

16. ASSESSMENT OF NON-TRADITIONAL LAND USE EFFECTS

16.1 INTRODUCTION

This chapter assesses the potential effects of the proposed Murray River Coal Mine Project (the Project) on Crown-designated areas (e.g., provincial and federal parks and protected areas), Crown-granted tenures (e.g., coal, mineral, guide outfitting, trapping, oil and gas, energy, commercial recreation), and public recreation. The chapter also assesses potential effects on visual quality and effects navigation.

A baseline report related to non-traditional land use is provided in Appendix 16-A. An evaluation of navigable waters in the vicinity of the Project is provided in Appendix 16-B. The visual quality baseline report is provided in Appendix 16-C.

Potential effects on Aboriginal current use of lands and resources for traditional purposes are considered in Chapter 17, Assessment of Effects to Current Use of Lands and Resources for Traditional Purposes.

16.2 REGULATORY AND POLICY FRAMEWORK

Section 7.1 of the Application Information Requirements, and the *Canadian Environmental Assessment Act, 2012* (2012b), requires the Application/EIS to assess the Project's effects on commercial and non-commercial land uses.

In Canada there is a public right to navigation that exists under common law. This right can only be restricted by an Act of Parliament, such as the *Navigation Protection Act* (NPA; 2014), which requires approval for any "works" that may affect navigation on listed "navigable waters." The NPA, formerly the Navigable Waters Protection Act (NWPA; 1985), was subject to amendments in the Jobs and Growth Act (2012b) that received Royal Assent on December 14, 2012. These amendments came into effect on April 1, 2014. The amendments included (Transport Canada 2012a):

- a change of the name of the law from the Navigable Waters Protection Act to the Navigation Protection Act;
- inclusion of a schedule that clearly lists the major waterways for which regulatory approval is required prior to the placement or construction of a work;
- the opportunity for proponents of works in non-scheduled waters to opt-in and seek approval of a proposed work to provide additional legal certainty; and
- an expanded list of low risk works (i.e., minor bridge repairs) that can be pre-approved because they pose very little impact on safe navigation.

Under the NPA, a work is defined as any of the following: “any man-made structure, device or thing” (e.g., bridges, dams, or docks), any “dumping of fill,” or any “excavation of materials from the bed of any navigable water” (2014).

Land and resource use in the Project area is informed by the Dawson Creek Land and Resource Management Plan (LRMP; Dawson Creek LRMP Working Group 1999a) and the Tumbler Ridge Official Community Plan (OCP- DTR 2012b). Table 16.2-1 provides an overview of the provincial and federal land and resource legislation.

Table 16.2-1. Provincial and Federal Land and Resource Legislation

Legislation	Description	Regulatory Authority
<i>Agricultural Land Commission Act</i> , SBC 2002. C. 36	Authorizes the designation of land suitable for farm use as an agricultural land reserve. Prohibits use of agricultural land for other than farm use.	BC ALC
<i>Coal Act</i> , SBC 2004. C. 15	Authorizes coal exploration and development activities and outlines tenure requirements. Coal Licenses grant rights to the holder to explore and develop Crown coal resources, limiting production to a 100,000-tonne sample for testing purposes. Coal leases grant leaseholders rights to explore, develop, and produce coal within the lease boundaries.	BC MEMPR
<i>Drinking Water Protection Act</i> , SBC 2001. C. 9	Provides for the regulation of water systems to protect drinking water, including water quality standards and mechanisms for source protection.	BC MOE
<i>Ecological Reserve Act</i> , RSBC 1996. C. 103	Reserves Crown land for ecological purposes. Limits public access to low-impact activities, such as nature observation or hiking. High-impact recreational activities, such as motorized vehicle use, are not permitted.	BC MOE
<i>Environmental Management Act</i> , SBC 2003. C. 53	Prohibits the introduction of waste into the environment from industries listed in the Waste Discharge Regulation, or from any activity that causes pollution. Activities which introduce waste may operate in accordance with a permit, Code of Practice or a regulation.	BC MOE
<i>Fish Protection Act</i> , SBC 1997. C. 21	Protects fish and fish habitat by prohibiting dams on provincially significant rivers and establishing special rules in relation to licences or approvals under the Water Act (1996d). The Act also provides for the designation of sensitive streams and the granting of streamflow protection licences.	BC MOE
<i>Fisheries Act</i> , RSBC 1996. C. 149	Defines activities requiring licences, including: fishing in provincial waters; the processing of fish or aquatic plants; the operation of fish buying stations; the construction and operation of fish farms or other aquaculture operations; and the harvesting of kelp.	BC MFLNRO

(continued)

Table 16.2-1. Provincial and Federal Land and Resource Legislation (continued)

Legislation	Description	Regulatory Authority
<i>Forest Act</i> , RSBC 1996. C. 157	<p>Provides for disposition of timber, road permits, timber scaling, payments to government, and inspections and penalties.</p> <p>Volume-based tenures grant the non-exclusive right to harvest a certain volume of timber within a Timber Supply Area.</p> <p>Area-based tenures grant the exclusive rights to harvest timber within a specified area. Volume-based tenures include: Forest Licences, Timber Sale Licences, Pulpwood Agreements, Licences to Cut, and Free Use Permits. Area-based tenures include: Tree Farm Licences, Timber Licences, Community Forest Agreements, First Nation Woodland Licences, and Woodlot Licences.</p> <p>Forest service road designation provides for the administration and maintenance of forest service roads by government. A road use permit authorizes use of one or more segments of a forest service road. A road permit is required for the construction, (non-exclusive) use and maintenance of a road other than a forest service road. A special use permit gives non-exclusive authority to construct and maintain a road.</p>	BC MFLNRO
<i>Forest and Range Practices Act</i> , SBC 2002. C. 69	<p>Sets the requirements for planning, road building, logging, reforestation, and grazing. Requires forest operators to set specific targets or strategies for environmental objectives established by the government. Establishes the Visual Landscape Inventory (VLI), which is the main framework for managing visual quality in British Columbia, and creates two designations to support it: Scenic Areas and Visual Quality Objectives (VQOs).</p>	BC MFLNRO
<i>Land Act</i> , RSBC 1996. C. 245	<p>Governs the disposition, management and administration of Crown land, as well as the surveying of Crown land.</p> <p>Disposition of Crown land may be made through a variety of tenure types. Investigative permits allow proponents to access Crown land for study purposes but do not allow the construction of any improvements (usually two years).</p> <p>Temporary permits grant the right to carry out specified activity(s) for a short term. Works permits are issued for the construction of a road, non-commercial airstrip, bridge, or trail.</p> <p>A licence of occupation is issued where minimum improvements are proposed or where medium term tenure is required (5 to 45 years). A licence of occupation may also be issued where it is in the best interest of the Crown to allow high demand areas or parcels to be used by numerous users. A lease is issued where long term tenure is required, where substantial</p>	BC MFLNRO

(continued)

Table 16.2-1. Provincial and Federal Land and Resource Legislation (continued)

Legislation	Description	Regulatory Authority
<i>Land Act</i> , RSBC 1996. C. 245 (<i>cont'd</i>)	<p>improvements are proposed, and/or where definite boundaries are required in order to avoid land use and property conflicts (usually 30- to 45-year terms). A statutory right of way is normally granted to authorize linear uses of Crown land for transportation, communication, energy production and utility developments (e.g., roads, power lines, cable telecommunications, oil and gas pipelines, etc.; 30-45 years).</p> <p>The Act applies to the following land uses: adventure tourism/commercial recreation; aggregates and quarry materials; agriculture; airports; all seasons resorts/alpine skiing; aquaculture; general commercial; communication sites; community and institutional use; film; floating home community; golf courses; grazing; general industrial; log handling; marinas and yacht clubs; mining; ocean energy; oil and gas; private moorage; residential; roadways; utilities; waterpower; and wind power.</p>	BC MFLNRO (<i>cont'd</i>)
<i>Land Title Act</i> , RSBC 1996. C. 250	Provides the legal framework registering and transferring titles and other interests in land. Fee simple title is the most secure, and broadest, type of property ownership recognized under the Act.	BC Land Title and Survey Authority
<i>Mineral Tenure Act</i> , RSBC 1996. C. 292	Authorizes the registration of mineral and placer claims within the Province and provides the framework for tenure administration.	BC MEMPR
<i>Mines Act</i> , RSBC 1996. C. 293	Authorizes mineral exploration and mine development, including construction, production, closure, reclamation and abandonment activities.	BC MEMPR
<i>Navigation Protection Act</i> , 2014 (RSC 1985, c. N-22)	Section 4 of the Act states that "An owner of a work that is constructed or placed, or proposed to be constructed or placed, in, on, over, under, through or across any navigable water, other than any navigable water that is listed in the schedule, may request that this Act be made applicable to the work as if it were a work that is constructed or placed, or proposed to be constructed or placed, in, on, over, under, through or across any navigable water that is listed in the schedule."	Transport Canada
<i>Oil and Gas Activities Act</i> , SBC 2008. C. 36	Regulates conventional oil and gas production, shale gas production and other oil and gas facilities, as related to exploration, development, pipeline transportation and reclamation. Provides authority for the BC Oil and Gas Commission (OGC) to grant approvals under the <i>Environmental Management Act</i> , the <i>Forest Act</i> , the <i>Heritage Conservation Act</i> (1996b), the <i>Land Act</i> (1996e) and the <i>Water Act</i> (1996d).	BC OGC

(continued)

Table 16.2-1. Provincial and Federal Land and Resource Legislation (completed)

Legislation	Description	Regulatory Authority
<i>Park Act</i> , RSBC 1996. C.344	Provides for the establishment, classification and management of provincial parks, conservancies and recreation areas (collectively referred to as “parks”). Park use permits may be issued to applicants wishing to conduct commercial enterprises in a park.	BC MOE
<i>Petroleum and Natural Gas Act</i> , RSBC 1996. C. 361	Requires proponents to obtain various approvals before undertaking exploration or production work. Permits authorize exploration work. Drilling licences convey the exclusive right to drill oil and gas wells in a defined area. Leases allow production, in addition to providing exclusive drilling rights.	BC OGC BC MNG
<i>Protected Areas of British Columbia Act</i> , SBC 2000. C. 17	Establishes a number of parks, ecological reserves and places that are listed in schedules to the Act. Also transfers existing Class “A” parks and ecological reserves previously established by orders-in-council to schedules to the Act.	BC MOE
<i>Range Act</i> , SBC 2004. C. 71	Defines the disposition of rights over Crown range and includes compliance and enforcement provisions. Grazing and hay-cutting tenures are issued as either a licence (10-year term) or a permit (1- to 5-year term).	BC MFLNRO
<i>Water Protection Act</i> , RSBC 1996. C. 484	Prohibits removal of water from BC or transfer of water between major watersheds.	BC MOE
<i>Wildlife Act</i> , RSBC 1996. C. 488	Regulates the management of wildlife, including: establishing and protecting wildlife management and critical wildlife areas; declaring and protecting endangered species; regulating import and export of wildlife; regulating the conditions under which wildlife can be killed for recreational reasons and for the protection of property; granting, suspending and cancelling licenses; and establishing and enforcing quotas. BC residents must obtain a Hunter Number Card and a hunting and species license in order to be granted hunting privileges. Non-resident big game hunters are required to be accompanied by a licenced guide or by a resident 19 years of age or older who holds a Hunting Permit.	BC MOE

There is no provincial and or federal legislation governing visual quality. The Dawson Creek LRMP provides general management direction (GMD) related to visual quality within the area covered by the LRMP. The GMD includes the objective to “manage scenic values in visually sensitive areas” (Dawson Creek LRMP Working Group 1999).

16.2.1 Dawson Creek Land and Resource Management Plan

The proposed Project is located within the boundaries of the Dawson Creek LRMP, which guides resource management activities on Crown land within the Dawson Creek Forest District¹ in northeastern BC (Dawson Creek LRMP Working Group 1999b). The LRMP was approved by the Province in March 1999 and encompasses 2.9 million hectares (ha) of land.

The Dawson Creek LRMP is divided into 12 resource management zones (RMZ) based on resource values, economic activity, environmentally important areas, and Agricultural Land Reserve boundaries. The LRMP also identifies several principles which provide GMD and established 16 new Protected Areas, encompassing over 180,000 ha or approximately 6% of the LRMP area.

16.2.1.1 General Management Direction

The LRMP contains the following principles to guide the GMD for the planning area:

- sustainable use of renewable natural resources;
- management of any one resource shall take into consideration other resource values, rights, tenures and development opportunities which recognize the biological and physical limitations of the land and resources;
- maintenance or enhancement of the quality of life, social and economic stability, employment opportunities including job creation, and the vitality of local communities;
- acknowledgement that communities located within the planning area should have the opportunities to benefit from the natural resources within the planning area. This can be achieved through, but is not limited to: economic diversification, managed access to resources, and increased value-added manufacturing and process; and
- land, water, air and all living organisms are integral parts of the ecosystem and should be sustained and accommodated by management plans.

The overall resource management direction for any area outside of Protected Areas with the LRMP is defined by the GMD, RMZ and sublevel zone direction. The GMD applies throughout the planning area and is not specific to a RMZ. The GMD identifies objectives and strategies specific to each resource value (i.e., biodiversity, soil conservation, fish and wildlife, air quality, recreation and tourism, visual quality, First Nations, culture and heritage, trapping, guide outfitting, water, agriculture and range, coal and minerals, energy, telecommunications, transportation and utilities, forestry, and access).

The coal and minerals GMD recognizes the economic importance and potential of coal and mineral mining in the region. According to the GMD, “mineral exploration, mining roads and mining developments are acceptable uses of the land outside of Protected areas, subject to the consideration

¹ Excluding the Kakwa Recreation Area.

of other values through the appropriate regulatory framework” (Dawson Creek LRMP Working Group 1999). A strategy of the GMD is to integrate coal and mineral exploration and development activities with other resource use activities where feasible. “Other resource use activities” include recreation and tourism, trapping, guide outfitting, domestic and commercial water use, oil and gas, hydro-electric power, communication, transportation and utility corridors, and forestry.

16.2.1.2 *Resource Management Zones*

Each RMZ has a unique set of resource values, objectives to sustain or enhance those values, and strategies to be implemented to achieve the objectives. RMZs provide geographically-focused, strategic direction for all land and resource development in the LRMP. The proposed Project is located within the Foothills RMZ, the Alberta Plateau RMZ, and the Major Rivers Corridor RMZ (Figure 16.2-1).

Foothills Resource Management Zone

This RMZ includes the Bullmoose Creek and Mount Anderson sub-zones, which are situated in the vicinity of the Project (Figure 16.2-1). A large portion of the RMZ has well developed infrastructure, including roads, seismic lines, pipeline corridors and trails, and has high potential for future development (Dawson Creek LRMP Working Group 1999). Aside from the GMD, the RMZ includes specific strategies for biodiversity, fish and wildlife, air quality, coal and minerals, forestry, and access.

Alberta Plateau Resource Management Zone

This RMZ includes the Redwillow Creek sub-zone, which is located in the vicinity of the Project (Figure 16.2-1). Road access is well-developed throughout the RMZ, as a consequence of oil and gas exploration and development and forestry activities. Aside from the GMD, the RMZ includes specific strategies for biodiversity, fish and wildlife, recreation and tourism, water, forestry, and access.

Major River Corridors Resource Management Zone

Most of the Project components will fall within this RMZ. Aside from the GMD, the RMZ includes specific strategies for biodiversity, fish and wildlife, recreation and tourism, agriculture and range, coal and minerals, forestry, and access.

16.2.2 **District of Tumbler Ridge Official Community Plan**

The Project falls within the Open Space and Rural Resource lands of the District of Tumbler Ridge (DTR)’s Official Community Plan, July 2012 (OCP) (Figure 16.2-2). Section 8 of the OCP identifies the following objectives for these lands:

- Support resource-based activities throughout the District as an integral part of Tumbler Ridge.
- Recognize the importance of recreational uses throughout the District.
- Encourage the wise stewardship of resources to protect the environmental integrity of the backcountry.

Figure 16.2-1

Dawson Creek Land and Resource Management Plan: Resource Management Zones in the Vicinity of the Project

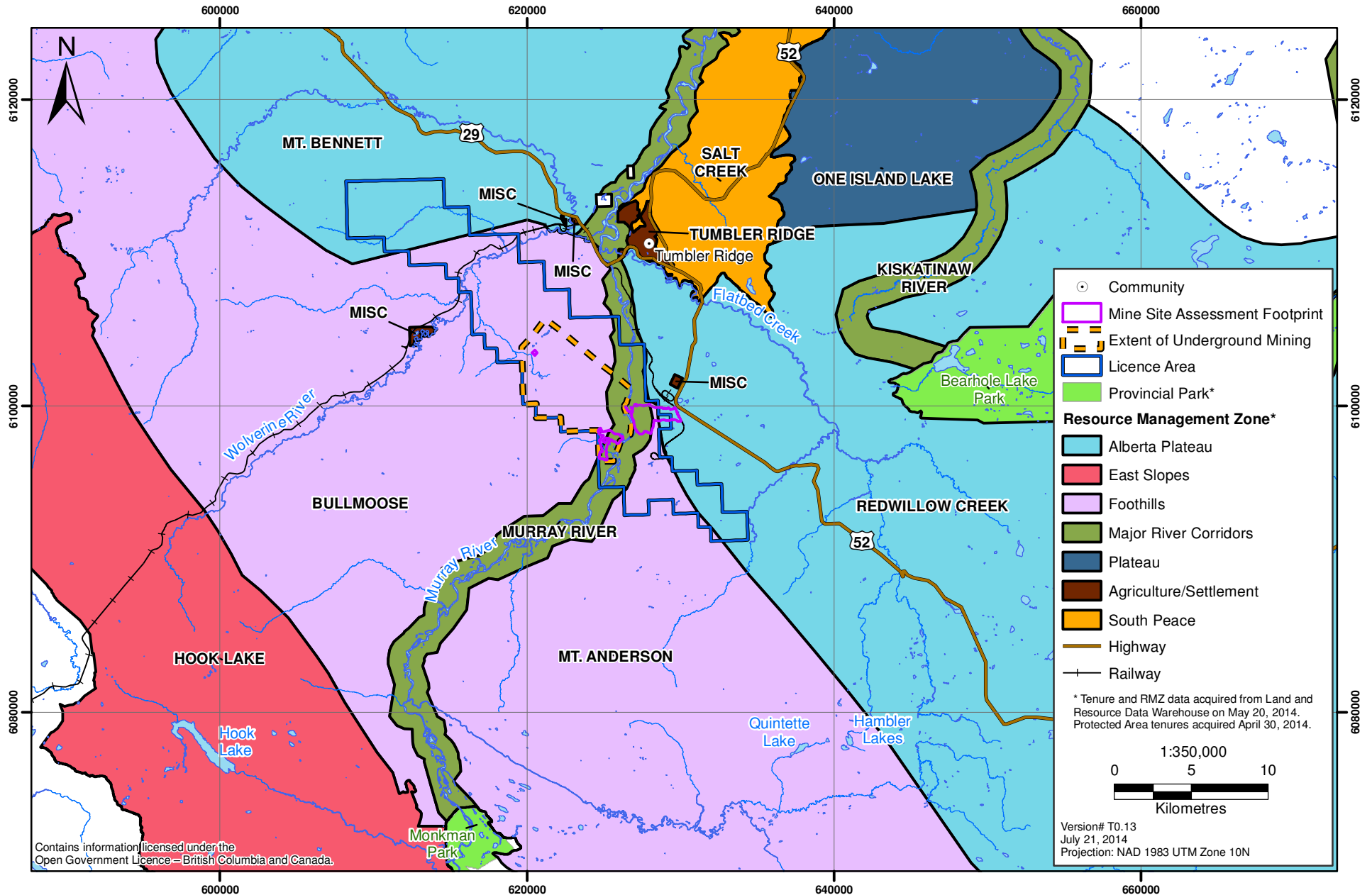
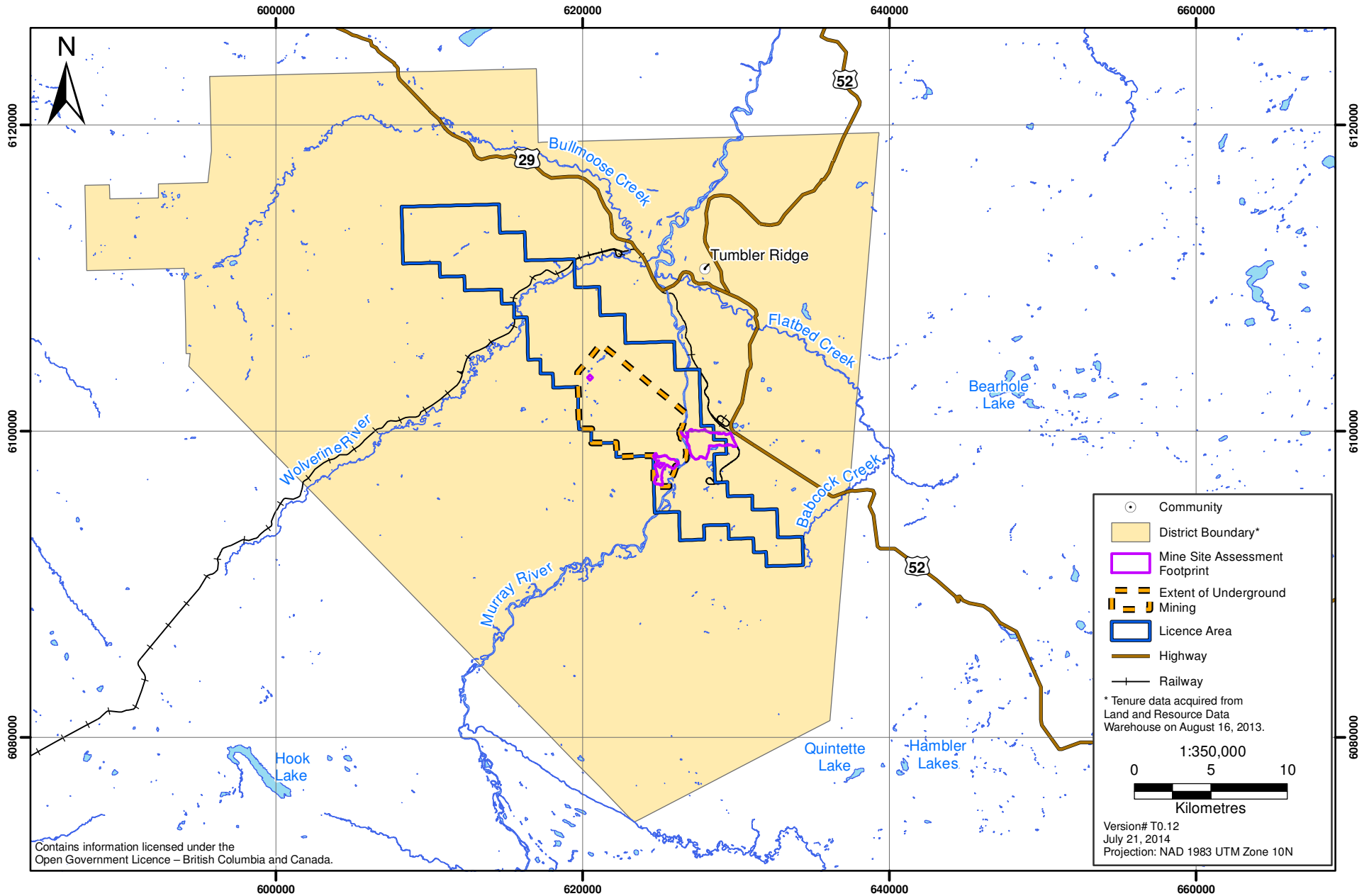


Figure 16.2-2
District of Tumbler Ridge Municipal Boundary



16.3 REGIONAL OVERVIEW

The Project is located in the south Peace region in northeastern BC, approximately 12.5 km south of Tumbler Ridge. Land and resource use in the region has largely been driven by resource development, primarily coal exploration and mining, oil and gas exploration and development, agriculture, and forestry. Hydroelectric and wind power projects are also active in the region, with new projects being proposed.

Resident and non-resident hunting, trapping and guide outfitting occurs in the region. Species targeted by hunters include moose, elk and deer. Trapped species include squirrel, marten, beaver, and weasel, coyote, fisher, lynx and muskrat. There is also hiking, fishing, camping, snowmobiling, ATV riding, and wildlife spotting in the region.

The Murray River is popular for boating. There are two boat launches on the Murray River, one in Tumbler Ridge, and one located at the Murray River FSR crossing, adjacent to the Project. Kinuseo Falls, a 60 m waterfall on the Murray River, located approximately 65 km from Tumbler Ridge, and 38 km upstream from the the Project is a popular destination for boaters.

16.4 HISTORICAL ACTIVITIES

Tumbler Ridge was incorporated in 1981 and constructed to support the development of the Northeast Coal Project (DTR 2012). This Project involved the export of 100 million tonnes of metallurgical coal between 1982 and 1997 (BritishColumbia.com 1998-2013). The Quintette open pit coal mine, located about 20 km south of Tumbler Ridge and across the Murray River from the proposed Project, operated between 1982 and 2000. The mine consisted of five open pits in three areas: Sheriff (Wolverine and Mesa pits), Frame (Shikano Pit) and Babcock (Windy and Window Pits). Mine permits for the Wolverine and Mesa pits were issued in December 1982 and mining commenced from 1983 until 1998 (Wolverine) and 2000 (Mesa). Raw coal was transported via an overland conveyor from the Mesa and Wolverine pits to the Quintette plant site for processing. The coal processing plant has been under care and maintenance since 2000; the overland conveyor, which previously crossed through a portion of HD Mining's Decline Site, was decommissioned by Teck in 2011. Teck is currently securing the necessary approvals to re-initiate mining in the Babcock area.

The Bullmoose Coal Mine operated from 1983 to 2003, producing about 3 million tons of metallurgical coal. The 1.7 million-tonne-per-year operation consisted of an open-pit mine, a plant facility in the Bullmoose Creek valley below the mine, and a separate rail loadout facility on the B.C. Rail branchline.

Previous exploration in the area included seismic lines and drilling for oil and gas wells which helped target areas for coal exploration. Large portions of forest land in the LSA have been recently harvested to remove mountain pine beetle affected timber.

16.5 BASELINE STUDIES

Baseline studies related to non-traditional use of lands and resources were conducted between 2010 and 2014. The baseline report is provided in Appendix 16-A. A visual quality baseline was

conducted between 2010 and 2011, and the baseline report is provided in Appendix 16-C. Data for the navigable waters assessment was collected between 2013 and 2014, and a report of the results is provided in Appendix 16-B. The main objectives of these studies were to identify land and resources uses in the Project area, including Crown-designated lands, Crown-granted tenures, private land and public use; to determine which watercourses interacting with proposed Project components are navigable; and to document visual quality conditions in the vicinity of the Project.

16.5.1 Data Sources

Table 16.5-1 identifies the data sources used in the land use baseline study.

Table 16.5-1. Non-Traditional Land Use Data Sources

Source	Database, Document or Website	Information Type
DataBC	Data Distribution Service (Data BC 2013)	Tenure shapefiles and attribute data
BC MFLNRO	Integrated Land and Resource Registry (BC MFLNRO 2013d)	Land tenures
	Forest Analysis and Inventory (BC MFLNRO 2013b)	Forestry tenures
	Big game harvest statistics 1976-2010 (BC MFLNRO 2012a)	Resident & non-resident hunter harvest statistics
	Land Tenures Branch (BC MFLNRO 2013f)	Crown land tenure information
	Fish, Wildlife and Habitat Management Branch (BC MFLNRO 2013a)	Fishing, hunting and trapping
	Recreation Sites and Trails BC (BC MFLNRO 2013g)	Recreation sites and trails
	Land and Coastal Marine Plans in BC (BC MFLNRO 2013e)	Dawson Creek LRMP
BC MOE	Recreation – Park Finder (BC MOE 2013a)	Provincial parks
	Water licences query (BC MOE 2013b)	Water licences
BC EMPR	Mineral Exploration and Mining (BC MEMPR 2013)	Mineral and coal tenures
BC OGC	BC Oil and Gas Commission (BC OGC 2013)	Oil and gas
BC ALC	BC Agricultural Land Commission (BC ALC 2013)	Agricultural Land Reserves
BC EAO	Project Information Center (e-PIC; BC EAO 2013c)	Projects in the environmental assessment (EA) process, projects that have completed an EA
GOABC	Guide Outfitter Directory (Guide Outfitters Association of BC 2013)	Guide outfitter contact information
DTR	District of Tumbler Ridge (DTR 2012)	Official Community Plan

The List of Scheduled Waters (Transport Canada 2014) under the *Navigation Protection Act* (2014) was reviewed to determine whether any of the watercourses anticipated to interact with the Project are automatically considered “navigable” under the Act.

Data on existing visual landscapes in the vicinity of the Project was collected from the provincial Visual Landscape Inventory (VLI; BC MFLNRO n.d.). The VLI was established by the *Forest and*

Range Practices Act (2002b) and is a database of areas and corridors in the province which may be considered visually sensitive. Areas considered visually sensitive are separated into discrete Visual Sensitivity Units (VSUs), with each unit having specific visual characteristics distinct from those around it. Characteristics defining a VSU include the Existing Visual Conditions (EVC), Visual Absorption Capability (VAC), and any specific biophysical or other characteristics unique to the area. Based on those characteristics, a recommended Visual Sensitivity Class (VSC) is assigned.

16.5.2 Methods

Methods used to undertake the land use baseline study included: defining study spatial boundaries (described below); gathering land use information from publically-available sources; interviewing tenure holders to confirm land and resource use; and summarizing the data into a baseline report.

A GIS analysis was conducted to determine the potential for interaction between Project works with water. Both direct (i.e., in, on, over, under, through or across) and indirect (i.e., downstream flow effects) interactions were considered. Field data on streams potentially affected by the Project were collected as part of the Fisheries (Appendix 9-A) and Hydrology (Appendix 8-A) baseline field programs. The navigability of waters was then assessed based on the principles and criteria built up through jurisprudence, incorporating available information gathered from stakeholder consultations for the Project relating to navigational public utility.

Methods used to assess visual quality effects were informed by the Province's *Visual Impact Assessment Guidebook* (BC MOF 2001). Locations for field investigation were chosen based on the results of a viewshed analysis, which identified viewpoints within a Visual Quality Local Study Area (see section 16.5.2.1) where Project infrastructure could potentially be visible. Viewpoints were identified based on the location of land and resource use in the general Project area. Each viewpoint was visited in the field and current conditions were recorded to create a visual inventory of the area.

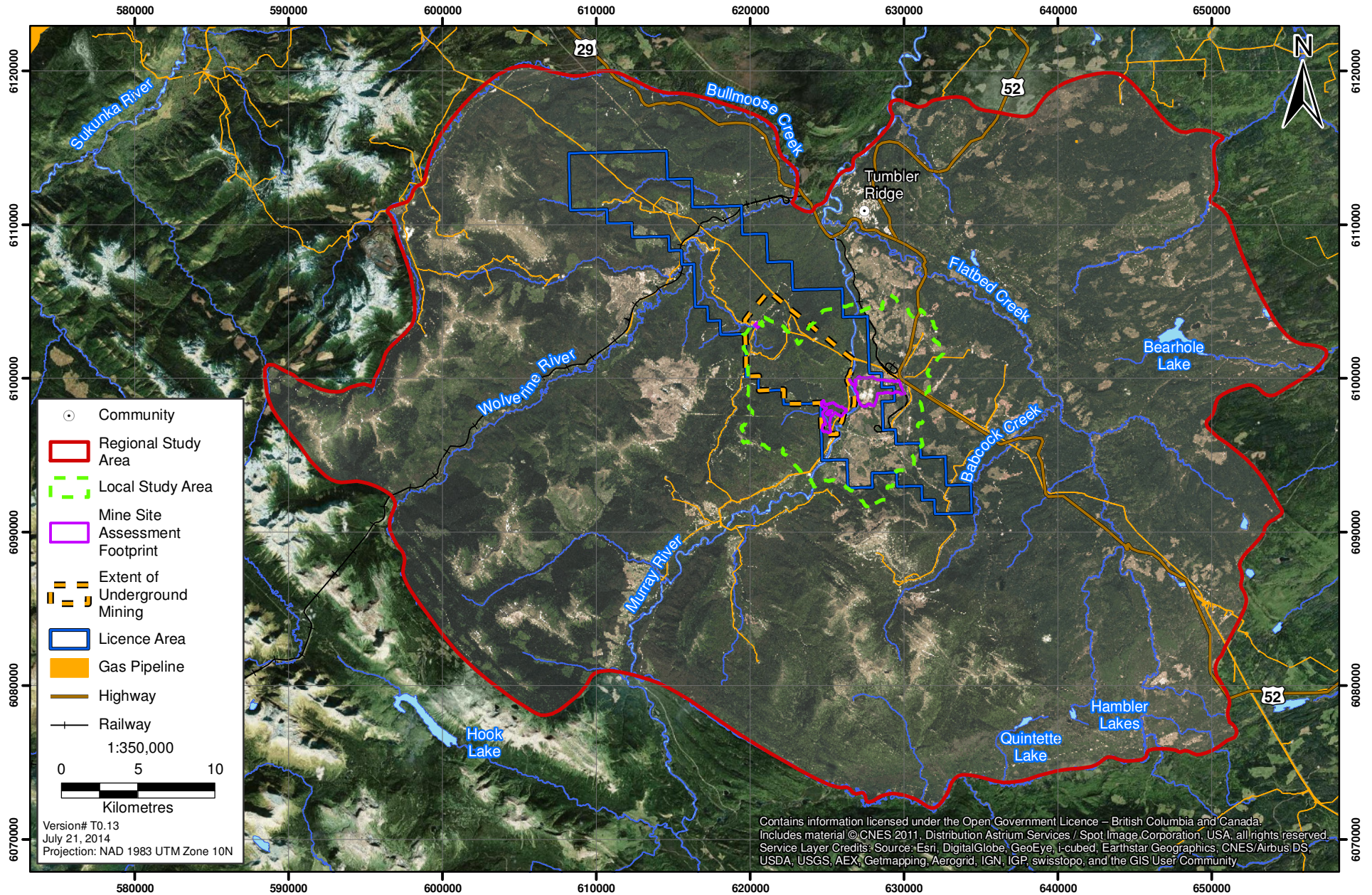
16.5.2.1 Baseline Study Areas

Non-traditional Land Use Baseline Study Areas

The Local Study Area (LSA) for the non-traditional land use baseline study encompasses 12,092 ha surrounding Project infrastructure (referred to in this chapter as the Project Assessment Footprint within which there is potential for direct effects from the Project. The LSA boundary follows the natural terrain and drainage boundaries (Figure 16.5-1).

The Regional Study Area (RSA) encompasses 227,578 ha and represents an area beyond which effects of the Project would be expected. The RSA considers distinctive ecosystems, watersheds, the species with the largest habitat range, and natural landform barriers (such as mountain ranges) beyond which effects on animals and humans diminish exponentially (Figure 16.5-1).

Figure 16.5-1
Non-traditional Land Use Baseline Study Areas



Navigation - Murray River and Tributary Watersheds

The Navigable Waters Assessment (Appendix 16-B) considers the navigability of waters within the Murray River and tributary watersheds. The study encompasses the mainstem of the Murray River, as well as Camp Creek (M20 Creek), Twenty Creek, Mast Creek, M17 Creek, and M19 Creek. Camp and Twenty creeks on the west side, and M17 and M19 creeks on the east side, flow into the Murray River. Mast Creek is one tributary of the Wolverine River, which confluences with the Bullmoose River at Tumbler Ridge, and continues to flow north-east and downstream into the Murray River (Figure 16.5-2).

Visual Quality Baseline Local Study Area

The 2010 Visual Quality Baseline utilized a Visual Quality Local Study Area (VQLSA). The VQLSA was created based on a viewshed analysis which highlights all areas that have a direct line of sight to the Project. The viewshed analysis utilized two specific inputs:

- A digital elevation model from the BC Terrain Resource Information Management Program with a resolution of approximately 20m; and
- Projected vegetation high above ground level, based on the Vegetation Resources Inventory (BC MFLNRO 2011).

The VQLSA is shown on Figure 16.5-3.

16.5.2.2 *Interviews*

Interviews were conducted with regional staff of the Ministry of Environment (MOE), Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO; Resource Operations); BC MFLNRO (recreation); and BC MFLNRO (Wildfire Management Branch) to confirm land and resource use in the land use baseline study areas. Twenty letters were emailed to stakeholders, including commercial tenure holders and recreational organizations, to request an interview. Six interviews with stakeholders were completed, representing a 30% response rate (see Table 3.2-1 in Appendix 16-A). Interviews included open-ended questions, which focused on obtaining information related to the location and timing of land use activities as well as comments on the Project.

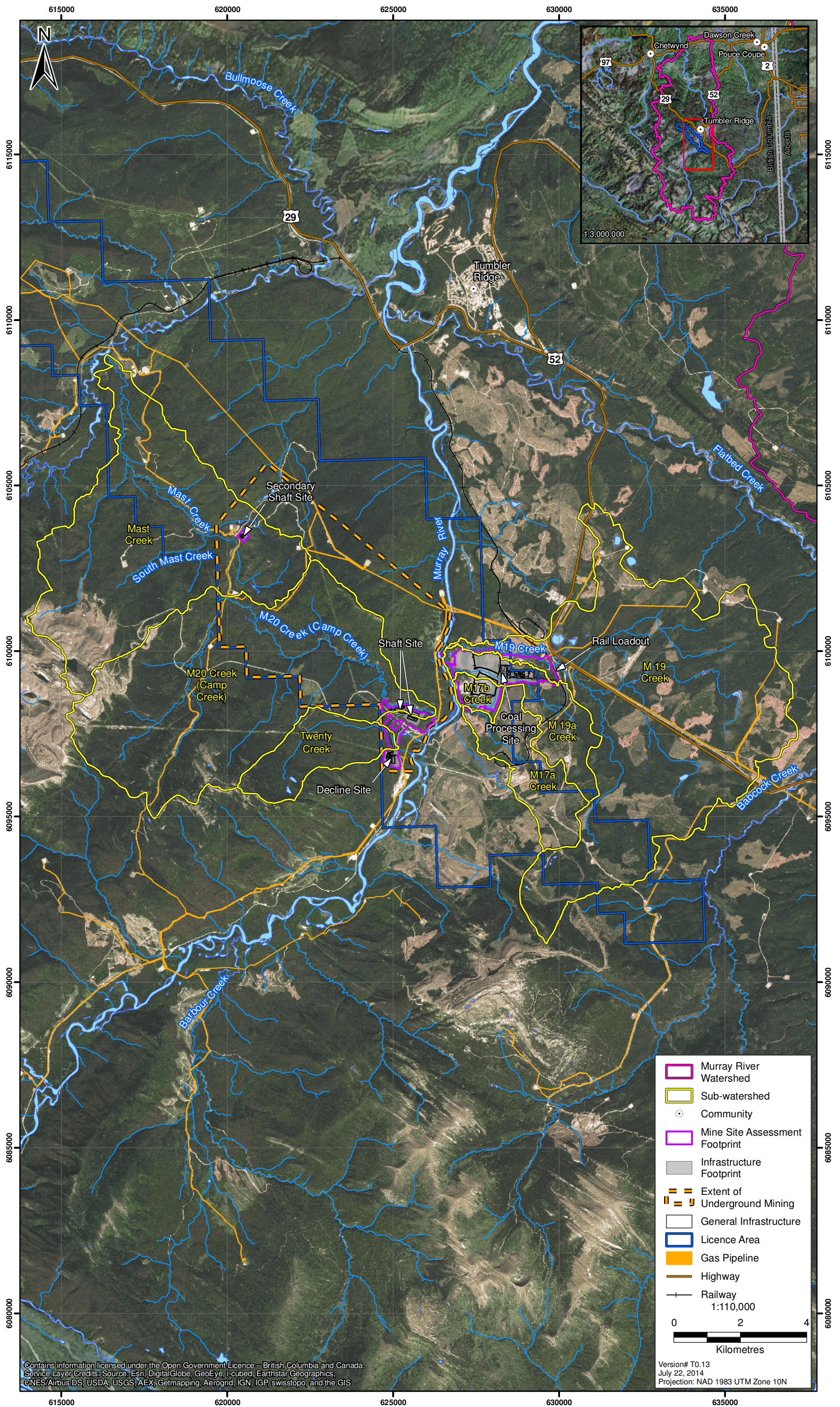
16.5.2.3 *Data Limitations*

Data relating to visitor attendance rates and trends for some provincial parks is not collected for parks that are not staffed (e.g., Monkman Provincial Park) or have low use. Furthermore, a standardized methodology is not used to collect data. Therefore there are gaps in data related to park use.

Resident and non-resident hunters are required to register kills using the Hunter Sample and the Guide Declaration. However, in some cases kill data are incomplete or cannot be assigned to a specific Wildlife Management Unit (WMU). In these instances, data may be assigned to either a region or to the province as a whole. As a result, data from WMUs that overlap the LSA may under-represent the actual wildlife harvest. Additionally, First Nations hunting is not captured in the Big Game Harvest Database. As such, the available data on resident and non-resident hunters may under-represent the level of hunting in the RSA.

Figure 16.5-2

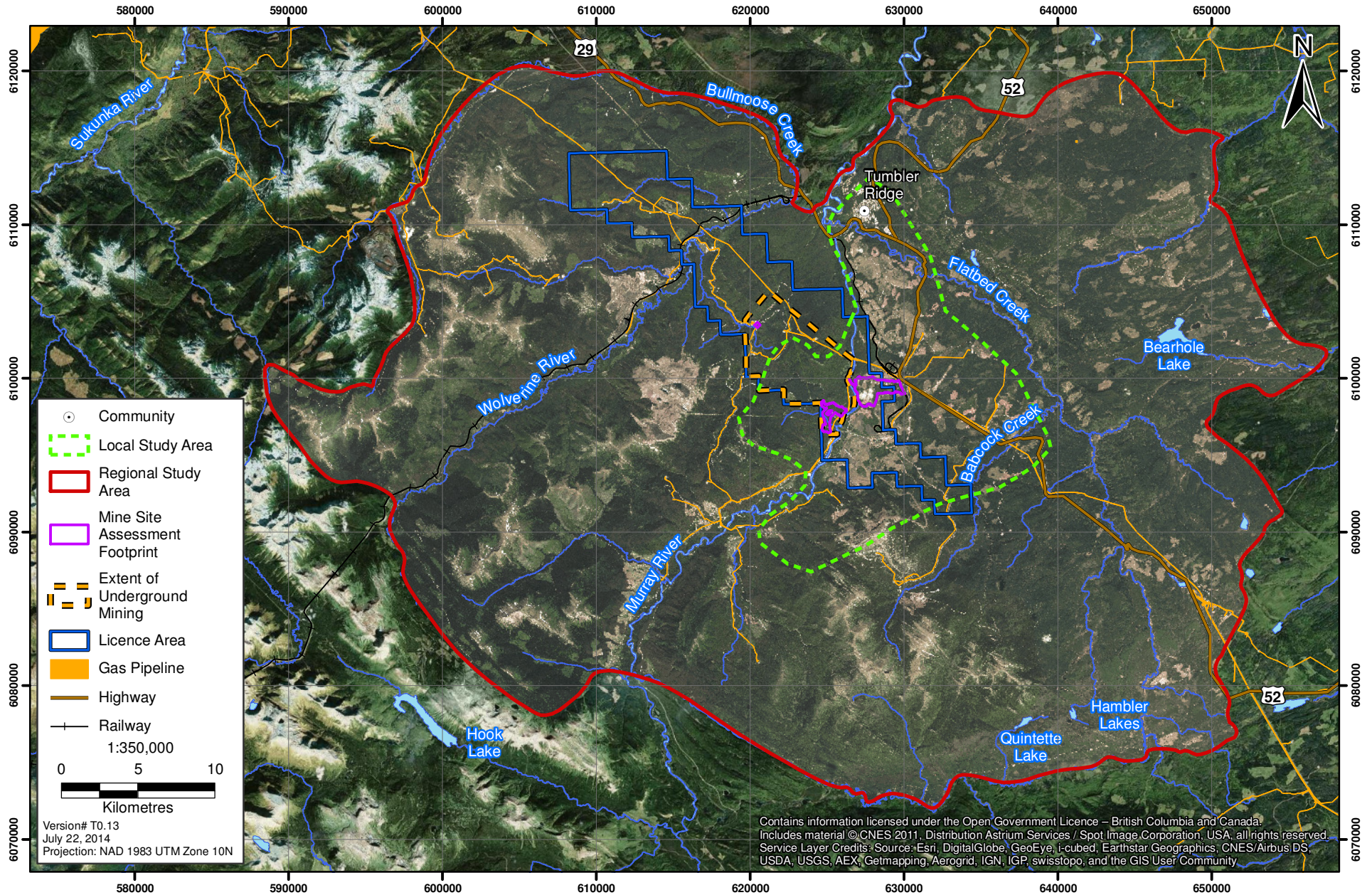
Murray River and Tributary Watersheds



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 July 22, 2014
 Projection: NAD 1983 UTM Zone 10N

Figure 16.5-3
Murray River Project Visual Quality Local Study Area



16.5.3 Characterization of Non-Traditional Land Use Baseline Condition

Crown-designated lands, and commercial and non-commercial land uses in the land baseline LSA and RSA are described below and summarized in Table 16.5-2.

Table 16.5-2. Summary of Land and Resource Interests within the Local and Regional Study Areas

Private Lands	No private lands overlap the Project footprint. There are 84 fee simple parcels in the LSA. There are 1,466 fee simple parcels in the RSA, 99% of which are in the Tumbler Ridge townsite.
Parks and Protected Areas	Bearhole Lake Provincial Park and Protected Area overlaps the RSA.
Fishing and Angling	The Murray River, which runs through the LSA and RSA, provides recreational fishing opportunities for grayling, bull trout and whitefish. There is no commercial angling in the LSA or RSA.
Recreation and Tourism	There is one campsite and one recreation site in the RSA. There are no sites in the LSA. There are no commercial recreation operators in the LSA or RSA. There is hiking, motorized recreation, and boating in the LSA and RSA.
Resident and Non-Resident Hunting	The RSA overlaps two WMUs, which are used by resident and non-resident hunters. Species targeted by resident hunters include moose, elk and deer.
Guide Outfitting	Four guide outfitter tenures overlap the RSA, two of which also overlap the LSA. One of these tenures overlaps over half of the RSA and the majority of the LSA.
Trapping	Ten trapline tenures overlap the RSA, three of which also overlap the LSA. Ten trapline cabins are located within the RSA, two of which are in the LSA. Trapped species include squirrel, marten, beaver, weasel, coyote, fisher, lynx and muskrat.
Forestry	The RSA falls within the Dawson Creek Timber Supply Area (TSA), as well as Tree Farm License (TFL) 48 held by Canadian Forest Products Ltd. One Pulpwood Agreement, one Community Forest, two forest licenses, and three Special Use Permits (for roads) are also located in the LSA. Occupant Licenses to Cut are also held by a number of industrial interests for site clearing and road building.
Mining and Mineral Exploration	There are two coal leases (Quintette and Trend mines) and 47 coal licences within the LSA. HD Mining holds 27 of the 47 coal licences in the LSA. Ancillary tenures are held by mining companies in the LSA or RSA for aggregate extraction, water use, and miscellaneous industrial uses. Tenures are also held by mining companies for utilities and timber clearing.
Petroleum and Natural Gas	The LSA contains 32 petroleum and natural gas leases, held by 10 companies. Within the LSA, there are nine oil and gas pipeline tenures held by five companies. Spectra's pipeline transects the Project Assessment Footprint. Other ancillary tenures held by PNG companies are for industrial infrastructure (drill sites, well sites, etc.), utilities and aggregate extraction. One drillsite/wellsite is located in the Project Assessment Footprint.
Aggregates	Three construction companies hold four quarry tenures in the LSA, one of which is adjacent to the Project Assessment Footprint. Within the RSA, one construction company holds one tenure for a quarry. Two tenures for quarries are held by other industrial interests. Ancillary tenures held by aggregate/construction companies include those for water diversion and use, and for clearing timber.

(continued)

Table 16.5-2. Summary of Land and Resource Interests within the Local and Regional Study Areas (completed)

Wind Power	Two wind power companies hold two tenures in the LSA. Ancillary tenures held by wind power companies in the LSA are for clearing timber.
Domestic Water Use	There are five water licenses in the LSA held by industrial interests. There are no domestic water licences in the LSA. Within the RSA, the City of Dawson Creek holds one water licence, authorizing it to draw water from the Kiskatinaw River for storage and waterworks. Industrial interests hold 43 additional water licenses in the RSA. There are no commercial water licences in the LSA or RSA.
Transportation	The LSA encompasses portions of Highway 52 and 20 resource roads, including the Murray River Forest Service Road. Three of these roads overlap the Project Assessment Footprint.
Utilities and Communication	The LSA contains one communication site and eight utility tenures. BC Hydro and Power Authority has a transmission line running through the LSA. The remainder of these tenures in the LSA are held by other industrial interests. There are ten additional communication sites, and 15 additional utility tenures in the RSA. BC Hydro holds four of the utility tenures, while Telus Communications holds one utility tenure and one communication site. The remainder of these tenures in the RSA are held by other industrial interests.

16.5.3.1 Private Lands

No private lands overlap the Project footprint. There are a total of 84 fee simple parcels within or overlapping the LSA (Table 16.5-3 and Figure 16.5-4). The majority of these are in a development known as Tumbler Ridge South (DTR 2012), along Highway 52, in the northeast corner of the LSA. Tumbler Ridge South is a combination of rural residential and heavy industrial lots. An additional 1,466 parcels are outside of the LSA but within or overlapping the RSA. The vast majority of these (1,450 or 99%) are within the Tumbler Ridge townsite, at the northern boundary of the RSA. Figure 16.5-5 shows the location of private lands in relation to the RSA.

Table 16.5-3. Fee Simple Parcels within the Non-traditional Land Use Local Study Area

Parcel Identification Number (PID)	Area (ha)	Parcel Identification Number (PID)	Area (ha)
District Lot 3198, Peace River District		10602003	57.55
District Lot 4154, Peace River District		27883850	33.49
District Lot 4154, Peace River District		27883850	24.96
District Lot 3184, Peace River District (Heavy Industrial)			
29207649	1	5612357	0.25
6991149	0.99	6990959	1.01
26611627	0.6	16024222	0.49
6991114	0.51	5855578	0.99
5855551	0.5	6991084	0.52
5855535	0.5	6990975	0.5
5855501	1.01	6991033	0.75
5612373	0.24	28987713	2
6991025	0.51	6991050	0.5
5855471	0.99	6991009	0.5

(continued)

Table 16.5-3. Fee Simple Parcels within the Non-traditional Land Use Local Study Area (completed)

Parcel Identification Number (PID)	Area (ha)	Parcel Identification Number (PID)	Area (ha)
District Lot 4134, Peace River District (Rural Residential)			
27317765	0.48	27317501	2.37
27317757	0.4	27317455	2.06
27317633	0.72	27317510	3.72
27317650	0.48	27317447	2.16
27317641	0.57	27317439	2.01
27317684	0.42	27317811	3.16
27317749	0.41	27317412	3.09
27317625	0.57	27317285	2
27317731	0.4	27317404	2.26
27317722	0.39	27317803	0.72
27317617	0.56	27317421	2
27317838	1.47	27317391	2.17
27317714	0.39	27317790	2.7
27317706	0.4	27317293	2.2
27317609	0.63	27317307	2
27317692	0.38	27317315	2.7
27317595	0.4	27317382	2.45
27317544	2.02	27317323	2
27317587	0.4	27317374	2.01
27317676	0.39	27317331	2.05
27317579	0.4	27317366	2
27317668	0.38	27317340	2
27317561	0.4	27317358	2
27317552	0.4	27317277	2.91
27317536	2.01	27317773	0.65
27317820	1.92	27317781	17.63
27317528	2.03	27317242	2
27317480	2.01	27317234	2.38
27317471	2.45	27317269	2.01
27317498	2.05	27317251	2
27317463	2.17		

16.5.3.2 Parks and Protected Areas

There are no provincial or federal parks or protected areas located within the LSA or near Project infrastructure. Provincial parks and protected areas in the RSA include part of or 32% of Bearhole Lake Provincial Park and Protected Area (5,779 ha; Figure 16.5-6). This 17,460 ha park is located 25 km east of Tumbler Ridge, and is accessed via the Kiskatinaw Forest Service Road from the Heritage Highway (Highway 52N).

Figure 16.5-4
Private Lands in the Local Study Area

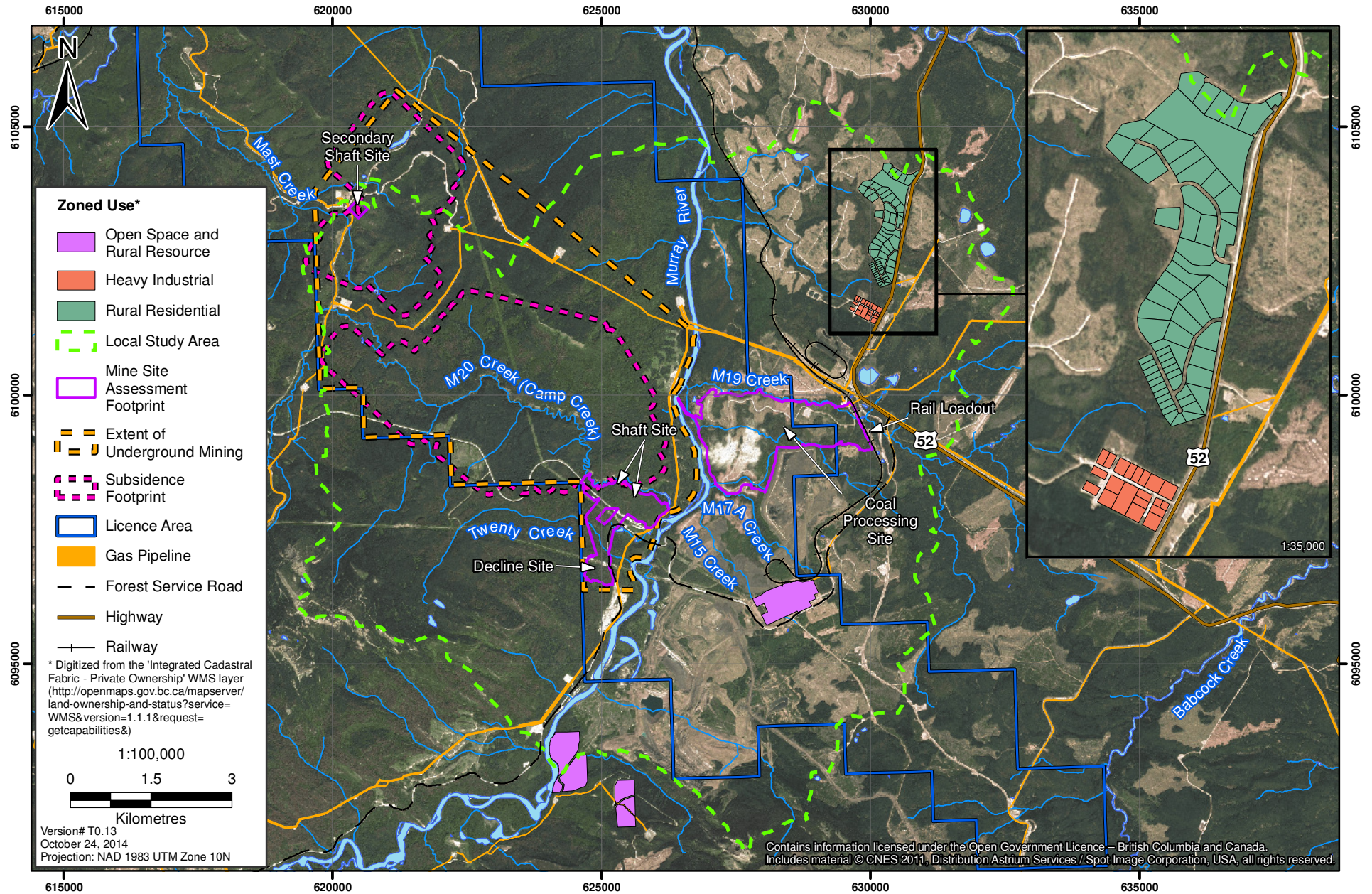


Figure 16.5-5
Private Lands in the Local and Regional Study Areas

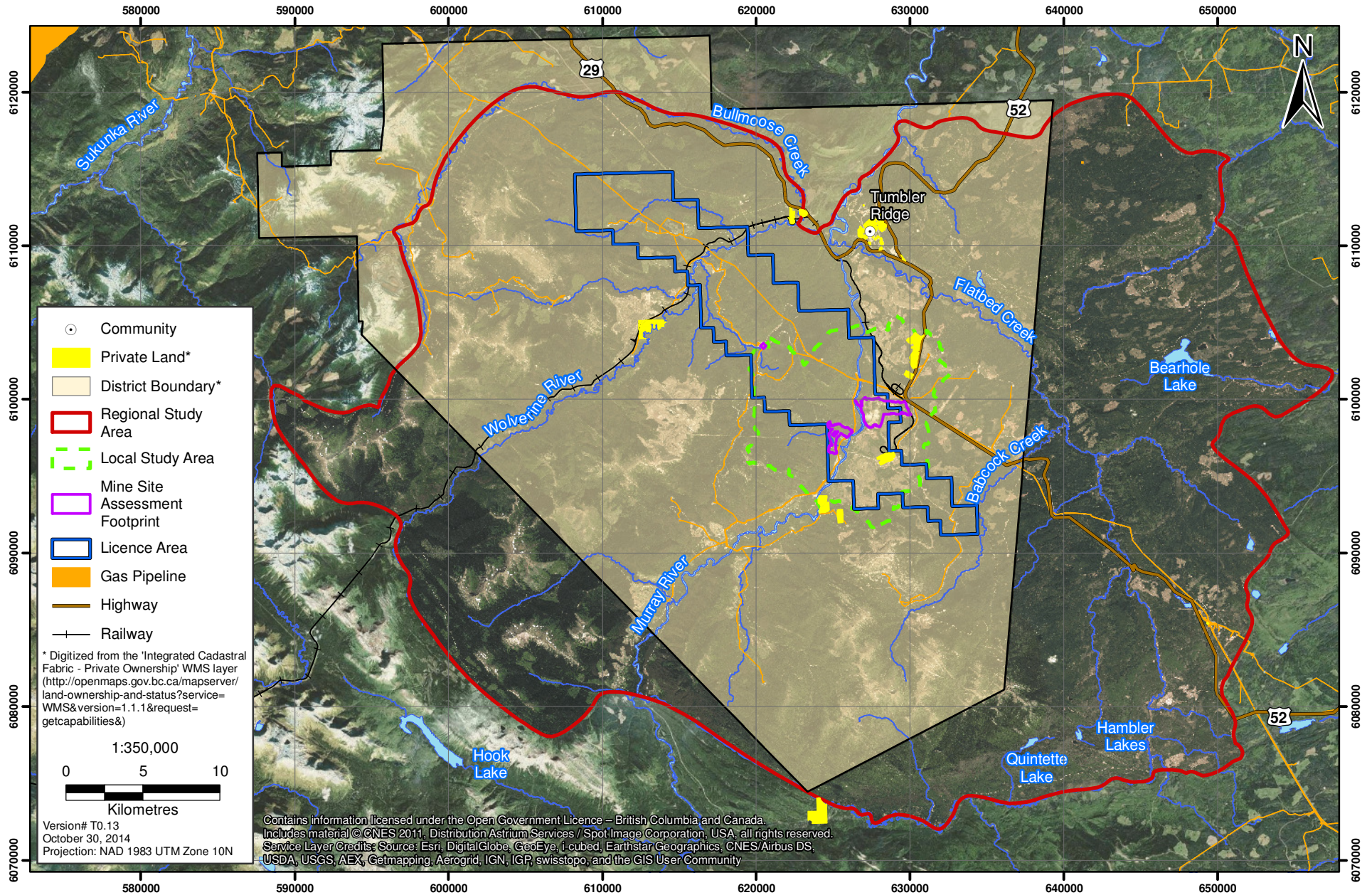
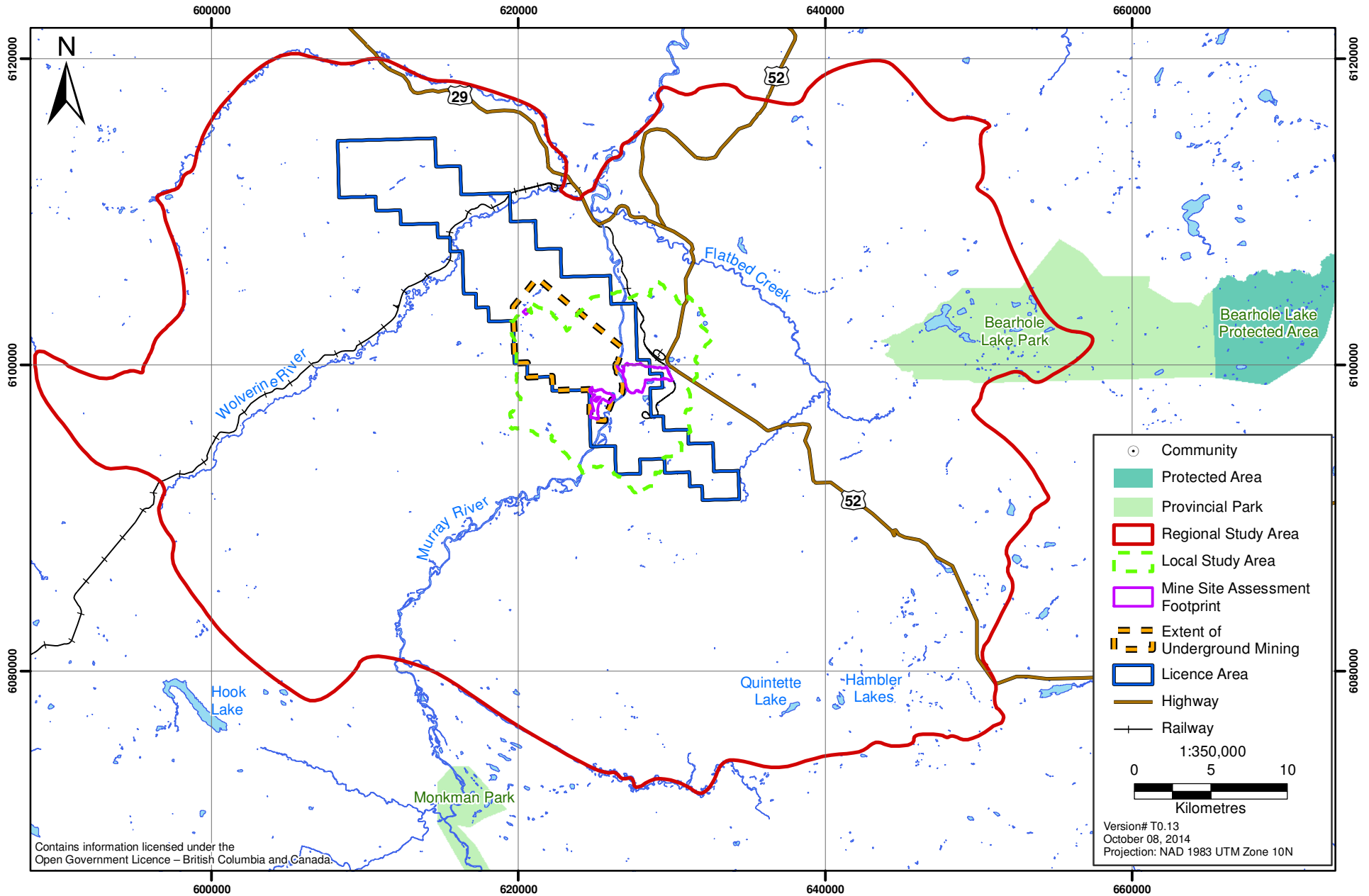


Figure 16.5-6
Parks and Protected Areas in the Land Use Baseline Regional Study Area



The headwaters of the Kiskatinaw River watershed, a water supply source for the City of Dawson Creek, are within the boundaries of Bearhole Lake Provincial Park (see Section 16.5.3.14; City of Dawson Creek 2007). Use of the park is dependent on the condition of the roads providing access to the park. There is no data on the number of visits due to limited staffing capacity and lack of traffic counters (D. Merritt, pers. comm., 2012).

16.5.3.3 *Fishing and Angling*

There are no commercial angling guides operating within the RSA or LSA. Aside from the Murray River, there are several popular fishing destinations outside of the RSA². The Murray River provides recreational fishing opportunities for grayling, bull trout and whitefish.

16.5.3.4 *Recreation and Tourism*

Tourist attractions and activities within and near the LSA and RSA are focused on the outdoor environment (Economic Growth Solutions Inc. 2008). Recreational activities include wildlife viewing, boating/canoeing, hiking, snowmobiling, and all-terrain vehicle (ATV) use. The area has a network of recreational trails, with over 40 trails actively used by hikers, trail runners, snowmobilers, and ATV riders (Figure 16.5-7).

Campsites

There are no commercial campgrounds or recreation sites within the LSA. Within the RSA, there is one private campground (Lions Campground) and one forestry recreation site with camping facilities (Figure 16.5-7).

The Lions Campground is situated on the banks of the Flatbed Creek, three km south of Tumbler Ridge. The campground has 40 campsites with basic amenities. The site is open from May to October.

The Flatbed Creek forestry recreation site, located 32 km southeast of Tumbler Ridge along Highway 52, maintains six campsites and offers canoeing, fishing, boating, and nature study.

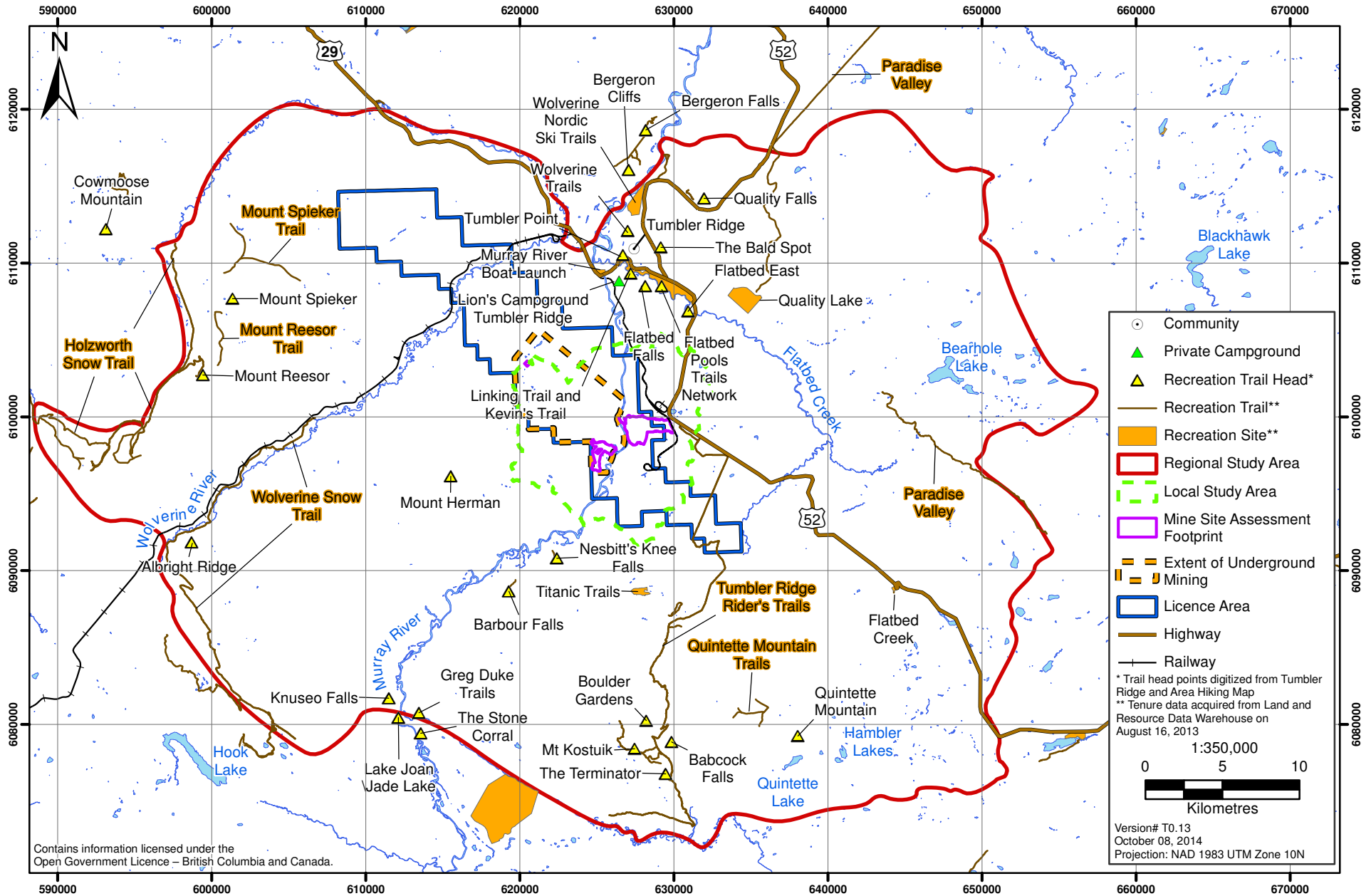
Hiking and Outdoor Clubs

The Wolverine Nordic and Mountain Society in Tumbler Ridge promotes non-motorized recreation (including hiking, cross country skiing, ski touring, ice climbing, mountain biking, paddling, and dog sledding) in the RSA. The club is responsible for establishing many of the area's hiking trails, and has an agreement with BC MFLNRO to maintain these trails (T. Bennett, pers. comm., 2012).

There are no hiking trails within the LSA. Three trails border the LSA – Mt. Hermann, Barbour Falls and Nesbitt's Knee Falls – and travel through the LSA is required to access these trails (C. Helm, pers. comm., 2012). In addition to these three trails, there are fourteen trails within the RSA (Figure 16.5-7).

² Popular fishing areas outside of the RSA include Monkman Lake, Gwillim Lake, Moose Lake, Quality Lake, Stony Lake, and the edge of the Murray River, near Tumbler Ridge.

Figure 16.5-7
Recreation in the Land Use Baseline Study Areas



The Tumbler Ridge Museum Foundation provides guided, interpretive, dinosaur trackway tours in the summer months. None of these trackways are located within the LSA. In the RSA, trackway sites are located upriver from Flatbed Falls at Cabin Pool, as well as at Wolverine River under the Highway 29 bridge crossing (DTR n.d.-c).

Snowmobiling

The Ridge Riders Snowmobile Association in Tumbler Ridge maintains over 300 km of snowmobile trails in the area. The Core Lodge Riding Area is located in the RSA. This area has a backcountry cabin which accesses a number of trailheads (DTR n.d.-b). Trails include the Tumbler Ridge Rider's Trail, the Mount Reesor Trail and Mount Spieker Trail. None of the trails overlap with the LSA. Snowmobile trails are heavily used in the winter, with 200 to 300 people using them per day (D. Merritt, pers. comm., 2012).

All-Terrain Vehicles

There are no established ATV trails, but there is a network of cutlines and forestry roads which constitute more than 300 km of informal trails (DTR n.d.-a). In many areas, ATVs are restricted above 1,400 m and generally follow existing access corridors (T. Bennett, pers. comm., 2012).

Boating

There is white-water kayaking on Flatbed Creek (DTR n.d.-b). Lorne's Jet Boat Tours and Wild River Adventure Tours operates jet boat tours on the Murray River, which run from Pine River up to Kinuseo Falls. There are currently no water-based commercial recreation tenures in the RSA. In April 2012, Loiselle Investments Ltd. applied for a commercial recreation licence (Crown land tenure, file #8003270) for the purpose of canoeing on the Wolverine River (to the west of the LSA) and the lower portion of the Murray River (T. Moorhouse, pers. comm.). At the time of the writing of the Application/EIS, a licence had not yet been approved.

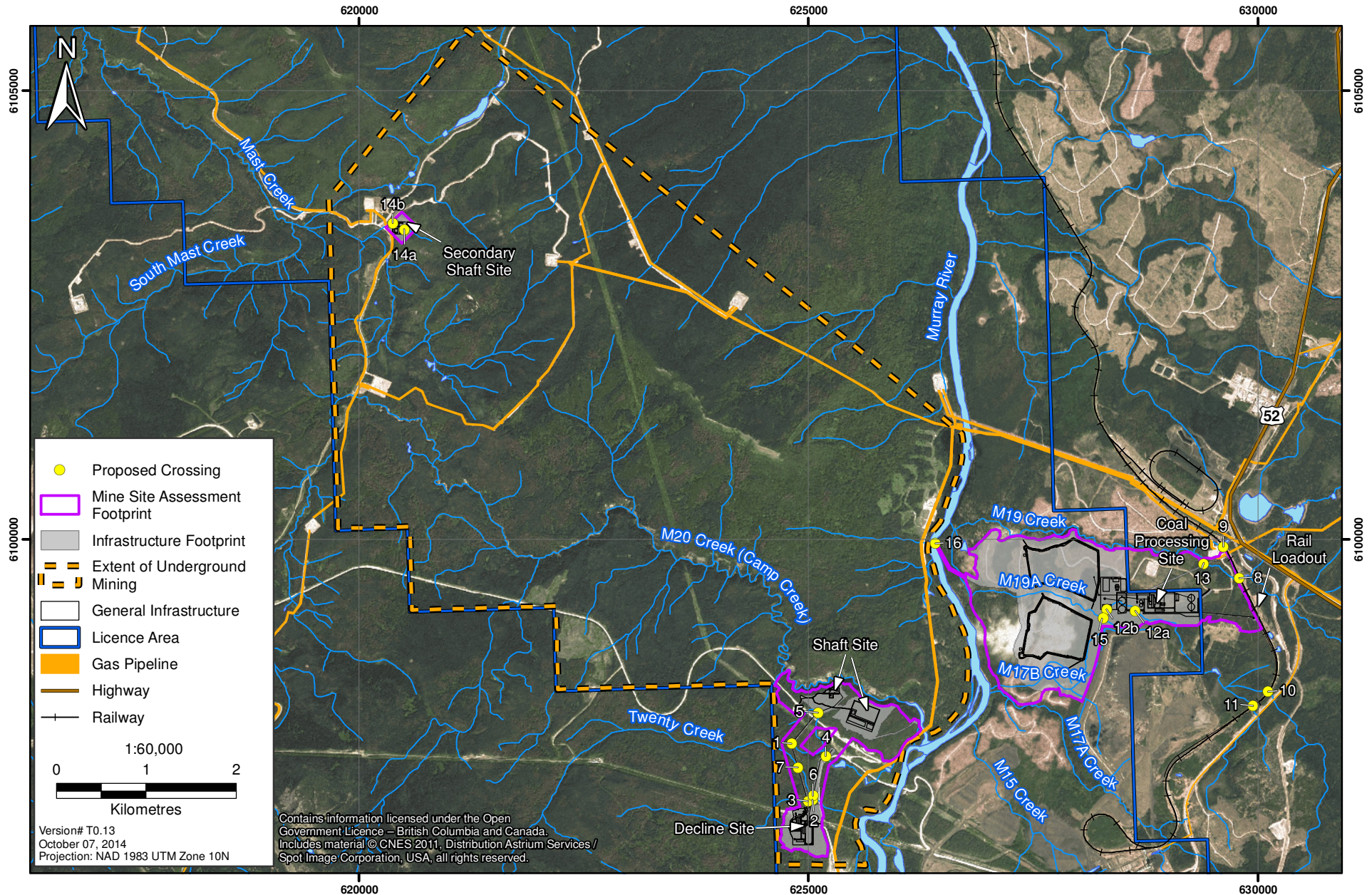
16.5.3.5 *Navigable Waters*

Watercourses that will interact with the Project, including the Murray River (Figure 16.5-8), are not listed in the Proposed List of Scheduled Waters (Transport Canada 2014) included in the *Navigation Protection Act* (2014). For potential crossings of tributaries of the Murray River (e.g., M19, M19A, Twenty, and Mast creeks), publically-available information does not identify any use of these watercourses. All of these tributaries are considered not navigable due to their physical characteristics (e.g., limited width/depth, and numerous obstructions), and flow conditions. The Murray River is the only navigable watercourse pursuant to the *Navigation Protection Act* (2014) (Appendix 16-B).

16.5.3.6 *Resident and Non-Resident Hunting*

The Project lies within administrative region 7B (Peace), and is overlapped by WMUs 7-20, 7-21, and 7-22 (Figure 16.5-9). Seventy-five percent of the LSA falls within WMU 7-21. WMU 7-20 overlaps 24% of the RSA. WMU 7-22 overlaps less than 1% of the RSA at its westernmost edge.

Figure 16.5-8
Identification of Watercourses that Intersect with the Project Layout



Between 1976 and 2010, resident hunter effort in WMU 7-21 averaged 9,083 hunter days per year, and hunting effort was focused on moose, followed by elk, mule deer, and white tail deer. Non-resident hunter effort in WMU 7-21 between 1976 and 2010 averaged 269 hunter days per year, with hunting effort directed primarily at black bear, but moose, elk, and grizzly bear were also hunted (Appendix 16-A).

Between 1976 and 2010, resident hunter effort in WMU 7-20 averaged 7,488 hunter days per year with hunter effort was focused on moose, followed by elk, mule deer, and white tailed deer. Non-residents concentrated their efforts on black bear, but elk, wolf, and moose were also hunted (Appendix 16-A).

There is a no shooting and no hunting area encompassing Mount Bergeron and Tumbler Ridge; and there is also a no shooting area within the Monkman Provincial Park (BC MFLNRO 2012b).

16.5.3.7 Guide Outfitting

Four guide outfitting tenures overlap the RSA (Figure 16.5-10 and Table 16.5-4). Guide outfitting licence 701254 overlaps the majority of the LSA, and over half of the RSA. There is one main base camp associated with this licence (commercial recreation license 0318950, located along Kinuseo Creek on the southern boundary of the RSA). Alpine Valley Outfitters operates guide outfitter licence 701258, which overlaps the northwestern part of the RSA, and the northwestern corner of the LSA. They also have four hunting camps within the portion of their tenure that overlaps the RSA (commercial recreation license 8013764). Tracks BC and High Prairie Outfitters Ltd. operate guide outfitter licence 701245, which overlaps a small north-western section of the RSA. Fredlund Guide Services operates guide outfitter licence 701249, which overlaps a small area of the southeast corner of the RSA.

Table 16.5-4. Guide Outfitting Licences in the Land Use Baseline Local and Regional Study Areas

License Number*	Operator	Target Species	Size (ha)	RSA overlap with license - ha (%)	LSA overlap with license - ha (%)
701254	[name withheld]	Black Bear, Grizzly Bear, Deer, Elk, Moose, Mountain Goat, Wolf	359,841	161,695 (45%)	11,579 (3%)
701258	Alpine Valley Outfitters	Black Bear, Grizzly Bear, Deer, Elk, Moose, Wolf	56,337	47,210 (84%)	514 (0.9%)
701249	Fredlund Guide Services	Black Bear, Grizzly Bear, Deer, Elk, Moose, Mountain Sheep, Mountain Goat	499,935	512 (0.1%)	0
701245	Tracks BC and High Prairie Outfitters Ltd.	Black Bear, Grizzly Bear, Cougar, Deer, Elk, Moose, Wolf	831,004	18,198 (22%)	0

* Current as of December 2013

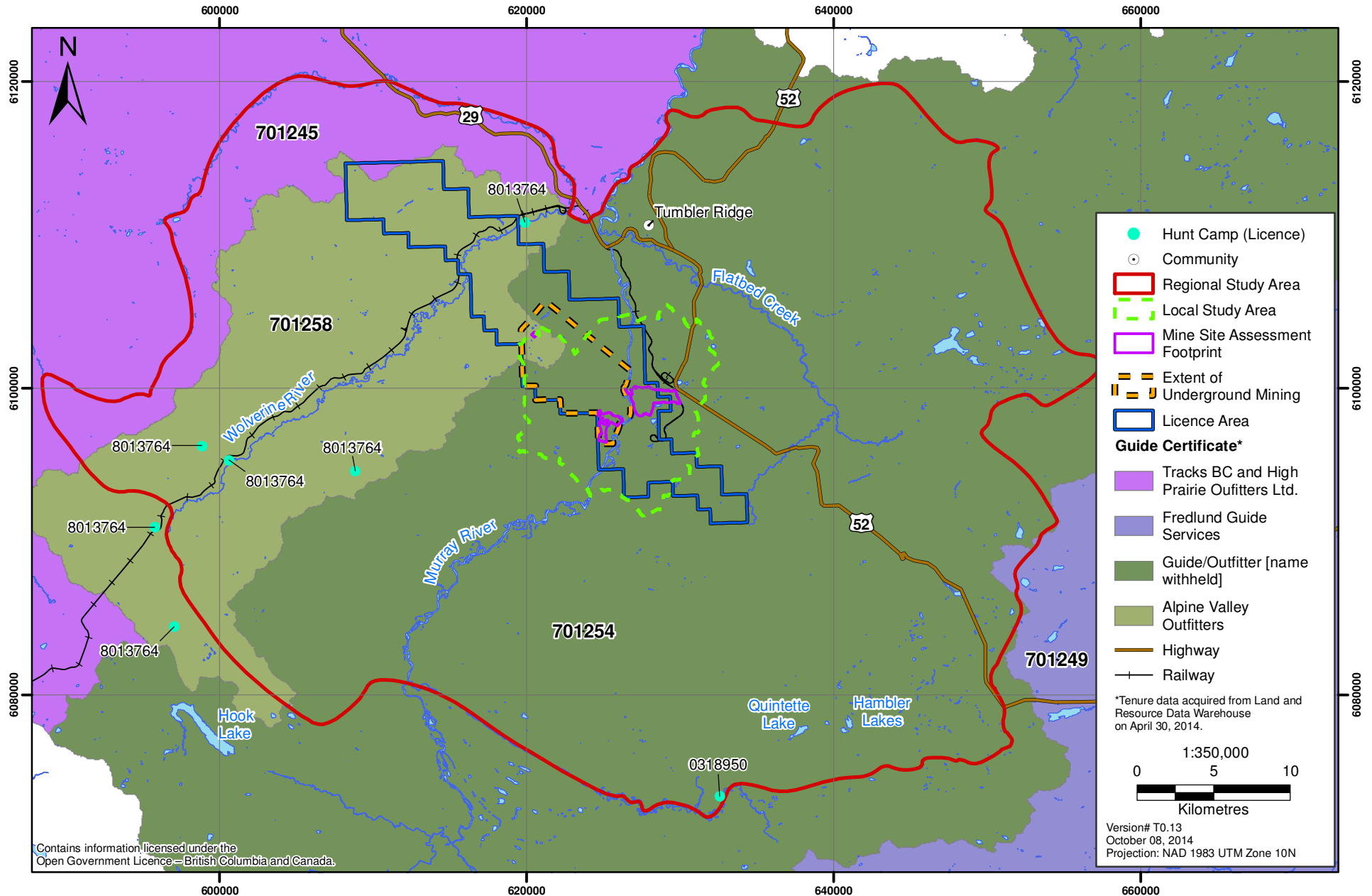
Source: BC MFLNRO (2013d)

16.5.3.8 Trapping

Three registered traplines, TR0721T006, TR0721T003, and TR0721T005, overlap the LSA. The boundaries of the RSA overlap an additional seven registered traplines (Table 16.5-5 and Figure 16.5-11).

Figure 16.5-10

Guide Outfitting Licences and Hunt Camps in the Land Use Baseline Study Areas



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Figure 16.5-11

Registered Traplines and Trapline Cabins in the Land Use Baseline Study Areas

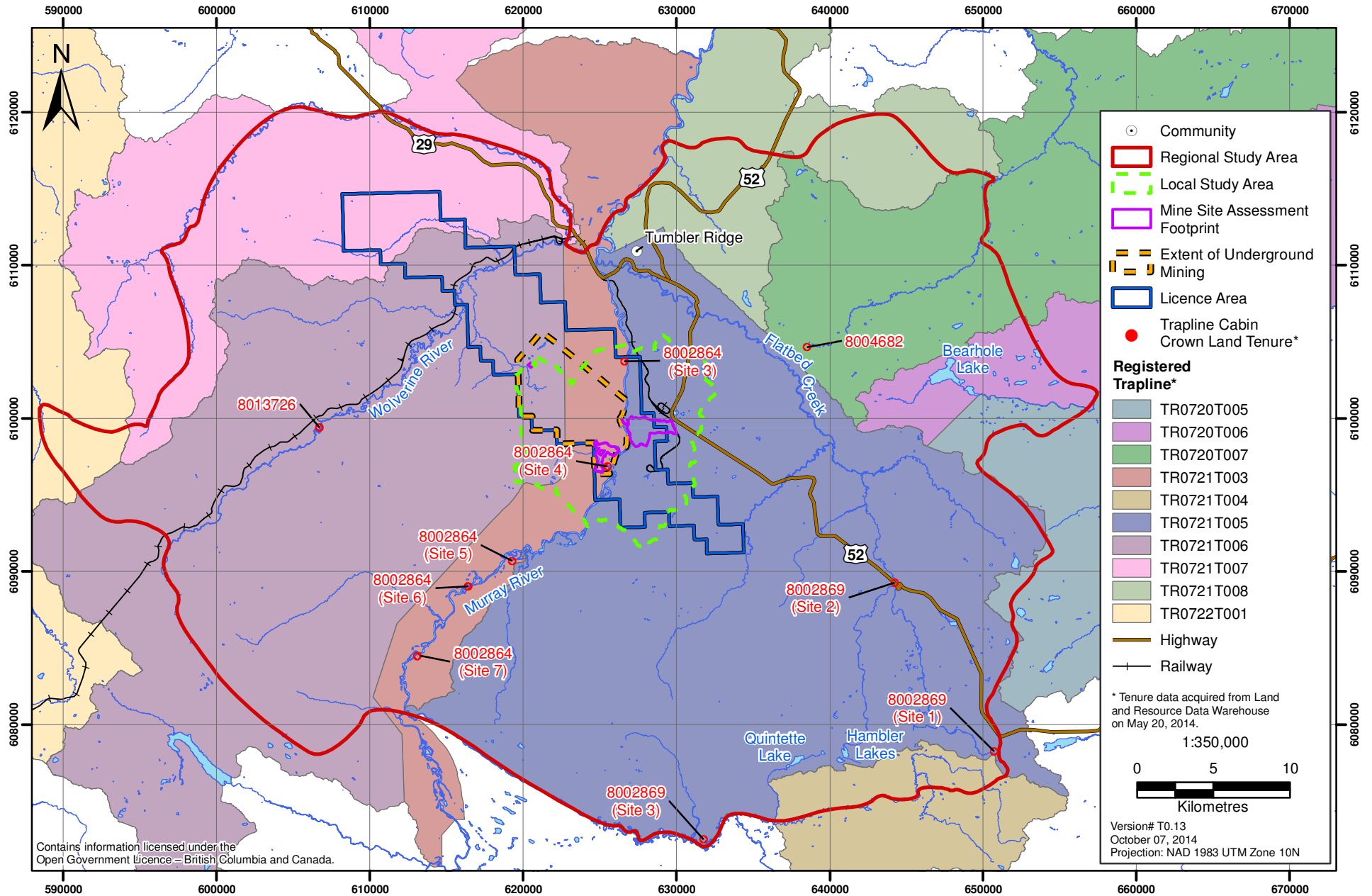


Table 16.5-5. Registered Traplines in the Local and Regional Study Areas

Trapline Number*	Interest Area (ha)	RSA Overlap with Trapline - ha (%)	LSA Overlap with Trapline - ha (%)	Trapline Area in Relation to the Project
TR0720T005	24,585	2,711 (11%)	n/a	A small portion overlaps the eastern edge of the RSA.
TR0720T006	30,921	5,563 (18%)	n/a	Majority of the tenure is located in the western area of the RSA. The tenure overlaps the eastern portion of the LSA.
TR0720T007	47,448	17,689 (37%)	n/a	A large portion of the tenure overlaps the northwestern area of the RSA.
TR0721T003	26,725	13,005 (49%)	3,633 (14%)	Project Assessment Footprint is within this trapline area.
TR0721T004	30,233	3,835 (13%)	n/a	A small portion overlaps the southeast corner of the RSA.
TR0721T005	88,356	86,571 (98%)	6,187 (7%)	Project Assessment Footprint is within this trapline area. Trapline area overlaps the eastern portion of the RSA.
TR0721T006	85,812	62,491 (73%)	2,273 (3%)	A small portion of this trapline area is located within the western boundary of the LSA and overlaps western portion of the RSA.
TR0721T007	51,826	22,113 (43%)	n/a	A portion of the tenure overlaps with the northeastern section of the RSA.
TR0721T008	29,464	11,643 (40%)	n/a	A portion of the tenure overlaps with the northern section of the RSA.
TR0722T001	151,941	1,819 (0.1%)	n/a	A small portion overlaps with the western edge of the RSA.

* Current as of August 2013

n/a = not applicable

Source: BC MFLNRO (2013d)

Two trapline cabins are located in the LSA (*Land Act* tenure number 8002864, Sites 3 and 4); the RSA contains an additional eight trapline cabins (Figure 16.5-11). Trapline cabins are designated under the *Land Act* (1996c).

The most commonly trapped species in WMU 7-20 from 2000 to 2010 were squirrel, marten, beaver, and weasel. Yearly harvests over this time period varied. Over this time period, 8,423 animals were trapped in WMU 7-21 compared to 2,111 animals in WMU 7-20. The most commonly trapped species in WMU 7-21 were marten, squirrel, weasel, and beaver, and large numbers of coyote, fisher, lynx and muskrat were also harvested (BC MFLRNO n.d.).

16.5.3.9 Forestry

The LSA and RSA are located within the Dawson Creek TSA, which is approximately 2.3 million ha in size. The Dawson Creek TSA is administered by the Peace Forest District. The current allowable

annual cut (AAC) for the Dawson Creek TSA is 1.86 million cubic metres (BC MFLNRO 2013c). Canadian Forest Products Ltd. (Canfor) holds TFL 48 (Figure 16.5-12) which is comprised of five supply blocks in the western half of the Dawson Creek TSA; one of these blocks has Murray River as its eastern boundary and is overlapped by the LSA.

Harvesting in the Dawson TSA is currently focussed on pine, due to the effects of the mountain pine beetle in the TSA, and trees are still of saw-log quality within the first few years of infestation (B. Pate, Pers. Comm., 2012).

Forest Tenures

Within the LSA, there are nine forest tenures³ (Table 16.5-6 and Figure 16.5-12). Along with Canfor's TFL 48, West Fraser Mills Ltd. holds forest licence A13840 located in the southeastern and northeastern sections of the LSA. They also have five BC Timber Sales cutblocks (under license A64393) on the northwestern portion of the LSA within the mining area. The southeastern edge of the LSA encompasses a Community Forest Agreement held by the Tumbler Ridge Community Forest Corp., which provides for a harvest of 20,000 m³ annually for a period of 25 years, as well as the opportunity to manage and profit from other forest resources (BC MFLNRO 2011). The LSA is covered by Tembec's Pulpwood Agreement, which is a non-replaceable tenure that will expire in 2023. It is an area-based tenure that provides Tembec with rights to harvest a volume of timber from deciduous leading stands within a large defined area within the Dawson Creek and Fort St. John TSAs. Babcock Mountain Sawmills Ltd. holds an occupant licence to cut and a licence of occupation (#8014205, for log handling/storage) in the LSA. There are also three Special Use Permits granted under the *Forest Act* (1996b) for road rights-of-way.

Ancillary Tenures - Water Diversion and Use

There are no water licences held by forestry companies in the LSA. In the RSA, Chetwynd Forest Industries holds one water licence (C128105) over seven sites, which authorizes the withdrawal of water from three streams (Club Creek, Flatbed Creek, and Windfall Creek) and two rivers (Murray River and Wolverine River) (see Figure 16.5-18).

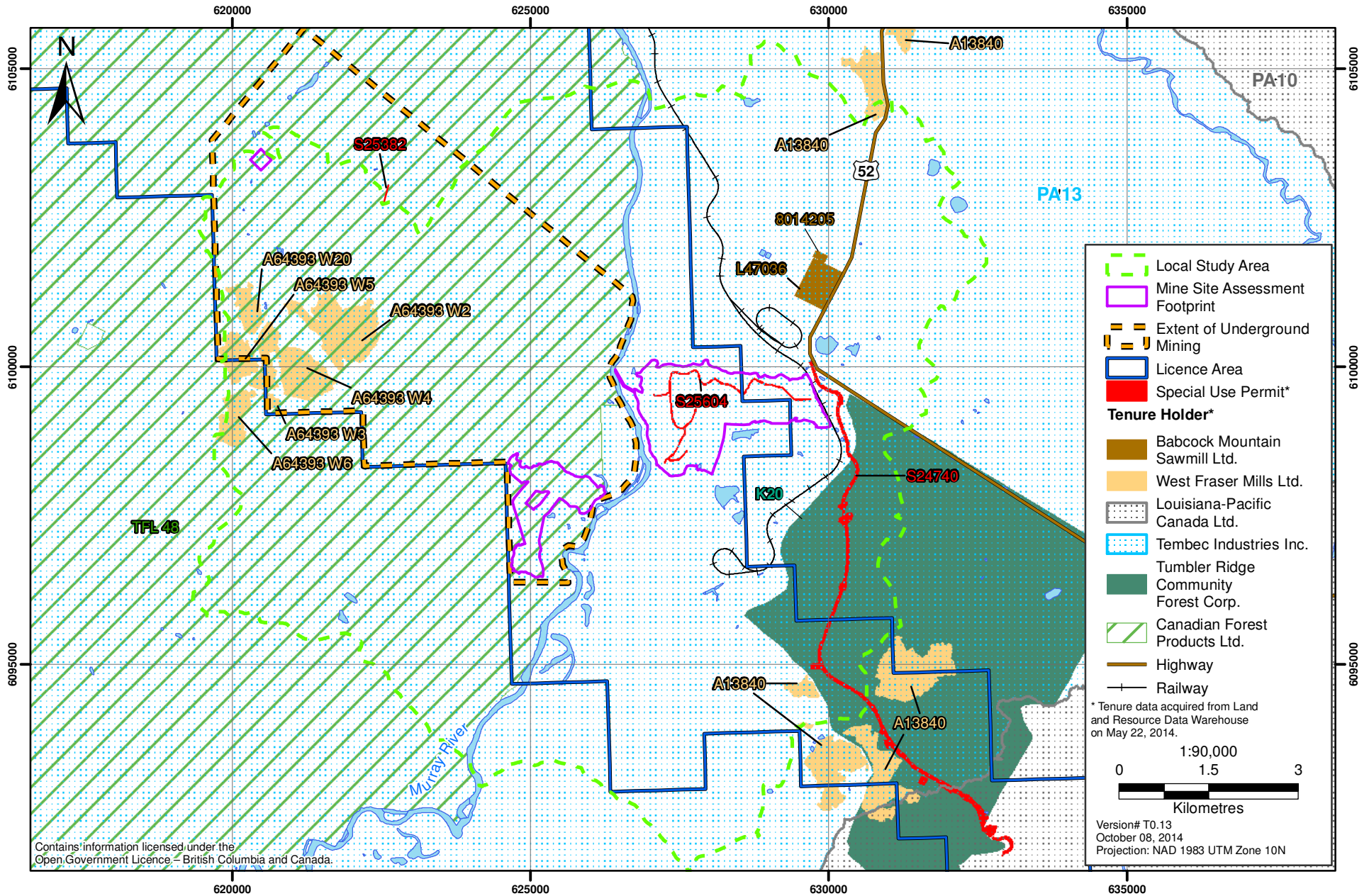
16.5.3.10 Coal Exploration and Mining

Coal Licences and Leases

There are two coal leases and 47 coal licences within the LSA. The Proponent holds 27 of the 47 coal licences in the LSA. The remaining 20 coal licences are held by 0541237 B.C. Ltd. (nine licences), Peace River Coal Inc. (nine licences), and Teck Coal Ltd. (two licences; Table 16.5-7 and Figure 16.5-13).

³ Occupant Licenses to Cut, which are typically held by non-forestry companies who need to cut trees in order to undertake their primary activity (e.g., site clearing and road building), are referred to as "ancillary tenures" in the chapter.

Figure 16.5-12
Forest Tenures in the Land Use Baseline Local Study Area



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Figure 16.5-13
Coal Tenures in the Land Use Baseline Local Study Area

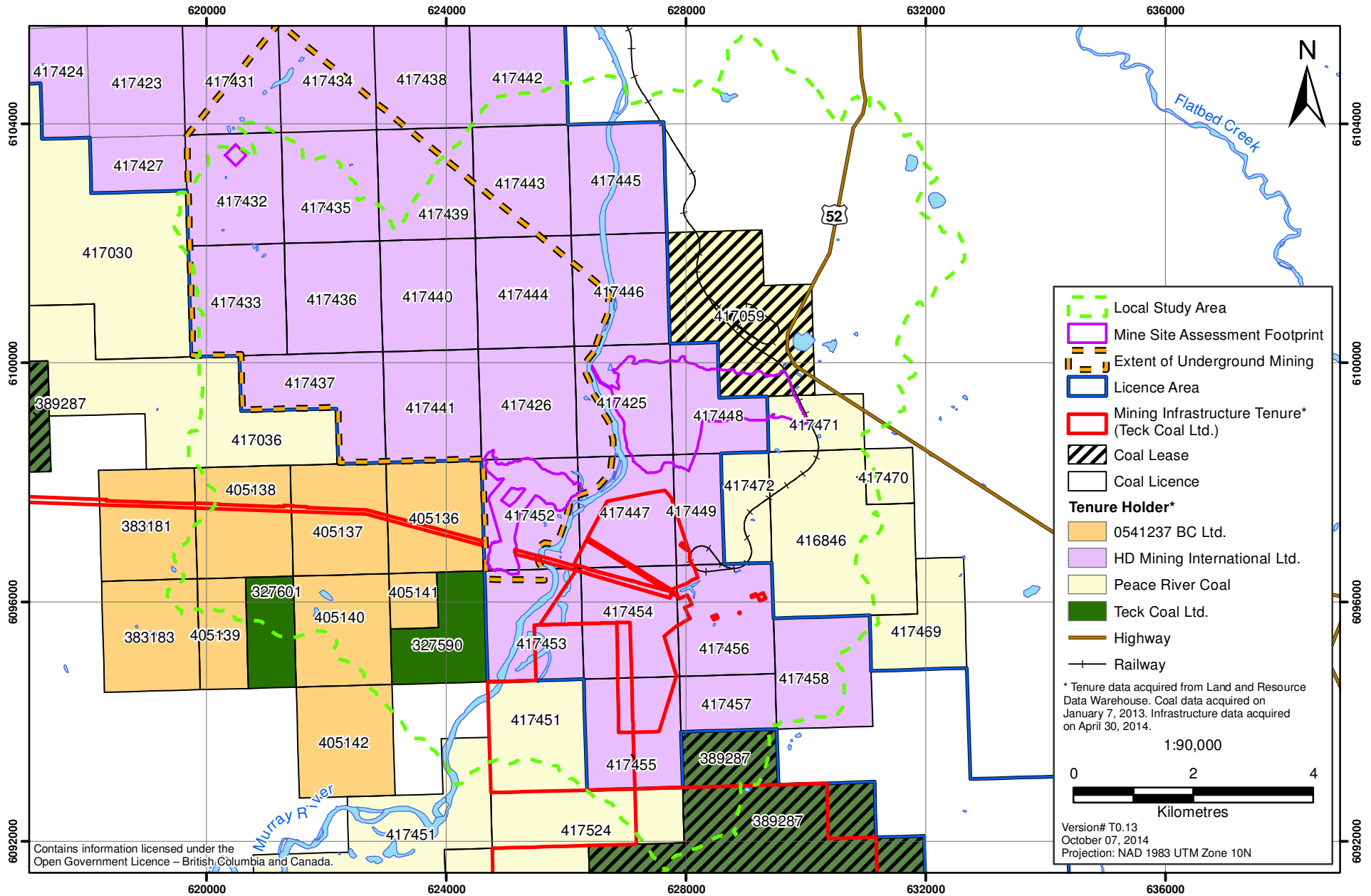


Table 16.5-6. Forest Tenures in the Local Study Area

Forest File ID*	Interest Holder	Tenure Type	Size (ha)	Overlap with LSA - ha (%)
L47036	Babcock Mountain Sawmills Ltd.	Occupant Licence to Cut	39	39 (100%)
S24740	Peace River Coal Inc.	Special Use Permit (road right-of-way)	45	25 (55%)
S25604	HD Mining International Ltd.	Special Use Permit (road right-of-way)	2.3	2.3 (100%)
S25382	Finavera Wind Energy Inc.	Special Use Permit (road right-of-way)	n/a	(0.45%)
TFL48	Canadian Forest Products Ltd.	Tree Farm Licence	643,433	5,692 (0.9%)
PA13	Tembec Industries Inc.	Pulpwood Agreement	831,619	12,093 (1.45%)
K2O	Tumbler Ridge Community Forest Corp.	Community Forestry Agreement	22,000	711 (3%)
A64393 (cutting permit W3)	West Fraser Mills Ltd.	BC Timber Sales	19	19 (100%)
A64393 (cutting permit W4)	West Fraser Mills Ltd.	BC Timber Sales	73	73 (100%)
A64393 (cutting permit W5)	West Fraser Mills Ltd.	BC Timber Sales	36	36 (100%)
A64393 (cutting permit W6)	West Fraser Mills Ltd.	BC Timber Sales	36	36 (100%)
A64393 (cutting permit W20)	West Fraser Mills Ltd.	BC Timber Sales	27	27 (100%)
A64393 (cutting permit W2)	West Fraser Mills Ltd.	BC Timber Sales	102	102 (100%)
A13840 (cutting permit 128)	West Fraser Mills Ltd.	Forest Licence	240	12 (5%)
A13840 (cutting permit 124)	West Fraser Mills Ltd.	Forest Licence	92	5.4 (6%)

* Current as of August, 2013

Source: BC MFLNRO (2013d)

n/a= not available in hectare(s)

Table 16.5-7. Coal Tenures (Non-Proponent) in the Local Study Area

Tenure Number*	Interest Holder	Interest Type	Overlaps with Project Assessment Footprint (Y/N)
383181	0541237 B.C. Ltd.	Licence	N
383183	0541237 B.C. Ltd.	Licence	N
405136	0541237 B.C. Ltd.	Licence	N
405137	0541237 B.C. Ltd.	Licence	N
405138	0541237 B.C. Ltd.	Licence	N
405139	0541237 B.C. Ltd.	Licence	N
405140	0541237 B.C. Ltd.	Licence	N
405141	0541237 B.C. Ltd.	Licence	N
405142	0541237 B.C. Ltd.	Licence	N

(continued)

Table 16.5-7. Coal Tenures (Non-Proponent) in the Local Study Area (completed)

Tenure Number*	Interest Holder	Interest Type	Overlaps with Project Assessment Footprint (Y/N)
417059	Peace River Coal Inc.	Lease	Y
416846	Peace River Coal Inc.	Licence	N
417030	Peace River Coal Inc.	Licence	N
417036	Peace River Coal Inc.	Licence	N
417451	Peace River Coal Inc.	Licence	N
417469	Peace River Coal Inc.	Licence	N
417470	Peace River Coal Inc.	Licence	N
417471	Peace River Coal Inc.	Licence	Y
417472	Peace River Coal Inc.	Licence	N
417524	Peace River Coal Inc.	Licence	N
389287	Teck Coal Ltd.	Lease	N
327590	Teck Coal Ltd.	Licence	N
327601	Teck Coal Ltd.	Licence	N

* Current as of February 2013

Source: BC MFLNRO (2013d)

Coal lease #417059 covers Peace River Coal Inc.'s Trend open pit coal mine, which produces hard coking coal. This lease overlaps with the northeast corner of the Project Assessment Footprint. Coal lease #389287 covers Teck Coal Ltd.'s Quintette metallurgical coal project, located on the east side of the Murray River in the southeast corner of the LSA.

Ancillary Tenures

Aggregate Extraction

Within the LSA, Teck Coal Ltd. holds a Licence of Occupation (#8003072) authorizing the excavation of sand and gravel (see Figure 16.5-16). This licence overlaps with the southern tip of the Project Assessment Footprint. No other quarry tenures are held by mining companies in the LSA or RSA.

Industrial Infrastructure

Within the LSA, there are eight *Land Act* industrial tenures held by Teck Coal Ltd. (Table 16.5-8 and Figure 16.5-13). Teck's Quintette Mine conveyor (Tenure #8003317, now decommissioned) crosses the Project Assessment Footprint.

Water Diversion and Use

Within the LSA, two mining companies hold three water licences. Peace River Coal Inc. holds a licence to withdraw water from MT100 Creek for sediment control and dust control. Teck Coal Ltd. withdraws water from the Murray River for coal washing, and Fifteen Creek for land improvement. (Table 16.5-9; see Figure 16.5-18). The Proponent has a water licence to withdraw water for dust control.

Table 16.5-8. Land Act Tenures Held by Mining Companies in the Local Study Area

File Number*	Interest Holder	Tenure Purpose	Tenure Subpurpose	Tenure Type	Tenure Area (ha)	Overlap with LSA - ha (%)
8002983	Teck Coal Ltd.	Industrial	Mineral Production	Standard Lease	579	579 (100%)
8003317	Teck Coal Ltd.	Industrial	Mineral Production	Statutory Right of Way (or Easement)	98	55 (56.33%)
8003491	Teck Coal Ltd.	Industrial	Mineral Production	Standard Lease	5,540	703 (12.70%)
8003545 (site 1)	Teck Coal Ltd.	Industrial	Miscellaneous	Licence of Occupation	1.1	1.1 (100%)
8003545 (site 2)	Teck Coal Ltd.	Industrial	Miscellaneous	Licence of Occupation	0.26	0.26 (100%)
8003545 (site 3)	Teck Coal Ltd.	Industrial	Miscellaneous	Licence of Occupation	0.03	0.03 (100%)
8003545 (site 4)	Teck Coal Ltd.	Industrial	Miscellaneous	Licence of Occupation	0.48	0.48 (100%)
8003545 (site 5)	Teck Coal Ltd.	Industrial	Miscellaneous	Licence of Occupation	0.60	0.60 (100%)

* Current as of March 2013

Source: BC MFLNRO (2013d)

Table 16.5-9. Water Licences Held by Mining Companies in the Local Study Area

License Number*	Tenure Holder	Stream Name	Purpose/Use
C120821	Peace River Coal Inc.	MT100 Creek	Dust control and sediment control
C058880	Teck Coal Ltd.	Murray River	Coal washing
C103818	Teck Coal Ltd.	Fifteen Creek	Land improvement

* Current as of July 2013

Source: BC MFLNRO (2013d)

Within the RSA, four mining companies hold 13 water licences, to withdraw water from various creeks (Table 16.5-10; see Figure 16.5-18).

Table 16.5-10. Water Licences Held by Mining Companies in the Regional Study Area

License Number	Tenure Holder	Stream Name	Purpose/Use
C124178	Peace River Coal Inc.	GT16C Creek	Not provided
		GT16E Creek	Not provided
		GT20 Creek	Not provided
		GT22A Creek	Not provided
		GT22C Creek	Not provided

(continued)

Table 16.5-10. Water Licences Held by Mining Companies in the Regional Study Area (completed)

License Number	Tenure Holder	Stream Name	Purpose/Use
C124178 (cont'd)	Peace River Coal Inc. (cont'd)	GT26 Creek	Not provided
		GT28 Creek	Not provided
		GT32 Creek	Not provided
		GT42A Creek	Not provided
C121160	Peace River Coal Inc.	BT11 Creek	Dust control
		BT13 Creek	Dust control
		BT11 Creek	Fire protection
		BT13 Creek	Fire protection
		BT11 Creek	Sediment control
		BT13 Creek	Sediment control
C120968	Peace River Coal Inc.	BT17 Creek	Sediment control
C121982	Peace River Coal Inc.	BT-31A Creek	Sediment control
		GT-42L Creek	Sediment control
C120821	Peace River Coal Inc.	MT100 Creek	Sediment control
		MT100 Creek	Dust Control
C058993	Teck Coal Limited	Mesa Creek	Sediment control
C058992	Teck Coal Limited	W9 Creek	Sediment control
C120869	0762998 B.C. Unlimited Liability Company	W12 Creek	Dust control
		W6 Creek	Dust control
		W12 Creek	Mining-washing coal
		W6 Creek	Mining-washing coal
C120674	0762998 B.C. Unlimited Liability Company	W12 Creek	Sediment control
C120673	0762998 B.C. Unlimited Liability Company	W6 Creek	Sediment control
C120868	Wolverine Coal Partnership	W4 Creek	Sediment control
C122889	Wolverine Coal Partnership	Perry Creek	Dust control
		Two Creek	Dust control
		Wolverine River	Dust control
C124105	Wolverine Coal Partnership	W4 Creek	Sediment control

* Current as of July 2013.

Source: BC MFLNRO (2013d)

Utilities

There are no utilities tenures held by mining companies in the LSA. Within the RSA, Teck Coal Ltd. holds four tenures for hydroelectric power lines (Table 16.5-11; see Figure 16.5-20).

Timber Clearing

Within the LSA, two mining companies hold five licences to cut (Table 16.5-12).

Table 16.5-11. Utility Tenures held by Mining Companies in the Regional Study Area

File Number*	Tenure Holder	Tenure Type	Purpose
8003348	Teck Coal Ltd.	Utility Right-of-way	Electric Power Line
8003508	Teck Coal Ltd.	Utility Right-of-way	Electric Power Line
8004041	Teck Coal Ltd.	Utility Right-of-way	Electric Power Line
8004042	Teck Coal Ltd.	Utility Right-of-way	Electric Power Line

* Current as of August 2013

Source: BC MFLNRO (2013d)

Table 16.5-12. Forestry Tenures held by Mining Companies in the Local Study Area

Forest File ID	Interest Holder	Tenure Type	Size (ha)	Overlap with LSA - ha (%)
L47471	Peace River Coal Inc.	Occupant Licence To Cut	11	7.3 (67%)
L46863	Peace River Coal Inc.	Occupant Licence To Cut	78	78 (100%)
L49134	Teck Coal Ltd.	Occupant Licence To Cut	5.3	0.84 (16%)
L49155	Teck Coal Ltd.	Occupant Licence To Cut	27	0.38 (1%)
L49010	Teck Coal Ltd.	Occupant Licence To Cut	3.1	3.1 (100%)

*Current as of April 2013

Source: BC MFLNRO (2013d)

16.5.3.11 Petroleum and Natural Gas

Petroleum and Natural Gas Leases and Drill Licences

The LSA contains 32 petroleum and natural gas leases, which are held by ten companies (Table 16.5-13 and Figure 16.5-14). Canadian Natural Resources Ltd. holds about 60% of the leases. There are no drill licences in the LSA.

Table 16.5-13. Petroleum and Gas Leases in the Local Study Area

Title Number*	Tenure Holder	Area (ha)	Overlap with LSA - ha (%)
52369	Apache Canada Ltd./Devon Canada Corp.	3,261	335 (10.28%)
4566	Canadian Natural Resources Ltd.	296	37 (12.42%)
8876	Canadian Natural Resources Ltd./Suncor Energy Inc.	296	122 (41.05%)
12125	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	1,189	5.3 (16.90%)
12533	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	549	364 (66.32%)

(continued)

Table 16.5-13. Petroleum and Gas Leases in the Local Study Area (completed)

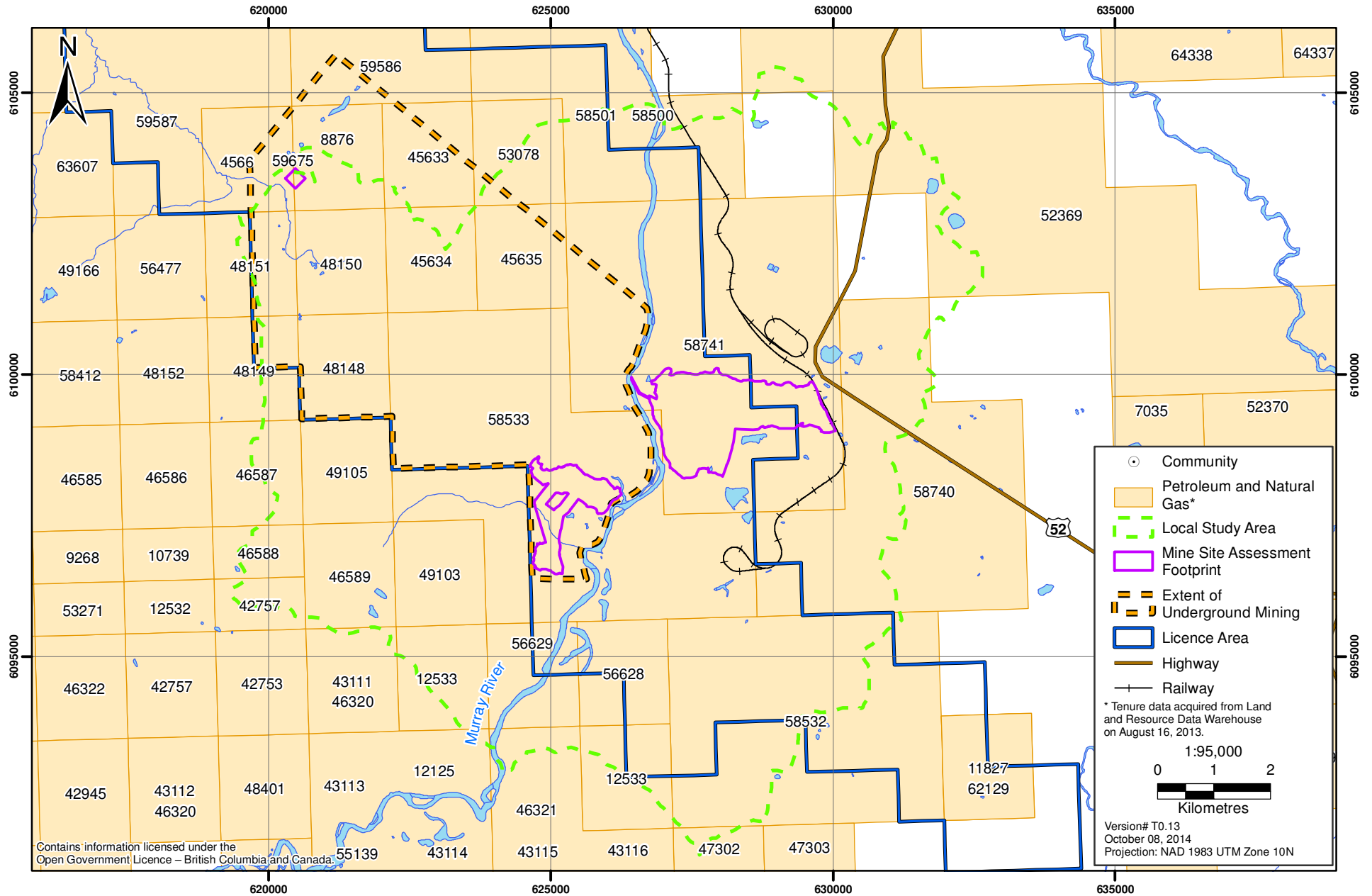
Title Number*	Tenure Holder	Area (ha)	Overlap with LSA - ha (%)
42757	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	445	68 (15.27%)
43111	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	297	12 (38.92%)
45633	Canadian Natural Resources Ltd.	296	12 (41.08%)
46320	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	594	12 (19.46%)
46321	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	1,486	77 (5.19%)
46587	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	297	127 (42.88%)
46588	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	148	96 (64.66%)
46589	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	297	290 (97.69%)
47302	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	297	20 (6.75%)
48151	Canadian Natural Resources Ltd.	296	157 (53.11%)
56628	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	297	297 (100%)
56629	Canadian Natural Resources Ltd./Imperial Oil Resources/ Talisman Energy Inc.	297	297 (100%)
58740	Canadian Natural Resources Ltd./Suncor Energy Inc.	1,781	928 (52.13%)
59675	Canadian Natural Resources Ltd.	889	158 (16.80%)
58500	Encana Corporation/ Suncor Energy Inc.	3,553	485 (13.66%)
58501	Encana Corporation/ Suncor Energy Inc.	2,961	485 (16.39%)
58741	Encana Corporation/ Suncor Energy Inc.	2,373	2,373 (100%)
49103	Imperial Oil Resources Ltd./ Talisman Energy Inc.	297	297 (100%)
49105	Canadian Natural Resources Ltd.	297	297 (100%)
48148	Meridian Land Services (90) Ltd.	297	297 (100%)
48149	Meridian Land Services (90) Ltd.	297	122 (41.15%)
48150	Meridian Land Services (90) Ltd.	296	296 (100%)
45634	Scott Land & Lease Ltd.	296	254 (85.81%)
45635	Scott Land & Lease Ltd.	296	296 (100%)
58532	Suncor Energy Inc.	1,782	1,015 (56.94%)
58533	Suncor Energy Inc.	2,374	2374 (100%)
53078	Western Land Services Co. Ltd.	296	147 (49.75%)

* Current as of August 2013

Source: BC MFLNRO (2013d)

Figure 16.5-14

Petroleum and Natural Gas Tenures in the Land Use Baseline Local Study Area



Ancillary Tenures

Oil and Gas Pipelines

Within the LSA, five companies hold nine oil and gas pipeline tenures (Table 16.5-14 and Figure 16.5-15). One pipeline (#8008555 held by Westcoast Energy Inc.) borders the Project Assessment Footprint on the west side of the Murray River.

Table 16.5-14. Oil and Gas Pipeline Tenures in the Local Study Area

Title Number*	Tenure Holder	Tenure Type
9707278	Canadian Natural Resources Ltd.	Temporary Permit
9623301	Canadian Natural Resources Ltd.	Right-of-Way (interim licence)
9704953	Canadian Natural Resources Ltd.	Right-of-Way (interim licence)
8003645	Pacific Northern Gas (N.E.) Ltd.	Right-of-Way
9703110	Pacific Northern Gas (N.E.) Ltd.	Right-of-Way
8014223	Pacific Northern Gas Ltd.	Right-of-Way
9623458	Suncor Energy Inc.	Right-of-Way (interim licence)
337943	Westcoast Energy Inc.	Right-of-Way
8008555	Westcoast Energy Inc.	Right-of-Way

* Current as of August 2013

Source: BC MFLNRO (2013d)

Industrial Infrastructure

Infrastructure associated with PNG development includes drillsites, wellsites, dehydrator sites, and meter sites. Within the LSA, a total of 15 energy production rights-of-way are held by Canadian Natural Resources Ltd., Suncor Energy Inc., Devon Canada Corp., Husky Oil Operations Ltd. and Pacific Northern Gas (N.E.) Ltd. (Table 16.5-15 and Figure 16.5-15) One drillsite/wellsite, held by Suncor Energy Inc. (#9623364), is located in the Project Assessment Footprint.

Aggregate Extraction

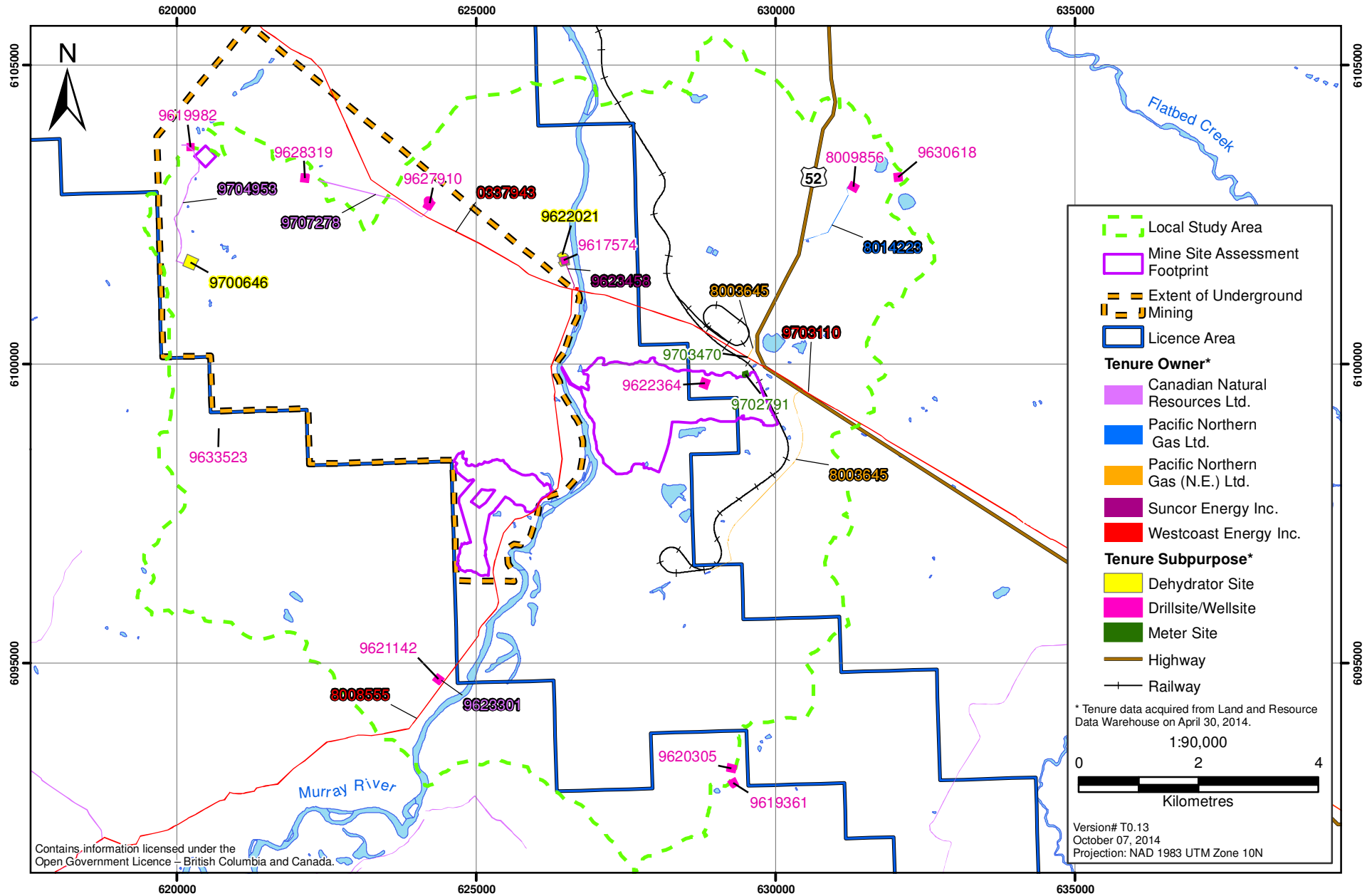
Canadian Natural Resources Ltd. holds one tenure (#9634868) for the extraction of sand and gravel within the LSA (Figure 16.5-16). Within the RSA, four companies hold nine quarry tenures (Table 16.5-16).

Utilities and Communication

Within the LSA, two PNG companies – Devon Canada Corp. and Suncor Energy Inc. – hold Crown land tenures authorizing electric power lines (see Figure 16.5-20). Westcoast Energy Inc. holds a Crown land tenure for communication purposes (#8009672) in the LSA. Within the RSA, there are four Crown land tenures authorizing electric power lines and six communication sites (Table 16.5-17; see Figure 16.5-20).

Figure 16.5-15

Oil and Gas Pipeline and Infrastructure Tenures in the Land Use Baseline Local Study Area



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Table 16.5-15. Oil and Gas Infrastructure in the Local Study Area

File Number*	Interest Holder	Tenure Purpose	Tenure Type	Tenure Area (ha)
9619982	Canadian Natural Resources Ltd.	Drillsite/Wellsite	Statutory Right Of Way (or Easement)	1.4
9621142	Canadian Natural Resources Ltd.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.0
9627910	Canadian Natural Resources Ltd.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.4
9628319	Canadian Natural Resources Ltd.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.0
9633523	Canadian Natural Resources Ltd.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.0
9700646	Canadian Natural Resources Ltd.	Dehydrator Site	Energy Production Right-of-Way (Interim Licence)	4.0
8009856	Devon Canada Corp.	Drillsite/Wellsite	Statutory Right Of Way (or Easement)	2.0
9630618	Husky Oil Operations Ltd.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.0
9703470	Pacific Northern Gas (N.E.) Ltd.	Meter Site	Energy Production Right-of-Way (Interim Licence)	0.01
9617574	Suncor Energy Inc.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	1.6
9619361	Suncor Energy Inc.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	1.9
9620305	Suncor Energy Inc.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.0
9622021	Suncor Energy Inc.	Dehydrator Site	Energy Production Right-of-Way (Interim Licence)	1.8
9622364	Suncor Energy Inc.	Drillsite/Wellsite	Energy Production Right-of-Way (Interim Licence)	2.4
9702791	Suncor Energy Inc.	Meter Site	Energy Production Right-of-Way (Interim Licence)	1.2

* Current as of August 2013
Source: BC MFLNRO (2013d)

16.5.3.12 Aggregates and Construction

Quarry Tenures

Three construction companies hold four quarry tenures in the LSA. Interroute Construction Ltd. holds two tenures, one of which is adjacent to the Project Assessment Footprint to the northeast. Kode Contracting Ltd. holds one tenure which overlaps with the southern tip of the LSA. Within the RSA, Kodiak Ridge Construction Ltd. holds one quarry tenure (Table 16.5-18 and Figure 16.5-16). Mining and oil and gas companies also hold quarry tenures in support of their primary activities (see Sections 16.5.3.8 and 16.5.3.9, and Figure 16.5-16).

Figure 16.5-16
Quarry Crown Land Tenures in the Land Use Baseline Local Study Area

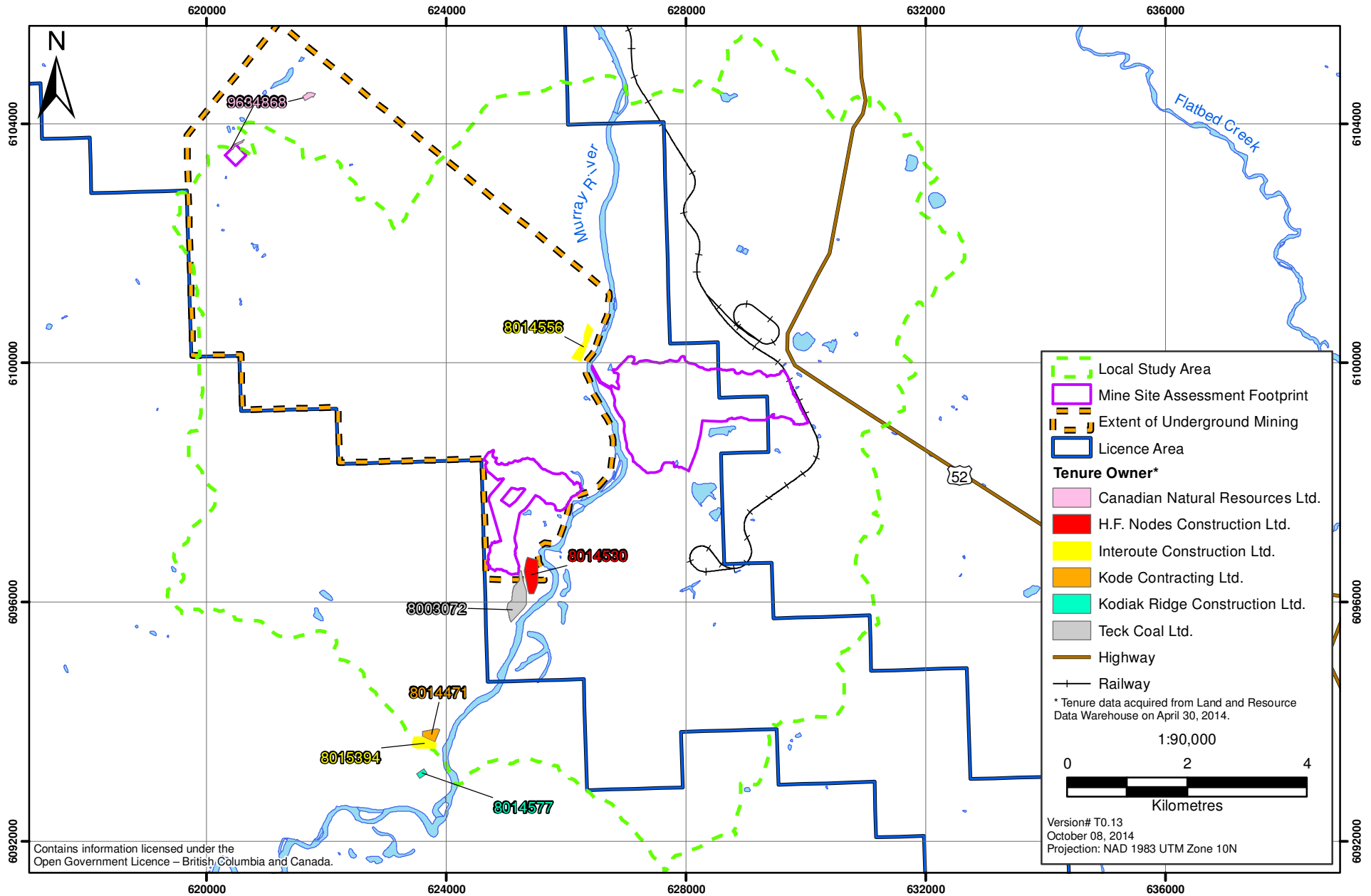


Table 16.5-16. Quarry Tenures Held by Petroleum and Natural Gas Companies in the Local and Regional Study Areas

File Number*	Tenure Holder	Tenure Purpose	Tenure Type	Interest Area (ha)	Overlaps with LSA (Y/N)	Overlaps with RSA (Y/N)
8013953	0887837 B.C. Ltd.	Sand and Gravel	Licence Of Occupation	20	N	Y
8014478	0887837 B.C. Ltd.	Sand and Gravel	Licence Of Occupation	3.8	N	Y
9604948	Canadian Natural Resources Ltd.	Sand and Gravel	Licence Of Occupation	0.92	N	Y
8008808	Canadian Natural Resources Ltd.	Sand and Gravel	Licence Of Occupation	4.4	N	Y
9629396	Canadian Natural Resources Ltd.	Sand and Gravel	Licence Of Occupation	1.1	N	Y
9634868	Canadian Natural Resources Ltd.	Sand and Gravel	Temporary Permit	2.2	Y	Y
9634869	Canadian Natural Resources Ltd.	Sand and Gravel	Temporary Permit	0.6	N	Y
9621190	Talisman Energy Inc.	Sand and Gravel	Licence Of Occupation	0.6	N	Y
8003419	Westcoast Energy Inc.	Rip Rap	Licence Of Occupation	1.5	N	Y

* Current as of March 2013.

Source: BC MFLNRO (2013d)

Table 16.5-17. Utility and Communication Tenures Held by Petroleum and Natural Gas Companies in the Local and Regional Study Areas

File Number*	Tenure Holder	Tenure Type	Purpose	Location
9615962	Devon Canada Corp.	Right-of-Way	Electric power line	LSA
9630897	Suncor Energy Inc.	Right-of-Way	Electric power line	LSA
8009672	Westcoast Energy Inc.	Communication Licence	Communication site	LSA
9625639	Canadian Natural Resources Ltd.	Right-of-Way	Electric power line	RSA
9631305	Husky Oil	Right-of-Way	Electric power line	RSA
9617430	Suncor Energy Inc.	Right-of-Way	Electric power line	RSA
8004879	Talisman Energy Inc.	Right-of-Way	Electric power line	RSA
349065	Canadian Natural Resources Ltd.	Licence of Occupation	Communication site	RSA
8013679	Canadian Natural Resources Ltd.	Licence of Occupation	Communication site	RSA
8014003	Talisman Energy Inc.	Licence of Occupation	Communication site	RSA
8009672	Westcoast Energy Inc.	Licence of Occupation	Communication site	RSA
8013593	Westcoast Energy Inc.	Licence of Occupation	Communication site	RSA
8014749	Westcoast Energy Inc.	Licence of Occupation	Communication site	RSA

* Current as of August 2013.

Source: BC MFLNRO (2013d)

Table 16.5-18. Quarrying Tenures in the Local and Regional Study Areas

File Number*	Interest Holder	Tenure Purpose	Tenure Type	Interest Area (ha)	Overlaps with LSA (Y/N)	Overlaps with RSA (Y/N)
8014530	H.F. Nodes Construction Ltd.	Sand and Gravel	Licence Of Occupation	4.8	Y	Y
8014471	Kode Contracting Ltd.	Sand and Gravel	Licence of Occupation	4.0	Y	Y
8015394	Interoute Construction Ltd.	Sand and Gravel	Licence Of Occupation	6.8	Y	Y
8014556	Interoute Construction Ltd.	Sand and Gravel	Licence Of Occupation	7.8	Y	Y
8014577	Kodiak Ridge Construction Ltd.	Sand and Gravel	Licence Of Occupation	1.4	N	Y

* Current as of August 2013

Source: BC MFLNRO (2013d)

Ancillary Tenures

Water Diversion and Use

Within the LSA, Interoute Construction Ltd. holds a water licence (C125492), authorizing it to draw water from the Murray River for processing (see Figure 16.5-18).

Timber Clearing

Within the LSA, two construction companies and one industrial services company hold licences to cut within their quarry tenures (Table 16.5-19).

Table 16.5-19. Forest Tenures Held by Construction Companies in the Local Study Area

Forest File ID*	Interest Holder	Tenure Type	Size (ha)	Overlap with LSA - ha (%)
L47228	Grizzly Ridge Sand & Gravel Ltd. (H.F. Nodes Construction Ltd.)	Occupant Licence To Cut	4.8	4.8 (100%)
L48607	Interoute Construction Ltd.	Occupant Licence To Cut	6.8	2.8 (41%)
L47163	Tumbler Ridge Industrial Specialties Ltd. (Interoute Construction Ltd.)	Occupant Licence To Cut	7.9	7.9 (100%)

* Current as of March 2013

Source: BC MFLNRO (2013d)

16.5.3.13 Wind Power

Wind Power Tenures

Two wind power companies hold two tenures in the LSA. Finavera Wind Energy Inc. holds a general area licence (#8015353), while Wind Prospect British Columbia Inc. holds an investigative licence (#8015574) split into one area and four sites (Table 16.5-20 and Figure 16.5-17). None of

these tenures overlap with the Project Assessment Footprint. Zero Emissions Energy Developments Inc. holds an Investigative Permit (#8014928) just outside the northeast boundary of the LSA.

Table 16.5-20. Wind Power Tenures in the Local Study Area

Licence Number*	Tenure Holder	Tenure	Area (ha)	Overlap with LSA - ha (%)
8015353	Finavera Wind Energy Inc.	Licence of Occupation	1149	129 (11%)
8015574 (Investigative Area)	Wind Prospect British Columbia Inc.	Investigative Licence	986	335 (34%)
8015574 (Site 1)	Wind Prospect British Columbia Inc.	Investigative Licence	1.4	1.4 (100%)
8015574 (Site 2)	Wind Prospect British Columbia Inc.	Investigative Licence	1.5	1.5 (100%)
8015574 (Site 3)	Wind Prospect British Columbia Inc.	Investigative Licence	2.5	0.90 (33.57%)
8015574 (Site 4)	Wind Prospect British Columbia Inc.	Investigative Licence	1.0	1.0 (100%)

* Current as of April 2013

Source: BC MFLNRO (2013d)

Ancillary Tenures

Timber Clearing

Within the LSA, one wind power company (Finavera Wind Energy Inc.) holds three licences to cut (Table 16.5-21).

Table 16.5-21. Forestry Tenures Held by Wind Energy Interests in the Local Study Area

Forest File ID*	Interest Holder	Tenure Type	Size (ha)	Overlap with LSA - ha (%)
L47440	Finavera Wind Energy Inc.	Occupant Licence to Cut	1.0	0.65 (65%)
L48618	Finavera Wind Energy Inc.	Occupant Licence to Cut	5.1	1.3 (26%)
L49281	Finavera Wind Energy Inc.	Occupant Licence to Cut	1,149	129.3 (11%)

* Current as of March 2013

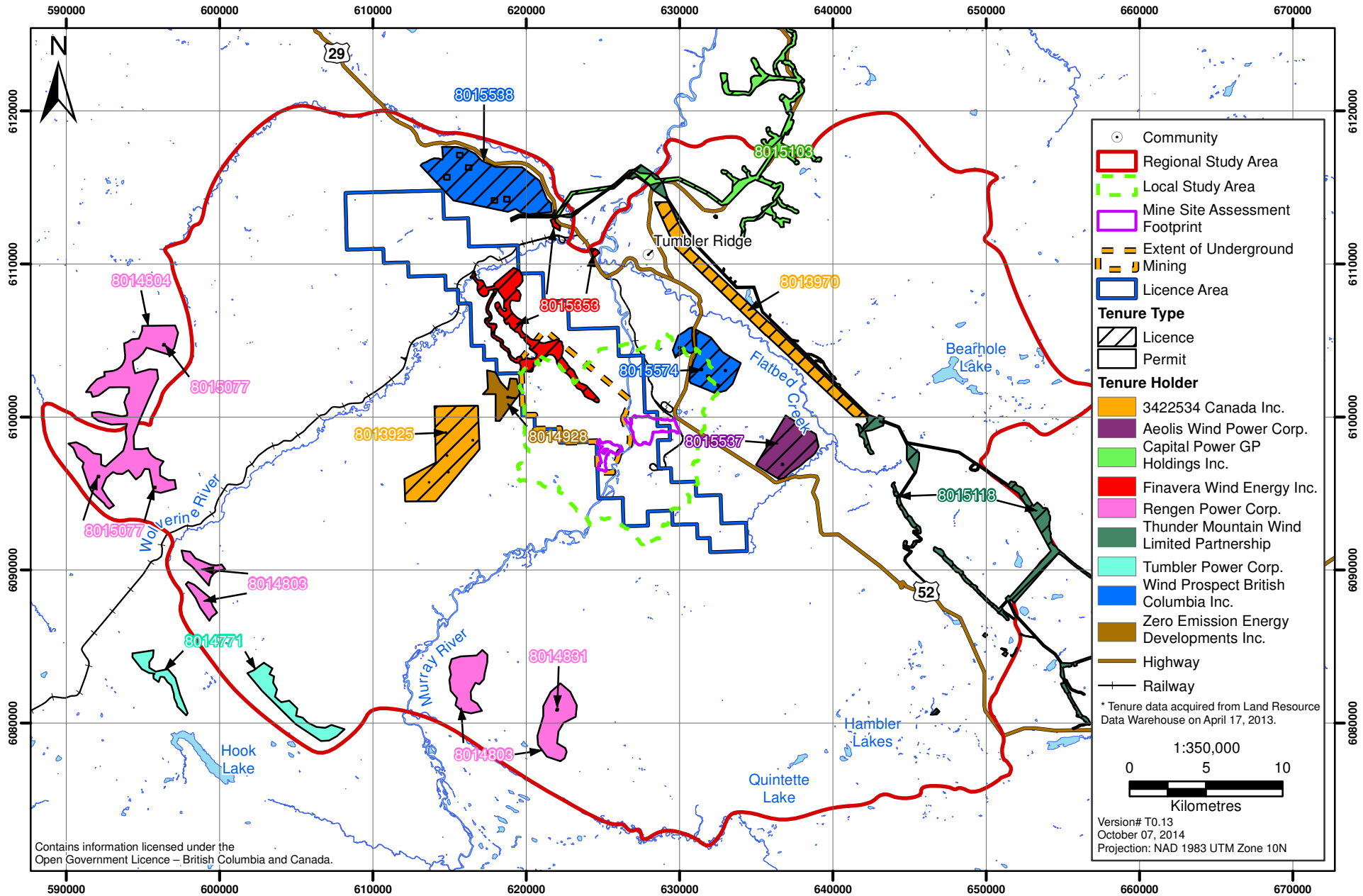
Source: BC MFLNRO (2013d)

16.5.3.14 Domestic Water Use

There are no domestic water licences in the LSA. Within the RSA, the City of Dawson Creek holds one water licence at Bearhole Lake (number C125120), authorizing it to withdraw water from the Kiskatinaw River for storage and waterworks (Figure 16.5-18).

Figure 16.5-17

Wind Power Tenures in the Land Use Baseline Study Areas



16.5.3.15 *Transportation*Roads

The LSA encompasses portions of Highway 52 and 20 resource roads (Table 16.5-22). Roads overlapping the Project Assessment Footprint include the Murray River Forest Service Road (FSR) (tenure held by Canadian Natural Resources Ltd.), Direct Energy Marketing Ltd.'s Petroleum Access Road (#9635570) and Canadian Natural Resources Ltd.'s Petroleum Development Road (#9629425; Figure 16.5-19). Table 16.5-22 identifies road tenures in the LSA.

Table 16.5-22. Road Tenures in the Local Study Area

File #	Interest Holder	Tenure Type	Tenure Purpose
8638	BC MFLNRO (District Manager Peace)	Forestry	Forest Service Road
R14639 (Site A)	Canadian Forest Products Ltd.	Forestry	Road Permit
R06882 (Sites B, C, F, G, Y, and 03)	West Fraser Mills Ltd.	Forestry	Road Permit
R07192 (Sites I, H, and K)	West Fraser Mills Ltd.	Forestry	Road Permit
R13360 (Sites A and E)	West Fraser Mills Ltd.	Forestry	Road Permit
R17309 (Sites K, L, N, and O)	West Fraser Mills Ltd.	Forestry	Road Permit
S25382	Finavera Wind Energy Inc.	Forestry	Special Use Permit, Forest
S25604	HD Mining International Ltd.	Forestry	Special Use Permit, Forest
S24740	Peace River Coal Inc.	Forestry	Special Use Permit, Forest
9624481	Canadian Natural Resources Limited	Petroleum and Natural Gas	Petroleum Development Road
9629425	Canadian Natural Resources Limited	Petroleum and Natural Gas	Petroleum Development Road
9628468	Canadian Natural Resources Limited	Petroleum and Natural Gas	Petroleum Access Road
9631331	Husky Oil Operations Limited	Petroleum and Natural Gas	Petroleum Development Road
9626757	Suncor Energy Inc.	Petroleum and Natural Gas	Petroleum Access Road
9628956	Suncor Energy Inc.	Petroleum and Natural Gas	Petroleum Development Road
9634254	Suncor Energy Inc.	Petroleum and Natural Gas	Petroleum Access Road
9623064	Suncor Energy Inc.	Petroleum and Natural Gas	Petroleum Access Road
9627910	BG International Ltd.	Petroleum and Natural Gas	Petroleum Access Road
9628319	Canadian Natural Resources Ltd.	Petroleum and Natural Gas	Petroleum Access Road
9629301	Canadian Natural Resources Ltd.	Petroleum and Natural Gas	Petroleum Development Road
9635570	Direct Energy Marketing Ltd.	Petroleum and Natural Gas	Petroleum Access Road

* Current as of August 2013
Source: BC MFLNRO (2013d)

Rail

Table 16.5-23 and Figure 16.5-19 identify rail lines in the LSA and RSA. BC Rail has a rail line running through the LSA, and Teck has a rail right of way in the LSA. Within the RSA, Rio Algom Ltd., Sojitz Coal Development (Canada) Ltd. Teck Corporation, and Teck-Bullmoose Coal Inc. collectively hold a rail right of way.

Table 16.5-23. Rail in the Local and Regional Study Areas

File Number*	Tenure Holder	Tenure Type	Location
8003423	Teck Coal Ltd.	Right-of-Way	LSA
8003388	BC Rail	Map Reserve	LSA
8003096	Rio Algom Limited Sojitz Coal Development (Canada) Ltd. Teck Corporation Teck-Bullmoose Coal Inc.	Right-of-Way	RSA

* Current as of February 2013

Source: BC MFLNRO (2013d)

Airstrips

Tumbler Ridge Airport (TUX) is 11km south of the town and is located within the RSA, just outside of the eastern boundary of the LSA (Figure 16.5-19). It contains a 4000 ft. runway and terminal building, taxiway, apron lighting, lighted windsocks and non-directional beacon. This airport is used for private and charter flights as it does not have the capacity for commercial airline use (Visit Tumbler Ridge 2013).

Ancillary Tenures - Utilities and Communication

There are no utilities or communication sites held by transportation interests in the LSA. Within the RSA, BC Rail holds a licence of occupation (number 8003447) for a communication site (Figure 16.5-20).

16.5.3.16 Utilities and Communication

BC Hydro and Power Authority holds an electric power line tenure (#7401287) in the LSA, which crosses the Project Assessment Footprint. BC Hydro holds an additional four power line tenures in the RSA, while Telus Communications holds one tenure. There are no communication sites held by communications interests in the LSA. Four communication sites held by communications interests are located in the RSA (Table 16.5-24 and Figure 16.5-20).

Utilities and communication tenures are also held by other interests in support of their primary tenure activities, including mineral exploration and mining (Section 16.5.3.8), petroleum and natural gas (Section 16.5.3.9), and transportation (Section 16.5.3.13; all tenures are shown on Figure 16.5-20).

16.5.3.17 Visual Sensitivity Units

Within the LSA, the VLI database identified five VSUs (Appendix 16-C) (Figure 16.5-21). Table 16.5-25 shows the ratings associated with each of the five VSUs as described Appendix 16-C.

Figure 16.5-20
Utilities and Communication in the Land Use Baseline Study Areas

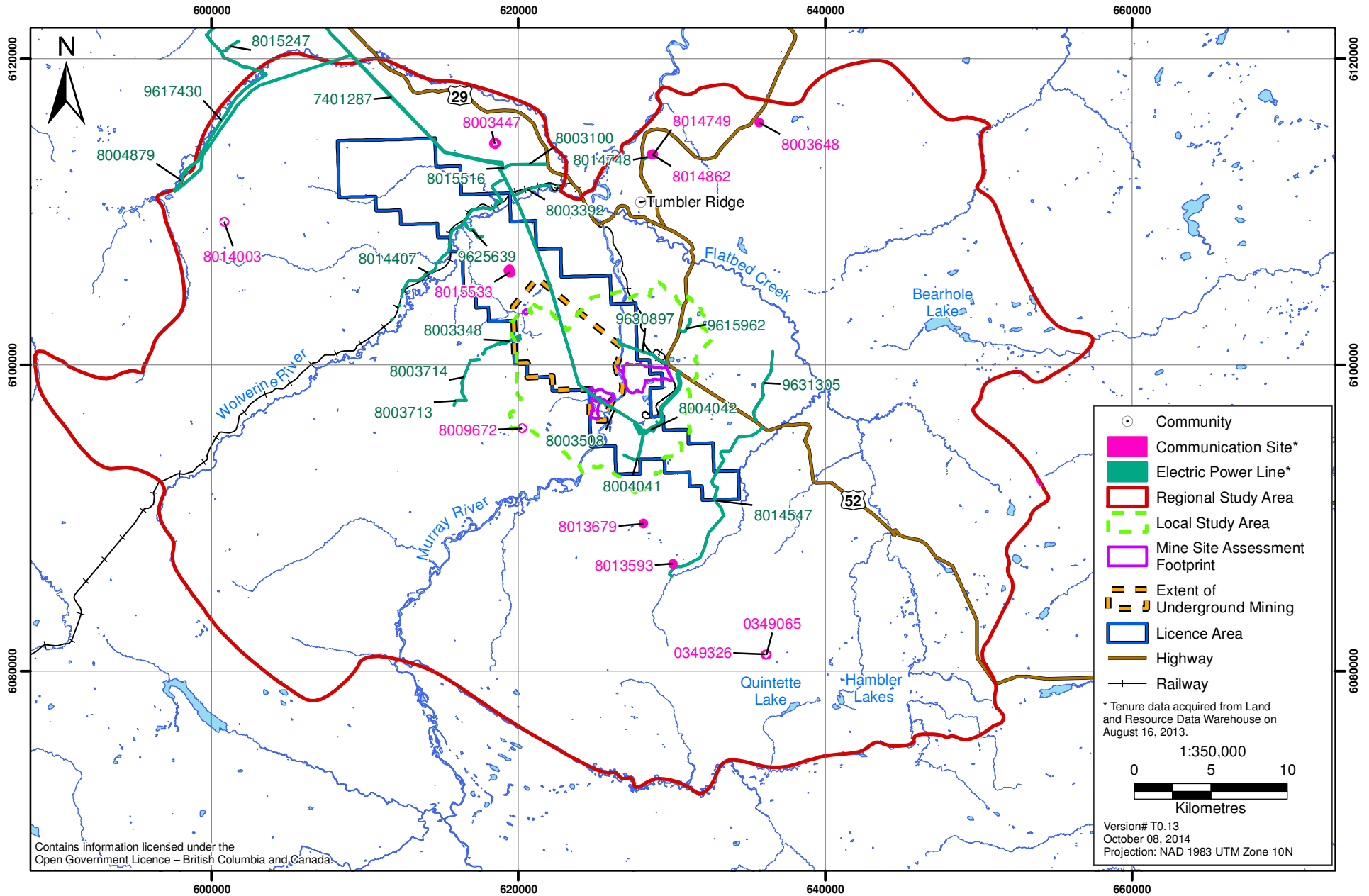


Figure 16.5-21
Visual Sensitivity Units in the Land Use Baseline Local Study Area

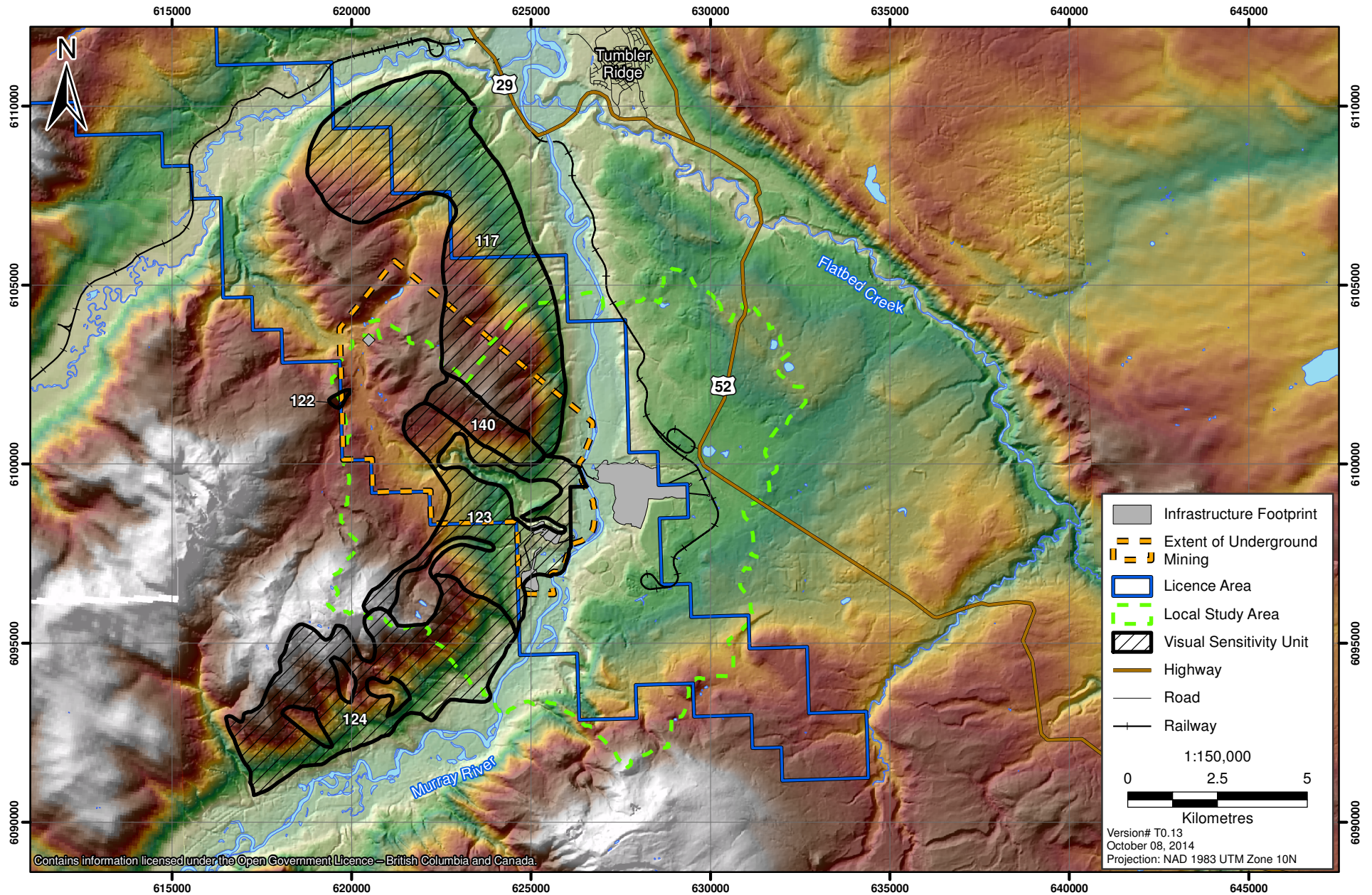


Table 16.5-24. Utilities and Communication Tenures in the Local and Regional Study Areas

File Number*	Tenure Holder	Tenure Type	Tenure Purpose	Location
7401287	BC Hydro and Power Authority	Right-of-Way	Electric power line	LSA and RSA
8003100	BC Hydro and Power Authority	Right-of-Way	Electric power line	RSA
8003392	BC Hydro and Power Authority	Right-of-Way	Electric power line	RSA
8014407	BC Hydro and Power Authority	Right-of-Way	Electric power line	RSA
8015516	BC Hydro and Power Authority	Right-of-Way	Electric power line	RSA
8014748	Telus Communications	Right-of-Way	Electric power line	RSA
349326	RCMP	Licence of Occupation	Communication site	RSA
8003648	Petron Communications Ltd.	Licence of Occupation	Communication site	RSA
8014862	Telus Communications Inc.	Licence of Occupation	Communication site	RSA

* Current as of August 2013

Source: BC MFLNRO (2013d)

Table 16.5-25. Ratings of Visual Sensitivity Units in the Local Study Area

Visual Sensitivity Unit	Existing Visual Class ^a	Visual Absorption Class ^b	Visual Sensitivity Class ^c	Existing or Recommended Visual Quality Objective ^a
117	R	M	3	PR
122	P	M	3	PR
123	PR	M	3	PR
124	M	H	3	PR
140	P	M	3	PR

^a P= Preserved; R=Retained; PR=Partially Retained/Partial Retention; M=Modified

^b M= Moderate; H= High

^c 3= Moderate sensitivity to human-made visual alteration. The area is important to viewers. There is a probability that the public would be concerned if the VSU was visually altered.

The Project is largely not visible from the Murray River FSR. The Project is visible from some sites along the Murray River, although vegetation on the banks of the river may obstruct visibility (Appendix 16-C).

16.6 ESTABLISHING THE SCOPE OF THE EFFECTS ASSESSMENT FOR NON-TRADITIONAL LAND USE

This section describes the scoping process used to identify potentially affected Valued Components (VCs), and assessment spatial boundaries. It also identifies the potential effects of the Project that are likely to arise from the Project's interaction with a VC. Scoping is fundamental to focusing the Application/EIS on those issues where there is the greatest potential to cause significant adverse effects. The scoping process for the assessment of Non-traditional Land Use consisted of the following steps:

- *Step 1:* conducting a desk-based review of available scientific data, technical reports, and other Project examples to compile a list of potentially affected VCs in the vicinity of the Project (results characterized in Section 16.5.3);

- *Step 2:* carrying out detailed field baseline studies to fill information gaps and confirm presence/absence of VCs (results characterized in Section 16.5.3);
- *Step 3:* consideration of feedback from the EA Working Group on the proposed list of VCs included in the AIR and the EIS Guidelines;
- *Step 4:* definition of assessment boundaries for each assessment category and/or VC; and
- *Step 5:* identification of key potential effects on VCs.

These steps are described in detail below.

16.6.1 Selecting Valued Components

Valued components (VCs) are components of the natural and human environment that are considered to be of scientific, ecological, economic, social, cultural, or heritage importance (CEAA, 2006; EAO, 2013). To be included in the EA, there must be a perceived likelihood that the VC will be affected by the proposed Project. VCs are scoped into the EA based on issues raised during consultation on the Application Information Requirements (AIR) and Environmental Impact Statement (EIS) Guidelines with Aboriginal communities, government agencies, the public and stakeholders. Consideration of certain VCs may also be a legislated requirement, or known to be a concern because of experience with other proposed mine projects.

Consultation activities relating to land use have included meetings and discussions related to the EA process for the Project (e.g., AIR review, open houses, working group meetings), as well as consultations with tenure holders related to the Murray River bulk sample *Mines Act* application. The information from these consultations has been used to focus the scope of the assessment on issues of interest or importance to land users and tenure holders.

VCs were included in the assessment due to one or more of the following:

- There are spatial and temporal overlaps between the Project and the VC such that interactions are possible;
- There is a clear and measurable relationship between the effects of the Project and the VC so that an accurate characterization of the Project's direct and indirect effects can be made; or
- There is a perceived, reasonable likelihood that the VC could be affected by the Project.

Each VC was considered using the non-traditional land use baseline study results (Appendix 16-A, summarized in Section 16.5.3). Information and results from relevant EA chapters were also considered, including Air Quality (Chapter 6); Wildlife and Wildlife Habitat (Chapter 13); and Human Health (Chapter 19).

16.6.1.1 Summary of Valued Components Selected for Assessment

The Project has the potential to change land uses within the LSA and RSA during all Project phases. Four VCs were selected based on consideration of the issues identified by Aboriginal groups, government agencies, public, stakeholders and professional judgment. Selected VCs include

harvesting (guide outfitting, resident and non-resident hunting, angling guides and recreational fishing, trapping); recreational use (hiking, snowmobiling, ATV use, boating) industrial land use (mining, PNG, energy, forestry), and navigation.

The VCs and the rationale for selecting them is provided in Table 16.6-1. The AIR (September 2013) identifies “commercial land use” and “non-commercial land use” as preliminary VCs for the social effects assessment. Subsequent to the issuance of the AIR, it was decided that land use VCs would not be considered in the same chapter as the social VCs due to the number and diversity of land and resource tenures and public uses identified in the land use baseline study areas (Section 16.5.3). The potential effects on land and resource uses are different from social effects. For example, potential effects on land use VCs include a change in the ability of tenure holders to access their tenures and the public to access areas for recreational purposes. Whereas, potential effects on social VCs include changes to employment and income, and community infrastructure and services and community well-being.

Land use VCs excluded from the effects assessment are listed in Table 16.6-2, along with a rationale for excluding them.

Table 16.6-1. Non-Traditional Land Use Valued Components Included in the Effects Assessment

Valued Component	Identified by*			Rationale for Inclusion
	AG	G	P/S	
Harvesting	X	X	X	Potential for changes in access or ability to access or use land use areas utilized by harvesters, and changes in the abundance and distribution of wildlife or fish resources important to harvesters as a result of Project activities. Project activities may affect harvesters’ experience of the natural environment for harvesters.
Recreational use		X	X	Potential for changes in access or ability to access or use land use areas used by recreationalists. Project activities may affect recreationists’ experience of the natural environment.
Industrial use		X	X	Subsidence from underground mining has the potential to damage to infrastructure.
Navigation	X			Identified as a VC in EIS Guidelines (CEA Agency 2013).

*AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder

Table 16.6-2. Valued Components Excluded from the Effects Assessment for Non-Traditional Land Use

Valued Component	Identified by*			Rationale for Exclusion
	AG	G	P/S	
Land Management Objectives		X	X	Project development and activities do not undermine objectives in Dawson Creek LRMP. Project is consistent with objectives of Open Space and Rural Resource land areas in the Tumbler Ridge OCP.
Quality of Resources	X	X	X	Quality of subsistence resources is assessed in Chapter 18 (Human Health, where resources are identified as “Country Foods”).
Visual and Aesthetic Resources	X	X	X	Issues related to potential changes in visual quality are discussed as potential effects as opposed to a VC.
Private Lands				There are no private lands overlapping the Project footprint. No concerns have been raised with respect to private lands in the LSA.
Agriculture		-	-	There is no agricultural or grazing activity in the LSA or RSA.

*AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder

16.6.2 Selecting Assessment Boundaries

Assessment boundaries define the maximum limit within which the effects assessment is conducted. They encompass the areas within, and times during which, the Project is expected to interact with the VCs, as well as the constraints that may be placed on the assessment of those interactions due to political, social, and economic realities (administrative boundaries), and limitations in predicting or measuring changes (technical boundaries). The definition of these assessment boundaries is an integral part in scoping for Non-traditional Land Use, and encompasses possible direct, indirect, and induced effects of the Project on Non-traditional Land Use, as well as the trends in processes that may be relevant.

16.6.2.1 Spatial Boundaries

Local Study Area

The LSA for the effects assessment is approximately 12,726 ha (Figure 16.6-1). This study area differs slightly from the baseline LSA because it includes the extent of underground mining in the northwest corner of the Project footprint.

Regional Study Area

The RSA for this assessment is the same as the baseline RSA and it is approximately 227,578 ha in size (Figure 16.6-1).

16.6.2.2 Temporal Boundaries

The Project's interaction with the Non-traditional Land Use VCs will vary depending on the stage in the mine lifecycle; as such Non-traditional Land Use effects of the Project will be examined over all four stages of mine life:

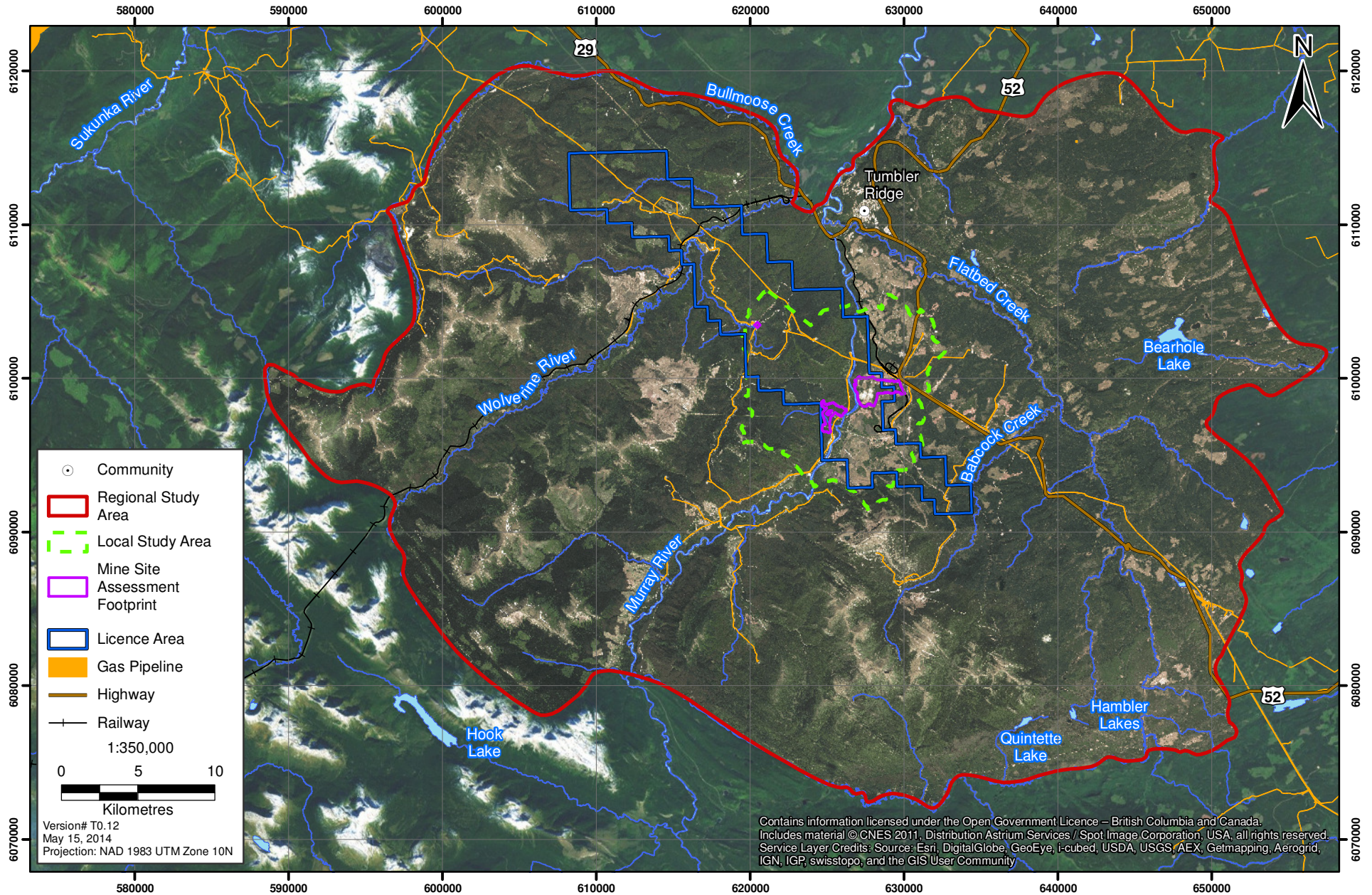
- **Construction:** 3 years;
- **Operation:** 25 years;
- **Decommissioning and Reclamation:** 3 years; and
- **Post Closure:** 30 years.

16.6.3 Identifying Potential Effects on Non-traditional Land Use

Five potential effects were identified during the scoping assessment: 1) change in access or the ability to access or use to land use areas; 2) change in the quality and experience of the natural environment; 3) change in the abundance and distribution of resources; 4) damage to infrastructure; and 5) change to navigation of the Murray River. Each effect is described below:

- **Change in access or ability to access or use land use areas:** Construction and operation of the Project has the potential to affect access to areas used by commercial tenure holders and the public within the LSA.
- **Changes to the quality and experience of the natural environment:** Sensory disturbances such as noise, visual/aesthetic changes and increased human presence may affect the quality and experience of the clients of guide outfitters, licenced trappers and the public who are recreating in the LSA.

Figure 16.6-1
Land Use Effects Assessment Study Areas



- **Change in the abundance and distribution of resources:** Construction and operation of the Project has the potential to affect the abundance and distribution of wildlife and fish within the LSA.
- **Damage to infrastructure:** The downward movement of the surface above underground mining operations may cause surface compressive and tensile strains, curvature, tilts and horizontal displacement (subsidence) that can cause damage to existing roads, buildings, and surface and sub-surface infrastructure in the vicinity of the Project (Xtraction 2014).
- **Change to navigation of the Murray River:** Installation of Project components in streams, or other Project activity has the potential to affect navigation of the Murray River.

Potential impacts of Project activities on land and resource uses are assessed in Table 16.6-3 based on professional judgement and review of other coal mining projects in the area (e.g., Roman Coal Mine). The table classifies interactions between the Project and potential effects on VCs as low (negligible to minor) (green), potentially moderate (yellow) or a key interaction causing potentially significant effects (red). A 'O' (grey) indicates there will be no interaction with the Project. Potential effects identified as moderate or significant are assessed. Negligible to minor effects on VCs are not assessed further.

16.6.3.1 Construction

The Project's Construction phase will involve a range of activities primarily focused at the Murray River shaft site, decline site, and coal processing site. Construction activities will include:

- construction of the Big Decline;
- site clearing and stripping;
- upgrading access roads and laydown areas;
- installation of water and sewer systems;
- construction of the coal preparation plant buildings and conveyor system;
- construction of the rail load-out facilities; and
- construction of the gas pipeline and electrical substation.

Potential Project effects during the Construction phase include:

- change in the quality and experience of the natural environment; and
- change in the abundance and distribution of resources.

Table 16.6-3. Ranking Potential Effects on Non-Traditional Land Use

Project Activities		Potential Effects on Non-traditional Land Use				
		Change in Access to Land Use Areas	Change in Quality and Experience of the Natural Environment	Change in the Abundance and Distribution of Resources	Damage to Infrastructure	Changes to Navigation of Murray River
Construction	Underground Mine					
	Construction of Big Decline (2 headings - surface and underground)	L	L	M	O	O
	Haul of waste rock from Big Decline portal to North Site	O	L	M	O	O
	Ventilation during construction	O	O	O	O	O
	Development mining of underground service bays, sumps, conveyor headings, etc.	O	O	O	O	O
	Construct underground conveyor system	O	O	O	O	O
	Coal Processing Site					
	Surface Preparation					
	Establish site drainage and water management	O	O	L	O	O
	Site clearing and stripping (CPP site, CCR #1)	O	L	M	O	O
	Soil salvage for reclamation	O	L	O	O	O
	Upgrade access roads, parking and laydown areas	O	L	M	O	O
	Heavy machinery use	O	L	M	O	O
	Buildings and Services					
	Install domestic water system	O	L	M	O	O
	Install sanitary sewer system	O	L	M	O	O
	Install natural gas and electricity distribution network	O	L	M	O	O
	Construct main fuel station	O	L	M	O	O
	Construct buildings (e.g., maintenance, administration, warehouse)	O	L	M	O	O

(continued)

Table 16.6-3. Ranking Potential Effects on Non-Traditional Land Use (continued)

Project Activities		Potential Effects on Non-traditional Land Use					
		Change in Access to Land Use Areas	Change in Quality and Experience of the Natural Environment	Change in the Abundance and Distribution of Resources	Damage to Infrastructure	Changes to Navigation of Murray River	
Construction (cont'd)	Construct raw coal and clean coal stockpile areas	O	L	M	O	O	
	Construct coal preparation plant buildings and install/commission equipment	O	L	M	O	O	
	Construct surface conveyor system	O	L	M	O	O	
	Construct rail load-out facilities	O	L	M	O	O	
	Shaft Site						
	Upgrades to infrastructure within existing site	O	L	L	O	O	
	Addition of waste rock within existing storage area	O	L	L	O	O	
	Management of runoff from waste rock pile and release to receiving environment (M20 Creek)	O	O	O	O	O	
	Decline Site						
	Upgrades to infrastructure within existing site	O	L	L	L	-	
	Management of water from underground activities and release by exfiltration to ground	O	O	L	L	-	
	Traffic and Transportation						
	Transportation of materials to and from site	L	L	M	O	O	
	Recycling and solid waste disposal	O	O	O	O	O	
	Shuttling workforce to and from site	L	L	L	O	O	
	Workforce and administration						
	Hiring and management of workforce	O	O	O	O	O	
	Taxes, contracts and purchases	O	O	O	O	O	

(continued)

Table 16.6-3. Ranking Potential Effects on Non-Traditional Land Use (continued)

Project Activities		Potential Effects on Non-traditional Land Use				
		Change in Access to Land Use Areas	Change in Quality and Experience of the Natural Environment	Change in the Abundance and Distribution of Resources	Damage to Infrastructure	Changes to Navigation of Murray River
Operation	Underground Mine					
	Longwall panel mining, and development mining	O	O	L	O	O
	Ventilation from underground	O	O	L	O	O
	Methane management	O	O	L	O	O
	Secondary shaft construction	O	O	L	O	O
	Underground seepage collection and water management	O	O	L	O	O
	Surface subsidence	O	O	M	H	O
	Coal Processing Site					
	Coal Processing Plant					
	Stockpiles of raw coal	O	O	L	O	O
	Operation of coal preparation plant and conveyor system	O	L	L	O	O
	Stockpiles of clean coal and middlings	O	O	L	O	O
	Operation of rail loadout	O	L	M	O	O
	CCR					
	CCR pile development	O	L	L	O	O
	Site clearing and stripping (expansion of CCR #1, construction of CCR #2)	O	L	M	O	O
	Seepage collection system	O	O	L	O	O

(continued)

Table 16.6-3. Ranking Potential Effects on Non-Traditional Land Use (continued)

Project Activities		Potential Effects on Non-traditional Land Use				
		Change in Access to Land Use Areas	Change in Quality and Experience of the Natural Environment	Change in the Abundance and Distribution of Resources	Damage to Infrastructure	Changes to Navigation of Murray River
Operation (cont'd)	Water Management					
	Management of water brought to surface from underground	O	O	L	O	O
	Management of seepage from CCR	O	O	L	O	O
	Management of other site contact water	O	O	L	O	O
	Maintenance of site ditching and water management infrastructure	O	O	L	O	O
	Release of excess contact water to receiving environment	O	O	M	O	L
	Shaft Site					
	Maintenance of infrastructure within existing site	O	L	L	O	O
	Progressive reclamation of waste rock pile	O	L	L	O	O
	Management of runoff from waste rock pile and release to receiving environment (M20 Creek)	O	L	M	O	O
	Decline Site					
	Maintenance of infrastructure within existing site	O	L	L	-	-
	Secondary Shafts Site					
	Site preparation and construction of shafts	O	L	M	O	O
	Maintenance of infrastructure within existing site	O	L	L	O	O
	Utilities, Power and Waste Handling					
	Electrical power use	O	L	-	O	O
	Natural gas use	O	O	-	O	O
	Domestic water use	O	O	L	O	O
	Domestic sewage handling	O	O	L	O	O
Recycling and solid waste disposal	O	O	-	O	O	

(continued)

Table 16.6-3. Ranking Potential Effects on Non-Traditional Land Use (continued)

Project Activities		Potential Effects on Non-traditional Land Use				
		Change in Access to Land Use Areas	Change in Quality and Experience of the Natural Environment	Change in the Abundance and Distribution of Resources	Damage to Infrastructure	Changes to Navigation of Murray River
Operation (cont'd)	Heavy Machinery, Traffic, and Transportation					
	Shuttling workforce to and from site	L	L	M	O	O
	Transportation of materials to and from site	L	L	M	O	O
	Surface mobile equipment use	O	L	M	O	O
	Road maintenance	O	L	M	O	O
	Fuel storage	O	O	O	O	O
	Workforce and Administration					
	Hiring and management of workforce	O	O	O	O	O
Taxes, contracts and purchases	O	O	O	O	O	
Decommissioning and Reclamation	Infrastructure Removal and Site Reclamation					
	Facility tear down and removal	O	L	L	O	O
	Reclamation of plant site	O	L	L	O	O
	Reclamation of on-site roads and rail lines	O	L	L	O	O
	Recycling and solid waste disposal	O	O	O	O	O
	Heavy Machinery, Traffic and Transportation					
	Shuttling workforce to and from site	L	L	L	O	O
	Transportation of materials to and from site	L	L	L	O	O
Surface mobile equipment use	O	L	L	O	O	
Fuel storage	O	O	O	O	O	

(continued)

Table 16.6-3. Ranking Potential Effects on Non-Traditional Land Use (completed)

Project Activities		Potential Effects on Non-traditional Land Use				
		Change in Access to Land Use Areas	Change in Quality and Experience of the Natural Environment	Change in the Abundance and Distribution of Resources	Damage to Infrastructure	Changes to Navigation of Murray River
Decommissioning and Reclamation (cont'd)	CCR					
	Reclamation of CCR	O	L	L	O	O
	Seepage collection system	O	O	L	O	O
	Site water management and discharge to receiving environment	O	O	M	O	O
	Underground Mine					
	Infrastructure tear down and removal	O	L	O	O	O
	Geotechnical and hydrogeological assessment and bulkhead installation	O	O	O	O	O
	Groundwater monitoring	O	O	O	O	O
	Workforce and Administration					
	Hiring and management of workforce	O	O	O	O	O
Taxes, contracts and purchases	O	O	O	O	O	
Post Closure	Shaft Site					
	Waste rock pile seepage monitoring	O	O	L	O	O
	CCR					
	Seepage collection system	O	O	O	O	O
	Site water management and discharge to receiving environment	O	O	O	O	O
	Underground Mine					
Groundwater monitoring	O	O	O	O	O	

- No spatial or temporal overlap.

O Spatial and temporal overlap, but no interaction anticipated; no further consideration warranted.

L Negligible to minor adverse effect expected; implementation of best practices, standard mitigation and management measures; no monitoring required; no further consideration warranted.

M Potential moderate adverse effect requiring unique active management/monitoring/mitigation; warrants further consideration.

H Key interaction resulting in potential significant major adverse effect or significant concern; warrants further consideration.

16.6.3.2 *Operation*

Project activities at the underground mine and coal processing site will be continuous during operation. Coal will be mined using longwall mining, a form of underground coal mining where coal is mined in large panels (typically 1 to 3 km long and 200 to 400 m wide). Coal will be processed through crushing, flotation and centrifuges. Rejects will be directed to the coarse coal rejects pile. There will be an average of approximately 20 vehicles per day (at the peak of operation) using the Murray River FSR (transporting personnel, equipment and materials), and one train per day will transport coal from the rail loadout facility to Prince Rupert.

Potential Project-related effects during operation include:

- change in the quality and experience of the natural environment;
- change in the abundance and distribution of resources;
- damage to infrastructure; and
- changes to navigation of the Murray River.

16.6.3.3 *Decommissioning and Reclamation*

During this phase, Project activities will be ramped down substantially and focused on the removal of infrastructure, constructing bulkheads to seal off the mine workings, reclamation and re-vegetation. Truck traffic will be mostly limited to on-site trucks to complete the work, with limited truck traffic remaining to transport personnel and materials to the site. Project-related effects during the Decommissioning and Reclamation phase are primarily related to elements and activities within the Project footprint, as well as the remaining road infrastructure and rights-of-way.

Potential Project-related effects during the Decommissioning and Reclamation phase include:

- change in the quality and experience of the natural environment;
- change in the abundance and distribution of resources; and
- damage to infrastructure.

16.6.3.4 *Post Closure*

The Post Closure phase is expected to last a minimum of 30 years with activities primarily related to focused on reclamation and environmental monitoring. Project-related traffic will be for reclamation, monitoring, and site water management. The risk of damage to infrastructure (e.g., pipelines and roads) is not anticipated to extend into the Post-closure phase. No potential Project-related effects on land and resource use during the Post Closure phase are anticipated.

16.6.3.5 *Summary of Potential Effects to be Assessed for Non-Traditional Land Use*

As a result of the scoping exercise conducted in this section, four effects are analyzed in Section 16.7: change in the quality of experience of the natural environment, change in the abundance and distribution of resources, damage to infrastructure, and changes to navigation of the Murray River.

As shown in Table 16.6-3, interactions with Project components related to a change in access or ability to access or use land use areas were rated as negligible to minor or no interactions were identified during all phases of the Project. As a result, changes in access are not anticipated and are not considered in the effects assessment.

16.7 EFFECTS ASSESSMENT AND MITIGATION FOR NON-TRADITIONAL LAND USE

16.7.1 Key Effects on Harvesting

The Construction, Operation, and Decommissioning and Reclamation phases of the Project have the potential to affect harvesting of resources by the public and tenure holders. Potential effects include a change in the abundance and distribution of wildlife or fish resources important to harvesters as a result of Project activities. Project activities may affect harvesters' experience of the natural environment for harvesters.

Several chapters are of relevance to the assessment of effects on non-traditional land use (Chapter 13, Assessment of Potential Wildlife Effects, and Chapter 18, Assessment of Potential Health Effects).

16.7.1.1 *Assessment of Effects on Harvesting Subcomponents*

Subcomponent 1: Guide Outfitting (Non-Resident Hunting)

Baseline studies indicate there are four guide outfitting licences located either wholly or partially within the land use RSA (701254, 701258, 701245, and 701249) (Figure 16.5-8). License 701254 overlaps the Project Assessment footprint; the licence overlaps with approximately 96% of the baseline LSA and 71% of the RSA. License 701258 overlaps approximately 4% of the baseline LSA and 21% of the RSA. Licence 701245 overlaps 8% of the RSA and does not overlap with baseline LSA, and licence 701249 overlaps less than 1% of the RSA and does not overlap the baseline LSA.

The Project is not anticipated to adversely affect licences 701245 and 701249 as they do overlap the baseline LSA or Project Assessment Footprint. The effects assessment focuses on licences 701254 and 701258 as they overlap the baseline LSA and RSA as well as the Project Assessment Footprint.

Subcomponent 2: Trapping

Baseline studies indicate there are ten registered traplines located either wholly or partially within the land use RSA and three of these traplines overlap the land use baseline LSA (TR0721T006, TR0721T003, and TR0721T005) (Figure 16.5-9). TR0721T006 overlaps with approximately 19% of the LSA and 28% of the RSA. TR0721T003 overlaps with approximately 30% of the LSA and 6% of the RSA; the western portion the Project Assessment Footprint is within this trapline. The holder of this trapline states that he traps most of the year and he traps near the Project (L. Reynan, Pers. Comm., 2012). TR0721T005 overlaps with about 51% of LSA and 38% of the RSA.

The Project is not anticipated to adversely affect TR0720T005, TR0720T006, TR0720T007, TR0721T004, TR0721T007, TR0721T008, and TR0722T001 as they do not overlap the LSA or Project Assessment Footprint. The effects assessment focuses on TR0721T003, TR0721T005 and TR0721T006 due to their overlap with the LSA, and in some instances the Project Assessment Footprint.

Subcomponent 3: Resident Hunting

No public concerns were expressed about the Project's impacts on resident hunting. Therefore the effects assessment does not consider potential effects on resident hunters.

Subcomponent 4: Angling and Recreational Fishing

No public concerns were expressed about the Project's impacts on recreational fishing. There are no commercial angling guides operating within the RSA or LSA. Therefore the effects assessment does not consider potential effects on recreational fishing or commercial angling.

Conclusion

The potential effects of the Project are assessed on guide outfitting licences 701254 and 701258; and trapline licences TR0721T006, TR0721T003 and TR0721T005. The potential effects of the Project on harvesting activities in the Non-traditional Land Use study areas are described.

16.7.1.2 Change in Quality and Experience of the Natural Environment

Project noise during the Construction, Operation, and Decommissioning and Reclamation phases has the potential to impact the quality of the harvesting experience for guide outfitters and trappers. Project infrastructure may also be visible to harvesters. The Project is not predicted to result in sensory disturbances due to noise (Chapter 18: Assessment of Human Health Effects).

During Construction and Operation, changes to baseline daytime and nighttime noise levels are expected to occur primarily in the vicinity of the Project Assessment Footprint and along the rail line (Appendix 18-C, Noise Modelling Report). Noise sources include vehicle traffic, vegetation clearing, and infrastructure development. Human receptors are not expected to be affected by noise within the Project Assessment Footprint as no public access will be allowed to the mine site for safety reasons.

During Construction and Operation, visual effects are not anticipated at lower elevations as Project infrastructure is mostly shielded by vegetation. The Project will be required to follow Visual Quality Objectives outlined in the Dawson Creek LRMP {Dawson Creek LRMP Working Group, 1999 #170}.

During Construction and Operation, the Coal Processing Site may be visible at higher elevations from the east side of the Murray River, where views are unobstructed due to past logging activity (Visual Quality Baseline, Appendix 16-C).

Project noise will decrease during the Decommissioning and Reclamation phases. The visual effects of the Project will diminish as the site is reclaimed and infrastructure is removed.

Guide Outfitters 701254 and 701258

- 701254: The guide outfitter has not provided the Proponent with information related to the use of the licence. Approximately 3% of the license falls within the LSA. Based on the modelling results, noise exceedances are not predicted beyond the Project Assessment

Footprint and rail line. Given the small overlap with the LSA no impact on the quality of the guiding experience for clients of this guide outfitter is anticipated as a result of the Project.

- 701258: While the Secondary Shaft Site falls within the licence area, most of the activity associated with this site will occur underground. Less than 1% of the licence falls within the LSA. Based on the modelling results, noise exceedances are not predicted beyond the Project Assessment Footprint and rail line. Given the small percentage of licence overlap with the LSA and the mining activity in this area of the licence will be underground, no impact on the quality of the guiding experience for clients of this guide outfitter is anticipated as a result of the Project.

Registered Traplines TR0721T003, TR0721T005 and TR0721T006

- TR0721T003: The LSA overlaps with 14% of this trapline area. In the Human Health assessment (Chapter 18), the trapper's cabin (tenure #8002864) (referred to as Trapline Cabin 5) may experience nighttime noise levels greater than the limiting criteria for sleeping outdoors (30 dBA) by nine decibels during construction and four decibels during operation. The cabin is used during the spring and fall. The cabin is used to store trapline-related supplies and it provides a base during the spring when the trapline holder is trapping beaver (L. Reynan, Pers. Comm., 2012). The trapline cabin is located in a treed area which is not visible to the public. The trapline holder has indicated the primary purpose of his cabin is to store equipment, and he is concerned about the cabin being vandalized. The trapper has continued to use the cabin while HD Mining has been working on the Bulk Sample program. HD Mining is willing to work with the trapline holder TR0721T003 to address concerns related to the use of his cabin.
- TR0721T005: The LSA overlaps with about 7% of the trapline license area. The trapline holder has not provided the Proponent with information related to the use of the licence, except to indicate that trapping occurs throughout the trapline area. Based on the modelling results, noise exceedances are not predicted beyond the Project Assessment Footprint and rail line. Given the small percentage of the licence overlap with the LSA, no impact on the quality of the guiding experience is anticipated as a result of the Project.
- TR0721T006: While the Secondary Shaft Site is located within this trapline, most of the activity associated with this site will occur underground. The LSA overlaps with 3% of the trapline. The trapline holder has not provided the Proponent with information related to the use of the licence. Based on the modelling results, noise exceedances are not predicted beyond the Project Assessment Footprint and rail line. Given the small percentage of licence overlap with the LSA and the mining activity in this area of the licence will be underground, no impact on the quality of the trapline holder is anticipated as a result of the Project.

16.7.1.3 Change in the Abundance and Distribution of Resources

According to the wildlife effects assessment (Chapter 13), activities during the Construction, Operation, and Decommissioning and Reclamation phases may result in changes to the abundance and distribution of wildlife harvested by guide outfitters and trappers. Project effects on wildlife are predicted to be discontinued once Operation ceases.

Species harvested within the LSA by guide outfitters include moose, elk, mountain goat, and grizzly bear. Trappers in the LSA harvest furbearers (Sections 16.5.3.7 and 16.5.3.8).

The Assessment of Wildlife Effects (Chapter 13) assessed effects of the Project on caribou, moose, mountain goat, elk, grizzly bear, furbearers, bats, raptors, songbirds, waterbirds, and amphibians. The Project is not predicted to result in effects on caribou as caribou are a high elevation species, and the Project is located at a low elevation in a valley. Effects on elk are predicted to be negligible, as the Project will result in a relatively small direct and functional (i.e., sensory disturbance-related) loss of habitat and/or disruption of movement. No effects on mountain goat are predicted as goats reside in high-elevation areas, which are away from Project infrastructure or activities.

Chapter 13 predicts residual effects on moose (habitat loss and alteration, and disruption of movement), grizzly bear (disruption of movement) and fisher (habitat loss and alteration and disruption of movement). With mitigation and monitoring, no significant Project-related residual effects are expected.

Guide Outfitters 701254 and 701258

- 701254: This guide outfitter hunts big game throughout the licence area from the beginning of May (for black and grizzly bear) until the end of November. In order for the business to be sustainable, they require hunts for five mule deer and white-tailed deer per year, and 15 each of black bear, elk and moose per year. The guide outfitter operating the licence indicated the sustainability of the licence could be jeopardized by further industrial development in the area (A. Fredlund, Pers. Comm., 2012).
- 701258: Most of this guide outfitting license (84%) is within the RSA, where residual effects on wildlife are anticipated. The guide outfitter has not provided the Proponent with harvest information.

Registered Traps TR0721T003, TR0721T005 and TR0721T006

- TR0721T003: This trapper traps from mid-October to March each year. From November to December, marten are typically harvested from the Qunitette mine site to the southern end of the trapline (outside of the RSA). From December to March, the portion of the trapline north of Tumbler Ridge is typically used to trap a variety of furbearers. The trapline holder indicated that trapping is his main occupation and trapping revenue represents a small percentage of his livelihood (L. Reynan, pers. Comm., 2012).
- TR0721T005: Marten is the main species trapped on this trapline, averaging 100 marten per year. The trapline holder has trapped full-time since 1979. Effects to furbearers are expected within the Murray River valley, part of which is in the area of this trapline.
- TR0721T006: The trapline holder has not provided the Proponent with harvest information. Also, the Murray River valley, where residual effects to furbearers are predicted, is outside of this trapline. No effects on this trapline are anticipated.

16.7.2 Mitigation Measures for Effects on Harvesting

Measures to mitigate potential effects on harvesting during the Project's Construction, Operation, Decommissioning and Reclamation and Post Closure phases are described below.

16.7.2.1 *Change in Quality and Experience of the Natural Environment*

To mitigate noise effects, the Proponent has committed to develop a Noise Management Plan (Section 24.3) and monitor to ensure noise levels meet the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMPR 2008), and the Environmental Code of Practice for Metal Mines (Environment Canada 2009). Noise levels will be assessed at sensitive receptor locations, and overnight mine noise, instantaneous blasting noise, train noise from the rail loadout, and interior noise levels at production facilities will be monitored (Chapter 18, Human Health). No residual effects are anticipated on trapline holder TR0721T003 as they relate to noise as the Proponent is willing to address concerns related to the use of his cabin.

16.7.2.2 *Change in the Abundance and Distribution of Resources*

To mitigate residual effects on wildlife and wildlife habitat from the Project, the Proponent has committed to develop a Wildlife Management Plan (Section 24.12), and Subsidence Management Plan (Section 24.15) to mitigate effects due to habitat loss and alteration.

Measures to mitigate impacts on habitat loss and alteration include:

- avoiding important habitat where practical alternatives are available (e.g., habitat loss and alteration was minimized through Project design);
- maintaining known and potential mineral licks in a natural state and ensuring ungulates have access to them during the season when they are most used;
- minimizing destruction or disruption of areas that contain known wallows, particularly during the ungulate breeding season during site clearing during Construction and Operation; and
- minimizing destruction or disruption of active fisher or marten dens during site clearing during Construction and Operation.

Measures to mitigate disruption of the movement include:

- giving wildlife the right-of-way along access roads and the highway; and
- enforcing speed limits roads controlled by the Proponent.

Despite the implementation of mitigation measures, residual effects on guide outfitter 701254, 701258 and trapline TR0721T003 and TR0721T005 are anticipated and are carried into the residual effects assessment (Section 16.8.1.2).

16.7.3 Key Effects on Recreational Use

The Project has the potential to affect recreational use during the Construction, Operation, and Decommissioning and Reclamation phases. Project activities may affect recreationists' experience of the natural environment.

16.7.3.1 *Assessment of Effects on Recreation Subcomponents*

Subcomponent 1: Private Camp Sites and Recreation Camp Sites

Baseline studies indicate there are no private camp sites or recreation sites within the LSA. Private camp sites and recreation sites within the RSA are not anticipated to be affected given their distance from the Project.

Subcomponent 2: Hiking and Trails

There are three hiking trails on the edge of the LSA (Figure 16.5-3). Travel through the LSA is required to reach the Mt. Herman, Barbour Falls and Nesbitt's Knee Falls trails (C. Helm, Pers. Comm.). The Mt. Herman, Barbour Falls and Nesbitt's Knee Falls trails are scoped into the effects assessment due to potential changes in the quality of experience for the public using these trails as a result of Project activities during the Construction and Operation phases.

Subcomponent 3: Snowmobiling and All-Terrain Vehicle Use

The Ridge Riders Snowmobile Association's Core Lodge Riding Area is located in the RSA. None of the snowmobile trails overlap with the LSA, and there are no established ATV trails, in the LSA or RSA (DTR n.d.-a). No effects on snowmobiling or ATV use are anticipated.

Subcomponent 4: Boating

There are no water-based commercial recreation tenures in the LSA or RSA. The public launch boats from the boat launch at the Murray River FSR bridge near the Project. Lorne's Jet Boat Tours and Wild River Adventure Tours operate jet boat tours on the Murray River. Tours navigate the Murray River from its confluence with Pine River up to Kinuseo Falls. There is potential for effects on recreational boating during the Construction and Operation phases.

Conclusion

The Project has the potential to impact users of the Mt. Herman, Barbour Falls and Nesbitt's Knee Falls hiking trails and boating on the Murray River.

16.7.3.2 *Change in Quality and Experience of the Natural Environment*

Project noise during the Construction, Operation, and Decommissioning and Reclamation phases has the potential to impact the quality of the experience for hikers and boaters. Project infrastructure may also be visible to the public recreating in the Project area.

During Construction and Operation, changes to baseline daytime and nighttime noise levels are expected to occur primarily in the vicinity of the Project Assessment Footprint and along the rail line (Appendix 18-C, Noise Modelling Report). Noise sources include vehicle traffic, vegetation clearing, and infrastructure development. Human receptors are not expected to be affected by noise within the Project Assessment Footprint as no public access will be allowed to the mine site for safety reasons.

During Construction and Operation, visual effects are not anticipated at lower elevations as Project infrastructure is mostly shielded by vegetation. The Project will be required to follow Visual Quality Objectives outlined in the Dawson Creek LRMP {Dawson Creek LRMP Working Group, 1999 #170}.

During Construction and Operation, the Coal Processing Site may be visible at higher elevations from the east side of the Murray River, where views are unobstructed due to past logging activity (Visual Quality Baseline, Appendix 16-C).

Project noise will decrease during the Decommissioning and Reclamation phases. The visual effects of the Project will diminish as the site is reclaimed and infrastructure is removed.

Mt. Herman, Barbour Falls and Nesbitt's Knee Falls Trails

Based on noise modelling predictions, noise from the Project is unlikely to be heard by the public who are hiking on trails near Mt. Hermann, Barbour Falls and Nesbitt's Knee given their distance from the Project Assessment Footprint.

The Barbour Falls and Nesbitt's Knee Falls trails, located on the east side of the Murray River, have not been ground-truthed to determine whether the Project is visible from these locations. Based on the conclusions from the Visual Quality Baseline (Appendix 18-C), the Project is not anticipated to be visible from the Mt. Herman Trail, since it is on the west side of the Murray River.

Boating on the Murray River

Within the LSA, boaters using the Murray River may hear Project noise as they pass by the Project on their way up to or down from Kinuseo Falls, particularly non-motorized watercraft. The Project is not expected to be visible from boats on the Murray River.

16.7.4 Mitigation Measures for Effects on Recreational Use

16.7.4.1 Change in Quality and Experience of the Natural Environment

Mitigation measures proposed to minimize noise effects levels include development of a Noise Management Plan (Section 24.3) and noise monitoring to ensure noise levels meet the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMPR 2008), and the Environmental Code of Practice for Metal Mines (Environment Canada 2009). Noise levels will be assessed at sensitive receptor locations, and overnight mine noise, instantaneous blasting noise, train noise from the rail loadout, and interior noise levels at production facilities will be monitored (Chapter 18, Human Health). With the implementation of mitigation measures, no residual effects are anticipated on recreational users.

16.7.5 Key Effects on Industrial Use

Subsidence during the Operation phase of the Project has the potential to affect industrial use, including roads, pipelines and power lines.

16.7.5.1 *Effects Assessment on Industrial Use Subcomponents*

Subcomponent 1: Forestry Tenures

Subsidence is not expected to affect forest tenures held by West Fraser Mills Ltd., Tumbler Ridge Community Forest Corp., Tembec's Pulpwood Agreement Grant (PA13), Babcock Mountain Sawmills Ltd. or Canfor because activities associated with these tenures is not anticipated to occur in the longwall exclusion zone. (200 m buffer around the mining panels). No impacts on these tenures are anticipated.

Subcomponent 2: Coal Tenures

Subsidence is not expected to affect coal tenures held by other companies because the subsidence will be focused on HD Mining's coal tenures.

Subcomponent 3: Petroleum and Natural Gas Tenures

Subsidence is not expected to affect PNG leases or drill licenses because activities associated with these tenures are not anticipated to occur in the longwall exclusion zone.

There is potential for subsidence damage from the Project to impact pipelines in the LSA, including 0337943 (Westcoast Energy Inc.), 9707278 (CNRL), 9704953 (CNRL), 9623458 (Suncor Energy Inc.), 9623301 (CNRL) and 8008555 (Westcoast Energy Inc.). Other pipelines in the LSA and RSA are not anticipated to be affected due to their distance from underground mining.

Subsidence damage may affect the use of oil and gas infrastructure such as drillsites/wellsites, dehydrator sites, and meter sites, including tenures 9700646, 9619982, 9628319, 9627910, 9622021, 9617574, 9621142, 9622364, and 9702791.

The remaining oil and gas infrastructure tenures in the LSA and RSA are not anticipated to be affected due to their distance from underground mining.

Subcomponent 4: Quarrying

No subsidence impacts from the Project are anticipated on quarrying tenures due to their distance from underground mining.

Subcomponent 5: Wind Power Generation

Subsidence damage from the Project has the potential to impact infrastructure on tenures 8015353 (Finavera Wind Energy Inc.) and 8014928 (Zero Emission Energy Developments Inc.).

The remaining wind power tenures are not anticipated to be affected by the Project due to their distance from underground mining.

Subcomponent 6: Transportation

Subsidence damage from the Project has the potential to affect roads in the Project area, including road tenure numbers 9626757, 9635570, R17309, R14639, 9629425, 9624868, 9628319, S25382, 9627910, and 9629301.

The remaining transportation tenures are not anticipated to be affected due to their distance from underground mining.

Subcomponent 7: Utilities and Communication Sites

Subsidence damage has the potential to impact certain utilities sites in the LSA including utilities tenure numbers 7401287, 8003508, 9630897, and 8003348.

The remaining utility tenures, and all communication sites, are not anticipated to be affected by the Project due to their distance from underground mining.

Conclusion

The following industrial tenures are included in the effects assessment:

- Pipeline tenures: 0337943, 9707278, 9704953, 9623458, 9623301 and 8008555;
- Petroleum and natural gas infrastructure tenures: 9700646, 9619982, 9638319, 9627910, 9622021, 9617574, 9621142, 9622364, and 9702791;
- Wind power tenures: 8015353 and 8014928;
- Transportation tenures: 9626757, 9635570, , 9629425, 9624868, 9628319, S25382, 9627910, 9629301, 9634254, 9634256, and 8003423; and
- Utilities tenures: 7401287, 8003508, 9630897, and 8003348.

16.7.5.2 *Damage to Infrastructure*

Mining activities may affect the integrity and stability of overlying infrastructure due to subsidence. Damage to infrastructure is expected primarily to occur within the extent of underground mining and a 200-m buffer around mining panels (known as the longwall exclusion zone).

Operation

The mine plan proposed by HD Mining (Figure 3.6-19) has been designed to avoid impacting most tenures. A 200-m buffer (where mining will be avoided) has been placed around important infrastructure (known henceforth as the longwall exclusion zone). Table 16.7-1 shows the infrastructure tenures within and outside of the longwall exclusion zone.

Table 16.7-1. Infrastructure-Related Tenures within the Extent of Underground Mining

Tenure Type	Tenure Number	Tenure Holder	Entirely Within Longwall Exclusion Zone (Y/N)
Right-of-Way (Pipeline)	0337943	Westcoast Energy Inc.	Y
Temporary Permit (Pipeline)	9707278	Canadian Natural Resources Inc.	Y
Right-of-Way (Interim License, Pipeline)	9704953	Canadian Natural Resources Inc.	N
Right-of-Way (Interim License, Pipeline)	9623458	Suncor Energy Inc.	Y
Right-of-Way (Pipeline)	8008555	Westcoast Energy Inc.	Y
Energy Production Right-of-Way (Interim Licence, Dehydrator Site)	9700646	Canadian Natural Resources Ltd.	Y
Statutory Right Of Way (Drillsite/ Wellsite)	9619982	Canadian Natural Resources Ltd.	Y
Energy Production Right-of-Way (Interim Licence, Drillsite/ Wellsite)	9628319	Canadian Natural Resources Ltd.	Y
Energy Production Right-of-Way (Interim Licence, Drillsite/ Wellsite)	9627910	Canadian Natural Resources Ltd.	Y
License of Occupation (Wind Power)	8015353	Finavera Wind Energy Inc.	N
Petroleum Access Road	9626757	Suncor Energy Inc.	Y
Petroleum Access Road	9635570	Direct Energy Marketing Ltd.	Y
Petroleum Development Road	9629425	Canadian Natural Resources Ltd.	N
Petroleum Access Road	9624868	Canadian Natural Resources Ltd.	Y
Petroleum Access Road	9628319	Canadian Natural Resources Ltd.	N
Special Use Permit, Forest Road	525382	Finavera Wind Energy Inc.	Y
Petroleum Access Road	9627910	BG International Ltd.	Y
Petroleum Development Road	9629301	Canadian Natural Resources Ltd.	Y
Right-of-Way (Electric Power Line)	7401287	BC Hydro and Power Authority	N
Right of Way (Electric Power Line)	8003508	Teck Coal Ltd.	Y
Right of Way (Electric Power Line)	9630897	Suncor Energy Inc.	Y
Right of Way (Electric Power Line)	8003348	Teck Coal Ltd.	Y

As shown by Table 16.7-1, the following tenures are not entirely within the longwall exclusion zone:

- Pipeline tenure #9704953;
- Wind power tenure #8015353;
- Road tenure #9629425 and #9628319; and
- BC Hydro transmission line tenure #7401287.

Decommissioning and Reclamation

In the Decommissioning and Reclamation phase, underground mining will cease, and bulkheads will be installed in the mine shafts to seal the mine workings and allow groundwater flooding of shafts. The risk of damage to infrastructure (e.g., pipeline and roads) is not anticipated in the Decommissioning and Reclamation phase as stresses and strains in the ground will find a new equilibrium as active subsidence/movement ends.

16.7.6 Mitigation Measures for Subsidence Effects to Industrial Land Users

HD Mining's Subsidence Management Plan (Section 24.15) will be developed for the Project to manage the effects of subsidence on the surface during the life of the Project. The plan is designed to be dynamic, and will be updated with additional criteria and mitigation measures should changing requirements or project scenarios warrant plan modification.

The goals of the plan are to:

- establish monitoring networks to detect and quantify amounts and patterns of subsidence over mine workings;
- analyze monitoring data to enable a predictive capacity for subsidence at the Project;
- assess the potential for subsidence damage to surface environments and infrastructure in advance of mining;
- coordinate with mine management, regulators and other land users to identify overlapping interests and plan for potential effects of surface subsidence; and
- develop mitigation and, if necessary, control measures to ensure that HD Mining's objectives are achieved.

Prior to undermining of roads, HD Mining will consult with tenure holders potentially impacted by subsidence, and the posting of speed limits and warning signs ("Road Liable to Subsidence") will be considered. HD Mining will take responsibility to cover repairs required to the road and ditches or culverts.

Despite the implementation of mitigation measures and monitoring, a residual effect due to subsidence is anticipated on some industrial tenure holders.

16.7.7 Key Effects to Navigation

16.7.7.1 Changes to Navigation on Murray River

The navigable waters assessment (Appendix 16-B) reports that one Project component (water discharge pipe) has the potential to interact with navigation of the Murray River, of the nineteen watercourses assessed. Design drawings for the outfall are not yet available; however, the pipeline and outfall infrastructure will be located along the east side of the Murray River and will represent an instream obstruction. However, the works are not expected to limit navigation. Appropriate measures (e.g., signage, buoys) will be installed to alert boaters and to clearly mark the location of any instream works. Therefore, no residual effects on navigation of the Murray River are anticipated.

16.8 RESIDUAL EFFECTS ON NON-TRADITIONAL LAND USE

This section discusses the residual effects following the implementation of mitigation measures. A summary of these effects is included in Table 16.8-1.

Table 16.8-1. Summary of Residual Effects on Non-Traditional Land Use

Valued Component	Project Phase	Project Component / Physical Activity	Description of Cause-Effect	Description of Mitigation Measure(s)	Description of Residual Effect
Harvesting	Construction, Operation, Decommissioning and Reclamation	Construction of Project components, Project traffic, use of rail loadout	Habitat loss and alteration disruption of wildlife movement	Wildlife Mitigation and Monitoring Plan, Noise Management Plan, Subsidence Management Plan	Change to harvest locations due to a change to the quantity and distribution of wildlife harvested by guide outfitters and trappers
Industrial Use	Operation, Decommissioning and Reclamation	Underground mining activity	Subsidence causing damage to surface and subsurface infrastructure	Longwall exclusion zone, Subsidence Management Plan, consultation with potentially affected tenure holders	Economic impact on overlapping tenure holders

One residual effect on harvesting is identified:

- Change to harvest locations for holders of guide outfitter licences 701254 and 701258 and holders of traplines TR0721T003 and TR0721T005 during the Construction, Operation, and Decommissioning and Reclamation phases of the Project due to a change in the abundance and distribution of wildlife harvested by these tenure holders.

One residual effect on industrial use was identified:

- Potential economic impacts on overlapping tenures due to damage to infrastructure from subsidence during the Operation and Decommissioning and Reclamation phases.

The residual effects on non-traditional land use VCs are summarized in Table 16.8-1.

16.8.1 Residual Effects on Harvesting

16.8.1.1 Change in the Abundance and Distribution of Resources

Construction, Operation and Decommissioning and Closure

There is potential for a residual effect on harvest locations for guide outfitters licences 701254 and 701258 and traplines TR0721T003 and TR0721T005 due to a change in the abundance and distribution of wildlife hunted and trapped by these tenure holders (i.e., moose, grizzly bear and furbearers). This effect could result in guide outfitters and trappers changing their harvest locations.

16.8.2 Residual Effects on Industrial Use

16.8.2.1 Residual Effect - Damage to Infrastructure

The mine plan proposed by HD Mining (Figure 3.6-19) has been designed to avoid effects to most tenures. A 200-m longwall exclusion zone has been placed around important infrastructure. Potential residual effects due to subsidence are anticipated on following industrial tenures because they are not entirely outside the longwall exclusion zone:

- CNRL Pipeline tenure #9704953;
- Finavera Wind power tenure #8015353 (no infrastructure in place);
- CNRL- Road tenure #9629425 and #9628319; and
- BC Hydro- transmission line tenure #7401287.

Finavera has not yet initiated construction of the Tumbler Ridge Wind Power Project. There is potential for wind towers to be located on top of underground mining within the longwall exclusion zone. The environmental assessment (EA) certificate (E12-01) issued for the Tumbler Ridge Wind Power project includes the following condition:

“To minimize potential conflicts and disruptions to forestry, oil and gas and coal operations, three months in advance of the anticipated commencement of construction date, the Proponent must identify forestry, oil and gas and coal tenure holders whose tenures overlap with the

Project Area, and provide final shape files of the Project layout and the proposed construction schedule with proposed road closures/ traffic use identified, as well as the expected date of operation. The Proponent must request written confirmation of any concerns from these tenure holders. The Proponent must report to EAO the results of these consultations one month prior to the anticipated commencement of construction date.”

Based on the EA certificate condition, Finavera is required to consult HD Mining before it initiates construction of the project. This consultation would provide Finavera and HD Mining with an opportunity to discuss options for avoiding subsidence effects. Effects from subsidence on this tenure are not assessed any further.

16.9 CHARACTERIZING RESIDUAL EFFECTS, SIGNIFICANCE, LIKELIHOOD AND CONFIDENCE ON NON-TRADITIONAL LAND USE

Residual effects are characterized using standard criteria: magnitude, geographic extent, duration, frequency, reversibility, and resiliency. Each of these terms are outlined and defined for non-traditional land use in Table 16.9-1.

Each identified residual effect (Section 16.8) is characterized and a significance conclusion of ‘not significant (minor)’, ‘not significant (moderate)’ or ‘significant’ is assigned. The following definitions are applied:

- **Not Significant (Minor):** Residual effects have no or low magnitude, local geographic extent, short- or medium-term duration, and occur sporadically if at all. The effects on the VC (e.g., at a species or population level) are indistinguishable from background conditions (i.e., occur within the range of natural variation as influenced by physical, chemical, and biological processes). Land and resource management plan objectives will be met.
- **Not Significant (Moderate):** Residual effects have medium magnitude; have local, watershed, or regional geographic extent; are short-term to chronic (i.e., may persist into the far future); and occur at all frequencies. Residual effects on the VC may be distinguishable at the population, community, and/or ecosystem level. The ability to meet land and resource management plan objectives may be impaired.
- **Significant (Major):** Residual effects have high magnitude; have regional or beyond regional geographic extent; are chronic (i.e., persist into the far future); and occur at all frequencies. Residual effects on the VC are consequential (i.e., structural and functional changes in populations, communities, and ecosystems are predicted). The ability to meet land and resource management plan objectives is impaired.

16.9.1 Residual Effects Characterization for Harvesting

16.9.1.1 Likelihood for Residual Effects on Harvesting

The likelihood of a residual effect occurring is calculated as a measure of probability, to determine the potential for the Project to cause residual effects. The likelihood of a residual effect does not influence the determination of significance; rather, it influences the risk of an effect occurring. Likelihood has been considered in keeping with the most recent guidance issued in September 2013 by the BC EAO (2013b): *Guidelines for the Selection of Valued Components and Assessment of Potential Effects*.

16.9.1.2 *Significance of Residual Effects on Harvesting*

The characterization of significance of residual effects on harvesting is shown in Table 16.9-2.

16.9.1.3 *Characterization of Confidence for Residual Effects on Harvesting*

Confidence, which can also be thought of as scientific uncertainty, is a measure of how well residual effects are understood. The predicted residual effects were assessed for their reliability to portray the certainty in the predicted outcome, based on the acceptability of the data inputs and analytical methods used in the characterization. If necessary, a more detailed risk assessment (e.g., additional sensitivity analyses) may also be necessary for those effects where there is greater uncertainty associated with the significance conclusions.

The confidence in the assessment of a residual effect on harvest locations due to change in the abundance and distribution of resources is **medium**, based on the available information on harvesting locations and levels.

16.9.2 **Residual Effects Characterization for Industrial Use**

16.9.2.1 *Likelihood for Residual Effects to Industrial Use*

The “likelihood” of a residual effect as used in this assessment is defined in Section 16.8.4.1.

The likelihood rating for the residual effect of damage to infrastructure on industrial land use is considered to be **medium**. There is certainty around the prediction of subsidence following longwall underground mining operations; however, effects on existing infrastructure will depend on the geographic extent of the subsidence.

16.9.2.2 *Significance of Residual Effects to Industrial Land Use*

The characterization of significance of residual effects to industrial land use is shown in Tables 16.9-3.

16.9.2.3 *Characterization of Confidence for Residual Effects on Industrial Land Use*

The “confidence” of the assessment of residual effects, as used in this assessment, is defined in Section 16.8.4.3.

The confidence in the assessment of the residual effect to industrial land use due to damage to infrastructure is **medium**, based on existing literature relating to the effects of subsidence from underground mining.

Table 16.9-4 is a summary of anticipated residual effects of the Project on non-traditional land use. These residual effects will be carried forward into the Cumulative Effects Assessment.

Table 16.9-1. Definitions of Characterization Criteria for Residual Effects on Non-Traditional Land Use

Magnitude	Duration	Frequency	Geographic Extent (Physical/ Biophysical)	Reversibility	Resiliency	Ecological Context	Likelihood of Effects	
							Probability	Confidence Level
<i>How severe will the effect be?</i>	<i>How long will the effect last?</i>	<i>How often will the effect occur?</i>	<i>How far will the effect reach?</i>	<i>To what degree is the effect reversible?</i>	<i>How resilient is the receiving environment or population?</i>	<i>What is the current condition of the ecosystem and how commonly is it represented in the LSA?</i>	<i>How likely is the effect to occur?</i>	<i>How certain is this analysis?</i>
<p>Negligible: No land and resource use not impacted.</p>	<p>Short-term: Effect lasts approximately 10 years or less.</p>	<p>Once: Effect is confined to one discrete period in time during the life of the Project.</p>	<p>Local: Effect extends less than 500 m from infrastructure or activity.</p>	<p>Reversible Short-term: Effect can be reversed relatively quickly.</p>	<p>Low: The receiving environment or population has a low resilience to imposed stresses, and will not easily adapt to the effect.</p>	<p>Low: The receptor is considered to have little to no unique attributes or provision of functions is severely degraded</p>	<p>High: It is highly likely that this effect will occur.</p>	<p>High: < 80% confidence. There is a good understanding of the cause-effect relationship and all necessary data are available for the Project area. There is a low degree of uncertainty and variation from the predicted effect is expected to be low.</p>
	<p>Medium-term: Effect lasts from 11 to 50 years.</p>	<p>Sporadic: Effect an effect that occurs at sporadic or intermittent intervals during any phase of the Project.</p>	<p>Landscape: Effect is limited to the LSA or one watershed (i.e., Sub-area).</p>	<p>Reversible Long-term: within 20 years of Post Closure.</p>	<p>Neutral: The receiving environment or population has a neutral resilience to imposed stresses and may be able to respond and adapt to the effect.</p>	<p>Neutral: The receiving environment considered to have some unique attributes and provides most functions that an undisturbed environment would provide.</p>	<p>Medium: This effect is likely, but may not occur.</p>	<p>Medium: 50 to 80% confidence. The cause-effect relationships are not fully understood, there are a number of unknown external variables, or data for the Project area are incomplete. There is a moderate degree of uncertainty; while results may vary, predictions are relatively confident.</p>
<p>Moderate: Land and resource use may be impacted</p>	<p>Long-term: Effect lasts between 51 and 100 years.</p>	<p>Regular: Effect occurs on a regular basis during the life span of the Project.</p>	<p>Regional: Effect extends across the broader region (e.g., RSA, multiple watersheds, etc.).</p>	<p>Irreversible: An effect cannot be reversed (i.e., is permanent).</p>	<p>High: The receiving environment or population has a high natural resilience to imposed stresses, and can respond and adapt to the effect.</p>	<p>High: The receiving environment or population is uncommon and occurs in a natural state and provides functions at a maximum capacity</p>	<p>Low: This effect is unlikely but could occur.</p>	<p>Low: < 50% confidence. The cause-effect relationships are poorly understood, there are a number of unknown external variables, and data for the Project area are incomplete. High degree of uncertainty and final results may vary considerably.</p>
<p>Major: Land and resource use cannot be undertaken.</p>	<p>Far Future: Effect lasts more than 101 years.</p>	<p>Continuous: Effect occurs constantly during the life of the Project.</p>	<p>Beyond Regional: Effect extends beyond the regional scale, and may extend across or beyond the province.</p>					

Table 16.9-2. Significance Rating for Change in the Abundance and Distribution of Resources on Harvesting

Criteria	Rating	Comment
Magnitude	Negligible	No impact on the use of the tenure.
Duration	Medium-term	Effect will occur during the Construction, Operation, and Decommissioning and Reclamation phases of the Project.
Frequency	Sporadic	Use of tenure is not constant throughout the year.
Geographic Extent	Landscape	Extent of effect is within the guide outfitters and trappers licence areas.
Reversibility	Reversible Long-term	Effect should begin to reverse in the Post Closure phase as sites are reclaimed.
Resiliency	Neutral	Some harvesters have had to adjust their activities due to industrial activity occurring in the area.
Significance	Not significant (minor)	Due to the negligible magnitude rating, landscape extent, sporadic frequency and reversibility of the effect in the long term, this residual effect is considered to be not significant (minor).

Table 16.9-3. Significance Rating for Damage to Infrastructure on Industrial Land Use

Criteria	Rating	Comment
Magnitude	Moderate	Use of infrastructure may be impacted.
Duration	Medium-term	Occur during the Operation and Decommissioning and Reclamation phases of the Project
Frequency	Sporadic	Subsidence will be sporadic depending on the strength of the rock.
Geographic Extent	Local	Effects will occur within the extent of underground mining in the LSA.
Reversibility	Reversible Short-term	Damage to overlying infrastructure can be repaired fairly quickly.
Resiliency	Neutral	It is unknown to what extent overlapping tenure holders are able to adapt to subsidence issues.
Significance	Not significant (minor)	Due to the moderate magnitude rating, sporadic frequency, local extent, reversibility in the short-term, and neutral resiliency of industrial tenure holders, this residual effect is considered to be not significant (minor).

Table 16.9-4. Characterization of Residual Effects, Significance, Confidence and Likelihood on Non-Traditional Land Use

Residual Effect	Residual Effects Characterization Criteria						Significance of Adverse Residual Effects	Likelihood and Confidence	
	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Resiliency		Probability	Confidence
Change in harvesting locations for guide outfitters (licences 701254 and 701258) and traplines (TR0721T003 and TOR0721T005) due to a change in abundance and distribution of wildlife.	Negligible	Medium-term	Sporadic	Landscape	Reversible Long-term	Neutral	Not Significant (minor)	Medium	Medium
Economic impact on overlapping tenure holders.	Moderate	Medium-term	Sporadic	Local	Reversible Short-term	Neutral	Not Significant (minor)	Medium	Medium

16.10 SUMMARY OF RESIDUAL EFFECTS ASSESSMENT AND SIGNIFICANCE FOR NON-TRADITIONAL LAND USE

Table 16.10-1 is a summary of anticipated residual effects of the Project on non-traditional land use. These residual effects will be carried forward into the Cumulative Effects Assessment (see Section 16.10).

Table 16.10-1. Summary of Residual Effects, Mitigation, and Significance on Non-Traditional Land Use

Residual Effects	Project Phase(s)	Mitigation Measures	Significance
<i>Harvesting</i>			
Change in harvest locations for guide outfitters (licences 701254 and 701258) and traplines (TR0721T003 and TOR0721T005) due to a change in abundance and distribution of wildlife.	Construction, Operation, Decommissioning and Reclamation	Wildlife Mitigation and Monitoring Plan, Noise Management Plan	Not significant (minor)
<i>Industrial Use</i>			
Economic impact on overlapping tenure holders.	Operation, Decommissioning and Reclamation	Longwall exclusion zone, Subsidence Management Plan	Not significant (minor)

16.11 CUMULATIVE EFFECTS ASSESSMENT FOR NON-TRADITIONAL LAND USE

16.11.1 Introduction

Cumulative effects are defined in this EA as “effects which are likely to result from the designated project in combination with other projects and activities that have been or will be carried out”. This definition follows that in section 19(1) of CEAA (2012) and is consistent with the IFC Good Practice Note on Cumulative Impact Assessment which refers to consideration of other existing, planned and/or reasonably foreseeable future projects and developments. Cumulative effects assessment (CEA) is a requirement of the AIR and the EIS Guidelines and is necessary for the proponent to comply with CEAA (2012) and the BC EAA (2002a).

The CEA Agency issued an Operational Policy Statement in May 2013 entitled *Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* which provides a method for undertaking CEA. Recently, the BC EAO also released the updated *Guideline for the Selection of Valued Components and the Assessment of Potential Effects* (BC EAO 2013), which includes advice for determining the need for a cumulative impact assessment. The CEA assessment methodology adopted in this Application/EIS therefore follows the guidance of the CEA Agency as outlined above, as well as the selection criteria in BC EAO (2013).

The method for assessing cumulative effects generally follows the same steps as the Project-specific effects assessment, as described in Sections 16.6 to 16.9: (1) scoping and identification of potential effects, (2) description of potential effects and mitigation measures, with subsequent identification of residual cumulative effects, and (3) identification and characterization of residual cumulative effects.

However, because of the broader scope and greater uncertainties inherent in CEA (e.g., data limitations associated with some human actions, particularly future actions), there is greater dependency on qualitative methods and expert judgment. This framework for the CEA facilitates comparison between the two levels of assessment (project-specific and CEA) and between assessment categories, and is tailored to how much information is available.

16.11.2 Establishing the Scope of the Cumulative Effects Assessment

The following two criteria for the relevance of evidence pertaining to other human actions are considered in the scoping of the CEA:

- a residual effect of the Project must be demonstrated to operate cumulatively with the effects of another human action; and
- the other human action must be known to have been carried out, or it must be probable (using best professional judgement) that it will be carried out.⁴

As stipulated in the Application Information Requirements (BC EAO 2013a), only residual effects are carried forward from the Project-specific effects assessment into the CEA. The VCs included in the CEA for non-traditional land use are:

- Harvesting - one residual effects on harvesting were identified:
 - Change to harvest locations due to a change to the abundance and distribution of wildlife harvested by guide outfitters licence 701254 and 701258 and trappers TR0721T003 and TR0721T005. This residual effect is rated as not significant (minor), with medium likelihood and medium confidence (see Section 16.8.1.2).
- Industrial Use - one residual effect on industrial land use was identified:
 - Effects of damage to infrastructure resulting in economic impacts on overlapping tenure holders. This residual effect is rated as not significant (minor) rating, with medium likelihood and medium confidence (see Section 16.8.2.1).

16.11.2.1 Spatial Boundaries

Spatial boundaries for the CEA comprise the area within which the VCs affected by the Project could also be affected by past, present, or future human actions (as defined in Section 5.10.2.2). It is not necessary for the spatial extent of the Project's effects to physically overlap with that of another human action, only for the Project to affect *the spatial extent of the same VC* affected by another human action.

⁴ These criteria are based on the report of the Joint Review Panel for the Express Pipeline Project (National Energy Board 1996). The Joint Panel specifically excluded consideration of "hypothetical" human actions from CEA. However, the CEA Agency's Practitioner's Guide states, "best practice suggests that effort should be made in identifying actions if there is reason to believe they may occur, yet are not overly hypothetical" (Hegmann et al. 1999). Further, the CEAA's more recent Operational Policy Statement added, "the Agency position has evolved to include 'certain' and 'reasonably foreseeable' projects and, where appropriate those projects that are 'hypothetical'" (CEA Agency 2007). Therefore, in accordance with best practices, future human actions that are hypothetical but are still judged to be probable are considered in this assessment.

The spatial boundary for the non-traditional land use CEA is based on the RSA used for the Project-specific land use effects assessment, and includes the total area of guide outfitter licences 701254 and 701258 and trapline licences TR0721T003 and TR072T005 (Figure 16.11-1). The total area of the CEA Spatial Boundary is 445,780ha.

16.11.2.2 Temporal Boundaries

The temporal boundaries for the CEA go beyond the phases of the Project, beginning before major human actions were undertaken in the region, and extending into the future.

- **Construction Phase:** 3 years;
- **Operations Phase:** 25 years;
- **Decommissioning and Reclamation:** 3 years; and
- **Post Closure:** 30 years.

In addition, the boundary also includes the following temporal phases:

- **Past:** 1940 (to capture the early non-Aboriginal human activities in the region) to 2010 (when baseline studies at the Murray River Coal Project began);
- **Present:** 2010 (from the start of the Project baseline studies) to 2014 (completion of the environmental assessment); and
- **Future:** temporal boundaries are stated in each assessment chapter, and vary according to the time estimated for VCs to recover to baseline conditions (taking into account natural cycles of ecosystem change).

The other human actions considered in the CEA (described in Section 5.10.5) fall into the following temporal categories:

- **Past** (closed) human actions;
- **Present** (continuing and active) human actions; and
- **Future** human actions, which may be:
 - **certain actions:** those actions that have received regulatory authorizations but are not as yet built or operating;
 - **reasonably foreseeable actions:** those actions that are currently in some stage of a regulatory authorization process, and for which a general concept is available from which potential cumulative effects may be anticipated; and
 - **hypothetical actions:** those actions that are conjectural but probable, based on best professional judgement of currently available information, including leases, licences, and extrapolations from historical development patterns; *the potential cumulative effects of such actions are discussed on a conceptual basis only in this CEA.*

16.11.2.3 Identification of Potential Cumulative Effects

Residual effects carried forward from the Project-specific assessment are considered in combination with the residual effects of past, present, and future human actions, where some spatial and temporal overlap occurs (as described in Sections 5.10.2.1 and 5.10.2.2). Unless there is a spatial overlap, temporal overlap is considered irrelevant.

The results are presented in an impact matrix, as shown in Table 16.11-1. If there is no spatial and temporal overlap between the residual effects of the Project and those of another human action, the relevant cell is marked with a dash (-). Where there is spatial and temporal overlap, but no interaction is anticipated, the cell is marked grey (■), and a rationale as to why no interaction is predicted is given in the accompanying text. If there is overlap, and an interaction is anticipated, the cell is marked with a green (■), yellow (■), or red (■), as described in Section 5.6.3 and summarized in the footnotes to Table 16.11-1. Supporting rationale for the rankings assigned to interactions is then provided in the text.

As in the Project-specific effects assessment, only potential adverse effects ranked as moderate or major (yellow or red) before active application of mitigation measures will be carried forward in the CEA.

As shown by the cumulative interaction table, with respect to subsidence, there are no other present or reasonably foreseeable future projects that are expected to interact with the Murray River Project. This residual effect will not be carried forward into the CEA.

16.11.2.4 Cause-Effect Pathways for Cumulative Effects

Cumulative effects to non-traditional land use can manifest through a number of cause-effect pathways, including:

- **Nibbling loss.** The gradual disturbance and loss of land and habitat (e.g., clearing of land for new roads into a forested area).
- **Spatial or temporal crowding.** Cumulative effects can occur when there are too many projects or activities within an area in too brief a period of time. A threshold may be exceeded and the environment may not be able to recover to pre-disturbance conditions. This can occur quickly or gradually over a long period of time before the effects become apparent. Spatial crowding results in an overlap of effects among actions (e.g., noise from a highway near multiple mines). Temporal crowding may occur if effects from different actions overlap or occur before a VC has had time to recover.
- **Growth-inducing potential.** Each new action can stimulate further actions to occur. The effects of these “spin-off” actions (e.g., increased vehicle access into a previously remote area lacking roads) may add to the cumulative effects already occurring in the vicinity of the proposed action, creating a “feedback” effect. Such actions may be considered “reasonably-foreseeable actions.”

Figure 16.11-1
 Non-traditional Land Use: Cumulative Effects Assessment Spatial Boundary

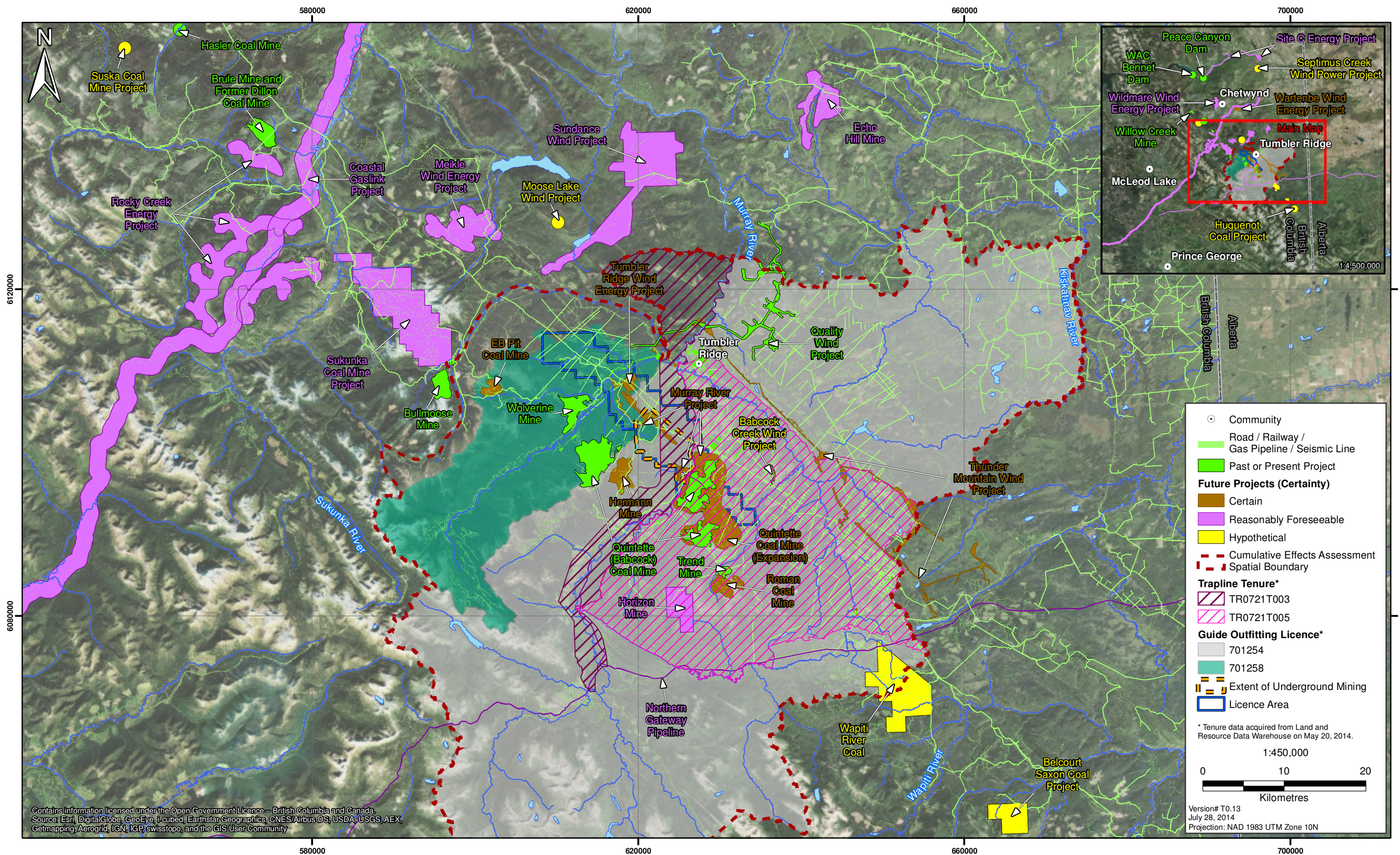


Table 16.11-1. Screening for Residual Effects to Interact Cumulatively with Effects of Other Human Actions on Non-Traditional Land Use

Murray River Coal Project Residual Effect	Potential for Cumulative Effect with Other Human Actions																	
	Time frame																	
	Past						Present						Future					
	Historic		Recent										Certain					
	Hasler Coal Mine	Sukunka (Bullmoose) Mine	Bullmoose Mine	Dillon Coal Mine	Quintette (Babcock) Mine	Willow Creek Mine	Brule Mine	Trend Mine	Quality Wind Project	Peace Canyon Dam	Wolverine Mine (Perry Creek) and EB Pit	WAC Bennett Dam	Hermann Mine	Quintette Mine	Roman Mine Project	Thunder Mountain Wind Park	Tumbler Ridge Wind Project	Wartenbe Wind Project
Change to harvest locations due to a change in the abundance and distribution of wildlife harvested by guide outfitter licences 701254 and 701258 and trappers TR0721T003 and TR0721T005.	O	L	L	O	L	O	M	L	L	M	L	M	M	M	L	L	-	
Economic impacts on overlapping tenures.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Murray River Coal Project Residual Effect	Potential for Cumulative Effect with Other Human Actions (cont'd)																	
	Time Frame (cont'd)																	
	Future (cont'd)																	
	Reasonably Foreseeable										Hypothetical							
	Echo Hill Mine	Coastal Gaslink Project	Horizon Mine	Meikle Wind Energy Project	Northern Gateway Pipeline	Rocky Creek Energy Project	Site C Clean Energy Project	Sukunka Coal Mine Project	Sundance Wind Project	Wildmare Wind Energy Project	Babcock Creek Wind Project	Belcourt Saxon Coal Project	Huguenot Mine	Moose Lake Wind Power	Septimus Creek Wind Power Project	Suska Mine	Wapiti River Coal Project	
Change to harvest location due to a change in the abundance and distribution of wildlife harvested by guide outfitter licences 701254 and 701258 and trappers TR0721T003 and TR0721T005.	O	O	M	L	L	O	L	L	O	-	L	O	O	-	-	-	L	
Economic impacts on overlapping tenures.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Murray River Coal Project Residual Effect	Potential for Cumulative Effect with Other Human Actions (cont'd)									
	Other Land Use Activities									
	Aboriginal Harvest	Agriculture and Range	Forestry and Manufacturing	Industrial Roads	Coal and Mineral Exploration	Oil and Gas Drilling and Exploration	Other Fishing and Trapping	Recreation and Tourism	Transportation	
Change to harvest location due to a change in the abundance and distribution of wildlife harvested by guide outfitter licences 701254 and 701258 and trappers TR0721T003 and TR0721T005.	L	-	M	M	M	M	L	-	L	
Economic impacts on overlapping tenures.	-	-	-	-	-	-	-	-	-	

Notes:

- No spatial or temporal overlap.
- O Spatial and temporal overlap, but no interaction anticipated; no further consideration warranted.
- L Negligible to minor adverse effect expected; implementation of best practices, standard mitigation and management measures; no monitoring required; no further consideration warranted.
- M Potential moderate adverse effect requiring unique active management/monitoring/mitigation; warrants further consideration.
- H Key interaction resulting in potential significant major adverse effect or significant concern; warrants further consideration.

Interacting projects and activities may combine to create additive, synergistic or induced effects. An additive effect increases the effect in a linear way (e.g., two projects both remove foraging habitat for the same moose population harvested by guide outfitter and trappers). A synergistic effect may result in an effect greater than the sum of the two actions (e.g., two projects remove escape habitat for mountain goat, shifting their foraging activities to an area where they are susceptible to increased predation). An induced effect may result when an effect stimulates another effect (e.g., construction of road access can stimulate ‘tie-in’ roads for forestry or other projects which may result in additional environmental effects).

Table 16.11-2 summarizes the anticipated cumulative interactions of other past, present and future Projects and other land use activities with the Project, and the type of potential cumulative effect predicted.

Table 16.11-2. Summary of Cumulative Interactions of Past, Present and Future Projects and Other Human Activities with Residual Effects to Non-Traditional Land Use

	Murray River Coal Mine Project	Past Project or Activity	Existing Project or Activity	Reasonably Foreseeable Future Project or Activity	Type of Potential Cumulative Effect
<i>Harvesting</i>					
Change to harvest location due to a change in the abundance and distribution of wildlife harvested by guide outfitter licences 701254 and 701258 and trappers TR0721T003 and TR0721T005.	X	N/A	Trend Mine, Wolverine/EB Pit	Hermann Mine, Quintette Mine, Roman Mine Project, Horizon Mine, Forestry, Industrial roads, Coal and Mineral Exploration, Oil and gas drilling and exploration	Nibbling loss, additive, growth-inducing

16.11.3

Description of Potential Cumulative Effects and Mitigation

The CEA will discuss the cumulative effect of all of the projects present in the CEA spatial boundary and how the projects, as a whole, will interact with the residual effects. This approach is taken as details around the reasonably foreseeable future projects are unknown. As the supporting evidence is not available, a detailed discussion will not be possible. In other words, the analysis will be a qualitative discussion based on a conservative approach.

16.11.3.1 Cumulative Effects to Harvesting

Guide outfitters and trappers rely on resources provided by the wilderness environment in order to carry out their business. Development of the Project is expected to result in residual effects to wildlife populations of moose, grizzly bear, and fisher (as a proxy for furbearers) in the Wildlife RSA as a result of habitat loss and alteration and disruption of wildlife movement. This effect is relevant to guide outfitters licences 701254 and 701258 and trappers TR0721T003 and TR0721T005. No residual effects are predicted on direct mortality.

Habitat loss will occur in the Project footprint, while habitat alteration will occur in the cleared areas surrounding the Project and may occur in the subsidence zone. It is predicted that subsidence would have little effect on wildlife habitat, largely mediated by effects on hydrology and the drying or creation of wetland areas that are important for wildlife. It should be noted that the area evaluated for habitat loss includes the entire footprint, and was not reduced to account for reclamation at closure. This results in a conservative assessment of the Project effects.

Disruption of movement was evaluated by examining the habitat loss in the Murray River Resource Management Zone (MRRMZ), which defines the riparian area and a buffer surrounding the Murray River. Wildlife, particularly those species with a preference for low elevation habitat during some parts of the year, are likely using the MRRMZ as a movement corridor. The proportion of habitat lost to the Project and other human activities was used as a metric for determining disruption of movement.

Other present and foreseeable future mining, hydroelectric, and other commercial activities, such as oil and gas exploration have the potential to act cumulatively on wildlife, resulting in a nibbling loss of habitat and additive disruption of movement in the RSA. The number of project interactions with each guide outfitter and trapline licence have the potential to cumulatively impact the overall use of these tenures. For example, guide outfitting licence 701254, which overlaps nine past, present and future projects, in addition to the Murray River Project, may be more likely to experience cumulative effects compared guide outfitting licence 701258, which overlaps four additional projects. However, the magnitude of the cumulative effect may be influenced by the size of the guide outfitter or trapline licence and the cumulative residual effects on habitat of harvested wildlife species.

The cumulative residual effects of habitat loss for moose was given a minor magnitude rating (Section 13.11.2) because of the relatively small area of late winter habitat lost to human activities (5.9%) of that available in the RSA. This is an area equivalent to the home range of 3.5 moose. All four tenures overlap the RSA and so the 5.9% habitat loss may occur in a combination of one, some or all of the four tenures.

The effects of disruption of movement for moose, grizzly bear and furbearers were predicated to occur primarily along the Murray River Resource Management Zone (MRRMZ). Guide outfitter 701254 and traplines TR0721T003 and TR0721T005 are within the MRRMZ and will likely experience cumulative effects from disruption of movement. Guide outfitter 701258 is outside of the MRRMZ and cumulative effects from disruption of movement are not anticipated in his license area.

No cumulative residual effect on fisher was predicted (section 13.11.4). With a conclusion that cumulative effects from multiple projects would not have a cumulative residual effect on the population of fisher in the cumulative effects assessment area, no residual effect is predicted for the harvest of fisher by trappers, and thus no cumulative residual effects are predicted for TR0721T003 and TR0721T005.

The wildlife cumulative effects assessment rated the two potential cumulative effects on moose (habitat loss and disruption of movement) as **not significant (minor)** (Table 13.11-9 in Section 13.11.6). The cumulative effect on grizzly bear from disruption of movement was also rated as **not significant (moderate)**.

Guide outfitters typically adjust the location of guided hunts based on wildlife movement. Guide outfitters will continue to be able to hunt moose and grizzly bear in other areas of their licence.

16.11.4 Mitigation Measures to Address Cumulative Effects on Non-Traditional Land Use

Management plans, monitoring, and adaptive management will be implemented to mitigate disturbances and changes caused by the Project on land use as outlined in Sections 16.7.2. No additional Project mitigation is anticipated other than that the mitigation identified in Section 16.7.2. It is anticipated that other large resource development projects would adopt mitigation and management measures similar to those of the Project.

16.11.5 Cumulative Residual Effects for Non-Traditional Land Use

Cumulative residual effects are those effects remaining after the implementation of all mitigation measures and are summarized in Table 16.11-3.

16.11.6 Characterization of Residual Cumulative Effects, Significance, Likelihood, and Confidence

The residual cumulative effects to VCs are next characterized using the same criteria described in Section 16.9 (e.g., Magnitude, Geographic Extent, Duration, Frequency, Reversibility, Resilience). Significance, probability and confidence are also assessed using the same criteria described in Section 16.9.

The cumulative residual effects for each VC were characterized by considering the Project's incremental contribution to the cumulative residual effect under two scenarios:

- Future case without the Project: a consideration of residual effects from all other past, existing, and future projects and activities on a subcomponent without the Murray River Coal Project.
- Future case with the Project: a consideration of all residual effects from past, existing, and future projects and activities on a subcomponent with the Murray River Coal Project.

This approach helps predict the relative influence of the Project on the residual cumulative effect for each intermediate component or VC, while also considering the role of other projects and activities in causing that effect.

The consideration of both scenarios led to the conclusion that the cumulative residual effects will be the same both with and without the Project. The Project is not considered to be a significant contributor with respect to the cumulative residual environmental effects. On the contrary, the number of projects expected to act cumulatively with the Murray River Coal Project, and the scale and magnitude of effects expected from some of these projects, crowd out the effects of the Murray River Coal Project to the point where they are immaterial. For that reason, this CEA will only look at the modelling for the cumulative residual effects with the Project, as the same results and conclusions will be reached without the Project.

Table 16.11-3. Summary of Cumulative Residual Effects on Commercial Land Use

Valued Component	Murray River Activity	Other Human Activity	Description of Potential Cumulative Effect	Description of Mitigation Measure(s)	Description of Residual Cumulative Effect
Harvesting	Construction of Project components, access roads and rights-of-way, Project traffic	Trend Mine, Wolverine/EB Pit, Hermann Mine, Quintette Mine, Roman Mine Project, Horizon Mine, Forestry, Industrial roads, Coal and Mineral Exploration, Oil and gas drilling and exploration	Cumulative wildlife habitat loss and fragmentation, and disruption of movement in the CEA spatial boundary (nibbling loss, additive)	Wildlife Mitigation and Monitoring Plan, Noise Management Plan, Subsidence Management Plan	Change in harvest locations due to a decrease in the abundance and distribution of wildlife resources in the CEA spatial boundary available for guide outfitter licences 701254 and 701258.

¹ Refers to the Project phase or other timeframe during which the effect will be experienced by the intermediate receptor or VC.

² "Cause-effect" refers to the relationship between the Project component/physical activity that is causing the change or effect in the condition of the receptor VC.

In keeping with BC EAO (2013b), likelihood of cumulative effects was considered prior to significance for effects on Non-Traditional Land Use. Once a significance determination is made, the confidence in the significance prediction is evaluated to assess scientific certainty in the result.

16.11.6.1 *Cumulative Residual Effects Characterization for Non-Traditional Land Use: Harvesting*

Table 16.11-4 summarizes the assessment of cumulative residual effects on harvesting. The lack of data on the timing and design of reasonably foreseeable future projects has required a conservative approach to assessing significance to cumulative residual effects. In other words, the assessment is based on a scenario of high development versus low development.

Change in Harvest Locations due to Change in the Distribution and Abundance of Resources

The wildlife CEA concluded that low level effects on the population of moose and grizzly bears, hunted by guide outfitters (licences 701254 and 701258). No cumulative residual effects were predicted for furbearers. In the event that all reasonably foreseeable future projects commence on time and as designed, the cumulative change in the abundance and distribution of resources as a result of the activities of these projects will increase the magnitude and duration of the effect on harvesting. Much of the change in magnitude is based on increased habitat loss and fragmentation and disruption of movement of wildlife in the Murray River corridor. The amount of Project traffic anticipated, or the amount of wilderness opened up by the Project is small compared to the total amounts of each anticipated by the development scenario predicted in this assessment.

Likelihood

The likelihood of cumulative effects to harvest locations from changes in the abundance and distribution of resources is **medium** because of the fact that industrial developments all inevitably produce noise and other disturbances in order to operate; and because of the predictable responses of certain wildlife harvested by guide outfitters to sensory disturbances. Wildlife habitat will be destroyed or altered as a result of site clearing and infrastructure development for all of the projects.

Significance

In the event that all reasonably foreseeable future projects commence on time and as designed, the cumulative residual effect of change in the abundance and distribution of resources on harvesting, even with the Project, will be **not significant (minor)**. The CEA for wildlife (Section 13.11) determined that no significant adverse cumulative residual effects to moose or grizzly bear were anticipated. Therefore, the cumulative adverse residual effects to the abundance and distribution of wildlife resources were also characterized as not significant.

Confidence

The confidence in the assessment of cumulative residual effects is **high** as the guide outfitters can harvest in other areas of their tenures.

16.12 EFFECTS ASSESSMENT CONCLUSIONS FOR NON-TRADITIONAL LAND USE

The results of the Project effects assessment and CEA for non-traditional land use are summarized in Table 16.12-1. The one residual effect was found to be not significant.

Table 16.11-4. Characterization of Residual Cumulative Effects, Significance, Likelihood, and Confidence

Cumulative Residual Effect	Cumulative Residual Effects Characterization Criteria						Significance of Adverse Cumulative Residual Effects	Likelihood of Occurrence	
	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Resiliency		Probability	Confidence
Change in harvest locations due for guide outfitters (licences 701254 and 701258) in the CEA area.	Minor	Far Future	Regular	Landscape	Reversible Long-term	Neutral	Not Significant (minor)	High	High

Table 16.12-1. Summary of Project and Cumulative Residual Effects, Mitigation, and Significance for Non-Traditional Land Use

Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
<i>Harvesting</i>				
Change in harvest locations for guide outfitters licences 701254 and 701258 and trappers TR0721T003 and TR0721T005.	Construction, Operation	Wildlife Management Plan, Noise Management Plan, Subsidence Management Plan	Not significant (minor)	Not significant (minor) for guide outfitters 701254 and 701258 N/A for TR0721T003 and TR0721T005
<i>Industrial Land Use</i>				
Economic burden on overlapping tenure holders.	Operation, Decommissioning and Reclamation	Longwall exclusion zone, regular communication with overlapping tenure holders, Subsidence Management Plan	Not significant (minor)	N/A

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- 1996c. *Land Act*, RSBC 1996. C. 245.
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1997. *Fish Protection Act*, SBC. C. 21.
2001. *Drinking Water Protection Act*, SBC. C. 9.
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