during earth moving activities (stripping, grading, soil handling and storage, etc.).

- Admixing of topsoil and subsoil during earth moving activities and equipment operation, resulting in an increased risk of erosion due to changes to soil structure a loss of vegetation productivity;
- Admixing of soil types (i.e., mixing soils from different locations), leading to a loss of vegetation productivity and an increased risk of erosion.
- Soil compaction and rutting during equipment operation, resulting in an increased risk of erosion due to changes to soil structure, reduced aeration and water holding capacity.
- The creation of unstable slopes due to alteration to landforms (i.e., as a result of earth works in locations with steep slopes). Locations of concern include the earth work locations along the hillside road and the east end of the proposed new highland road alignment where it cuts up the old river terrace slope.
- Soil contamination from leaks and accidental spills from equipment operation and maintenance.

7.1.2 Mitigation Measures

Mitigation measures to avoid or minimize potential effects to soils and landforms comprise:

Minimize disturbance footprint:

- The work area outside of existing hardened areas (i.e., existing roads) must be kept to an absolute minimum. Work planning for construction of the new highland road alignment must be consistent with this principle and clearly described in the EPP, accounting for the road bed, ditches, equipment operation, separate storage of topsoil and subsoil, and fence installation.
- All workspace shall be clearly flagged prior to construction activities being started.
- All construction and operational activities associated with the work will remain within the flagged areas.
- The contractor will utilize existing roads for access and will not travel on native vegetation or tame pasture outside of the marked work area to reduce soil and vegetation impacts.
- Rig matting can be considered if temporary work spaces on grassland or pasture are required, however rig matting must not be placed on vegetated areas for more than 5 days during the growing season (1 May to 15 September). There is no limit during the dormant season. All matting must be clean of all soil and seeds prior to bringing on site and between uses if used in an area with non-native invasive species.
- Where tree and shrub removal is required, these should be flush cut and root balls left in place where feasible (i.e., where grubbing is not required), especially the shrub removal adjacent to wetland areas. Under no circumstances should equipment be used to push trees over or pull them out by the roots.

Minimize soil loss due to admixing and erosion during earth works:

- Soil disturbance is scheduled to avoid May and June when there is an increased risk of rutting, admixing of soil layers and general damage to the environment as a result of wet conditions.
- Stripping within the project area must be kept to the minimum required.

- Road construction work should be phased in a manner to minimise the exposure of disturbed soils (i.e., stripping, road construction and restoration work completed in a rolling manner to minimize exposure in any given location).
- Stripping will be completed under appropriate moisture conditions (i.e. not wet).
- Stripping and replacement of topsoil and subsoil must be done in a manner so that **absolutely no admixing of topsoil and subsoil occurs.**
- All stripped topsoil will be separated from sub-soil materials by at least 1 m.
- Where possible, soils and other materials must not be stored for more than two weeks at a given location on vegetated areas during the growing season (1 May to 15 September) in order to prevent killing the underlying vegetation.
- Topsoil and subsoil must be stored in a manner to prevent loss due to wind and/or water erosion (e.g., stored in low windrows, wet down or cover in windy conditions if dust becomes a problem).
- Stripped topsoil will be placed immediately adjacent to areas where it is removed and will be replaced in the same location as it was taken. If this is not possible the soil will be placed as close as possible to its original location and replaced when construction is complete. There must be no mixing of soils from different locations (i.e., different soils types and moisture regimes).
- All other stripping and grading activity will utilize appropriate equipment to minimize soil compaction and admixing.
- All heavy equipment will be restricted to hardened areas during wet conditions (roads) or parked on rig matting.
- Grading will be limited to that required to meet the project specifications.
- All site contouring must allow for the proper drainage of ditches to appropriate water ways. No ponding or pooling will be allowed within the ditches.
- Ditch contours should maintain a similar diameter for water flow as they currently have or have a greater diameter to allow increased water flow.
- All contours must line up with appropriate culverts to ensure water flow is maintained.
- All materials hauled off site must be secured properly and covered to prevent damage or loss.
- All equipment and operational vehicles will be stopped or modified when rutting or wet ground conditions jeopardizes topsoil structure or integrity.

Preventing soil erosion through rapid and effective restoration of native vegetation in disturbed areas:

- Re-grading during restoration shall be minimized to reduce compaction.
- Placement of salvaged topsoil will be completed under appropriate moisture conditions (i.e. not wet).
- Seeding must be undertaken after 15 September (during the dormant season).
- Temporary erosion control may be required in areas where topsoil has been replaced until seeding and mulching can be undertaken after 15 September.
- Topsoil will be evenly spread over all areas with the goal of a minimum of 10 cm of topsoil covering all areas unless otherwise stated by the ESO.
- Topsoil will not be mixed with sub-soils during the placement process.

- Once placed, topsoil will not be driven on by equipment unless during the seeding or soil preparation work for seeding.
- Lumpy topsoil will be lightly tilled prior to seeding.
- All vehicle traffic will be suspended on topsoil and sod in wet conditions to prevent compaction and rutting.
- If any excess topsoil or subsoil material remains at the end of construction, a long-term soil stockpile plan will be developed accounting for:
    - Locating the stockpiles away from known populations of non-native invasive plants;
    - Storing topsoils and subsoils separately;
    - Storing in a natural hill formation that is not overly steep to allow for vegetation establishment and minimise erosion potential;
    - The stockpiles will be seeded with native vegetation appropriate for the location of the stockpile and the nature of the material to be stockpiled.

Preventing soil contamination:

- The Contractor will provide drip and spill containment for portable generators and equipment used or parked overnight on-site, as permitted by the ESO.
- All oil and fluid from maintenance or spills from equipment are to be contained and hauled offsite or placed in appropriate containers in designated equipment maintenance areas. All materials are to be transported to an appropriate recycling and/or disposal facility.
- All potential hazardous waste materials (including fuels, oils, lubricants, etc.) generated from the project shall be stored in spill and leak-proof containers away from existing residences.
- Used filters, oils, lubricants, and other waste materials collected during the project will be transported to an appropriate facility.
- Authorized personal will be responsible for handling all hazardous materials.
- Appropriately sized spill kits will be available and on site at all times.
- All hazardous materials will be properly labeled according to the Workplace Hazardous Materials Information System (WHMIS) Regulations and Materials Safety Data Sheet (MSDS) will be available onsite at all times.
- Portable toilet facilities will be used on the construction site and all human waste will be removed by a licenced sewage disposal company. All facilities will be maintained at all times and include hand washing stations or hand sanitizers.

7.1.3 Residual Effects

Negative residual impacts to soils and landforms are expected to comprise:

- The permanent displacement of approximately 6,995 m^2 of native soils;
- The permanent displacement/disturbance of approximately 9,540 m^2 of previously altered soils (old road bed); and
- A temporary disturbance footprint of approximately 46,710 m^2.

Provided the above mitigation measures are implemented, impacts to soils are expected to be localized to the project footprint, largely medium-term (temporary disturbance footprint), reversible and Low to Moderate in magnitude. The total permanent footprint of the new road alignment makes up 0.042% of the total surface area of the Ya Ha Tinda Ranch and 0.108% of the total surface area of the ranch east of Scalp Creek.

7.2 Vegetation

7.2.1 Potential Effects

The new highland road alignment runs through fescue grassland plant communities that have been historically grazed and modified such that they are currently in a range of early to late successional stages. Although modified through grazing pressure, these grasslands are of high ecological and functional value. They are extremely fragile and can be negatively affected by invasive species and disturbance. Potential effects include:

- Loss of native vegetation due to vegetation removal, including rare plants and vegetation types of natural significance (grasslands and aspen forest);
- Damage to adjacent vegetation from vehicles, equipment operation or stockpiling, including rare plants and vegetation types of natural significance (grasslands and aspen forest); and
- Potential invasion or introduction of non-native weed species into disturbed sites.

7.2.2 Mitigation Measures

Vegetation along the proposed new highland road alignment, as well as adjacent to other earth work areas, must be protected through minimal disturbance techniques where ever feasible. Equipment selection, reclamation techniques and construction techniques will all require careful planning to minimize impact to the grasslands and maximize the chances of successful restoration. Mitigation measures comprise:

Weed control:

- A pre-construction survey will be undertaken to identify areas where invasive grasses make up more than 10% of the cover.
- Glyphosate treatment will occur where soil will be stripped and only where invasive grasses make up more than 10% of the cover. If no invasive species (i.e. grasses) are present then no glyphosate treatment will be necessary.
- Application of Gyphosate will occur at minimum of one week prior to soil stripping.
- A pre-construction survey for other non-native invasive plant species will also be undertaken within the proposed disturbance footprint in advance of ground disturbance and pre-treatment will be undertaken where required.
- Locations with non-native invasive plants may also be delineated from which topsoils must not be re-used during restoration work and instead must be removed from the ranch for disposal at an appropriate facility.
- All equipment will be steam cleaned prior to entering site. Equipment will be inspected upon arrival to ensure it is free of soil (i.e. weed seeds and clubroot).

- Equipment such as pickup trucks will be washed regularly to ensure they do not bring in any weeds to site.
- No soil will be imported to site; only clean aggregate (with no soils or seeds) for road surfacing purposes.
- Weed control will be completed during the first growing season following construction (2018) to ensure that no weed issues occur due to the completion of this project.

Minimizing disturbance and loss of native vegetation:

- Minimising disturbance footprint, as per Section 7.1.2.
- The new highland road alignment has been selected to minimise the loss of native grassland areas by using an old road bed alignment to avoid the most sensitive, high value grassland areas and by minimizing the extent of new disturbance within pasture areas as much as feasible while achieving a safe set-back distance from the unstable Scalp Creek embankment.
- Tree and shrub removal is limited to a few areas of smaller aspen and shrubs (see Photos 9 and 10).
- The possibility exists for rare plants (soft cinquefoil, Lake Louise arnica and Greenland primrose) to occur within the project disturbance footprint, therefore a pre-construction survey(s) for these species will be undertaken within the anticipated project disturbance footprint, including potential staging areas. Any incidental observations of other rare plants will also be recorded and any additional mitigation measures will be identified as necessary based on the findings of the survey(s) (e.g., salvage/transplant, propagate from seed).
- Where possible, soils and other materials should not be stored for more than two weeks at a given location on vegetated areas during the growing season (1 May to 15 September) in order to prevent killing the underlying vegetation.

Photo 9 – aspen to be removed

Photo 10 – shrubs to be removed

Rapid and effective restoration of native vegetation in disturbed areas:

- All areas disturbed by the project will be seeded to or planted with native vegetation. This includes all disturbance areas adjacent to the highland and hillside road sections, as well as any staging or work areas where ground disturbance has occurred.
- Seed mixes to be used in restoration areas are provided in Appendix C.
- Wetland seed mixes will be used only in locations where stream banks or ephemeral drainages are crossed, to be determined by Parks Canada.
- Seeding must be undertaken in the fall after 15 September (during the dormant season).
- Following seeding, hydro-mulching with a strong tackifier (e.g., Flexterra) will be required in order to prevent seed loss and soil erosion due to high winds in the winter months.
- Following topsoil placement, temporary erosion control may be required until seeding and mulching can be undertaken after 15 September.
- During reclamation all seed lots used will have their weed analysis and germination analysis supplied prior to their purchase. Seed certificates must be provided to the ESO at least 2 weeks prior to seeding and before seed is purchased. Seed lots may be rejected based on weeds, germination or age of the seed certificates. Once approved, the seed mix will be modified based on pure live seed with germination and inert material taken into account (i.e., if the germination rate is only 50% double the seed will be required).
- Any lots with regulated weeds (Alberta Weed Act) or invasive species of concern will be rejected. Invasive species of concern will include, but not be limited to:
    - Kentucky Bluegrass – *Poa pratensis*
    - Smooth Brome – *Bromus inermis*
    - *Downy Brome – Bromus tectorum*
    - Timothy – *Phleum pratense*

  - Creeping Red Fescue – *Festuca rubra*
  - Sheep Fescue – *Festuca ovina*
  - Quack Grass – *Agropyron repens*
  - Reed Canary Grass – *Phalaris arundinacea*
  - Green Foxtail – *Alopecurus arundinaceus*
  - Tall Buttercup – *Ranunculus acris*
  - White Cockle – *Silene latifolia*
  - Common Tansy – *Tanacetum vulgare*
- All seed supplied will be inspected by a qualified restoration professional to ensure the appropriate seed is used and all live plant material will be inspected before installation to ensure it is alive and healthy.
- Use of a Brillion drill for seeding is preferred where topography allows or broadcast seeding and harrowing where a drill is not practical.
- Application of hydro-mulches will occur after seed has been applied and may include up to 20% of the seed mix.
- Upland seeding rates will be 23.45 kg/ha of pure live seed using a Brillion seed drill or 30 kg/ha if broadcasted and harrowed into the soil.
- Some adjustments to the upland seed mix may be required for the cut banks in new disturbance areas along the hillside road due to the steepness of these slopes and south-facing aspect, to be determined by Parks Canada.
- In areas where rough fescue has been documented to be at least 10% of the plant community or more, greenhouse grown rough fescue plugs will also be planted. Plugs must be grown from wild harvested seed that can be traced to specific wild harvest locations along the foothills of Alberta.
- Rough fescue plugs must be planted out in the spring following construction completion.
- A pre-construction survey will be undertaken to identify and document the % cover of rough fescue along the road alignment.
- Rough fescue plugs will be planted at a minimum of one plug for every four square meters if less than 20% rough fescue is found in the surrounding plant community and 1 plant for every 2 square meters if there is between 20% and 50% rough fescue cover in the surrounding community. In areas with over 50% rough fescue in the surrounding community the use of 1 plant per square meter is recommended.
- Seed will be sourced from one of the following suppliers. Not all suppliers may have all required species and a combination of suppliers may be necessary:
  - Brett Young Canada
  - Eastern Slopes Rangeland Seeds
  - Pickseed Canada
- Live plant material will be sourced from one of the following suppliers. Both suppliers have supplied the required live plants successfully in the past. Any additional suppliers may be considered but seed source will be approved prior to any plants being produced. Plants that are found to be the wrong species will be rejected:

- Eastern Slopes Rangeland Seeds
- Grumpy's Greenhouse

7.2.3 Residual Effects

Negative residual impacts to vegetation are expected to comprise:

- The permanent loss of approximately 6,995 m^2 of modified (through grazing pressure) native grasslands;
- The permanent loss of approximately 9,540 m^2 of native vegetation that has grown back in on the former road bed; and
- A temporary disturbance footprint of approximately 46,710 m^2.

Provided the above mitigation measures are implemented, these impacts are expected to be localized to the project footprint, largely medium-term (temporary disturbance footprint), reversible and Low to Moderate in magnitude. The total permanent footprint of the new road alignment makes up 0.042% of the total surface area of the Ya Ha Tinda Ranch and 0.108% of the total surface area of the ranch east of Scalp Creek.

7.3 Wildlife

7.3.1 Potential Effects

- Habitat loss due to the footprint of the new highland road alignment.
- Potential wildlife injury or mortality as a result of vegetation clearing and equipment operation, particularly destruction of occupied bird nests, bat roosting sites and ground squirrel burrows.
- The physical presence of equipment and construction personnel, as well as sensory disturbance from noise and activity during site preparation, construction and equipment operation, may result in displacement of wildlife, including ungulates and carnivores, from otherwise suitable habitat.
- Potential disruption to wildlife movement as a result of the construction of new fencing adjacent to the new road alignment.
- Habituation to the area as a result of food attractants (i.e. garbage) and barriers to movement in and around the construction site. Habituation is a result of a lowered fear response and fear avoidance of humans and human-use areas and may result in an increase in human-wildlife conflict. This can lead to a greater demand for wildlife management and/or the relocation and/or destruction of problem wildlife.

7.3.2 Mitigation Measures

Habitat loss:

- The new highland road alignment has been selected to minimise the loss of native grassland habitat by using an old road bed alignment to avoid the most sensitive, high value grassland areas and by minimizing the extent of new disturbance within pasture areas as much as feasible while achieving a safe set-back distance from the unstable Scalp Creek embankment.

Wildlife injury/mortality:

- Construction has been planned to occur outside of the migratory breeding bird season, i.e., commencing after August 1 (see Appendix B).
- Tree and shrub removal is limited to a few areas of smaller aspen and shrubs (see Photos 9 and 10) that are unlikely to be used for bat roosting. No trees with potential to be used for bat maternal roosting colonies (i.e., > 25 cm diameter breast height) will be removed.
- Ground disturbance activities in areas of known ground squirrel burrow locations (i.e., just north of the Hay Barn) have been scheduled to occur in August, when ground squirrels remain active on the landscape. As such, if the affected burrows are occupied, the ground squirrels will be mobile and have time to move to alternative burrows or excavate new ones prior to hibernation.

Sensory disturbance:

- Work is permitted during daylight hours only. No work during dusk, dawn and night-time hours is permitted.
- Wildlife must be given right-of-way. No wildlife harassment is permitted.

Wildlife Movement:

- Considerable thought and work has gone into the design and maintenance of the fencing at the Ya Ha Tinda ranch in order to achieve operational requirements (functional pastures that contain horses and bison), while allowing for permeability to wildlife and minimal entanglement issues. The new fencing has incorporated the same design features as the existing fencing.

Habituation:

- Notify the ESO and Departmental Representative immediately about dens, litters, nests, carcasses/road kills, bear, cougar or wolf activity or encounters on or around the site. If the ESO or Departmental Representative are not available, Banff Dispatch will be contacted at (403) 762-1470.
- All food garbage and wildlife attractants must be kept secure at all times. This includes ensuring that any on-site construction waste bins are secure from public access to ensure that no mixing of food garbage with construction waste occurs or other attractants placed in bins that are accessible to wildlife.

7.3.3 Residual Effects

Negative residual impacts to wildlife are expected to comprise:

- Temporary, localized increase in wildlife disturbance during the construction period;
- A temporary loss of habitat (disturbance footprint) of approximately 46,710 m^2; and
- The permanent removal of approximately 16,535 m^2 of modified native grassland habitat (approximately 0.042% of the total surface area of the ranch), all within operational ranch pasture areas.

Provided the above mitigation measures are implemented, these impacts are expected to be localized, largely short-term (temporary disturbance footprint), reversible and Negligible to Low in magnitude.

7.4 Aquatic Resources

7.4.1 Potential Effects

- Loss of approximately 150 m^2 of wetland habitat due to encroaching road footprint between Stations 5+600 and 5+800 (Drawing C-2007 in Appendix A), required in order to raise the driving surface of the road in this wet area.
- Loss of riparian vegetation where the disturbance footprint is in proximity to water bodies and drainage features.
- Potential for injury/mortality of amphibian species as a result of equipment operation in proximity to wetlands and drainage features.
- Improvements to aquatic connectivity as a result of culvert repairs and installation of new culverts in areas where the existing and proposed new road alignment poses a barrier to the movement of surface water and, in the case of Shelby's Creek, potentially fish.
- Sedimentation from grading and excavation and from culvert and ditch work. A decrease in surface water quality can result from increased sedimentation due to surface water runoff over disturbed soils. Changes in water quality can impact aquatic resources.
- Contamination from vehicle and equipment leaks or spills during operation. Aquatic organisms can be exposed to contaminants, either causing direct mortality or affecting their growth and reproduction.

7.4.2 Mitigation Measures

Minimizing loss of habitat and riparian vegetation:

- Encroachment into the wetland between Stations 5+600 and 5+800 (Drawing C-2007 in Appendix A) will be field fit in consultation between the Departmental Representative, ESO and contractor in order to minimise encroachment as much as possible (i.e., no more than 1 m expanded width).
- Raising the road at this location and installing new culverts is expected to result in improved water quality in this wetland, as surface flows over and erosion of the road surface will be reduced, resulting in reduced sediment inputs into the wetland, while allowing for improved hydraulic conductivity under the road via the new culverts.
- Riparian vegetation removal must not occur except where reviewed and approved in advance by the ESO. Any such areas proposed for removal must be clearly flagged for discussion purposes with the ESO.
- Flush cutting is the preferred method for any riparian vegetation removal such that the roots remain in place to retain bank stability and the potential for re-growth will be retained.
- In addition to seeding, live staking of suitable riparian shrub species may be required as part of restoration works in riparian areas, to be determined by Parks Canada.

Avoiding injury/mortality of amphibian species:

- Contractors will be made aware of the potential presence of amphibians in proximity to water courses/wetlands and the requirement to avoid any incidental injury or mortality during the course of their work.
- All amphibian observations must be documented and submitted to the ESO for Parks Canada's records.
- Additional care and mitigation measures may be required in some areas should there be persistent amphibian presence at the time of construction work.

Improvements to aquatic connectivity:

- New culverts are being installed and existing ones repaired and modified to improve hydraulic connectivity across the road bed.
- The new culvert(s) to be installed at the new highland road crossing of Shelby's creek must be designed and installed in accordance with the Alberta Code of Practice for Watercourse Crossings (2013), provided in Appendix D. Design and installation of the culvert(s) must be undertaken in a manner that minimizes potential impacts on fish habitat, maintains fish passage for relevant species (bull trout, mountain whitefish, cut-throat trout, rainbow trout, brook trout) and sufficiently accommodates watercourse flows, as follows (Taylor and Helms 2008):
    - Culvert size should be based on the capacity to handle peak flows;
    - For cylindrical culverts on fish-bearing streams, a minimum culvert diameter of 1000 mm should be provided and designed/sized according to site-specific considerations (the proposed culvert is 1200 mm diameter).
    - Cylindrical culverts should be installed to simulate open bottom or pipe arch culverts. Culverts up to 2000 mm in diameter should be countersunk into the natural substrate a depth of 300 mm below the streambed elevation. At a minimum there must be no hang-height at the downstream end that could prevent fish passage.
    - A minimum water depth of 200 mm should be provided throughout the culvert length. To maintain this water depth at low flow periods an entrance/downstream pool can be constructed. In some cases, an upstream pool may also be necessary.
    - The culvert slope should follow the existing streambed slope where possible. Excessive culvert slope, reduced culvert capacity due to countersinking and maintenance of the 200 mm minimum depth of flow, and back watering due to the creation of an outlet pool should be considered when selecting the required culvert diameter to allow fish passage and pass peak flows.
- The existing road alignment crossing of Shelby's Creek has had continual problems with culvert maintenance, backwatering and road washout. The existing culverts and road fill will be pulled back to allow the creek to flow freely at this location.

Preventing sedimentation and associated aquatic impacts:

- Culvert design has included consideration for erosion control, i.e., hand placement of appropriately sized riprap.

- A comprehensive ESC Plan must be developed by the contractor and submitted for review by the ESO at least 2 weeks prior to work commencing. No release of sediments into any water body in levels that are harmful to fish or fish habitat is permitted. The ESC plan must detail appropriate work methods, proposed erosion control methods and containment methodology for works in proximity to water bodies and drainage features, including:
    - Wetlands adjacent to and downslope of the hillside road;
    - Drainage features along the hillside and highland road;
    - Shelby's creek (existing and proposed new road alignment crossings).
- All ESC measures shall be inspected regularly at appropriate intervals throughout the course of construction and repairs or adjustments shall be made as necessary.
- Where ESC measures need to be maintained following construction completion (i.e., until vegetation is established in disturbed areas), these must also be monitored and maintained in functional order with repairs or adjustments made as necessary.
- The ESC plan must detail site isolation plans for culvert repair and installation locations where surface flows are present, in particular for the road construction and culvert installation proposed at Shelby's Creek, as well as culvert removal and pulling back the existing road bed at the existing road crossing of Shelby's Creek. Site isolation plans must be prepared by a Qualified Aquatic Environmental Specialist (QAES). A QAES is a person that has detailed knowledge of the aquatic environment including fish and fish habitat management and assessment through experience as well as education, as per the Alberta Code of Practice for Watercourse Crossings (2013), provided in Appendix D.
- In-stream works on Shelby's Creek (existing and proposed road alignment crossings) should be scheduled to occur within the in-stream work window with least risk for impacting sensitive life stages for relevant fish species (16 August to 31 August).
- Parks Canada will conduct pre-construction electro-fishing surveys of Shelby's Creek to confirm absence/presence of fish and identify species of fish present to further inform the in-stream work window.

Preventing contamination:

- All equipment must arrive on-site and be maintained in clean, good working order. Equipment must be inspected daily for drips and leaks.
- The Contractor will provide drip and spill containment for portable generators and equipment used or parked overnight on-site, as permitted by the ESO.
- Mechanized equipment will be stored at least 30 m from watercourses with an impermeable containment.
- The contractor must prepare an Emergency Response Plan that outlines procedures to follow in the case of a spill, including appropriate spill kit requirements for all equipment on-site and spill and emergency response contacts.
- The Spill Response Plan will also detail the containment and storage, security, handling, use and disposal of all hazardous materials, including empty containers, surplus product or waste

generated in the application of these products, to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment.

7.4.3 Residual Effects

Negative residual impacts to aquatic resources are expected to comprise:

- Loss of approximately 150 m^2 of wetland habitat due to encroaching road footprint between Stations 5+600 and 5+800 (Drawing C-2007 in Appendix A), required in order to raise the driving surface of the road in this wet area (maximum 1 m increase in road width over a 150 m length of existing road). This highly localized, permanent impact is expected to be off-set by positive residual impacts from improvements to aquatic connectivity as a result of culvert repairs, installation of new culverts and removal of old culverts in areas where the existing and proposed new road alignment poses a barrier to the movement of surface water and, in the case of Shelby's Creek, potentially fish; and
- Temporary loss of riparian vegetation at a few locations where the proposed disturbance footprint intersects riparian areas.

Provided the above mitigation measures are implemented, negative residual impacts are expected to be localized, largely short-term and reversible and Negligible to Low in magnitude.

7.5 Species of Conservation Concern and Listed Species at Risk

7.5.1 Potential Effects

Species of conservation concern and listed species at risk that are known to occur or have the potential to occur within the project area at the Ya Ha Tinda Ranch are listed in Table 4. Their potential to be affected by the project is discussed below.

Western (Boreal) Toad

This species has been assessed as Special Concern by COSEWIC but is not listed under the *SARA*. No amphibian surveys have been undertaken at the ranch but one toad was observed adjacent to Shelby's Creek during field work in June 2017. It is generally found near ponds, streams or lakes, so has the potential to occur in the vicinity of such habitats at the ranch. If present, there is potential for injury or mortality of individuals as a result of equipment operation. There is also potential for indirect effects to amphibian habitat as a result of potential impacts to wetland habitat, as outlined in Section 7.4 above.

American Badger

This species has been assessed as Special Concern by COSEWIC but is not listed under the *SARA*. The potential for badger presence at the ranch is based on badgers being observed in the 1940's at Scotch Camp, along the Red Deer River, 10 km inside the boundary of Banff National Park (Holroyd and Van Tighem 1983). In that area, badger diggings were also reported above and across the River. However,

there is no other information on their occurrence. Although there is potential for badger to occur, medium sized carnivores such as badgers have been subject to trapping pressures and habitat alterations to the east of the park which have likely shifted their distribution and number over time and the likelihood that the ranch is being used for core home range habitat is considered to be low. No potential den sites or scat have been observed during field surveys of the proposed road works. No residual effects to American badger are anticipated as a result of the project.

Grizzly Bear

This species has been assessed as Special Concern by COSEWIC but is not listed under the *SARA*. Grizzly bears are known to occur at the Ya Ha Tinda Ranch. Potential impacts are as described in Section 7.3 above with only localized, short-term, negligible residual effects expected.

Little Brown Myotis and Northern Long-eared Myotis

These species are both listed as Endangered under the SARA and are afforded the highest level of legal protection for species at risk in Canada. As described in Section 7.3 above, no suitable roosting habitat will be affected and no residual impacts to these species are anticipated as a result of the project.

Wolverine

This species has been assessed as Special Concern by COSEWIC but is not listed under the *SARA*. The potential for wolverine presence is based on wolverine signs being reported along the Red Deer River valley at the boundary of Banff National Park (Achuff et al. 1986). Although there is potential for wolverine to occur, medium sized carnivores such as wolverine have been subject to trapping pressures and habitat alterations to the east of the park which have likely shifted their distribution and number over time and the likelihood that the ranch is being used for core home range habitat is considered to be low. No potential den sites or scat have been observed during field surveys of the proposed road works. No residual effects to wolverine are anticipated as a result of the project.

Birds

Parks Canada contracted an experienced wildlife biologist to undertake a review of the life history requirements for bird species known or suspected to nest at the Ya Ha Tinda ranch within the road improvement project boundaries in order to provide mitigation recommendations. The full report is provided in Appendix B. The recommended mitigation strategy was to avoid the breeding window and schedule vegetation removal prior to 15 April or after 1 August, in order to reduce potential impacts to almost all nesting bird species in the project area to zero, including the listed species at risk (olive-sided flycatcher, short-eared owl, common nighthawk and rusty blackbird). Construction has accordingly be scheduled to commence after 1 August. Potential impacts are as described in Section 7.3 above with localized, negligible to low magnitude residual effects expected as a result of the permanent removal of approximately 16,200 m^2 of modified native grassland habitat, all within operational ranch pasture areas.

Bull Trout

This species has been assessed as Threatened in Alberta by COSEWIC but is not yet listed under the *SARA*. It is expected to occur in fish-bearing waterbodies at the ranch. As described in Section 7.4, negative residual impacts to fish species are expected to be negligible, with positive impacts as a result of potentially improved fish passage on Shelby's Creek.

Westslope Cutthroat Trout

This species has been listed as Threatened under the SARA, however the listing only applies to populations of genetically pure Westslope cutthroat Trout and critical habitat is only identified where the genetically pure populations existing. There are no genetically pure populations at the Ya Ha Tinda ranch. As described in Section 7.4, negative residual impacts to fish species are expected to be negligible, with positive impacts as a result of potentially improved fish passage on Shelby's Creek.

7.5.2 Mitigation Measures

Mitigation measures for potentially affected species of conservation concern are as described in Section 7.3 (Wildlife) and 7.4 (Aquatic Resources).

7.5.3 Residual Effects

Provided the mitigation measures outlined above are implemented, negative residual adverse effects to species of conservation concern are anticipated to be Negligible in magnitude. No negative residual adverse effects to listed species at risk that would contravene a SARA prohibition are anticipated.

7.6 Cultural Resources

7.6.1 Potential Effects

Potential effects to cultural resources comprise:

- Disturbance or destruction of known or unknown archaeological or historical sites during earth moving activities.

7.6.2 Mitigation Measures

- Cuts and fills proposed along the hillside road alignment have been kept to a minimum and are on sloping terrain with no known sites in the nearby area, suggesting lower potential for archaeological sites. The remainder of hillside road work is to take place on existing road footprint.
- The new highland road and fence alignments have been chosen with the aim of avoiding disturbance to known concentrations of archaeological sites.
- The alignment of the tie-in between the east end of the new highland road alignment and the existing road alignment (near Bighorn Creek) appears to avoid all known sites, or impacts a site area where past re-visits have suggested that the site has already been destroyed (i.e. 1631R).

- Flattening of the curve of the new road-alignment between the hay barn and old road bed has shifted the curve slightly further north and reduced the risk of any additional impacts to newly identified site 2475R (south of this curve).
- Fencing around the road is in close association with existing road disturbance and is expected to have minimal impact on the ground surface.
- Jingle pasture fencing re-alignment is also assumed to have minimal ground disturbance therefore is considered of minimal risk to any intact archaeological resources.
- A Parks Canada archaeologist will be on site to monitor during the soil stripping of the new portion of the highland road alignment (i.e., the NW portion between the old road bed and the ranch proper), where new ground disturbance is proposed through pasture.
- The Parks Canada archaeologist will also spot check other portions of the project (i.e. the tie-in of the new highland road alignment closest to Bighorn Creek, and roadway and jingle pasture fencing alignments) to verify anticipated low potential characteristics and/or minimal ground disturbance assumptions.
- Fencing installation should attempt to minimise ground disturbance as much as possible, and road construction should stay in existing disturbance areas as much as possible as well.
- If the scope and/or footprint of the project changes, this information must be relayed back to Parks Canada archaeologists as this may have an effect on archaeological resources and project requirements.
- There may be cultural resources present in the project area that have not yet been discovered (even after an archaeological assessment has been carried out or no assessment was deemed necessary for the project). If staff observe any significant cultural resources while working, they should stop work in the immediate area, and contact the Department Representative, ESO or a Parks Canada archaeologist or cultural resource advisor, to discuss any protective measures that might be needed. Significant resources that could be considered grounds for work stoppage include, but are not limited to, human remains, unique or diagnostic artifacts, and/or artifacts directly associated with known sites and/or unidentified sites in the area. In all cases, cultural managers must be made aware of the finds, and these finds must be communicated back to Parks Canada Archaeologists.

7.6.3 Residual Effects

Provided the mitigation measures outlined above are implemented, residual adverse effects to Cultural Resources are anticipated to be localized, short-term, non-reversible and are rated as Negligible in magnitude.

7.7 Visitor Experience

7.7.1 Potential Effects

- Disruption and/or delays to visitors accessing Bighorn Campground during the hillside road construction work.

- Altered access routing for the Outpost at Warden Rock outfitter operation due to the new road alignment.

7.7.2 Mitigation Measures

- Construction on the hillside portion of the road will commence in September 2017 in order to avoid work on the access road to the Bighorn Campground in the busy summer season. Some staging within the campground footprint may occur after the Labour Day weekend. Construction is proposed to be completed by end of October 2017.
- The existing highland road alignment will remain open during construction of the new alignment in the summer/fall of 2017. Operational access to the ranch will be maintained throughout construction.
- If rutting or damage occurs to the roads the contractor is responsible to maintain and repair the roads during the course of the project.

7.7.3 Residual Effects

Provided the mitigation measures outlined above are implemented, residual adverse effects to visitor experience are anticipated to be localized, short-term, reversible and are rated as Negligible to Low in magnitude.

7.8 Public Safety

7.7.1 Potential Effects

- Disruption to emergency access as a result of construction work on the hillside road.
- Increased fire hazard as a result of construction works during fire season, particularly in grassland areas. The predominant landscape feature is grassland which is a significant fire risk.
- Improved road safety following completion of the works.

7.7.2 Mitigation Measures

- The existing highland road alignment will remain open during construction of the new alignment in the summer/fall of 2017. Operational access to the ranch will be maintained throughout construction.
- Provisions must be made to allow for emergency access during all works on the hillside road.
- A fire extinguisher will be carried and available for use on each machine in the event of fire (e.g. ignited by a spark) to prevent the fire from burning or spreading to other fuels in the work area.
- Basic firefighting equipment – e.g. three shovels, two pulaskis, and two 20 litre backpack pumps shall be maintained at the construction site at a location known and easily accessible to all the Contractor's staff.
- Machinery and equipment shall be operated in a manner and with all original manufacturers' safety devices to prevent ignition of flammable materials in the area.

- Care shall be taken while smoking on the construction site to ensure that accidental ignition of any flammable material is prevented.
- The Contractor shall maintain an awareness of the fire danger rating (Index) in the work area by contacting the Banff Fire Duty Officer (FDO) (April through October) or Fire/Vegetation Specialist for Banff National Park (November through March). Fire prevention care is to be commensurate with the fire Index.
- In case of fire, the Contractor or worker shall take immediate action to extinguish the fire provided it is safe to do so. The FDO, Fire/Vegetation Specialist, ESO and the Departmental Representative shall be notified of any fire immediately.
- Deliberately lighting of fires or burning of waste materials is strictly not permitted.

7.7.3 Residual Effects

The purpose of this project is to achieve a positive increase in the safety of visitors and staff that use the Ya Ha Tinda Ranch access road. Negative residual adverse effects to public safety during construction are anticipated to be highly localized, short-term, reversible and are rated as Negligible in magnitude.

8. PUBLIC/STAKEHOLDER ENGAGEMENT & ABORIGINAL CONSULTATION

8 a) Indicate whether public/stakeholder engagement was undertaken in relation to potential adverse effects of the proposed project:

☐ No

☒ Yes (describe the process to involve relevant parties and indicate how comments were taken into consideration).

Communications with the Friends of the East Slopes about the project have been ongoing throughout project planning and will continue through project implementation.

8 b) Indicate whether Aboriginal consultation was undertaken in relation to potential adverse effects of the proposed project:

☒ No

☐ Yes (describe the process to involve relevant parties and how the results were taken into consideration).

9. SIGNIFICANCE OF RESIDUAL ADVERSE EFFECTS

The purpose of this project is to achieve a positive increase in the safety of visitors and staff that use the Ya Ha Tinda Ranch access road. Due to the permanent removal of approximately 16,535 m^2 of modified native grassland habitat (approximately 0.042% of the total surface area of the Ya Ha Tinda Ranch), residual effects to soils and vegetation are anticipated to be low to moderate in magnitude. This habitat loss is limited to operational ranch pasture areas. Negative residual adverse effects to wildlife, aquatic resources, cultural resources, visitor experience and public safety are expected to be negligible to low in magnitude. No negative residual adverse effects to listed species at risk that would contravene a SARA

prohibition are anticipated. Provided the mitigation measures outlined in this report are implemented, no significant adverse environmental effects are expected as a result of this project.

10. SURVEILLANCE

☐ Surveillance is not required

☒ Surveillance is required (provide details such as the proposed schedule and the focus of inspections)

A contracted site inspector will be providing full-time project oversight on behalf of Parks Canada throughout the project implementation. The Environmental Surveillance Officer (ESO) will conduct additional monitoring visits on a regular basis throughout project implementation for quality control purposes.

11. FOLLOW-UP MONITORING

Follow-up monitoring is:

☒ not required

☐ legally required (e.g. under the *Species at Risk Act* or *Fisheries Act)*

☐ required in accordance with the *Parks Canada Cultural Resource Management Policy*

Although not legally required, standard follow-up monitoring to confirm restoration success will occur for several years post-construction.

12. SARA NOTIFICATION

Notification is:

☒ not required

☐ required under the *Species at Risk Act* (outline the nature of and response to any notification).

13. EXPERTS CONSULTED

Department/Agency/Institution: Parks Canada	Date of Request: 2015
Expert's Name & Contact Information: Gwyn Langemann	Title: Parks Canada Archaeologist
Expertise Requested: Archaeological Overview Assessment and Archaeological Impact Assessment for Ya Ha Tinda road rehabilitation	
Response: Recommendations as outlined in Section 6.6 of this BIA and Langemann 2015.	

Department/Agency/Institution: Parks Canada	Date of Request: 2016/17
Expert's Name & Contact Information: Aaron Osicki	Title: Parks Canada Archaeologist
Expertise Requested: Review of revised project plan following incorporation of recommendations by Gwyn Langemann into the project design.	
Response: Further archaeological assessment was undertaken and recommendations for further modifications to the project plan were provided and adopted.	

Department/Agency/Institution: Cooper Beauchesne and Associates Ltd.	Date of Request: December 2016
Expert's Name & Contact Information: Ryan Gill, RPBio	Title: Senior Wildlife Biologist
Expertise Requested: Recommendations for mitigations for breeding birds for the Ya Ha Tinda road rehabilitation project	
Response: See Appendix B.	

Department/Agency/Institution: Tannas Conservation Services Ltd.	Date of Request: September 2016
Expert's Name & Contact Information: Dr. Steven Tannas	Title: P.Ag., Ph.D.
Expertise Requested: Recommendations for restoration of disturbed areas for Ya Ha Tinda road rehabilitation project.	
Response: A restoration plan was provided, as well as further refined advice and seed mixes, which were incorporated into the mitigation strategies in the BIA.	

14. DECISION

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

☒ not likely to cause significant adverse environmental effects.

☐ likely to cause significant adverse environmental effects.

NOTE: If the project is identified as likely to cause significant adverse effects, CEAA 2012 prohibits approval of the project unless the Governor in Council (Cabinet) determines that the effects are justified in the circumstances. A finding of significant effects therefore means the project CANNOT go ahead as proposed.

FOR SARA REQUIREMENTS:

☒ There are no residual adverse effects to species at risk and therefore the SARA-Compliant Authorization Decision Tool was not required

OR, the SARA-Compliant Authorization Decision Tool (Appendix 2) was used and determined:

☐ There is no contravention of SARA prohibitions

☐ Project activities contravene a SARA prohibition and CAN be authorized under SARA

☐ Project activities contravene a SARA prohibition and CANNOT be authorized

15. ATTACHMENTS

Appendix A **Ya Ha Tinda Ranch Road Rehabilitation Design Drawings**

Appendix B **Ya Ha Tinda Ranch Road Rehabilitation Recommendations for Mitigations for Breeding Birds**

Appendix C **Ya Ha Tinda Ranch Road Rehabilitation Restoration Seed Mixes**

Appendix D **Alberta Code of Practice for Watercourse Crossings 2013**

16. NATIONAL IMPACT ASSESSMENT TRACKING SYSTEM

☒ Project registered in tracking system

☐ Not yet registered *(CEAA 2012 requires PCA submit a report to Parliament annually. EIAs must be entered in the tracking system **by the end of April** to enable reporting*.

17. REFERENCES

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*****Ensure that all required mitigation measures and conditions (e.g. follow-up monitoring requirements) are included in project permits and authorizations*****

Appendix A

Ya Ha Tinda Ranch Road Rehabilitation Design Drawings

Appendix B

Ya Ha Tinda Ranch Road Rehabilitation Recommendations for Mitigations for Breeding Birds

Ryan Gill RPBio | Senior Wildlife Biologist
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Office: 250-837-3550
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Helen Dickinson
Environmental Assessment Scientist
Parks Canada
Government of Canada

RE: Ya Ha Tinda roadworks – recommendations for mitigations for breeding birds

February 3, 2017

Dear Ms. Dickinson,

The following document provides a summary of bird species and their life history requirements known or suspected to nest at the Ya Ha Tinda ranch, within the road improvement project boundaries. A general description of the habitat in the work area is included; a list of breeding birds associated with those habitats is provided in Appendix 1. While this list is not exhaustive, it likely covers most of the species breeding in habitats impacted by the project.

Also included is a range of mitigations proposed for this project, listed in order of optimal measures. Nest searching is considered the least optimal, last resort but is included as it is currently accepted as due diligence by regulators. However, the manner in which nest search surveys are conducted determines their efficacy. In that regard, we include the nest search protocols we have developed over our many years of experience in the field.

If you have any questions, do not hesitate to contact me to discuss.

Best Regards,

Ryan Gill RPBio

BACKGROUND

STUDY AREA

The Ya Ha Tinda ranch is situated on the eastern side of the Rocky Mountains, north of the Trans-Canada Highway. Situated in the Red Deer valley, the ranch sits at an elevation of approximately 1600m above sea level, in the montane and subalpine ecotypes (Holland and Coen 1983). Surrounding habitat is characterized by open grasslands and mixed deciduous / coniferous forests, transitioning through subalpine to alpine at the higher elevations. In addition to the adjacent Red Deer river, two creeks bisect the project area, Bighorn Creek and Eagle Creek. As Ya Ha Tinda is a working ranch, grasslands are used for winter range for horses, as well as overwintering ungulate populations (Gilnes et al. 2011).

Proposed Scope of Construction

The construction project (hereafter, 'the project') has been divided into two components – Hillside and Highland portions.

The Hillside portion of the project involves improving the existing road surface, and possibly increasing the size of the cut-bank above the road to improve stability. No re-alignment is planned for this section, and the disturbance to vegetation should be minimal, unless the extent of excavation for the cut-bank is increased.

The Highland portion of the project involves a complete re-alignment of the existing road to guard against erosion from Scalp Creek. The new alignment will follow an abandoned road-bed, which meanders through existing pasture. In some areas the alignment will require disturbance to some shrubby and treed habitats.

In the following discussion on bird species, each project component includes a list of bird species which have potential to be disturbed during the breeding season.

HABITAT AFFECTED BY THE PROJECT

The area of the ranch affected by the project falls into three broad habitat categories:

- Grassland - Open rangeland and native grasslands
- Shrub - Moist, shrubby riparian areas, or shrub complexes in drier areas
- Mixed Forest – Deciduous dominated stands composed of aspen, birch and poplar, with lodgepole pine and white spruce also present.

There are also small stands of coniferous forest, and open wetlands, but the majority of habitat affected falls into the three types listed.

Grassland

Grassland habitat comprises most of the habitat affected by the highland portion of the project. This habitat is characterized as graminoid and forb dominated, open habitat, bisected by fences

with few shrubs or other woody vegetation. Much of the grassland exists as pastures, which is heavily grazed by horses and elk in the winter (Morgantini 1995).

Birds nesting in this habitat are primarily ground nesting species, with the exception of some species which use utility poles, snags or artificial structures to nest. Density is generally lower, but birds are often more easily disturbed at greater distances due to the lack of cover.

Shrub

Shrub habitats are impacted by both the Hillside and Highland portions of the project. The Highland portion only briefly impacts shrubby habitat at the northwestern extent, where the proposed road leaves the existing road and enters the grassland. On the Hillside portion, shrub habitat is likely to be impacted along almost the entire project area. In addition to the vegetation adjacent to the road works, riparian habitat at the two creek crossings may also be impacted.

Shrub habitats appear to exist as 1) drier-to-mesic, upland shrubby habitats, with more open ground cover, and less dense woody cover; and 2) riparian wetland shrub habitats, with dense vegetation.

In the drier sites, shrub composition is dominated by willow, but with dwarf birch and shrubby cinquefoil as sub-dominant species (Morgantini 1995). Vegetation structure of the driest sites generally suggests suppressed growth, resulting in a moderate density, and low shrub height (Morgantini 1995). Mesic sites may see a mix of willow and dwarf birch growing in moderate to high density, with high vertical structure (Morgantini 1995). Riparian shrub sites which may exist in the impacted area of the project likely exist as dense dwarf birch with a sedge herb layer. These richer sites provide denser growth.

Nesting density in these shrubby habitats can be higher than in other habitats because of the heterogeneity of the structure, and diversity of vegetation comprising shrub patches. Disturbance is attenuated over a shorter distance than more open habitats, but shrub nesting species are still susceptible to noise and visual disturbance.

Mixed Forest

Forested habitats occur at intervals along the Hillside portion of the project. While it is difficult to determine the composition of these habitats from available imagery, there appears to be no extensive, closed-canopy forests adjacent to the project.

Forested habitat appears to occur as 1) coniferous and deciduous stands in mesic sites, and 2) wooded riparian (deciduous and coniferous) habitat, intermixed with wetland vegetation and dense shrubs. These latter habitats are differentiated from riparian shrub habitats by having a dominant tree layer.

Coniferous stands are likely dominated by lodgepole pine with a component of white spruce and some aspen (Morgantini 1995). However, within the work area there appear to be no extensive tracts of coniferous forests, with most of this habitat type occurring between Bighorn and Eagle creeks. Morgantini (1995) also suggests pure aspen stands are common in mesic areas; in some cases mixed with poplar. Wooded floodplain, or riparian areas do not appear extensive in the

work area, but given their high structural, and biotic heterogeneity, they may provide opportunity for higher breeding densities.

Nesting density in mesic sites, where the understory is not well developed, and the canopy is not high, or closed will likely not be lower than at richer sites. However, these habitats can provide important habitat for some species, depending on the stand characteristics.

Breeding Birds

A species list provided in Appendix 1 was compiled from data sources provided by Parks Canada. Data sources reviewed include data from recent surveys, historic surveys, provincial and federal databases, Birds of North America, and the BC Breeding Bird Atlas (Cornell Lab of Ornithology n.d., Bird Studies Canada n.d.). Each data source was examined and cross checked to ensure all species likely to be nesting were included. Data sources from Parks Canada included:

- Banff National Park species of concern
- Known to occur in Banff National Park
- Detected during the Ya Ha Tinda point count survey (2015)
- McTaggart-Cowan survey (1940)
- Ramstead survey
- Parks Canada Biotics Web Explorer

All species occurring in the data sources above were included. This species list was then compared to the list of species identified by COSEWIC, species identified by SARA schedule 1, species listed as 'special concern' for Banff National Park, or species considered 'threatened', or 'special concern', by the Alberta government. This final list included 105 bird species.

From the original master list of 105 species, 46 species were identified as potentially being affected by the project. Of these 46 species, four are SARA schedule 1 listed species (Olive-sided Flycatcher, Short-eared Owl, Common Nighthawk and Rusty Blackbird).

Each species was assigned a general habitat association (Table 1). Habitat types generally reflect those described above, but include two additional habitat classes. 'Wetland' is included as one of the species with potential for disturbance is the Rusty Blackbird, a wetland breeding songbird. Also, 'Road-cut' is included because three species included in the list are known to use natural or artificial banks for nesting (Bank Swallow, Northern Rough-winged Swallow and Townsend's Solitaire). Dark-eyed Junco may also use this habitat, but is more likely found elsewhere.

Habitat Type	Count of Species	Number of SARA schedule 1 species
Grassland	7	2
Shrub	17	0
Mixed Forest	18	1
Road-cut	3	0
Wetland	1	1

TABLE 1: HABITAT ASSOCIATIONS.

Forest and shrub nesting species dominate the species list, and generally reflect the distribution of breeding birds in different habitats throughout western Canada.

Mitigation Recommendations

The Migratory Bird Convention Act (1995) (MBCA) was originally passed in 1916 to protect birds and their nests from intentional disturbance. While this act and its protective measures have been in place for over 100 years, few cases of enforcement have been documented. However, more recently the impacts of industrial development to breeding birds are becoming well known, and efforts are now commonly being initiated to minimize the disturbance to songbirds.

Environment Canada, the regulator responsible for compliance with the MBCA, recommends avoiding the breeding bird window entirely, scheduling vegetation disturbance between mid-August and mid-April (Environment Canada n.d.); and nest sweeps have become a standard mitigation for work within the breeding window. However, Environment Canada has recently deemed nest searching to be an ineffective method of reducing nest disturbance. Furthermore, nest searching itself leads to disturbance and potential abandonment of nests. However, aside from complete avoidance of the nesting window, nest searching is currently the only feasible, reactionary method of nest disturbance mitigation.

Mitigation 1 - Avoidance

Avoid the breeding window, scheduling vegetation removal prior to April 15 or after 1 August. By clearing vegetation outside of this window, potential impacts would be reduced to zero for almost all nesting bird species in the Ya Ha Tinda project area.

Mitigation 2 – Vegetation Disturbance Prior to April 15

If clearing *and* removal of vegetation cannot be completed prior to April 15, cutting and piling vegetation, for later removal will sufficiently deter birds from selecting those habitats. It is important that the cutting of vegetation be completed prior to April 15 to remove the habitat prior to birds settling in the area.

Mitigation 3 – Nest Searching

If all other mitigation options are untenable, nest searching functions as a last alternative for demonstrating due diligence with regards to the MBCA. However, it is important that sound protocols are followed for nest searching to be reasonably successful. Nest searching is inherently difficult due to the cryptic behaviour of nesting birds and their concealed nests. Even in open habitat, nest detection for some species can be difficult for skilled nest searchers.

Nest Searching Protocols

These nest searching protocols arise from a breadth and depth of experience searching for, and monitoring nests. While the protocols do not cover all habitats, or bird species, much of the approach described below can be applied to most situations.

A systematic survey of all potential breeding habitat occurring within the area affected will be conducted. Two biologists will search the study area, working independently, but proximately for safety, and in the event that observers need to double up on habitat or species detections.

Nest searching will be conducted beginning in the early morning and continue throughout the day to coincide with bird breeding activities. All potential nesting substrates and breeding activity will be examined via:

1. careful examination of trees, shrubs and other nesting habitat,
2. observing and following birds, and
3. call playback if evidence of owl use is found.

Examination of nesting substrates is particularly useful for looking for large stick nests (e.g., Corvids), and for cavity nests (e.g., woodpeckers, chickadees, and some owl species). Observing bird behavior is effective for all species of birds and will be used to pinpoint potential nest sites. In particular, nest building behaviors (carrying nesting material, cavity excavation), and other reproductive behaviors such as copulation, courtship, and territorial defense can be used as clues to determine nesting.

Wildlife trees will be examined closely for evidence of nesting owls and Mountain Chickadee. Owls are highly reactive to conspecific call playback, and this method can be used to locate general nesting areas, and determine species presence. Call playbacks will not be used unless suitable habitat is encountered, and owls are suspected in the area.

Nest searching should occur over the course of several days, with three visits to a search area being scheduled over five days, allowing one day between visits. This disrupted search improves the chances of finding those nests which may be at a cryptic stage on one visit (laying), but a more obvious stage at a subsequent visit (incubating). When a nest is located, a buffer is flagged around the nest to be retained until after the nest has fledged. Buffer size is dependent on species and the surrounding habitat, but guidelines described by Environment Canada are used as a reference (Environment Canada n.d.).

Nest searching must be conducted far enough removed from project work to allow searchers sufficient time to adequately survey the area. Areas searched and deemed clear of nests must be cleared within 3-5 days of the last search. If more than five days elapses between searching and clearing, the site must be searched again. Search areas should be kept small (approximately 0.25 hectares for forested sites, larger for more open habitat) to allow searchers to sufficiently cover an area. The challenge of balancing nest searching requirements with the progress of work represents the greatest logistical challenge of any project.

Appendix 1. Account of most likely nesting species in area.

Species Common Name	Habitat Association	Habitat Description	Nest Type	SARA schedule 1	Alberta Status
Alder Flycatcher	forest	shrubby, deciduous	cup	No	Secure
American Crow	forest	all habitats	stick	No	Secure
American Kestrel	open	likely, as long as suitable wildlife trees	cavity	No	Sensitive
American Redstart	shrub	shrubby, deciduous	cup	No	Secure
American Robin	forest	shrubby, treed all habitats	cup	No	Secure
Bank Swallow	road-cut	cutbanks	colony	No	Secure
Black-billed Magpie	shrub	riparian thickets near open areas	stick	No	Secure
Brewer's Sparrow	shrub	shrubs, open	cup	No	Sensitive
Cape May Warbler	forest	unlikely at YHT work site	cup	No	Sensitive
Cedar Waxwing	shrub	open woodlands, shrubby habitat, riparian	cup	No	Secure
Chipping Sparrow	shrub	likely, shrubs and open shrubby habitat	cup	No	Secure
Clay-Coloured Sparrow	shrub	shrubby, open habitat	cup	No	Secure
Northern Rough-winged Swallow	road-cut	colony, known areas	colony	No	Secure
Northern Flicker	forest	any treed habitat, buildings	cavity	No	Secure
Common Nighthawk	open	open areas	ground scrape	Yes	Sensitive
Common Yellowthroat	shrub	wetland, shrubby, deciduous	cup	No	Sensitive
Cooper's Hawk	forest	mature forests	stick	No	Secure

Species Common Name	Habitat Association	Habitat Description	Nest Type	SARA schedule 1	Alberta Status
Dark-eyed Junco	forest	all habitats, road cuts	cup	No	Secure
Downy Woodpecker	forest	open deciduous woodlands	cavity	No	Secure
Dusky Flycatcher	shrub	shrubby, scrubby	cup	No	Secure
Eastern Kingbird	shrub	trees, shrubby, open habitat, exposed.	cup	No	Secure
Evening Grosbeak	shrub	shrubby, deciduous	cup	No	Secure
Gray Jay	forest	mature coniferous, near edges	cup	No	Secure
Great Gray Owl	forest	deciduous woodlands	stick	No	Sensitive
Killdeer	open	open areas	ground scrape	No	Secure
Least Flycatcher	forest	poplar/aspen groves, developed understory	cup	No	Sensitive
Mountain Chickadee	forest	mixed woodlands, aspen	cavity	No	Secure
Olive-sided Flycatcher	forest	opening edges	cup	Yes	May be At Risk
Orange-crowned Warbler	shrub	shrubby, deciduous	cup	No	Secure
Red-breasted Nuthatch	forest	mixed woodlands, small diameter rotten	cavity	No	Secure
Rufous Hummingbird	forest	coniferous forests, thickets	cup	No	Secure
Rusty Blackbird	wetland	wetlands	cup	Yes	Sensitive
Savannah Sparrow	open	likely, open grasslands	ground	No	Secure
Sharp-tailed Grouse	shrub	nearby leks? Under shrubs, small trees	ground	No	Sensitive

Species Common Name	Habitat Association	Habitat Description	Nest Type	SARA schedule 1	Alberta Status
Short-eared Owl	open	likely, open grasslands	ground	Yes	May be At Risk
Townsend's Solitaire	road-cut	cutbanks, likely	cup	No	Secure
Tree Swallow	open	small snags, open areas	cavity	No	Secure
Vesper Sparrow	open	shrubby, open habitat	ground	No	Secure
Warbling Vireo	forest	tall deciduous trees, flexible	cup	No	Secure
Western Wood Pewee	forest	deciduous woodlands	cup	No	Sensitive
White-Crowned Sparrow	shrub	open shrubs	cup	No	Secure
Willow Flycatcher	shrub	shrubs	cup	No	Secure
Wilson's Warbler	shrub	shrubby, deciduous	cup	No	Secure
Yellow Bellied Sapsucker	forest	mixed woodlands, aspen	cavity	No	Secure
Yellow Warbler	shrub	open woodlands, shrubby habitat, riparian	cup	No	Secure
Yellow-rumped Warbler	shrub	coniferous forests	cup	No	Secure

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Appendix C

Ya Ha Tinda Ranch Road Rehabilitation Restoration Seed Mixes

Tannas Conservation Services Ltd

Seed Mix Calculator Input Form - Upland Ditch

Site Caracterization and Planting Specifications			
1a	Seeding Method	Broadcast	1500
1b	Target Seeding Rate	1500	Seeds/m^2
1c	Invasion Threat	Low	0%
1d	Moisture Regime	Mesic	0%
1e	Nutrient Regime	Medium	0%
1f	Erosion Risk	Low	0%
1g	Habitat Type	Fescue Grassland	
1g	Natural Subregion	Montane	
2a	Calculated Modifier	**0%**	%
2b	Calculated Seeding Rate	**1500**	Seeds/m^2

Site Specific Needs	
Area to be seeded (m^2)	10000
Area to be seeded (ha)	**1**
Seed Type	Native

Tannas Conservation Services Ltd

Species Entry Form - Upland Ditch

	Species Code	Target Cover	Germination Rate	Inert Material	Species Specific	Recommended Modifier	Grazing Response
1	Koelmac	55%	100%	0%	1.4	1.4	Increaser - 1
2	Agrodas	5%	100%	0%	0.7	0.2	Increaser - 1
3	Agrosmi	5%	100%	0%	0.7	0.2	Increaser - 1
4	Stipcur	25%	100%	0%	1	1.2	Increaser - 1
5	Stipvir	10%	100%	0%	0.7	0.9	Decreaser
	Total	**100%**					

Tannas Conservation Services Ltd

Seed Mix Calculator Results - Upland Ditch

Site Characteristics and Seeding Rate Recommendations	
Seeding Method	Broadcast
Invasion Threat	Low
Moisture Regime	Mesic
Nutrient Regime	Medium
Erosion Risk	Low
Habitat Type	Fescue Grassland
Natural Subregion	Montane
Seeding Rate (seeds/m^2)	1740.00
Seeding Rate (kg/ha)	23.45

Tannas Conservation Services Ltd

Recommended Seed Mix - Upland Ditch

Species Code	Scientific Name	Common Name	Target Cover	% of Seed Mix (PLS)	Kg Required (PLS)
Koelmac	*Koeleria macrantha*	Junegrass	55%	10%	2.27
Agrodas	*Agropyron dasystachyum*	Northern Wheatgrass	5%	7%	1.55
Agrosmi	*Agropyron smithii*	Western Wheatgrass	5%	9%	2.17
Stipcur	*Stipa curtiseta*	Western Porcupine Grass	25%	63%	14.82
Stipvir	*Stipa viridula*	Green Needlegrass	10%	11%	2.64
		Total	**100%**	**100%**	**23.45**

Tannas Conservation Services Ltd

Seed Mix Calculator Input Form - Wet Ditch

Site Caracterization and Planting Specifications			
1a	Seeding Method	Broadcast	1500
1b	Target Seeding Rate	1500	Seeds/m^2
1c	Invasion Threat	Moderate	10%
1d	Moisture Regime	Mesic	0%
1e	Nutrient Regime	Medium	0%
1f	Erosion Risk	moderate	5%
1g	Habitat Type	Fescue Grassland	
1g	Natural Subregion	Montane	
2a	Calculated Modifier	**15%**	%
2b	Calculated Seeding Rate	**1725**	Seeds/m^2

Site Specific Needs	
Area to be seeded (m^2)	10000
Area to be seeded (ha)	**1**
Seed Type	Native

Tannas Conservation Services Ltd

Species Entry Form - Wet Ditch

	Species Code	Target Cover	Germination Rate	Inert Material	Species Specific	Recommended Modifier	Grazing Response
1	Poapalu	25%	100%	0%	1.4	1	Increaser - 1
3	Agrosmi	20%	100%	0%	0.7	0.2	Increaser - 1
4	Bromcar	10%	100%	0%	0.7	0.4	Decreaser
5	Stipvir	10%	100%	0%	0.7	0.9	Decreaser
6	Poaampl	10%	100%	0%	1	1	Decreaser
7	Desccea	25%	100%	0%	1	1	#N/A
	Total	100%					

Tannas Conservation Services Ltd

Seed Mix Calculator Results - Wet Ditch

Site Characteristics and Seeding Rate Recommendations	
Seeding Method	Broadcast
Invasion Threat	Moderate
Moisture Regime	Mesic
Nutrient Regime	Medium
Erosion Risk	moderate
Habitat Type	Fescue Grassland
Natural Subregion	Montane
Seeding Rate (seeds/m^2)	1690.50
Seeding Rate (kg/ha)	22.36

Tannas Conservation Services Ltd

Recommended Seed Mix - Wet Ditch

Species Code	Scientific Name	Common Name	Target Cover	% of Seed Mix (PLS)	Kg Required (PLS)
Poapalu	*Poa palustris*	Fowl Bluegrass	25%	4%	0.87
Agrosmi	*Agropyron smithii*	Western Wheatgrass	20%	45%	9.98
Bromcar	*Bromus carinatus*	Mountain Brome	10%	27%	6.10
Stipvir	*Stipa viridula*	Green Needlegrass	10%	14%	3.03
Poaampl	*Poa ampla*	Big Bluegrass	10%	4%	0.87
Desccea	*Deschampsia ceaspitosa*	Tufted Hairgrass	25%	7%	1.51
		Total	**100%**	**100%**	**22.36**

Appendix D

Alberta Code of Practice for Watercourse Crossings 2013

Alberta Government

Code of Practice for Watercourse Crossings

Made under the Water Act and the Water (Ministerial) Regulation

Consolidated to include amendments in force as of June 24, 2013

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ALBERTA ENVIRONMENT AND SUSTAINABLE RESOURCE DEVELOPMENT

CODE OF PRACTICE FOR WATERCOURSE CROSSINGS
*(*made under the *Water Act and Water (Ministerial) Regulation)*

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Definitions

1(1) All definitions in the *Water (Ministerial) Regulation* and in section 1 of the *Water Act* apply except where expressly defined in this Code of Practice.

(2) In this Code of Practice,

(a) "active channel" means those parts of the bed and banks of a water body that are without terrestrial vegetation;

(b) "this Code of Practice" means the *Code of Practice for Watercourse Crossings*, as amended or replaced from time to time;

(c) "to carry out a works" includes to commence or continue the works;

(d) "class" means the class of a water body that is specified in section 7, or that is designated by a class symbol on a map that is listed in Schedule 6;

(e) "to construct" includes to place or install a works;

(f) "Director" means, for the purposes of this Code of Practice, a Director as specified in Schedule 5;

(g) "emergency" means a situation where there is an imminent risk to the aquatic environment, public health or safety, or an imminent risk of structural failure to a watercourse crossing;

(h) "engineering technical specialist" means a person who

(i) possesses

(A) a post-secondary degree or technical diploma in engineering sciences, or

(B) educational equivalencies,

(ii) has knowledge of hydrology, hydrogeology and water management assessment, and

(iii) is currently experienced in water management and hydrological assessment methods, the determination of expected flows for flood events and the designing of watercourse crossings;

(i) "fish" means fish used for domestic, sport and commercial purposes, and fish of special concern, including but not limited to rare, endangered, threatened or vulnerable species;

(j) maintenance" means the repair, partial replacement or structural restoration of a watercourse crossing that results or may result in the disturbance or alteration of the bed or banks or active channel of a water body;

(k) "map" means a map listed in Schedule 6, and includes the legends on a map;

(l) "mapped water body" means a water body that appears on a map that is listed in Schedule 6;

(m) "owner" means

(i) the person who owns a watercourse crossing,

(ii) a successor, assignee, executor, administrator, receiver, receiver-manager, liquidator or trustee of a person described in clause (i), or

(iii) a person who acts as the principal or agent of a person described in clause (i) or (ii);

(n) "plan" means a plan specified in section 6;

(o) "productive capacity" means the natural capability of habitats that comprise the aquatic environment to produce healthy fish that are safe for human consumption, or to support or produce the naturally occurring diversity of aquatic organisms upon which fish depend;

(p) "professional engineer" means a professional engineer as defined in the *Engineering, Geological and Geophysical Professions Act;*

(q) "qualified aquatic environment specialist" means a person who

(i) possesses

(A) a post-secondary degree in biological sciences,

(B) a technical diploma in biological sciences, or

(C) educational equivalencies,

(ii) has a detailed knowledge of aquatic environment, including fish and fish habitat, management and assessment, and

(iii) is currently experienced with

(A) fisheries and aquatic environment assessment methods, and

(B) the determination of mitigation measures required to maintain the productive capacity of the aquatic environment, including fish habitats in Alberta that may be adversely affected by the carrying out of works in and adjacent to the water, bed and shore of water bodies;

(r) "restricted activity period" means the time period during which fish migration, fish spawning, egg incubation, fry emergence or early fry development are likely to occur in a water body;

(s) "temporary crossing" means a watercourse crossing referred to in section 9 that will remain in place for a maximum period of 6 months from the date that the crossing is constructed, unless otherwise specified by the Director under section 9(4)(a);

(t) "Type 1 crossing" means a watercourse crossing that is constructed using a single span bridge, single span pipeline bridge or other similar structure, that does not have abutments that are placed on or within the bed or within the active channel of a water body;

(u) "Type 2 crossing" means a watercourse crossing that is constructed using an open bottom culvert, or a single or multi-span bridge with abutments or piers or other similar structures that are placed on or within the bed or within the active channel of a water body;

(v) "Type 3 crossing" means a watercourse crossing that is constructed using a round, arch or box culvert or other similar structure, on or within the bed of a water body;

(w) "Type 4 crossing" means a watercourse crossing that is a ford or low level crossing, or other similar crossing, where the crossing is constructed at or below the level of the bed of the water body;

(x) "Type 5 crossing" means a temporary crossing that is constructed using a logfill;

(y) "uncoded water body" means a mapped water body that does not have a class symbol specified on a map listed in Schedule 6;

(z) "unmapped water body" means a water body that does not appear on a map listed in Schedule 6;

(aa) "UTM coordinates" means coordinates that use the Universal Transverse Mercator grid to identify or plot the specific location of a site or object;

(bb) "water body" means, for the purpose of this Code of Practice, a water body with defined bed and banks, whether or not water is

continuously present, but does not include fish bearing lakes;

(cc) "watercourse crossing" means a crossing or temporary crossing and any associated permanent or temporary structures that are or will be constructed to provide access over or through a water body, including but not limited to a Type 1 crossing, Type 2 crossing, Type 3 crossing, Type 4 crossing or a Type 5 crossing, and

(i) structures and measures to isolate the location of the works,

(ii) erosion protection structures, and

(iii) sedimentation management structures,

but does not include

(iv) a pipeline crossing or telecommunication line crossing as defined in the *Code of Practice for Pipeline and Telecommunication Lines Crossing a Water Body,*

(v) the realignment of the channel of a water body beyond a distance of 20 metres upstream and downstream from the watercourse crossing, or the diversion of water from the site of a watercourse crossing, including associated structures, that require an authorization under the *Water Act*, and

(vi) structures that are required to meet clause (a) in Part 1 of Schedule 2 that are located outside the right of way of a watercourse crossing and that require an authorization under the *Water Act*;

(dd) "works" means the construction, maintenance, replacement or removal of all or part of a watercourse crossing, including a temporary crossing, or any activity associated with the construction, maintenance, replacement or removal, and includes works for a Type 1 crossing, Type 2 crossing, Type 3 crossing, Type 4 crossing or Type 5 crossing, except where otherwise specified.

(3) Notwithstanding the definition of "owner" in subsection (2)(m), where there is a requirement for an owner to provide notice to the Director under this Code of Practice, and there is more than one owner of a watercourse crossing, one owner may provide notice on behalf of the other owners in order to meet such a requirement.

Bound by Code of Practice

2(1) An owner and any person who carries out a works shall comply with the requirements set out in this Code of Practice.

(2) This Code of Practice does not apply to those watercourse crossings that are exempt from the requirement for an approval under the *Water (Ministerial) Regulation*.

Notice to the Director

3(1) For the purposes of section 4 of the *Water (Ministerial) Regulation*, an owner must provide notice to the Director, in writing, at least 14 calendar days before any works are carried out, or as otherwise specified in writing by the Director.

(2) The written notice under subsection (1),

(a) for a Type 1 crossing, Type 2 crossing, Type 3 crossing and Type 4 crossing that are not temporary crossings, must contain the information specified in clauses (a), (b), (c), (f) and (g) of Schedule 1, and any information available under clause (d) and (e) of Schedule 1, unless otherwise specified in writing by the Director;

(b) for a temporary crossing, must contain the information specified in clauses (a), (b), (c), and (h) of Schedule 1, unless otherwise specified in writing by the Director; and

subject to section 9(4)(a), authorizes an owner to carry out a works in accordance with this Code of Practice for the period of time specified in the notice.

(3) Where a written notice under subsection (1) did not contain all of the information required under clause (d) or (e) of Schedule 1, that information must be available at least 14 days before any works are carried out, and must be provided to the Director by the owner, if requested under section 13(4).

Notice Where the Works are not Completed Within Time Period

4(1) Where notice is provided in accordance with section 4(1) of the *Water (Ministerial) Regulation* and section 3 of this Code of Practice, and the works have not been commenced or completed within the time period specified in the notice, the notice is no longer valid, and an owner must provide a new notice prior to carrying out the works.

(2) The new notice under subsection (1) must provide

(a) with respect to a Type 1 crossing, Type 2 crossing, Type 3 crossing or Type 4 crossing that are not temporary crossings,

(i) the new date for the commencement or continuation of the works,

(ii) the estimated duration of time that activities related to the works will occur in a water body, in accordance with clause (g) of Schedule 1,

(iii) any information that has changed from the information provided in the notice under section 3, and

(iv) in cases where the works has commenced but has not been completed by the time period stated in the notice under section 3, the new expected completion date of the works; and

(b) with respect to a temporary crossing,

(i) the new date for the commencement or continuation of the works,

(ii) the estimated date of removal of the temporary crossing, and

(iii) any information that has changed from the information provided in the notice under section 3.

Emergency

5(1) Where there is an emergency and it is not possible for an owner to provide notice in accordance with section 3, an owner may take appropriate measures to deal with the emergency and must notify the Director of the emergency within 24 hours of becoming aware of the emergency.

(2) Notice under subsection (1) must contain the information specified in clauses (a) and (b) of Schedule 1, the legal description of the land on which the watercourse crossing is located, and any other information regarding the nature of the emergency that is available to the owner at the time.

(3) Within 30 days of completion of the works required to deal with the emergency, the owner must provide the following information to the Director:

(a) information specified under clause (c) in Schedule 1, other than the legal description of the land,

(b) a description of the conditions, if applicable, that were used in carrying out the works,

(c) a description of measures taken to meet the applicable requirements of sections 8 and 9, Part 1 of Schedule 2 and Schedule 3, including a statement whether the works incorporated the specifications and recommendations of a qualified aquatic environment specialist.

Plans

6(1) At least 14 days before a works is carried out, except for those works with respect to a temporary crossing, an owner must have prepared and completed a plan for the works

(a) that meets the standards for carrying out a works specified in Part 1 of Schedule 2;

(b) that contains or incorporates the information and written specifications under Part 2 of Schedule 2, as required under subsection (2),

(i) that are prepared by either a professional engineer or an engineering technical specialist, whichever is considered appropriate by the owner, and that contain the stamp, certification and signature of either the professional engineer or the certification and signature of the engineering technical specialist, as required under section 11(2)(a) and (b); or

(ii) that are prepared by an owner in those situations specified in subsection (2), and that contain the confirmation of the owner as required under section 11(2)(c);

(c) that, in addition to the requirements specified under clauses (a) and (b), contains or incorporates the following:

(i) the type of watercourse crossing and the conditions for carrying out a works, determined in accordance with section 8 and Schedule 3, including any applicable written specifications and recommendations of a qualified aquatic environment specialist;

(ii) an outline of the contingency measures to be taken in the event of potential problems resulting from adverse conditions or delays in carrying out or completing the works, and that take into account any restricted activity periods; and

(iii) in addition to any monitoring measures contained in the written specifications and recommendations of a professional engineer, engineering technical specialist, owner or qualified aquatic environment specialist, specification of the monitoring measures that will, during the anticipated life of the watercourse crossing, be required to meet the requirements of this Code of Practice.

(2) Information and written specifications that must be included in a plan under

subsection (1)(b)

(a) must be prepared by either a professional engineer or an engineering technical specialist, whichever is considered appropriate by the owner, except as specified in clause (b);

(b) may be prepared by the owner only in those situations where

(i) the watercourse crossing is to be removed, or

(ii) where

(A) the watercourse crossing is or will be located in an unmapped water body that enters any class of mapped water body, at a distance of greater than 2 kilometres upstream from the mouth of the unmapped water body, and

(B) there is no documented evidence of fish presence in the unmapped water body.

(3) In addition to complying with other requirements specified in this Code of Practice, an owner and a person who carries out a works must comply with the plan prepared for the works under subsection (1) except where measures must be taken to deal with an emergency.

(4) Notwithstanding subsection (1), after notice to the Director has been provided in accordance with section 3(1), an owner

(a) may change a plan only where the change complies with this Code of Practice, and

(b) must provide notice of the change to the Director in accordance with section 3 and Schedule 1, where the change in the plan modifies the information that was provided to the Director under section 3(2) or 3(3).

(5) Where a change is made to a plan under subsection (4), all of the provisions of this Code of Practice apply to the change.

Maps and Class of Water Bodies

7(1) For the purposes of this Code of Practice, a map that is listed in Schedule 6 forms part of this Code of Practice, and

(a) designates the class of a mapped water body as Class A, B, C, or D,

(b) specifies the restricted activity period for classes of water bodies,

(c) describes the location of Class A and B water bodies, and

(d) may specify special conditions for some water bodies.

(2) The class of a mapped water body, except for an uncoded water body, is the class that is designated by a class symbol on a map.

(3) The class of an uncoded water body is as follows:

(a) Class D, unless otherwise specified in clause (b);

(b) where an uncoded water body enters a mapped water body that is a Class A, B or C water body, the portion of the uncoded water body for a distance of 2 kilometres upstream from the mouth of the uncoded water body is the same class as the mapped water body that is entered.

(4) The class of an unmapped water body is as follows:

(a) where an unmapped water body enters a mapped Class A water body, the unmapped water body is

(i) Class A for the portion of the unmapped water body for a distance of 2 kilometres upstream from the mouth of the unmapped water body, including where the unmapped water body is dry or frozen to the bottom at the time of the works, and

(ii) Class B for any other portion of the unmapped water body;

(b) where an unmapped water body enters a mapped Class B water body, the unmapped water body is

(i) Class B for the portion of the unmapped water body for a distance of 2 kilometres upstream from the mouth of the unmapped water body, including where the unmapped water body is dry or frozen to the bottom at the time of the works, and

(ii) Class C for any other portion of the unmapped water body;

(c) where an unmapped water body enters a mapped Class C water body, the unmapped water body is Class C for all portions of the unmapped water body;

(d) where an unmapped water body enters a mapped Class D water body, the unmapped water body is Class D for all portions of the unmapped water body;

(e) where an unmapped water body enters a fish bearing lake, the unmapped water body is Class C, whether or not the fish bearing lake appears on a map.

Watercourse Crossing Types, Except Temporary Crossings

8(1) A new watercourse crossing must be constructed in accordance with the applicable parts of section 10 and Schedules 2 and 3, and the written specifications and recommendations of a qualified aquatic environment specialist if required under subsections (5) and (6), and the type of new watercourse crossing that must be constructed is as follows:

(a) in or over a Class A water body, only a Type 1 crossing for pedestrian and equestrian purposes;

(b) in or over a mapped Class B water body, in order of preference:

(i) a Type 1 crossing, or

(ii) a Type 2 crossing, by isolating the location of the construction, only if

(A) a Type 1 crossing cannot be used, or

(B) a Type 2 crossing will meet the requirements of clause (a) in Part 1 of Schedule 2,

as determined in accordance with subsection (6);

(c) in or over an unmapped Class B water body, in order of preference:

(i) a Type 1 crossing,

(ii) a Type 2 crossing, by isolating the location of the construction, only if

(A) a Type 1 crossing cannot be used, or

(B) a Type 2 crossing will meet the requirements of clause (a) in Part 1 of Schedule 2,

as determined in accordance with subsection (6); or

(iii) a Type 3 crossing, by isolating the location of the construction, only if

(A) a Type 2 crossing cannot be used, or

(B) a Type 3 crossing will meet the requirements of clause

(a) in Part 1 of Schedule 2,

as determined in accordance with subsection (6);

(d) in or over a Class C water body, in order of preference:

(i) a Type 1 crossing,

(ii) a Type 2 crossing, by isolating the location of the construction, only if

(A) a Type 1 crossing cannot be used, or

(B) a Type 2 crossing will meet the requirements of clause (a) in Part 1 of Schedule 2,

as determined in accordance with subsection (6); or

(iii) a Type 3 crossing, by isolating the location of the construction, or a Type 4 crossing, only if

(A) a Type 2 crossing cannot be used, or

(B) a Type 3 crossing or Type 4 crossing will meet the requirements of clause (a) in Part 1 of Schedule 2,

as determined in accordance with subsection (6);

(e) in or over a Class D water body, a Type 1 crossing, Type 2 crossing, Type 3 crossing, or Type 4 crossing.

(2) The replacement of any type of existing watercourse crossing must be constructed in accordance with the applicable parts of section 10 and Schedules 2 and 3, and the written specifications and recommendations of a qualified aquatic environment specialist if required under subsections (5) and (6), and the type of watercourse crossing for the replacement that must be constructed, in order of preference, is as follows:

(a) in or over a Class A water body,

(i) a Type 1 crossing, or

(ii) a Type 2 crossing, by isolating the location of the construction;

(b) in or over a mapped Class B water body,

(i) a Type 1 crossing, or

(ii) a Type 2 crossing, by isolating the location of the construction;

(c) in or over an unmapped Class B water body,

(i) a Type 1 crossing,

(ii) a Type 2 crossing, by isolating the location of the construction, or

(iii) a Type 3 crossing, by isolating the location of the construction;

(d) in or over a Class C water body,

(i) a Type 1 crossing, or

(ii) a Type 2 crossing or Type 3 crossing, by isolating the location of the construction, or a Type 4 crossing;

(e) in or over a Class D water body, a Type 1 crossing, Type 2 crossing, Type 3 crossing or Type 4 crossing.

(3) The maintenance or removal of any type of existing watercourse crossing must be carried out as follows:

(a) with respect to a Class A, B and C water body, by isolating the location of the construction, and in accordance with the applicable parts of section 10 and Schedules 2 and 3;

(b) with respect to a Class D water body, in accordance with the applicable parts of section 10 and Schedules 2 and 3.

(4) Notwithstanding subsections (1), (2) and (3), where a water body is dry or frozen to the bottom at the time of the carrying out of the works, including the construction, replacement, removal, or maintenance of a watercourse crossing, the requirement to isolate the location of the construction or works does not have to be met.

(5) An owner must obtain the written specifications and recommendations of a qualified aquatic environment specialist for watercourse crossings referred to in

(a) subsections (1)(b)(ii), (1)(c)(ii), (1)(c)(iii), (1)(d)(ii), and (1)(d)(iii);

(b) subsection (2), except subsection (2)(e) or where there is replacement of a Type 1 crossing with a Type 1 crossing; and

(c) subsection (3)(a).

(6) For the purposes of subsection (1),

(a) a professional engineer, engineering technical specialist or other

qualified person must determine whether a type of crossing can be used, taking into account the technical or environmental feasibility of the type of crossing;

(b) a qualified aquatic environment specialist must determine whether a type of crossing will meet the requirements of clause (a) in Part 1 of Schedule 2.

(7) A qualified aquatic environment specialist must

(a) consider any applicable restricted activity periods; and

(b) meet the requirements of clauses (a) and (g) in Part 1 of Schedule 2 and of Schedule 4;

in preparing any written specifications and recommendations under this section.

(8) This section does not apply to temporary crossings.

Temporary Crossings

9(1) Subject to subsection (2), a temporary crossing must be constructed in accordance with the applicable parts of Schedules 2 and 3 and the written specifications and recommendations of a qualified aquatic environment specialist if required under subsection (2), and the type of temporary crossing that must be constructed is as follows:

(a) in or over a Class A water body, at any time,

(i) a Type 1 crossing, or

(ii) a Type 2 crossing where the construction is in conjunction with the replacement or maintenance of an existing watercourse crossing or other existing structure;

(b) in or over a Class B water body,

(i) a Type 1 crossing, at any time,

(ii) a Type 2 crossing, at any time,

(iii) a Type 4 crossing, only

(A) when the water body is dry, or

(B) when the crossing site is not covered by ice, or

(iv) a Type 5 crossing, only when the water body is dry or frozen

to the bottom, or there is sufficient ice-cover to support the crossing, however the crossing must be removed before spring break-up;

(c) in or over a Class C water body,

(i) a Type 1 crossing, at any time,

(ii) a Type 2 crossing, at any time,

(iii) a Type 3 crossing, only

(A) when the water body is dry, or

(B) when the crossing site is not covered by ice, by isolating the location of the construction,

(iv) a Type 4 crossing, only

(A) when the water body is dry, or

(B) when the crossing site is not covered by ice, or

(v) a Type 5 crossing, only

(A) when the water body is dry or frozen to the bottom, or

(B) when there is sufficient ice-cover to support the crossing, however the crossing must be removed before spring break-up;

(d) in or over a Class D water body,

(i) a Type 1 crossing, Type 2 crossing, Type 3 crossing or Type 4 crossing, at any time, or

(ii) a Type 5 crossing, only

(A) when the water body is dry or frozen to the bottom, or

(B) when there is sufficient ice-cover to support the crossing, however the crossing must be removed before spring break-up.

(2) An owner must obtain the written specifications and recommendations of a qualified aquatic environment specialist for a temporary crossing referred to in subsections (1)(a)(ii), (1)(b)(ii), (1)(b)(iii)(B), (1)(c)(ii), (1)(c)(iii)(B), and (1)(c)(iv)(B).

(3) A qualified aquatic environment specialist must meet the requirements of clauses (a) and (g) in Part 1 of Schedule 2 and of Schedule 4, in preparing any written specifications and recommendations under this section.

(4) An owner

(a) must remove a temporary crossing

(i) no later than 6 months from the date when the construction commenced, unless otherwise specified in writing by the Director; and

(ii) in accordance with the applicable parts of Schedules 2 and 3; and

(b) must restore the bed and banks of the water body to the condition it was in prior to the construction of the temporary crossing, or if not possible, to a condition that meets the requirements of clauses (a) and (g) of Part 1 of Schedule 2.

(5) Sections 6, 8, 10(1), 10(2), 10(3), 10(4), 10(5), 10(6), 10(7), 11, 13 and 14 of this Code of Practice do not apply to a temporary crossing.

Restricted Activity Periods

10(1) Unless otherwise authorized under this section, works, including those referred to in section 8, must not be carried out within any applicable restricted activity period.

(2) Works

(a) must be carried out in or over a mapped Class A water body, within the time period recommended by a qualified aquatic environment specialist;

(b) must be carried out for a Type 2 crossing, Type 3 crossing and Type 4 crossing in or over a mapped Class B and C water body, outside the restricted activity period specified on the applicable map;

(c) may be carried out in or over a Class D water body, at any time.

(3) Where an unmapped water body enters a mapped Class A water body,

(a) the works must be carried out within the period recommended by a qualified aquatic environment specialist for the portion of the unmapped water body for a distance of 2 kilometres upstream from the mouth of the unmapped water body;

(b) for any other portion of the unmapped water body than that specified

in clause (a),

(i) the unmapped water body has the restricted activity period of the nearest mapped Class B or C water body entering the mapped Class A water body, or

(ii) if there is no mapped water body entering the mapped Class A water body, the unmapped water body has the restricted activity period for the mapped Class B or C water body that is immediately downstream of the mapped Class A water body.

(4) Where an unmapped water body enters a mapped Class B water body, the restricted activity period is the restricted activity period for the mapped Class B water body.

(5) Where an unmapped water body enters a mapped Class C water body,

(a) the restricted activity period for the portion of the unmapped water body for a distance of 2 kilometres upstream from the mouth of the unmapped water body, is the restricted activity period for the mapped Class C water body, and

(b) for any other portion of the unmapped water body than that specified in clause (a), the restricted activity period is the restricted activity period of the nearest mapped water body that enters the mapped Class C water body.

(6) Where an unmapped water body enters a fish bearing lake, whether or not the fish bearing lake appears on a map, the restricted activity period for the unmapped water body

(a) is the same as that specified for the nearest mapped water body entering the fish bearing lake,

(b) if there is no mapped water body entering the fish bearing lake, is the same as that specified for the mapped outlet water body of the fish bearing lake, or

(c) if there is no mapped outlet water body of the fish bearing lake, is the same as that specified for the nearest mapped water body that is designated as a mapped Class C water body.

(7) Where a qualified aquatic environment specialist determines that a works can be carried out within a restricted activity period referred to under subsections (2)(b), (3)(b), (4), (5) and (6), and still meet the requirements of Part 1 of Schedule 2, the works may be carried out within that restricted activity period, and must be carried out in accordance with the written specifications and recommendations of the qualified aquatic environment

specialist.

(8) A qualified aquatic environment specialist must consider an applicable restricted activity period in preparing any written specifications and recommendations under this Code of Practice.

Certification and Confirmation

11(1) Where a qualified aquatic environment specialist has prepared specifications and recommendations under this Code of Practice, the qualified aquatic environment specialist must certify in writing that the written specifications and recommendations prepared by the specialist meet the requirements of clause (a) in Part 1 of Schedule 2.

(2) Where written specifications for a plan for a works associated with a watercourse crossing under section 6(1)(b),

(a) were prepared by a professional engineer, the engineer must certify in writing that the written specifications included in the plan meet the standards specified in clauses (c) and (d) in Part 1 of Schedule 2, and the design drawings must include the stamp and signature of the professional engineer;

(b) were prepared by an engineering technical specialist, the engineering technical specialist must certify in writing that the information and written specifications included in the plan meet the standards specified in clauses (c) and (d) of Part 1 of Schedule 2;

(c) were prepared by an owner, the owner must confirm in writing that the information and written specifications included in the plan meet the standards specified in Part 1 of Schedule 2.

(3) All certifications and confirmations referred to under subsections (1) and (2) must be prepared a minimum of 14 days before the works is carried out.

(4) After the works has been completed, an owner must within one year of the date of completion of the works, confirm in writing that

(a) the plan prepared under section 6 was followed in carrying out the works, and

(b) the standards of Part 1 of Schedule 2 have been met.

Reporting

12(1) An owner must, within 24 hours, report to the Director by telephone, facsimile or e-mail, or in any other manner specified in writing by the Director, a contravention of this Code of Practice, except for a

contravention under section 11, 13 or 14, and must include information relating to possible environmental impacts resulting from the contravention and initial actions taken to mitigate the contravention.

(2) An owner must, within 7 calendar days of reporting a contravention under subsection (1), or within another time period specified in writing by the Director, provide to the Director a written report that contains the following information:

(a) a description of the contravention;

(b) an explanation as to why the contravention occurred;

(c) a summary of all preventative measures and actions that were taken prior to the contravention;

(d) a summary of all measures that were taken to mitigate the initial damage and proposed measures to address any remaining problems related to the contravention;

(e) the names, addresses, phone numbers and responsibilities of all persons responsible for carrying out the works at the time that the contravention occurred; and

(f) proposed preventative measures designed to prevent future contraventions.

Record Keeping and Information Availability

13(1) An owner must compile and retain the following records within the time period specified in subsection (2);

(a) the names, addresses and phone numbers of the owners of the watercourse crossing;

(b) a copy of the plan prepared for the watercourse crossing;

(c) any as built plans or as constructed plans, if such as built or as constructed plans were prepared;

(d) the time period during which the carrying out of the works occurred, including the start and completion dates;

(e) all photographs or video-recordings taken under section 14(2);

(f) a copy of all certifications and confirmations referred to in section 11.

(2) An owner must meet the following time requirements for the preparation or

compilation of the records specified in subsection (1), unless otherwise specified in writing by the Director:

(a) a plan under section 6 must be available at least 14 days before the works are carried out;

(b) for records referred to in subsection (1)(a), (c), (d) and (e), records must be compiled within 3 months of completion of the works or within another time period specified by the Director;

(c) for certifications and confirmations referred to in subsection (1)(f), records must be compiled within the time periods specified in section 11.

(3) An owner must retain all records referred to in subsection (1) for one year after the completion of the removal of the watercourse crossing.

(4) An owner must, within the time period specified in writing by the Director, provide to the Director any requested information or records retained under subsection (1), or information relating to a qualified aquatic environment specialist who has certified specifications and recommendations.

Monitoring of Works

14(1) The owner must monitor a watercourse crossing in accordance with the plan prepared under section 6 to ensure that the requirements of this Code of Practice are met over the operational life span of the crossing.

(2) The owner must, for water bodies that are designated as Class A, B or C water bodies, take the following photographs or video-recordings at a watercourse crossing site before the works are commenced:

(a) one or more photographs or video-recordings of the water body and its banks upstream from the watercourse crossing site;

(b) one or more photographs or video-recordings of the water body and its banks downstream from the watercourse crossing site; and

(c) two or more photographs or video-recordings of the banks at the watercourse crossing site, one of each bank taken from the opposite bank.

Guidelines

15 The Department may publish Guidelines to assist in the interpretation and implementation of this Code of Practice, however such Guidelines do not form part of this Code of Practice.

Effective Date

16 This Code of Practice comes into force on May 1, 2000.

Code of Practice Review and Amendment

17 Alberta Environment and sustainable resource development may institute a review and amendment of this Code of Practice at any time, however this Code of Practice will be reviewed by May 1, 2003.

SCHEDULE 1

Notice to the Director

(Section 3)

Information that must be contained in a notice for the purposes of section 3:

(a) the name, address and phone number of at least one owner of the watercourse crossing;

(b) the name and phone number of the person to be contacted with respect to the watercourse crossing;

(c) a map, diagram, or air photo that shows the watercourse crossing location in relation to the boundaries of the quarter section that the crossing is located in, including the legal description of the land and the name of the water body (if named) that is crossed, and the UTM coordinates, if available, on which the watercourse crossing is located;

(d) the type or types of watercourse crossing structures and conditions determined in accordance with sections 8, 9, 10 and Schedule 3 that will be used in carrying out the works, including, where applicable, the rationale for not using the preferred type of watercourse crossing referred to in section 8, and whether physical or other measures are required to meet clause (a) in Part 1 of Schedule 2;

(e) the diameter in centimetres or metres of the culvert, the length of the culvert in metres or the number and length of spans in the bridge, the width of the watercourse crossing in metres and a description of any other structure that is part of the watercourse crossing;

(f) whether the works to be carried out will incorporate the specifications and recommendations prepared by a qualified aquatic environment specialist, and if so, the name of the qualified aquatic environment specialist, and consulting company name, if applicable;

(g) the expected commencement and completion dates of the works, including the estimated duration of time that the works will be carried out in a water body;

(h) for a temporary crossing,

  (i) the type of structure,

  (ii) the expected date of removal, and

(iii) whether a qualified aquatic environment specialist will provide written specifications and recommendations, and if so, the name of the qualified aquatic environment specialist, and consulting company name, if applicable.

SCHEDULE 2

Plans

(Section 6)

PART 1
STANDARDS FOR CARRYING OUT A WORKS

Standards that must be met for carrying out a works for the purposes of this Code of Practice:

(a) Upon completion of the works, the quantity and productive capacity of the aquatic environment, including fish habitat, at the watercourse crossing site, where technically feasible, and adjacent to the watercourse crossing site must be equivalent to or exceed that which existed prior to commencing the works;

(b) The selection of a watercourse crossing site must:

(i) avoid, or if not possible,

(A) minimize disturbance of the bed and banks of the water body or

(B) minimize realignment of the water body,

(ii) avoid, if possible, high gradient areas, unstable slopes and actively eroding banks, and bank seeps or springs;

(c) The capacity of any culverts and bridges in a watercourse crossing must ensure that:

(i) the increase in any back-flooding does not result in flood damage to private and public property,

(ii) the bed, pier or abutment scour will not endanger the stability of the works or alter the location of all or part of the water body,

(iii) enough freeboard is provided to pass floating debris and ice without affecting the stability of the watercourse crossing or creating a potential for a blockage of the flow of the water body, and

(iv) fish migration through or over the crossing is maintained by ensuring that, at a minimum, water velocities over or through the crossing do not create a barrier to migrating fish for more than 3 consecutive days at a 1 in 10 year recurrence interval;

(d) Works with respect to a watercourse crossing must be carried out in a

manner,

(i) that protects the bed and bank adjacent to the bridge or culvert structure from bed scour and erosion,

(ii) that maintains or approximates the existing slope of the bed of the water body,

(iii) that, where applicable, results in the placement of a culvert at or below the level of the water body bed;

(e) Measures must be implemented to avoid, or if not possible, minimize impairment of water quality of the water body;

(f) Measures must be implemented to avoid harm to or destruction of fish and fish eggs, and the harmful alteration, disruption or destruction of fish habitat, including but not limited to fish spawning and nursery areas;

(g) Upstream and downstream fish migrations must not be impeded over the life span of the watercourse crossing, following completion of the works;

(h) The flow of the water body must be maintained at the watercourse crossing site at all times through or around the crossing;

(i) Measures must be implemented to minimize the duration and amount of disturbance of the bed and banks of the water body;

(j) Measures must be implemented to prevent the deposition into the water body of deleterious substances and materials that are toxic to fish and other aquatic organisms;

(k) Measures must be implemented to prevent the transfer of biota that is not indigenous to the environment at the watercourse crossing site;

(l) Measures must be implemented to minimize erosion and sedimentation into the water body, including temporary erosion control measures;

(m) Measures must be implemented to permanently stabilize all disturbed areas on the watercourse crossing site sloping to the water body within one full growing season;

(n) Debris disposal, cleanup and initial stabilization must be carried out as part of the works.

PART 2
REQUIREMENTS FOR INFORMATION AND WRITTEN SPECIFICATIONS FOR PLANS OF WORKS, FROM OWNER, PROFESSIONAL ENGINEER OR ENGINEERING TECHNICAL SPECIALIST

Written specifications that must be provided under section 6(1) must

(a) meet the standards for carrying out a works specified in Part 1 of this Schedule;

(b) incorporate any written specifications and recommendations prepared by a qualified aquatic environment specialist for the works; and

(c) include the design specifications of the works and other information related to the works, including:

(i) information on a page which is a minimum size of 21 centimetres by 27 centimetres, in a suitable format and scale, and that includes:

(A) a map, diagram, or air photo that shows the location of the works in relation to the boundaries of the quarter section that the watercourse crossing will be located in, the legal description of the land, and UTM coordinates, if available, on which the watercourse crossing is located,

(B) the name of the water body that is crossed if known,

(C) the diameter of the culvert or the number of spans in a bridge or a description of any other structure or causeway to be used as part of the watercourse crossing,

(D) piers, abutments and other features that are part of the watercourse crossing, shown through the width of the active floodplain of the water body,

(E) the length in metres of the bridge or culvert in metres that is part of the watercourse crossing and the height of crossing measured from stream bed to the top of the crossing,

(F) all surveyed and unsurveyed profile and cross-sectional drawings required for the design;

(ii) any hydraulic, hydrologic, or hydrogeologic analysis performed for the design of the works; and

(iii) a description of any other specifications for the works that the owner or professional engineer or engineering technical specialist considers appropriate.

SCHEDULE 3

Conditions for Carrying Out a Works

(Sections 8 and 9)

In addition to the requirements regarding watercourse crossing structures and conditions specified in sections 8, 9 and 10 of this Code of Practice, the following conditions must be met in carrying out a works:

PART 1
GENERAL CONDITIONS (Apply to all Watercourse Crossings, Except Type 1 Crossings)

(a) Subject to clauses (c) and (g) of Part 2, if a water body is flowing, the water body channel must not be constricted by more than two-thirds (2/3) of its width during the carrying out of a works;

(b) Where any excavation of the bed of a water body occurs,

(i) the excavated areas must be backfilled with material that is of the same quality and gradation that was removed, except for the Battle, Vermilion and Beaver Rivers where special conditions apply as specified on the appropriate map;

(ii) where the width of the crossing measured between the banks of the water body is less than 15 metres, all material excavated from the bed or banks of the water body must be removed and stored at a location out of the water body until the materials are removed from the location or backfilled into the water body;

(iii) where the width of the crossing measured between the banks of the water body is equal to or greater than 15 metres, and it is necessary to stockpile the material excavated from the bed in the water body, the material must be stockpiled in a manner that avoids areas of highest water velocity, and does not windrow the material across the channel perpendicular to the flow of water;

(c) Where isolating the location of a works,

(i) the isolation must be carried out in a manner that isolates the location of the works from the flowing water in the water body, and eliminates the flow of surface water through the construction site;

(ii) any berms, coffer dams or other isolation structures used in a works within a flowing watercourse are to be

(A) constructed of non-erodable material or protected from erosion for the entire period of time the berm, coffer dam or isolation

structure will be in place, and

(B) removed completely upon completion of the works;

(iii) in cases where the entire flow of water of a water body is diverted around the watercourse crossing site, it must be returned to the water body downstream of the crossing site;

(iv) where ice is present on a water body, any diverted water must be returned to the water body downstream of the watercourse crossing site, under the ice if ice is present;

(v) silt fences may be used in situations where there is low flow in a water body, where appropriate, to isolate the construction area from the water body;

(vi) during the carrying out of the works, any fish that are found within the isolated portion of the watercourse crossing site are to be removed, without harm to or destruction of the fish, to an area of the water body immediately adjacent to the watercourse crossing, outside the isolated portion of the watercourse crossing site;

(vii) during a restricted activity period, when fish are spawning or migrating, an isolation method that blocks the entire width of a water body must not be in place for longer than 3 consecutive days, unless upstream and downstream fish migration is accommodated;

(viii) during a period of time outside a restricted activity period, an isolation method must not be in place for longer than 14 consecutive days unless upstream and downstream fish migration is accommodated;

(ix) any water entering an intake of a bypass pumping system must pass through a screen with openings that are no larger than 2.54 millimetres and at a velocity that does not result in the entrainment and entrapment of fish or fish fry;

(x) any accumulations of silt and sediment within the isolation area resulting from the works in the isolation area must be removed to an upland site prior to restoration of water flow through the isolation site;

(xi) any water removed from an isolation area, must be discharged in a manner that ensures suspended sediments are not introduced into a water body.

PART 2
WATERCOURSE CROSSING CONDITIONS (Except Temporary Crossings)

A. TYPE 1 CROSSINGS

Where a Type 1 crossing is used, no alteration of the active channel of a water body is allowed except for minor disturbances associated with the construction of a watercourse crossing.

B. TYPE 2 CROSSINGS

Where a Type 2 crossing is used, the width of the active channel must not be significantly narrowed.

C. TYPE 4 CROSSINGS

Where a Type 4 crossing is used, and where granular material or rock is used for fill and hardening of the bed of the water body at the watercourse crossing site, it must be clean and without silt or other fine materials.

PART 3
TEMPORARY CROSSING CONDITIONS

A. TYPE 1 CROSSINGS

For single span bridges that are temporary crossings constructed of native timber,

(a) logs used in the construction must be delimbed;

(b) except where fill material is ice or snow, fill material placed on the bridge deck must be held in place and separated from the deck by a geotextile fabric or natural mat that is impermeable to soil movement;

(c) removal of the fill material and mat must precede removal of the bridge structure.

B. TYPE 2 CROSSINGS

All temporary crossings that are Type 2 crossings must be an appropriate size and constructed in a manner to accommodate the flows of the water body that are expected during the period of use so that any back-flooding does not result in damage to public and private land and property.

C. TYPE 3 CROSSINGS

All temporary crossings that are Type 3 crossings must

(a) be an appropriate size and constructed in a manner to accommodate flows expected during the period of use so that any back-flooding does not result

in damage to public and private land and property; and

(b) ensure fish passage is maintained.

D. TYPE 4 CROSSINGS

Where a Type 4 crossing is used, and where granular material or rock is used for fill and hardening of the bed of the water body at the watercourse crossing site, it must be clean and without silt or other fine materials.

E. TYPE 5 CROSSINGS

Where a Type 5 crossing is used:

(a) logs used in constructing the crossing must be delimbed and bucked to at least 1.5 metres longer than the width of the grade fill on each end of the crossing structure;

(b) except where fill material is ice or snow, fill material placed on top of the temporary crossing must be held in place and separated from the deck by a geotextile fabric or natural mat that is impermeable to soil movement;

(c) removal of the fill material and mat must precede removal of the logs;

(d) the bed and banks of the water body must not be altered or disturbed, except for minor disturbances associated with the construction;

(e) it must be constructed in a manner to prevent over-ice flooding caused by the ice being pushed to the bottom of the water body.

SCHEDULE 4

Qualified Aquatic Environment Specialist's Written Specifications and Recommendations

1(1) The written specifications and recommendations of a qualified aquatic environment specialist referred to under this Code of Practice must include:

(a) specifications and recommendations on measures required to meet the requirements of clause (a), (f) and (g) in Part 1 of Schedule 2 of this Code of Practice;

(b) a copy of information gathered and assessments made by the qualified aquatic environment specialist regarding the aquatic environment, including fish populations and habitat, in preparing the specifications and recommendations, including but not limited to:

(i) a list of all existing information, published and unpublished reports reviewed,

(ii) any new information gathered through field assessments, and

(iii) any reports prepared by the qualified aquatic environment specialist;

(c) the crossing location, including the legal description, and the UTM coordinates;

(d) a summary of physical and biological data pertaining to the water body at the watercourse crossing location including:

(i) all fish species that are present or could be present at any time during the year,

(ii) aquatic species of special concern, including rare, endangered, threatened or vulnerable species,

(iii) a description of existing aquatic and riparian fish habitat,

(iv) a description of the hydrological characteristics of the water body, and

(v) any other relevant information regarding the aquatic environment, including fish populations and habitat;

(e) a description of any field assessment study sites, the methods used during field assessments and dates and times of field assessments;

(f) a description of the anticipated effects of the works on the water body and aquatic environment;

(g) the name and signature of the person or persons responsible for the field assessments and specifications and recommendations.

(2) A field assessment for watercourse crossings must be conducted

(a) where in the opinion of the qualified aquatic environment specialist, the required information does not exist to prepare the written specifications and recommendations in order to meet the requirements of clauses (a), (f) and (g) in Part 1 of Schedule 2, including where

(i) a disruption or alteration of the bed or bank(s) of a Class B or C water body occurs, and when the fish passage requirements for a Type 3 crossing in a fish bearing water body need to be determined;

(ii) works occur or are anticipated to occur in a water body during a period of fish spawning, egg incubation, hatching or early fry development; and

(b) where the replacement or maintenance of an existing watercourse crossing is carried out in or over a Class A water body except where there is a replacement of a Type 1 crossing with a Type 1 crossing.

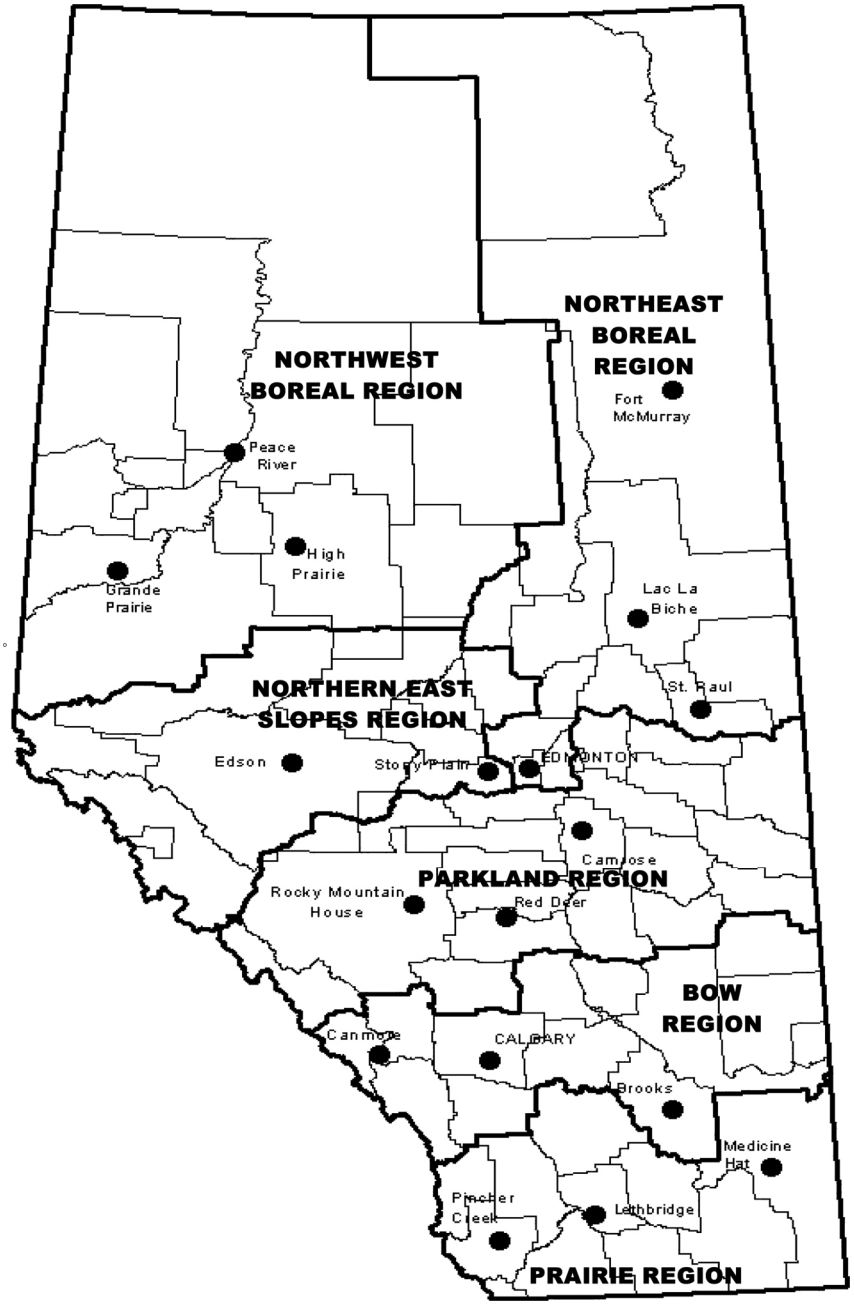
SCHEDULE 5

PART 1
DIRECTORS FOR THIS CODE OF PRACTICE

DIRECTOR and REGION		FAX	TELEPHONE
Manager, Regional Support, Northwest Boreal Region Management Areas: Peace River, Grande Prairie and High Prairie	Northwest Boreal Region Bag 900-5, Provincial Building 9621 - 96 Avenue Peace River, AB, T8S 1T4	780 624-6335	780 624-6167
Manager, Regional Support, Northeast Boreal Region Management Areas: Fort McMurray, Lac La Biche, and St. Paul	Northeast Boreal Region 111, 4999 - 98 Avenue Edmonton, AB, T6B 2X3	780 422-0528	780 427-5296
Manager, Regional Support, Northern East Slopes Region Management Areas: Edson and Stony Plain	Northern East Slopes Region 52322 Golf Course Road Stony Plain, AB, T7Z 2K9	780 963-4651	780 963-6131
Manager, Regional Support, Parkland Region Management Areas: Camrose, Red Deer and Rocky Mountain House	Parkland Region 501, Provincial Building 4920 - 51 Street Red Deer, AB, T4N 6K8	403 340-7662	403 340-7654

Regional Water Manager, Bow Region Management Areas: Calgary, Canmore and Brooks	Bow Region 2nd Floor, 3115 - 12 Street NE Calgary, AB, T2E 7J2	403 297-2749	403 297-6582
Regional Water Manager, Prairie Region Management Areas: Pincher Creek, Lethbridge and Medicine Hat	Prairie Region Provincial Building 293, 200 - 5 Avenue, S. Lethbridge, AB, T1J4C7	403 381-5337	403 382-4254

PART 2
REGIONAL BOUNDARIES MAP



SCHEDULE 6

Maps

1. Peace River Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

2. Grande Prairie Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

3. High Prairie Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

4. Edson Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

5. Stony Plain Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

6. Pincher Creek Management Area - [2013/05], published by Alberta's Queen's Printer, as amended or replaced from time to time

7. Lethbridge Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

8. Medicine Hat Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

9. Fort McMurray Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

10. Lac La Biche Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

11. St. Paul Management Area - [2013/05], published by Alberta's Queen's Printer, as amended or replaced from time to time

12. Camrose Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

13. Red Deer Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

14. Rocky Mountain House Management Area - [2013/05], published by Alberta's Queen's Printer, as amended or replaced from time to time

15. Calgary Management Area - [2013/05], published by Alberta's Queen's Printer, as amended or replaced from time to time

16. Canmore Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time

17. Brooks Management Area - [2006/12], published by Alberta's Queen's Printer, as amended or replaced from time to time