



**Western Copper
Corporation**

**Project Proposal
Carmacks Copper Project
Yukon Territory**

Appendix H6

**Vegetation Information Update
(July 2006)**

Carmacks Copper Project – Vegetation Information Update

The following information on the vegetation in the vicinity of the proposed Carmacks Copper project is supplementary to that provided by Hallam Knight Piesold in 1994 and Access Consulting group in 2005. It results from field observations taken at the site in mid-July 2006.

A map delineating primary vegetation types within the project area is shown in Figure 1. It should be noted that these delineations are distinct in some areas (e.g. sharp boundaries at the edges of grasslands and willow fens), while depicting broad transition zones in other areas (e.g. between upland forests dominated by black spruce and those dominated by white spruce).

The primary vegetation types within the project area are described as follows:

Lodgepole Pine

Lodgepole pine forests occur on south-facing slopes often in association with trembling aspen and grassland forest types. Seral stands of lodgepole pine are also found on sites affected by recent fire. Tree species include lodgepole pine, white spruce and trembling aspen. The shrub layer is Scouler's willow, Bebb's willow, prickly rose and soapberry, while the ground cover is kinnikinick, twinflower, lupine, death camas and northern rough fescue.

Both types of lodgepole pine forests occur in the Williams Creek area.

Black Spruce

Black spruce is the most common vegetation type found in the vicinity of the project site. Black spruce forests cover much of the uplands, particularly those areas with northerly aspects. Black spruce forests also form the forest cover on lowland bogs. Tree species include black spruce, white spruce and paper birch. The shrub layer is gray-leaf willow, little-tree willow, Labrador tea, shrubby cinquefoil, dwarf birch and mountain alder on disturbed sites. The ground cover includes crowberry, blueberry, lingonberry, bearberry, toadflax and northern rough fescue.

In the project area, upland black spruce is widespread, while black spruce bog occurs primarily on the lowlands adjacent to Nancy Lee Creek.

White Spruce

White spruce forest occurs as upland forest cover, usually in association with the more common black spruce forest. It also forms the forest cover in permafrost-free riparian zones. Tree species include white spruce, black spruce, lodgepole pine and trembling aspen. The shrub layer is Bebb's willow, Scouler's willow, highbush cranberry, prickly rose and soapberry, while the ground cover includes kinnikinick, goldenrod, lupine, hedsarum and lungwort.

In the project area, white spruce is most obvious as the riparian forest cover on lower Williams and Merrice Creeks.

Trembling Aspen

Trembling aspen forests are found on south-facing slopes usually in association with grassland cover. Tree species include trembling aspen, white spruce and lodgepole pine. The shrub layer is prickly rose, highbush cranberry and soapberry. The ground cover is kinnikinick, purple reed grass, rocky mountain fescue and lupine.

In the project area, small aspen stands occur on the south-facing slopes adjacent to Williams, North Williams and Merrice Creeks.

Willow Fen

Willow fens are the most common wetlands in this region. Shrubs include false mountain willow, little-tree willow, Barclay's willow, tall blueberry willow, dwarf birch, shrubby cinquefoil and river alder. The ground cover is bearberry, nagoon berry, water sedge, blue-joint reed grass and bog rush.

Within the project area, willow fens occur primarily as narrow wetlands in creek valley bottoms.

Grassland

Grasslands occur on steep, dry, south-facing slopes, often with stands of trembling aspen. The ground cover is common juniper, kinnikinick, pasture sage, wormwood death camas, purple reed grass and rocky mountain fescue.

In the project area, grasslands are found on the south-facing slopes above Williams and North Williams Creeks.

Vegetation Densities

The total area investigated in the vegetation survey is about 3,400 ha. The area for each of the six primary vegetation types observed is shown in the following table.

Primary Vegetation Type	Area	% of Project Area
Black Spruce	1,956	58
Lodgepole Pine	687.6	20
White Spruce	589.7	17
Willow Fen	74.9	2
Trembling Aspen	65.2	2
Grassland	26.7	1
Total	3,400.1	100

More than half of the project area is comprised of black spruce forests and a little less than a quarter of the area is lodgepole pine. White spruce stands are the next most common at 17% of the project area. 5% of the project area is made up of willow fen, trembling aspen, and grasslands.

Age Classes

Much of the area to be used for the project infrastructure was cleared in the early 1990s. Those sites cleared earlier are now regenerating with trembling aspen, balsam poplar, mountain alder, prickly rose, fireweed, goldenrod and reed grass.

The area has not been recently burned. The vegetative cover is open canopy upland forest with no merchantable timber except for low quality fuel wood.

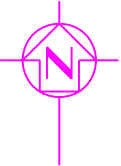
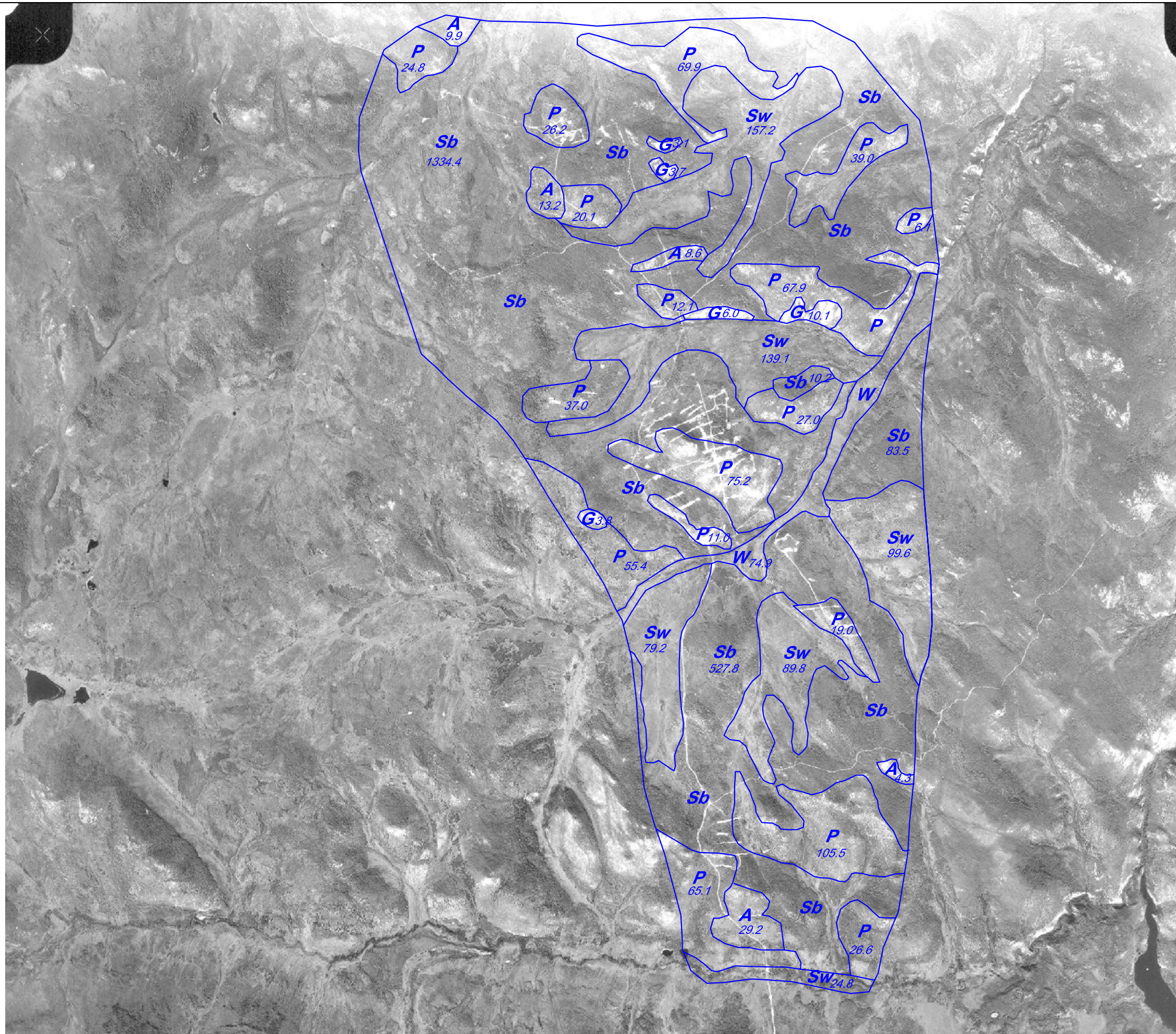
Vascular Plant Species

A list of vascular plant species observed during the July 2006 survey is shown in Appendix A.

Appendix A Vascular plant species observed at the Carmacks Copper project area during July 2006 survey

<i>Achillea millefolium</i>	common yarrow
<i>Alnus crispa</i>	mountain alder
<i>Alnus incana</i>	river alder
<i>Anemone multifida</i>	cutleaf anaemone
<i>Anemone richardsonii</i>	yellow anemone
<i>Antennaria monocephala</i>	pussytoes
<i>Arabis holboellii</i>	rock cress
<i>Arctostaphylo rubra</i>	bearberry
<i>Arctostaphylus uva-ursi</i>	kinnikinick
<i>Arnica cordifolia</i>	heart-leaved arnica
<i>Artemisia frigida</i>	pasture sage
<i>Artemisia campestris</i>	wormwood
<i>Astragalus alpinus</i>	alpine milk-vetch
<i>Betula glandulosa</i>	dwarf birch
<i>Betula papyrifera</i>	paper birch
<i>Boschniakia rossica</i>	ground-cone
<i>Bupleurum americanum</i>	thoroughwort
<i>Calamagrostis canadensis</i>	blue-joint reed grass
<i>Calamagrostis purpurascens</i>	purple reed grass
<i>Carex aquatilis</i>	water sedge
<i>Carex saxatilis</i>	sedge
<i>Crepis elegans</i>	hawk's-beard
<i>Deschampsia caespitosa</i>	tufted hairgrass
<i>Eleocharis palustris</i>	spike-rush
<i>Elymus trachycaulus</i>	wheatgrass
<i>Empetrum nigrum</i>	crowberry
<i>Epilobium angustifolium</i>	fireweed
<i>Equietum fluviatile</i>	water horsetail
<i>Equisetum arvense</i>	common horsetail
<i>Erigeron acris</i>	fleabane
<i>Eriophorum</i> sp.	cottongrass
<i>Euphrasia subarctica</i>	eyebright
<i>Festuca altaica</i>	northern rough fescue
<i>Festuca saximontana</i>	rocky mountain fescue
<i>Gentianella propinqua</i>	four-petalled gentian
<i>Geocaulon lividum</i>	toadflax
<i>Hedysarum alpinum</i>	bear-root
<i>Hippuris vulgaris</i>	common mare's-tail
<i>Hordeum jubatum</i>	foxtail barley
<i>Juncus castaneus</i>	bog rush
<i>Juniperus communis</i>	common juniper
<i>Ledum groenlandicum</i>	Labrador tea
<i>Linnnaea borealis</i>	twinline
<i>Lupinus arcticus</i>	arctic lupine
<i>Mertensia paniculata</i>	lungwort
<i>Minuartia rubella</i>	sandwort
<i>Moneses uniflora</i>	single delight
<i>Oxycoccus microcarpus</i>	cranberry
<i>Parnassia palustris</i>	grass-of-Parnasus
<i>Pedicularis labradorica</i>	Labrador lousewort

<i>Pedicularis sudetica</i>	Sudeten's lousewort
<i>Penstemon gormanii</i>	Gorman's penstemon
<i>Petasites frigidus</i>	coltsfoot
<i>Picea glauca</i>	white spruce
<i>Picea mariana</i>	black spruce
<i>Pinus contorta</i>	lodgepole pine
<i>Platanthera hyperborea</i>	northern green orchid
<i>Platanthera obtusata</i>	northern bog orchid
<i>Poa alpigena</i>	bluegrass
<i>Polemonium acutiflorum</i>	tall Jacob's ladder
<i>Polemonium pulcherrimum</i>	northern Jacob's ladder
<i>Populus balsamifera</i>	balsam poplar
<i>Populus tremuloides</i>	trembling aspen
<i>Potentilla fruticosa</i>	shrubby cinquefoil
<i>Potentilla norvegica</i>	rough cinquefoil
<i>Potentilla palustris</i>	swamp cinquefoil
<i>Pulsatilla ludoviciana</i>	pasque flower
<i>Pyrola asarifolia</i>	pink wintergreen
<i>Pyrola grandiflora</i>	large-flowered wintergreen
<i>Ribes hudsonianum</i>	black currant
<i>Rorippa palustris</i>	yellow cress
<i>Rosa acicularis</i>	prickly rose
<i>Rubus artica</i>	nagoon berry
<i>Rubus chamaemorus</i>	cloudberry
<i>Salix alaxensis</i>	felt-leaf willow
<i>Salix arbusculoides</i>	little-tree willow
<i>Salix barclayii</i>	Barclay's willow
<i>Salix bebbiana</i>	Bebb's willow
<i>Salix glauca</i>	gray-leaf willow
<i>Salix myrtillofolia</i>	blueberry willow
<i>Salix pseudomonticola</i>	false mountain willow
<i>Salix pseudomyrsinites</i>	tall blueberry willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Saxifraga tricuspidata</i>	prickly saxifrage
<i>Senecio indecorus</i>	groundsel
<i>Senecio lugens</i>	black-tipped groundsel
<i>Shepherdia canadensis</i>	soapberry
<i>Solidago multiradiata</i>	goldenrod
<i>Trisetum spicatum</i>	trisetum
<i>Vaccinium uliginosum</i>	blueberry
<i>Vaccinium vitis-idaea</i>	lingonberry
<i>Viburnum edule</i>	high-bush cranberry
<i>Zygadenus elegans</i>	death camas



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Yukon Territory**



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A_{10.1} Vegetation Type, area (ha)

- A = Trembling Aspen
- G = Grassland
- P = Lodgepole Pine
- Sb = Black Spruce
- Sw = White Spruce
- W = Willow Fen

Total Areas

- A = 65.2 ha
- G = 26.7 ha
- P = 687.6 ha
- Sb = 1956 ha
- Sw = 589.7 ha
- W = 74.9 ha

Study Area = 3400.1 ha

Figure 1

Primary Vegetation Types within Carmacks Copper Project Area



Revised by: HD Checked by: DDC

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