

**Timber Harvest Project
For The
Small Volume Area

Watson Lake**

Forest Management Unit: **Y03**
2008

A Publication of:
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Executive Summary

This project fulfils a portion of the recommendations made by the Kaska Forest Resource Stewardship Council towards wood supply requirements in Forest Management Units Y02 and Y03. The intent of this project is to provide opportunities for local use in the form of small volume timber permits of less than 1000 m³ as well as incorporation of the area into the Watson Lake Fuel Abatement Program. Operating units have been established on the ground. Individual harvest blocks along with Site and Harvest Plans will be prepared at the time of application, prior to issuance of permits.

The Watson Lake Small Volume Area (SVA) is located immediately south of Watson Lake, between the south fireguard and the Liard River. The area contains recreational cross-country ski trails, an array of new and old roads, and the municipal sewage lagoon.

There are four operating units within the SVA totalling 116.8 hectares. Total available volume within operating units is **20,327 m³**. Harvesting prescriptions will target the larger merchantable stems (>15 cm dbh) while retaining smaller stems and all aspen. This should reduce fuel load and open up the stand thus reducing large fire potential.

1.0 INTRODUCTION

1.1. Background

A *Memorandum of Understanding* (MOU) was signed, July 29, 2002, between the Kaska First Nation and the Yukon Government. The MOU empowered the *Kaska Forest Resource Stewardship Council* (KFRSC) to create a regional Forest Management Plan for the Southeast Yukon in Forest Management Units Y02, Y03, and Y09. Work continues on this plan.

In September 2003, a landscape plan was completed by the Interim Wood Supply Technical Working Group established under the KFRSC. The landscape plan identified the area south of Watson Lake as potential for meeting local timber needs. In January 2004, the KFRSC recommended that small volume wood supply needs could be met through use of these identified areas south of Watson Lake.

In March 2004, the Yukon Forest Management Branch (FMB), with guidance from the KFRSC, initiated this Timber Harvest Project (THP) for the Watson Lake Small Volume Area (SVA). The Intent of the project is to provide small volume timber opportunities to meet local wood supply demand as well as incorporate the project area into the Watson Lake fuel abatement program.

1.2. Ecoregion and Drainages

The Watson Lake Small Volume Area is within the Liard Basin Ecoregion of the Boreal Cordillera Ecozone (*Environment Canada 2005*). This Ecoregion is best described as a broad, rolling, low-lying area mantled with glacial drift and outwash deposits. It is characterized by extensive stands of boreal forest composed of lodgepole pine (*Pinus contorta*), white and black spruce (*Picea glauca/mariana*), and trembling aspen (*Populus tremuloides*). The dry sites generally support lodgepole pine while moist sites commonly consists of black spruce and larch (*Larix laricina*), with Labrador tea (*Ledum groenlandicum*), horsetail (*Equisetum spp.*), and mosses as ground cover.

The ecoregion is underlain by Carboniferous Palaeozoic limestone and Cretaceous shale and lies 620-930 m above mean sea level. Luvisolic soils are associated with the productive upland boreal forests of the region. Cumulic Regosols support productive stands of white spruce along the floodplain of the Liard River and its larger tributaries. Eutric and Dystric Brunisols exist on coarse-textured fluvio-glacial deposits. Permafrost is scattered, confined mainly to lower north-facing slopes and sphagnum bogs.

Mean annual temperature for the area is around -3°C with a summer and winter mean of 11°C and -18.5°C respectively. The area receives annual precipitation amounts between 350-400 mm and drains into the Liard River.

2.0 PROJECT AREA IDENTIFICATION

The Watson Lake Small Volume Area is located just south of the Watson Lake town site, situated on a plateau above and to the north of the Liard River (Appendix I). The project takes place on forested Territorial Land within the Kaska Traditional Territory. There are 4 operating units (OU) within the SVA encompassing 116.8 ha. The area is bounded by a fire guard to the north, an old access road to the east, steep banks leading to the river flats to the south, and the Hardy Mainline to the west. The towns' sewage lagoon is in the middle of the area with its gated road providing access to one of the operating units. There is a small network of cross country ski trails throughout the area.

2.1. Landscape Issues

2.1.1. Wildlife

No raptor or migratory bird nests were found during the development phases of the area. Should any nests be found during future operations, operations will cease immediately and officials from Client Services & Inspections (CS&I) will be notified.

2.1.2. Riparian and Water Resources

There are no known streams or wetlands within the SVA and none were identified during reconnaissance or engineering operations. Should any unidentified streams or wetlands be found during future operations they will be buffered according to the Timber Harvest Planning and Operating Guidebook (THPOG) (*DIAND 1999*). The entire SVA drains into the Liard River which is buffered from OU's by more than 200 m which is the maximum buffer requirement defined in the THPOG.

The town sewage lagoon is adjacent to OU U2-5 to the south. Harvesting operations are not anticipated to have any significant or negative affect on water quality.

2.1.3. Recreation and Visual Quality

The project area is in close proximity to the municipality. There are designated cross country ski trails within the SVA, however, none of them are within operating units. These trails have been mapped and are buffered so that OUs' cannot be seen directly from the trails. The integrity of these ski trails will be maintained throughout all phases of operations.

Because the area is set aside for small permits (<1000 m³) it is anticipated that harvesting will occur gradually over the next few years. This gradual opening in combination with the harvest prescription, reserve patches, and leave areas between openings should further alleviate any concerns regarding visual quality.

2.1.4. Wildfire

The SVA is a mostly continuous vegetated forest type to the south and southwest of the Town of Watson Lake. The prevailing winds of the region are from the southwest. Wildfire is a common occurrence in the region with a 100 year fire cycle and an average fire size of 1000 ha. This could be problematic to the town site in the event of wildfire.

This situation is currently being mitigated through local fuel abatement programs. Most of the high risk stands immediately adjacent to the community have been treated to FireSmart standards. A series of fire guards have also been placed in strategic locations around the town. Treatment of operating units within the SVA will aid in further reducing large fire potential by breaking up the contiguous fuel load. Treatments between stands may also be implemented in the future, making a landscape level fuel break, adding a further degree of protection against wildfire.

Not all trees react to fire in the same manner. FireSmart rates the foliage flammability of trees between very low and very high (FireSmart 1999). Table 1 outlines the FireSmart rating of the different trees found in the SVA. Lodgepole pine make up the bulk of the stems in the SVA at 63% (Figure 1).

Table 1. FireSmart rating of the flammability of foliage for trees found in the SVA.

Tree Species	Flammability of Foliage
Lodgepole Pine	High
White Spruce	High
Black Spruce	Very High
Trembling Aspen	Very Low

2.2. Stand Level Issues

2.2.1. Ecosystem and Stand Composition

The SVA is best described as a simple homogenous upland ecosystem within natural disturbance zone (NDZ) 3 (DIAND 1999). Primary disturbance types, with size and frequency, are summarized in Table 1 below.

Table 1. Summary of primary disturbance types, patch size, and interval of stands within NDZ 3.

Disturbance Event	Average Patch size (Ha)	Mean event interval
Fire	1000	100 years
Insect	300	every 40 yrs after stand maturity
Disease	10	primarily in young stands

This area is comprised predominately of lodgepole pine/spruce stands and conifer/aspen mixedwood stands with vegetation type classifications of V-14, V-15, or V-33 (Zoladeski 1996) (Refer to section 8 for V-type definitions).

The largest component of stems in the SVA are lodgepole pine making up 63% of the total (Figure 1). Spruce is the second highest component making up 31% with approximately 13% being white spruce and 18% black spruce. Trembling aspen makes up 6% of the stems in the area.

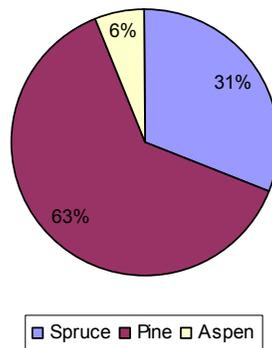


Figure 1. Percentage of stems per hectare, by species composition, of the different tree species in the Watson Lake SVA.

2.2.2. Cultural Heritage and Archaeological Sites

An overview assessment of potential heritage sites was conducted for FMB (Thomas 2004). Areas of high potential have been identified and mapped, in and around the operating units. No archaeological sites were identified and monitoring will continue throughout future operations. Any information on land based heritage resources, such as archaeological sites, can be accessed through the Heritage Branch of the Department of Tourism and Culture.

Any suspected sites of importance uncovered during road development or harvesting operations will require immediate cessation of all operations. FMB and/or the Heritage Branch shall be notified and operations will not resume until notice is given.

2.2.3. Traditional Land Users

Trapper concessions #368 and #414 encompass the Watson Lake SVA.

3.0 HARVESTING SECTION

Operating units will be harvested by targeting merchantable conifers greater than or equal to 15 cm dbh. All aspen will be retained along with all conifer stems less than 15 cm dbh. This reduction in fuel load and increased spacing will work towards reducing large fire potential in the area.

3.1. Operating Unit Area and Volume Summary

Table 3 gives a description of the four OU's showing area and total available volume (Appendix I). All volume estimates are based on net merchantable volume which includes all coniferous stems => 12.5 cm dbh. Actual harvest volumes will be less considering harvesting guidelines.

Table 3. Summary of SVA operating units showing areas and total available volume.

Operating Unit	Total Area (ha)	Reserves (ha)	Net Area (ha)	Total Available Volume (m ³)**
U1-2	28.9	2.2	26.7	6692
U1-3	28.2	1.0	27.2	5383
U2-5	55.6	7.5	48.1	7715
U2-6	4.1	0	4.1	537
	116.8	10.7	106.1	20,327

**Net merchantable =>12.5 cm (dbh)

The SVA has a typical stem size distribution for its age class and contains the bulk of the merchantable volume in mid range diameter classes (Figure 2).

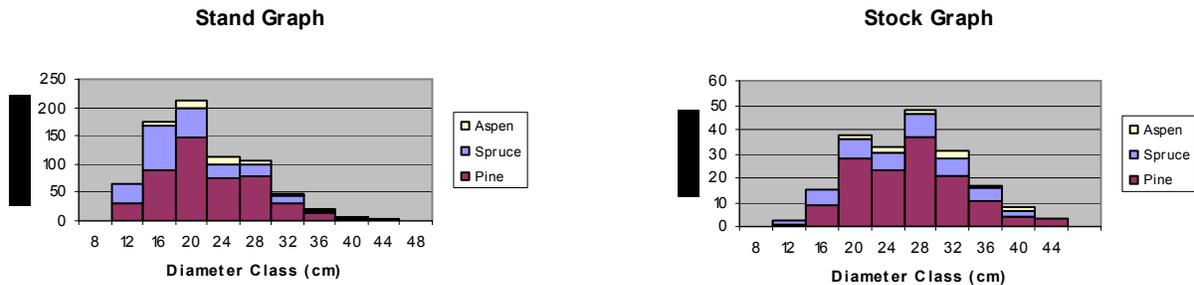


Figure 2. Stand and Stock graphs, showing stems per hectare and merchantable volume by diameter class, for the Watson Lake SVA.

3.2. Harvesting Guidelines

- All spruce and pine larger than or equal to 15 cm dbh may be removed. Harvesting of the larger spruce and pine stems will reduce fuel load on the site while opening crown closure as well. This will reduce large fire potential working towards the fuel abatement objectives for the area.
- Tops will be bucked to a 10 cm top and all tops and limbs shall be piled and burned.
- Directional felling techniques must be employed to ensure that non-targeted trees remain undamaged.
- All aspen will be retained along with all spruce and pine under 15 cm dbh including advanced regeneration.
- Snags that are considered safe to work around may be retained to augment structural diversity for the future stand and enhance wildlife habitat attributes.
- Operating Units may have more than one block permitted within it. These blocks will be tailored to individual clientele needs and will have to be flagged in the field prior to activation of the permit.

3.3. Harvesting Schedule and Season

The harvesting schedule will correlate with demand. There will be no seasonal restraints, however, operations will cease under wet conditions when rutting and site degradation are a concern.

3.4. Reforestation

The intent of the project area is to act as an interim supply while regional management plans are being developed as well as to contribute to overall community fuel abatement objectives. Therefore; it is not imperative that stands be replaced with economically desirable conifer stems.

Natural regeneration is the preferred and targeted method of regeneration. All trembling aspen will be retained and it would be desirable to have sites regenerate naturally with aspen suckers. Having stands replaced with aspen will assist in meeting community fuel abatement objectives by replacing the existing spruce and pine trees, with their high foliage flammability, with less flammable aspen.

Regeneration surveys will be conducted after harvest, as per the Yukon Regeneration Survey Manual, to determine stocking and density levels. Natural regeneration is the goal, however, fill plants may be prescribed if any areas are found to be not sufficiently re-stocked.

4.0 ACCESS MANAGEMENT

The SVA is accessed by the Hardy mainline, the lagoon road, and the south fireguard trail (Appendix I). FMB will ensure OU's are accessible by road and will endeavour to provide internal OU roads when feasible. Internal OU roads will be constructed when needed and de-activated upon completion of harvesting operations. Road size and impacts will be kept to a minimum. Specific road size and standards will be determined on an individual basis.

OU U1-2 is accessed off of the town's southern fireguard. The fireguard can be accessed at many different points. The road is in need of upgrade and the most feasible fireguard access point will be determined prior to upgrading.

OU U1-3 is accessed by the Lagoon Road. The Lagoon access road is a well maintained gated road under the responsibility of the municipal Public Works. Gate access will have to be arranged with the municipality prior to any operations.

The Hardy Mainline connects to the Alaska Highway just west of town and provides access to OU's U2-5 and U2-6. This road is a well maintained road open to the public. This road is also used to access an agriculture lease by the Liard River and the public ski trails. The access road into U2-6 will start about half way down the Hardy Mainline and will be a short (300 m) road. The Hardy mainline currently goes through the southwest tip of U2-5 providing some access. New access roads will be constructed into the OU as required.

5.0 MONITORING PLAN

Harvest operations will be subject to permit terms and conditions and will be monitored by the staff of CS&I Branch. Harvesting techniques will be made clear to each permittee prior to issuance of permits. This may require site visits in the preliminary stages of harvesting to ensure that proper size class and species are being retained and protected.

6.0 OPERATING UNIT SUMMARIES

This section highlights salient information that will be required for site and harvest plans at the time of harvest.

6.1. Operating Unit U1-2 Summary

Boundary: Located 150 m south of the Watson Lake southern fireguard containing one reserve patch which splits the unit in half. The east boundary is 200 m from a designated ski trail. The southern boundary follows an abrupt terrain break while the west boundary follows a white birch/aspens/pine timber type (Appendix II).

Mapsheet#: 105A/02

Airphoto #'s: A28344#090

Ecology and Site Conditions:

ECO-REGION				VEGETATION TYPE			SOIL TYPE		
Liard Basin				V14,V15			S3		
ELEV	SLOPE %	ASPECT	TERRAIN	SLOPE POSITION	MOIST. REGIME	SOIL DRAINAGE	LFH(OM) DEPTH	SOIL TEXTURE	
700 m	0-15	North & South	Even	Crest	Fresh	Well	5-10 cm	Sandy loam	

Harvest Stand Description:

MERCH. AREA (ha)	VEGETATION TYPE	CROWN CLOSURE	AGE	HEIGHT (m)	AVG. DBH (cm)	Volume (m ³ /ha)
26.7	V14,V15	55%	121-150	20	28	250

Harvesting Prescription: Removal of conifer stems >15 cm dbh. Tops and limbs piled and burned. See section 3.2.

Riparian Considerations: There are no streams or wetlands within or immediately adjacent to this operating unit.

Terrain Stability: There are no terrain stability concerns pertaining to this operating unit.

Visual Sensitivity: The unit cannot be seen from the Liard River or any major roads. Designated ski trails are in the vicinity and have been buffered by more than 200 m.

Cultural Heritage: There are no known archaeological sites within this unit.

Forest Health: There are no known forest health issues within this operating unit.

6.2. Operating Unit U1-3 Summary

Boundary: The unit contains two reserve patches and is accessed via the lagoon road. The southwest boundary of the unit follows an elevation break which loosely follows the access road. The lagoon boundary fence is the eastern limit of the unit. The northern and western boundaries follow distinctive timber types of spruce regen and aspen/pine (Appendix II).

Mapsheet#: 105A/02

Airphoto #'s: A28344#090

Ecology and Site Conditions:

ECO-REGION			VEGETATION TYPE			SOIL TYPE		
Liard Basin			V14, V15			S3		
ELEV	SLOPE %	ASPECT	TERRAIN	SLOPE POSITION	MOIST. REGIME	SOIL DRAINAGE	LFH(OM) DEPTH	SOIL TEXTURE
650 m	0-35	South	Sloped	Mid	Fresh	Well	10-15 cm	Sandy loam

Harvest Stand Description:

MERCH. AREA (ha)	VEGETATION TYPE	CROWN CLOSURE	AGE	HEIGHT (m)	AVG. DBH (cm)	Volume (m ³ /ha)
27.2	V14,V15	55%	121-150	22	29	198

Harvesting Prescription: Removal of conifer stems >15 cm dbh. Tops and limbs piled and burned. See section 3.2.

Riparian Considerations: There are no streams or wetlands within or immediately adjacent to this operating unit. Sewage lagoon to the south of the unit.

Terrain Stability: There are no terrain stability concerns pertaining to this operating unit.

Visual Sensitivity: Area is closed to public access. The unit cannot be seen from the Liard River or any major roads.

Cultural Heritage: There are no known archaeological sites within this unit.

Forest Health: There are no known forest health issues within this operating unit.

6.3. Operating Unit U2-5 Summary

Boundary: Contains five reserve patches and is accessed via the Hardy Mainline. The southwest tip of the unit is dissected by the access road leaving a small patch on the west side of the mainline. The south boundary follows a terrain break above a designated ski trail. East and north boundaries follow topographic and timber type breaks. The western boundary parallels the Hardy mainline and is separated by a timber type buffer (Appendix II).

Mapsheet#: 105A/02

Airphoto #'s: A28344#090

Ecology and Site Conditions:

ECO-REGION			VEGETATION TYPE			SOIL TYPE		
Liard Basin			V14			S3		
ELEV	SLOPE %	ASPECT	TERRAIN	SLOPE POSITION	MOIST. REGIME	SOIL DRAINAGE	LFH(OM) DEPTH	SOIL TEXTURE
650 m	0-30	South	Rolling	Mid/crest	Fresh	Well	5-10 cm	Sandy loam

Harvest Stand Description:

MERCH. AREA (ha)	VEGETATION TYPE	CROWN CLOSURE	AGE	HEIGHT (m)	AVG. DBH (cm)	Volume (m ³ /ha)
48.1	V14	55%	121-150	19	23	160

Harvesting Prescription: Removal of conifer stems >15 cm dbh. Tops and limbs piled and burned. See section 3.2.

Riparian Considerations: There are no streams or wetlands within or immediately adjacent to this operating unit.

Terrain Stability: There are no terrain stability concerns pertaining to this operating unit.

Visual Sensitivity: The unit cannot be seen from the Liard River or any major roads, however, the main access road dissects a piece of the unit. A designated ski trail is located just south of the boundary and is buffered by >50 m and an elevation break.

Cultural Heritage: There are no known archaeological sites within this unit.

Forest Health: There are no known forest health issues within this operating unit.

6.4. Operating Unit U2-6 Summary

Boundary: North, east, and south boundaries follow a terrain break and timber type change. West boundary follows an old selectively logged timber type and is 250 m from the Hardy Mainline (Appendix II).

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Airphoto #'s: A28344#090

Ecology and Site Conditions:

ECO-REGION			VEGETATION TYPE			SOIL TYPE		
Liard Basin			V33			S1		
ELEV	SLOPE %	ASPECT	TERRAIN	SLOPE POSITION	MOIST. REGIME	SOIL DRAINAGE	LFH(OM) DEPTH	SOIL TEXTURE
680 m	0-5	Flat	Even	Crest	Fresh	Well	5-10 cm	Sand loam

Harvest Stand Description:

MERCH. AREA (ha)	VEGETATION TYPE	CROWN CLOSURE	AGE	HEIGHT (m)	AVG. DBH (cm)	Volume (m ³ /ha)
4.1	V33	40%	121-150	19	23	130

Harvesting Prescription: Removal of conifer stems >15 cm dbh. Tops and limbs piled and burned. See section 3.2.

Riparian Considerations: There are no streams or wetlands within or immediately adjacent to this operating unit.

Terrain Stability: There are no terrain stability concerns pertaining to this operating unit.

Visual Sensitivity: The unit cannot be seen from the Liard River or any major roads. Buffered from the Hardy mainline by 250 m.

Cultural Heritage: There are no known archaeological sites within this unit.

Forest Health: There are no known forest health issues within this operating unit.

7.0 REFERENCES

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8.0 ACRONYMS: The following is a list of technical and abbreviated terms used.

cm – centimeter

CS&I – Client Services and Inspections Branch, Yukon Government. Department of Energy Mines and Resources.

Dbh – diameter breast height – the measure of a tree’s diameter in centimeters at a point 1.3 meters above the ground.

FMB – Forest Management Branch, Yukon Government. Department of Energy Mines and Resources.

ha – hectare

KFRSC – Kaska Forest Resource Stewardship Council

km – Kilometre

m³ – cubic metre

MOU – Memorandum of Understanding

NDZ – Natural Disturbance Zone

OM – Organic Matter over the mineral soil, usually broken into 3 components.

LFH – Litter, Fines and Humus. Litter is fresh needles, leaves, cones and other organic debris. Fines are aged and partially decomposed litter and Humus is the fully decomposed organic layer sitting directly above the mineral soil.

OU – Operating Unit – a distinct area of operations within a Harvest Planning Area.

SVA – Watson Lake Small Volume Area

THP – Timber Harvest Project. Formerly FDP (Forest Development Plan)

THPOG – Timber Harvest Planning and Operating Guidebook

V type – vegetation type for ecosystem classification.

V-14 Closed lodgepole pine-spruce forest (>50% crown closure).

Conifer stands of lodgepole pine and black or white spruce.

V-15 Closed lodgepole pine forest (>50% crown closure).

Upland pine dominated stands, often with a presence of black and white spruce.

V-33 Open lodgepole pine-aspen forest (<50% crown closure).

Mixedwood stands dominated by lodgepole pine.

Heritage Resource Overview Assessment Report

For

Timber Harvest Project, Watson Lake Small Volume Area

November, 2008

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Yukon Government**

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1.0 Introduction

The following report contains an overview of heritage resource potential for four proposed harvest areas in the Watson Lake Planning Unit of Forest Management Unit Y06. Recommendations put forward in this study are based on overview studies informed by adaptive resource management principles discussed in the *Heritage Potential Modeling Study for Southeast Yukon Forestry Planning* (Thomas 2005) and recommendations included in the *Overview Assessment of Potential Heritage Concerns in the East Hyland, Watson Lake, West Rancheria and Ross River Planning Areas* (Thomas 2004) as well as supplemental interpretations of orthographic photo and topographic map information at the present time. The purpose of the report is to identify physiographic features within proposed harvest areas where heritage resource inventories and impact assessments should be completed in advance of forest harvest. The Harvest Areas discussed in this study are U1-2, U1-3, U2-5 and U2-6.

2.0 Objectives

The objectives of this study are to identify:

1. physiographic regions within proposed project harvest areas (HA) that are considered to have elevated potential for the presence of heritage resources.
2. the types of impacts that are associated with timber harvest (TH) and to discuss how TH may impact heritage resources that are either on the land surface or buried in the subsurface.
3. adaptive heritage resource management strategies that can be used to mitigate the effects of timber harvest on heritage resources.

Fulfilling these objectives will allow Forest Management Branch to incorporate heritage resource inventories and assessments into the forest development planning timeline.

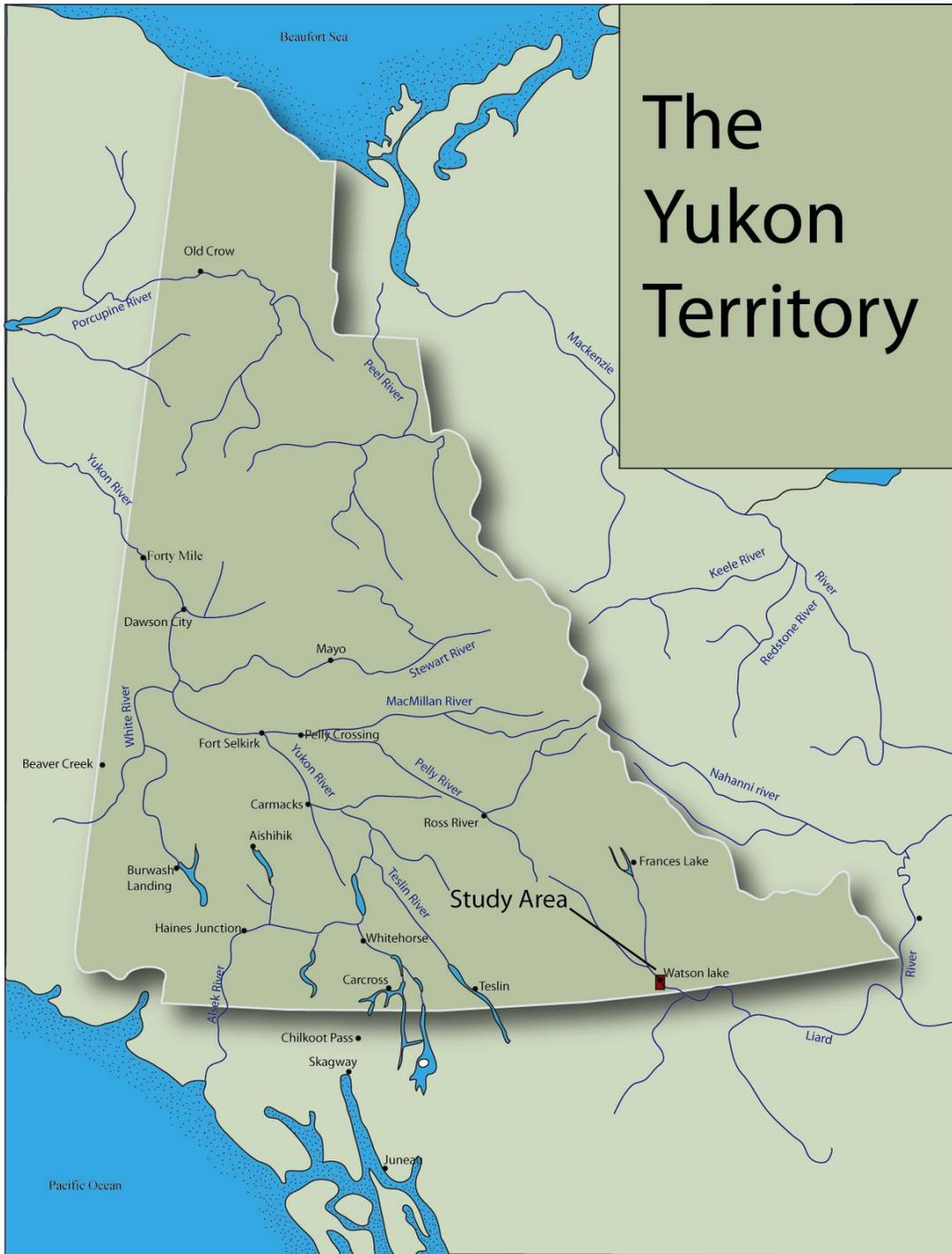


Figure 1: Map of the Yukon Showing the location of the Watson lake Small Volume Area.

3.0 Definitions

3.1 Heritage Resources

Heritage resources are protected and managed under the Chapter 13 of the *Umbrella Final Agreement* (UFA) and under the *Historic Resources Act*. In the latter historic

resources are defined as “(i) a historic site, (ii) a historic object, and (iii) any work or assembly of works of nature or of human endeavor that is of value for its archaeological, paleontological, pre-historic, historic, scientific, or aesthetic features”(1991). For the present report, the following **working** definitions are used:

1. A **Site** is an area or a place, or; a parcel of land which contains heritage resources or objects.
2. **Historic Sites** contain heritage resources that are greater than 45 years in age and that have been abandoned. By convention, historic sites date to the period for which written records are available; in the Southeast Yukon, the historic period commences with the arrival of the Hudson’s Bay Company in the early-mid 19th century. Historic sites include cabins, caches, camps, brush camps, and any other man-made structures, features or objects that date between about 1950 and 1830-50.
3. **Archaeological Sites** generally date to before European contact and are found on or under the ground surface, and consist of the remains of ancient camps, including, hearths, animal bone and stone tools and debris. In this usage, and Archaeological Site equates to a Prehistoric Site (a site that dates to the period before written history). Note, however, that in heritage resource management usage, archaeological resources are viewed as resources that are in subsurface context (buried) and may also include historic period objects and features.
4. **Paleontological resources** are fossil and other remains of extinct or prehistoric plants and animals.

3.2 Burial Sites

Burial sites are not defined here as a heritage “resources” or “sites” though they are afforded similar measures of protection under *Historic Resources Act* and the *Umbrella Final Agreement*. From the “Guidelines Respecting the Discovery of Human Remains and First Nation Burial Sites in the Yukon,” burial sites are defined as follows:

1. A **burial site** is the location of any human grave or remains that have been interred, cremated or otherwise placed, and includes ossuaries, single burials, multiple burials; rock cairns; cave or cache burials etc. not situated within a recognized cemetery.
2. A **First Nation burial** is a place outside a recognized cemetery where the remains of a cultural ancestor of a Yukon First Nations person have been interred, cremated or otherwise placed.
3. **Human remains** mean the remains of a dead human body and include partial skeletons, bones, cremated remains and complete human bodies that are found outside a recognized cemetery.
4. A **grave offering** is any object or objects associated with the human remains that may reflect the religious practices, customs or belief system of the interred.
5. A **recognized cemetery** is a defined area of land that is set aside for the burial of human remains.

4.0 Methods

The results of this study were obtained by identifying high potential areas within 300 m of the high water mark (Thomas 2005) and then interpreting landforms for site specific potential using orthographic photos and topographic maps. Both methods are guided by the principle that past human land use was focused on the distribution of habitable landforms in close proximity to water and are, likewise, limited by the understanding that the landscape is dynamic and often in flux making it difficult to associate high potential landforms with water bodies in a comprehensive manner.

Potential studies involved the use of topographic maps to identify water bodies and water courses as well as approximate topographic features. Orthographic photographs were used to identify high potential topographic features (such as hills and terraces) that are presently outside or on the periphery of the water body buffer zones but are still considered to be associated with a water body. For example, the high terraces that bound the Liard River floodplain are considered to be associated with water and therefore have elevated heritage resource potential, even though many sections of these landforms are over 300 m from actual water.

Once broad areas with elevated potential were identified appropriate heritage management inventory and impact assessment and management strategies were developed for areas within 100 m specific topographic features with elevated potential. These strategies strive to propose management initiatives that address potential impacts to heritage resources with the understanding that some heritage resources are located above the ground and are therefore susceptible to impact by timber harvesting and that some heritage resources are buried in the ground and are only susceptible to forest developments that disturb the subsurface. Considering that completing a surface feature inventory project is less laborious and time consuming than completing a subsurface inventory project, differentiating the levels of impact is a worthwhile undertaking. Table 1 assigns levels of impact to various forest development activities and Figure 2 depicts the planning process used to guide the formulation of recommendations regarding differing levels of impact.

Heritage Resource Overview Assessment: Watson Lake Small Volume Area

Project Activity	Sub-class	Impact on Heritage Resources	Significance Class
Pre-Harvest Planning and Assessment		Nil	0
Survey and Layout		Minor clearing of vegetation. Surface heritage sites may be encountered but can be avoided without altering the scope of the layout.	0
Road Use and Increased Vehicle Access		Disturbs previously exposed heritage sites. Potential for unauthorized artifact collection.	0
Road and Landing Construction	Slashing and Processing	Clearing of vegetation. Could impact surface heritage sites such as log or brush structures and burial sites.	1
	Road Construction	Grading of roads disturbs the surface and subsurface and will therefore impact buried archaeological sites and/or graves.	2
	Summer stream crossing	May involve grading of the bank or construction of bridge or culvert. This can impact the subsurface and may therefore disturb buried archaeological sites or graves.	2
	Winter stream crossing	This involves construction of an ice bridge. No impact on subsurface therefore sites will not be impacted. If the modification of bank grade is required, please see above.	0
	Landings	Clearing of vegetation. Could impact surface heritage sites such as log or brush structures and burial sites. Occasionally the subsurface is impacted therefore subsurface heritage sites may be disturbed.	2
Timber Harvest	Falling and Skidding	Clearing of vegetation. Could impact surface heritage sites such as log or brush structures and burial sites.	1
	Loading and Hauling	Nil	0
Reforestation	Mechanical Site Treatment	In most cases this activity represents a significant disturbance of the ground surface which, depending on sedimentation, can lead to the partial or total disturbance or destruction of subsurface archaeological sites or features.	2
	Leave for Natural Treatment	Nil	0
	Planting	Nil	0
	Monitoring	Nil	0

Table 1: List of forest development activities and the type of impact associated with each development type.

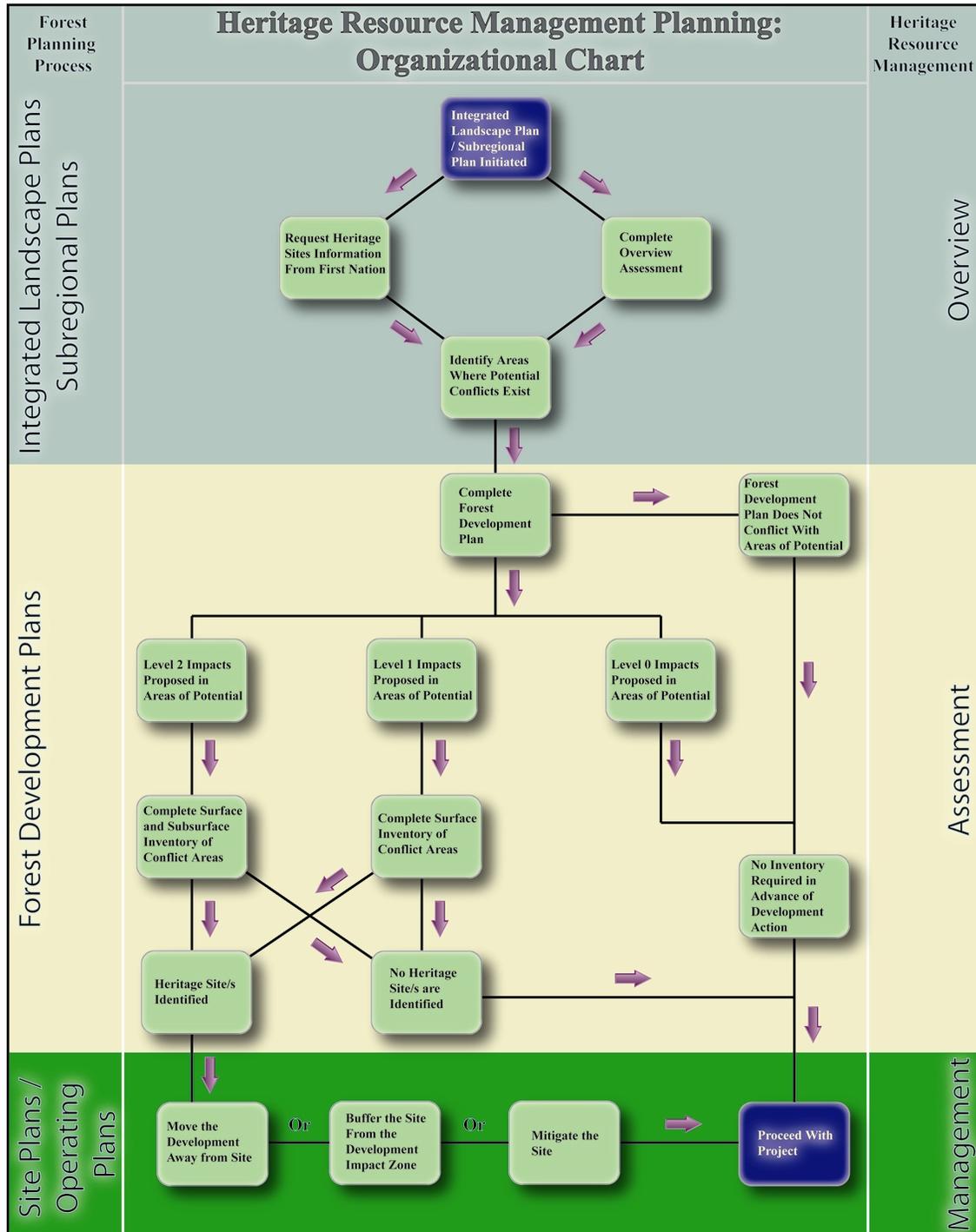


Figure 2: Organizational chart depicting the heritage resource management planning process. Figure from Thomas (2007).

5.0 Overview Results

The results of the overview assessment show that portions of Harvest Area U2-6 is within 300 m of the Liard River and that portions of Harvest Area U1-3 may be within 100 m of

a former wetland or paleo-river channel. Based on the preceding, it can be stated that HAs do include areas considered to have elevated potential for the presence of heritage resources including buried archaeological artifacts and surficial historic artifacts and sites.

5.1 Assessment Results

No known heritage resources are located in the proposed timber harvest areas though heritage resource inventories have not been completed in the proposed harvest blocks. A review of known archaeological and historic site locations indicates that several archaeological sites are indeed located in analogous situations to harvest areas in the Watson Lake Small Volume Area (analogous settings are within 5 km of the study area).

Of the four harvest areas reviewed, HAs U1-2 and U2-5 have no landforms or features with elevated potential for heritage resource presence. HAs U1-3 and U2-6 do include areas with elevated potential (see Figure 3 and 4):

- U1-3: Elevated heritage potential has been identified in portions of the southern boundary of the proposed cut block. The areas of potential are typified by a moderately elevated terrace that appears to be part of an extinct channel of the Liard River.
- U2-6: Elevated heritage potential has been identified in portions of the southern boundary of the proposed cut block. The areas of potential are typified by a low terrace of the Liard River and a group of rolling hills to the north. Thomas (2004: 9, Table 3) identified the same area of block 'W-3' for assessment.

In these areas heritage inventories and assessments are recommended in advance of timber harvest and associated activities. The scope of the assessment work is outlined in section 5.2 and the scheduling of the recommended work is outlined in section 5.3.

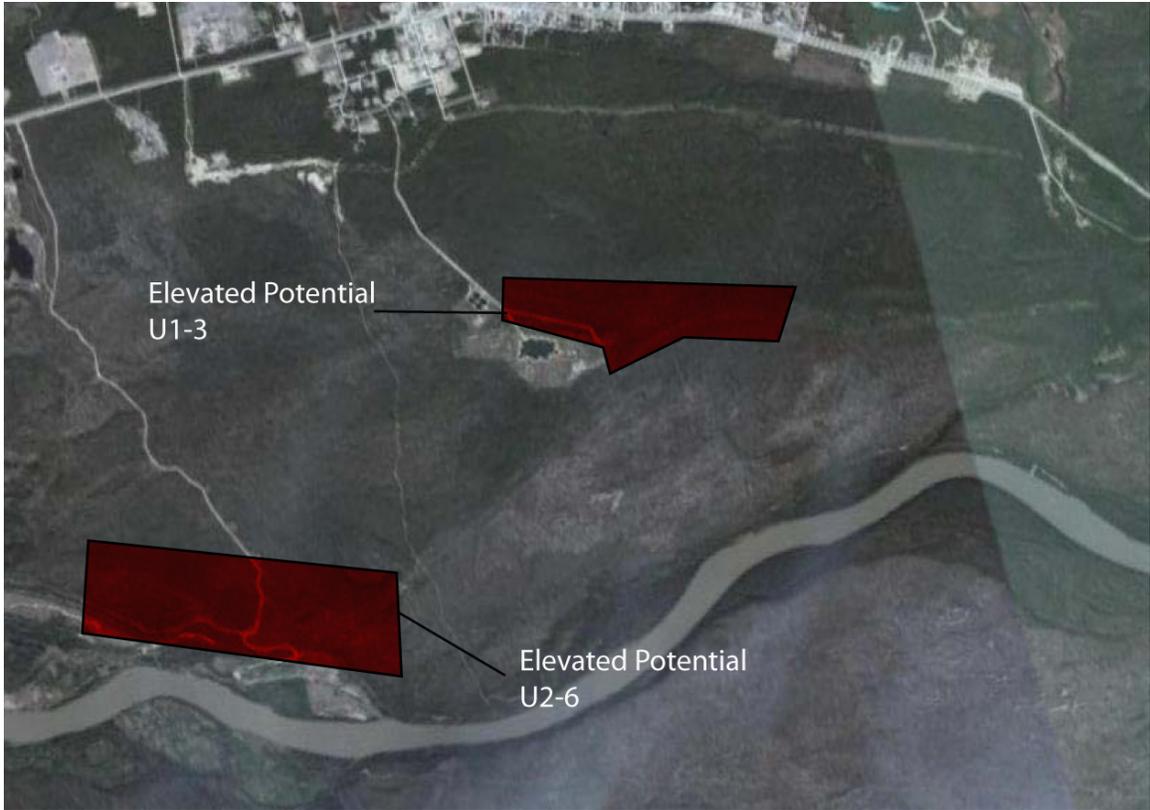


Figure 3: Orthographic image of the study area showing areas with elevated heritage resource potential.

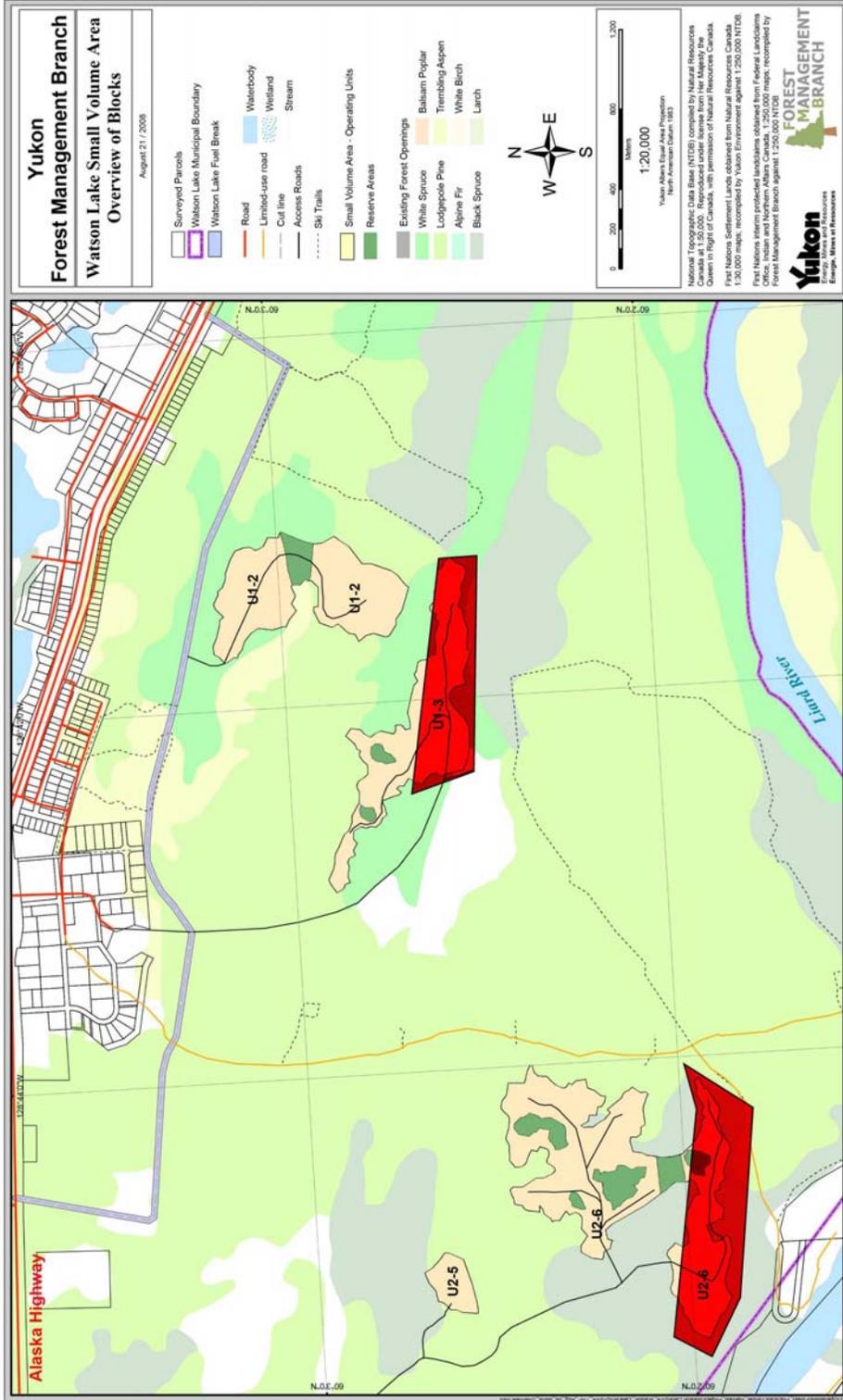


Figure 4: Map of the study area showing the location of proposed cut blocks and locations of areas with elevated potential for the presence of heritage resources.

5.2 Recommendations

This section of the report discusses recommended options for identifying and assessing heritage resources in the project's harvest areas (HA). This section includes recommendations for all HAs located on territorial lands.

It is recommended that the nature of the work be designed to address the type of land impact that is being proposed and can be implemented in phases that correspond to forest management activities. Given that the proposed development is not inherently destructive to all heritage resources and that the proponent is not permanently alienating development areas from the public trust, complete inventories and assessments may not be required in all HAs. It is suggested here that the proponent conduct surface inventories in all high potential areas where development impacts types are classified as Level 1 in Table 1. In areas where the development impact is classified as Level 2, as is the case in all-season road construction and some types of silviculture treatments, complete heritage resource inventories and assessments are recommended. The inventories should involve testing activities that identify heritage resources that are buried in the ground as well as located on the surface of land.

No heritage resource inventory and assessment is recommended in advance of timber harvest or associated activities in HA U1-2 or U2-5 or the northern portions of U2-6. Harvest block plans included in this report (Figure 4) indicate that new block access roads will be developed in areas of elevated heritage resource potential. For this reason it is recommended that the route of these roads be subject to a surface and subsurface heritage resource inventory in advance of development. For portions of HA U1-3 and U2-6 that will be subjected to timber harvest, it is recommended that a surface heritage resource inventory be completed in advance of development.

Regarding silviculture land treatments that may be proposed for the HAs, these may be considered to have a level 2 impact when the treatment impacts sediments and organic deposits above the mineral 'B' or 'C' horizon of the soil. Treatments that result in the removal of vegetation and debris, and may also involve minor and irregular scouring of litter mats and humic accumulations, are considered to have a 'level 1' impact. Therefore, if impact 'level 2' type silviculture treatments are planned in HA U1-3 or U2-6 then a subsurface heritage resource inventory will be required in advance of the treatment.

5.3 Scheduling of Heritage Resource Assessment Work

Regarding the construction of all season access roads in areas where elevated potential has been identified it is recommended that a surface and subsurface heritage resource inventory be completed in advance of road right-of-way clearing and road construction.

Regarding timber harvest in areas where elevated potential has been identified, it is recommended that a surface heritage resource inventory be completed in advance of timber harvest. In this instance it may be practicable to complete this work in conjunction

with cut block layout surveys. Regarding silviculture land treatments in areas where elevated potential has been identified it is recommended that subsurface resource inventories may be completed either before harvest or after harvest and before land treatment.

6.0 References

1991 Historic Resources Act.

Thomas, C.

2004 *Southeast Yukon land use study: Overview assessment of potential heritage concerns in the East Hyland, Watson Lake, West Rancheria and Ross River Planning Areas*. Thomas Heritage Consulting, report on file with Heritage Resources Unit, Government of Yukon.

Thomas, C. D.

2005 *Heritage potential modeling study for southeast Yukon forestry planning*. Report produced for Heritage Resources Unit and Forest Management Branch, Government of Yukon.

2007 *Historic resources potential overview study: Tr'ondëk Hwëch'in Traditional Territory Forest Management Planning Area*. Report prepared for Heritage Resources Unit and Forest management Branch, Government of Yukon.

**Yukon
Forest Management Branch
Watson Lake
Small Volume Area**

-  First Nation Lands Interim Protected or Settlement Land
-  Surveyed Parcels
-  Watson Lake Municipal Boundary
-  Watson Lake Fuel Break
-  Roads & Highways
-  Access Roads
-  Ski Trails
-  Waterbody
-  Wetland
-  Stream
-  **Small Volume Area - Operating Units**
-  Reserve Areas
-  Existing Forest Openings
-  White Spruce
-  Lodgepole Pine
-  Alpine Fir
-  Black Spruce
-  Balsam Poplar
-  Trembling Aspen
-  White Birch
-  Larch

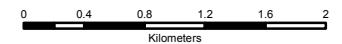
Forest cover compiled by Forest Management Branch against NTDB 1:50,000 from 1:40,000 black and white photography

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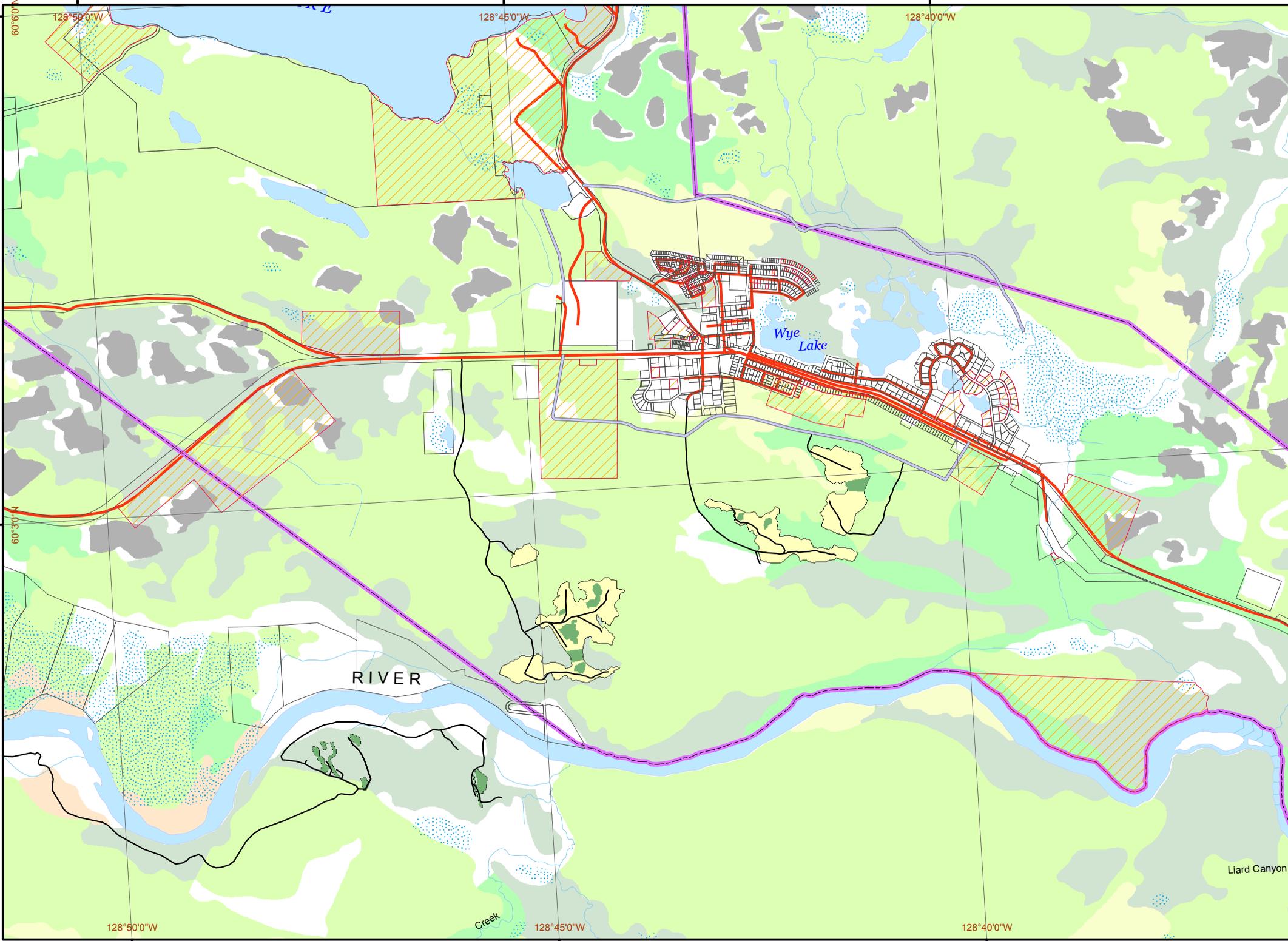
This map is intended as a spatial reference overview of the East Hyland Planning Unit. For detailed and specific block information, consult block maps. Consult Lands Branch - YTG for legal land tenures data.

**Small Volume Area
Watson Lake, Yukon**

June 2006



1:50,000
Albers Equal Area projection



**Yukon
Forest Management Branch
Watson Lake
Small Volume Area**

-  First Nation Lands Interim Protected or Settlement Land
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-  Black Spruce
-  Balsam Poplar
-  Trembling Aspen
-  White Birch
-  Larch

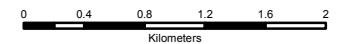
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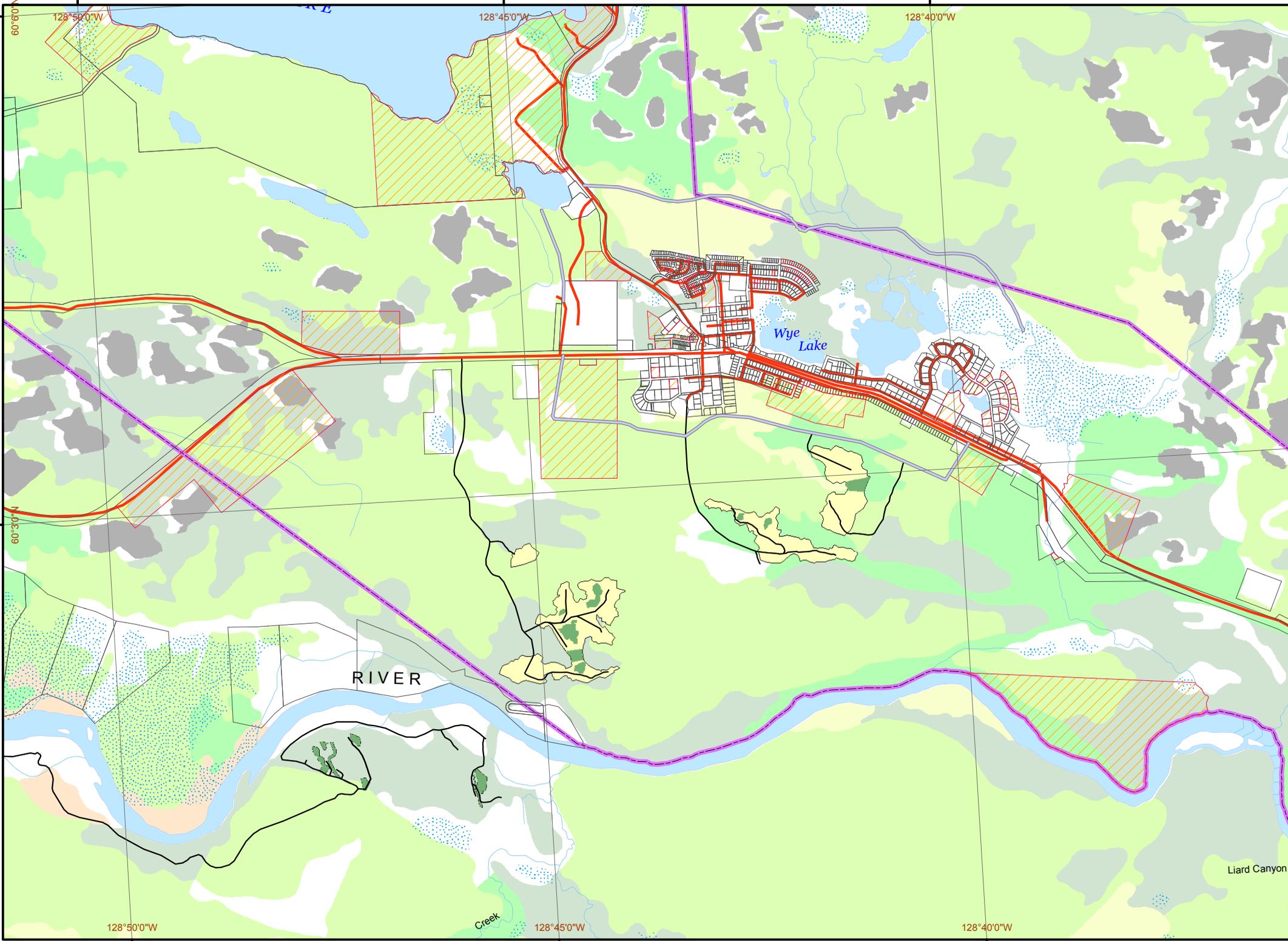
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**Small Volume Area
Watson Lake, Yukon**

June 2006



1:50,000
Albers Equal Area projection



Alaska Highway

Yukon Forest Management Branch

Watson Lake Small Volume Area Overview of Blocks

August 21 / 2008

-  Surveyed Parcels
-  Watson Lake Municipal Boundary
-  Watson Lake Fuel Break
-  Road
-  Limited-use road
-  Cut line
-  Access Roads
-  Ski Trails
-  Waterbody
-  Wetland
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-  Small Volume Area - Operating Units
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-  Lodgepole Pine
-  Trembling Aspen
-  Alpine Fir
-  White Birch
-  Black Spruce
-  Larch



1:20,000

Yukon Albers Equal Area Projection
North American Datum 1983

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First Nations Settlement Lands obtained from Natural Resources Canada 1:30,000 maps; recomplied by Yukon Environment against 1:250,000 NTDB.

First Nations interim protected landclaims obtained from Federal Landclaims Office, Indian and Northern Affairs Canada, 1:250,000 maps; recomplied by Forest Management Branch against 1:250,000 NTDB



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