
Appendix 2.6F Characteristics of Plant Species for Revegetation

The revegetation plan of the Project includes revegetation prescriptions with native species suitable for use in mine-related landforms and natural landforms in the Sub-Boreal Forest and Engelmann Spruce – Subalpine Fir biogeoclimatic zones. Species were selected based on their ability to grow in a wide range of environmental conditions. Of special consideration were species that provide habitat for wildlife (including caribou forage); First Nations traditional use; endangered plant species; and functions such as erosion control and nitrogen fixation. Early-, mid-, and late-successional species were all represented. The information on the chosen species, as well as some characteristics indicating why they may be particularly well-suited for reclamation, is included in the paragraphs below. The complete listing of the species for each revegetation prescription is also found in Table 2.6.7, Table 2.6.8, and Table 2.6.9 of Section 2.2.

Trees

Abies lasiocarpa (subalpine fir) is a 20 m coniferous evergreen tree that grows in subalpine coniferous forests. It tolerates cold, humid temperatures, and germinates best on exposed mineral soil containing moist humus with a pH range of 4.0 to 6.5. It is adapted to coarse and medium textured soils (USDA Plants).

Alnus crispa (green alder) is an erect, solitary, deciduous tree/shrub. It grows 1 m to 4 m tall, with shallow, rhizomatous roots and nodules with nitrogen-fixing actinomycetes. Reproduction is sexual by seed, or vegetative by tillers. Highest germination rates occur in bare mineral soils after disturbances. Early- and late-successional status. Soil is medium to coarse and wet to mesic, with a poor to fair nutrient regime. Valuable as forage for livestock, deer, moose, caribou, muskrat, beaver, rabbit, and snowshoe hare.

Alnus incana (mountain alder) is a broad-leaved, deciduous tree occurring in dense thickets. The root system is rhizomatous. Good pioneer species for revegetation of disturbed riparian sites, and used as a barrier against wind and soil erosion. Can tolerate many soils, but grows best in heavy, moist soils near rivers and streams. Grows well in a wide range of soil pH and has high flood tolerance. Valuable as food for cottontail, muskrat, moose, elk, deer, snowshoe hare, birds, and beaver. May be used by First Nations (USDA Plants).

Picea engelmannii (Engelmann spruce) is a 60 m evergreen coniferous tree, primarily occurring in high elevation forests. It is primarily located in montane and subalpine habitats from 1000 m to 3000 m elevation. The root system is shallow. It is adapted to fine and medium textured soils with a pH range of 6.0 to 8.0. Late-successional tree species (USDA Plants).

Picea glauca x engelmannii (hybrid white spruce) is an evergreen coniferous tree that is a hybrid between white spruce and Engelmann spruce. Hybridization is common where the range of the two species overlap. At lower elevations, *Picea glauca x engelmannii* hybrids more closely resemble white spruce, while at higher elevations they more closely resemble Engelmann spruce (Uchytel, 1991).

Pinus albicaulis (whitebark pine) is an evergreen coniferous tree. Tap root, with minimum root depth of 40 m. Early- to late-successional status, with sexual seed reproduction. Requires sandy

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to gravelly, well-drained soil, with poor to fair nutrient content. Adapted to dry, rocky, and sandy sites. Able to tolerate acidic soils, with a low pH limit of 4.8. Valuable for ability to tolerate cold, exposed sites, can improve soil moisture, and is good for erosion control (USDA Plants).

Pinus contorta (lodgepole pine) is an evergreen coniferous tree that reaches heights of 30 m to 50 m and diameters of 0.6 m to 1.3 m. It is used for erosion control because it is a fast growing species with the ability to firmly anchor into most soil types. It can be used as a wind brake species. First Nations have used the tree for medicinal, building and household, and food and ceremonial purposes. Many birds, chipmunks, and squirrels consume the seeds. The tree is important for various birds' cover, roosting, and nesting sites.

Salix scouleriana (Scouler's willow) is a deciduous tree. Grows rapidly from multiple stems to a maximum height of 15.2 m. Adapted to coarse-, fine-, and medium-textured soils, with high moisture use and a pH of 6.5 to 8.0. Minimum root depth is 0.3 m. Propagated by bare root, container, cuttings, or seed. Palatable to browsing and grazing animals (USDA Plants).

Shrubs

Arctostaphylos uva-ursi (L.) Spreng (kinnikinnick) is a long-lived perennial prostrate shrub, with trailing stems forming mats up to 2 m in diameter; much branched, with terminal portions of branches erect, 7.5 cm to 10 cm tall, up to 20 cm tall. Taproot to a minimum depth of 25 cm. Reproduction is sexual by seeds, and it can be propagated by cuttings. Early- to mid-successional stage. Medium to coarse soil and moist to dry, well drained. Nutrient regime is fair to poor. Drought tolerant provides erosion control and ground cover on steep dry slopes, useful for understory reclamation. Browse for deer and big horn sheep, fruits provide important food source for birds, important for bears in early spring.

Elaeagnus commutata Bernh (wolf willow) is a long-lived perennial, shrub, erect, 50 cm to 400 cm in height. Root system is rhizomatous, medium to deep. Early- to late-successional status. Sexual reproduction by seeds, and vegetative by rhizomes. Excellent in prairies, good erosion control in riparian areas, nitrogen fixer. Soil medium to fine, dry to moist and fair nutrient regime. Important browse species for wild ungulates. Excellent cover for nesting birds and many mammals, especially deer.

Juniperus communis L. (common juniper) is a low, mat-forming, semi-erect, evergreen shrub, 0.5 m to 1.5 m tall, and 2 m to 4 m in diameter. Root system fibrous, adventitious, minimum 0.35 m deep. Mid- to late-successional status. Sexual reproduction by seeds. Various soil types, loam to rocky, calcareous or acidic. Dry to moist, drought tolerant. Poor to good nutrient regime. Provides good ground cover on poor soil sites, is low maintenance, suitable for planting in open, disturbed areas to reduce erosion and improve soil fertility. Minimal grazing, largely unaffected.

Lonicera involucrate (black twinberry) is an erect, deciduous shrub. The root system is single-stem, moderate, minimum 0.3 m deep. Reproduction by bare root, container, cuttings, or seed. Adapted to fine- and medium-textured soils. High moisture use. pH tolerance of 5.5–8.0. Provides cover for passerines, small and large mammals, and breeding for passerines and butterflies. Valuable to First Nations as palatable, medicinal, and dye (USDA Plants).

Rosa acicularis (prickly rose) is a perennial, multi-stemmed, woody, low-growing shrub. Forms fine roots in the first 3 cm of soil. Early- to mid-successional status. Reproduction is sexual by seed, or vegetative by rhizomes. Tolerates coarse to fine, moist to wet soil, with a poor to rich nutrient regime. Valuable for revegetation and erosion control. Able to tolerate acidic environments, and moderately tolerant of crude oil. Rose thickets can provide nesting sites for birds and cover for small animals. Forage value for snowshoe hare, ungulates, big game, and livestock. High vitamin A content and winter source of vitamin C. Rose hips are a moderately high crude protein source.

Rubus idaeus (wild red raspberry) is a deciduous shrub, erect or arching, forms thickets, grows 0.5 m to 3 m tall. Root type is long-lived, perennial rootstock. Pioneer or early seral species. Reproduces sexually (seed), asexually (seed through apomixes), or vegetatively (stolons, suckers, rhizomes, and basal stem buds of root crowns). Tolerates coarse to fine, moist to wet soil, with poor to rich nutrient content. Valuable for erosion control, as well as for establishment on harsh sites such as tailings. Able to tolerate moderately acidic conditions.

Shepherdia canadensis (soopolallie) is a perennial shrub, with growth up to 7 m tall and a rooting depth up to 60 cm. Reproduction is sexual by seeds or asexual. Requires loam or sandy-loam soil, moist to semi-wet, with good drainage. Able to tolerate a wide range of nutrients. Valuable as nitrogen-fixer, and tolerant of saline conditions. Provides good erosion control, soil stabilization, and can be used in reclamation of mine spill areas. Valuable as food source for mule deer, grizzly, and grouse, and as cover for small animals. Early- to late-successional status.

Vaccinium membranaceum (black huckleberry) is a deciduous shrub, growing 0.1 m to 2 m tall. Found in thickets and in coniferous woods with acidic soils at elevations from 1,000 m to 1,800 m. Tolerates sandy and gravelly, moist and dry soils. Valuable as food, tea, and dye for First Nations. Important food source for many birds and mammals (USDA Plants).

Viburnum edule (highbush cranberry) is a perennial, erect shrub, growing 50 cm to 200 cm high. Root type is rhizomatous. Early- to late-successional status. Grows in medium to fine, moist soil, with a poor to rich nutrient regime. Good for wildlife, forest edges, during droughts, and under anaerobic soil conditions. Valuable as cover for small birds, small mammals, and bears.

Graminoids

Agrostis scabra (hair bentgrass) is a short-lived, erect, perennial bunch grass, 20 cm to 70 cm in height. Root type is fibrous with shallow roots. Early- to late-successional species, with sexual production by seed, and vegetative production by tillers. Requires coarse to fine, dry to moist, poor to rich nutrient soil. Valuable for colonizing and as pioneer species for disturbed sites. Tolerant to drought and acidic conditions. Has some wildlife value as forage for elk and deer.

Bromus ciliatus (fringed brome) is a perennial bunch grass, 50 cm to 100 cm in height, with shallow, fibrous roots. Reproduction is by seed. Tolerates coarse to fine, moist soil, with a fair nutrient regime. Mid- to late-successional status. Provides good long-term cover, moderate erosion control, and excellent forage for wildlife.

Calamagrostis canadensis (bluejoint) is a long-lived perennial, erect, 60 cm to 200 cm in height. Root type is fibrous, from rhizomes with a shallow depth. Early- to late-successional status. Sexual reproduction via seed, or vegetative via rhizomes. Habitat is coarse to fine soil, moist to wet moisture regime, and fair to rich nutrient regime. Provides erosion control in moist to wet soils. Forage value to livestock and wildlife. Provides cover to wildlife in riparian areas.

Carex aquatilis (water sedge) is a long-lived perennial, graminoid, erect, 20 cm to 100 cm in height. Has thick, scaly rhizomes interspersed with fine roots, with an average root depth of 36 cm. Early- to mid-successional status. Reproduction is asexual through rhizomes, or infrequently through seed, sprigs, or cuttings. Requires moist, cool, sandy loam to clay soils, with high organic matter. Tolerant to anaerobic conditions in poor to imperfectly drained soils. Provides erosion control along stream banks, sensitive Arctic areas, and wetlands. pH tolerance of 3 to 7. Forage value to ungulates, waterfowl, small animals, and rodents. Nesting grounds and habitat for waterfowl, small animals, rodents, and fish. Used by First Nations as food and medicine.

Carex utriculata (beaked sedge) is a graminoid. Root system is rhizomatous, with a moderate growth rate, with a minimum depth of 0.2 m. The pH tolerance is from 5.7 to 7.7. Adapted to fine and medium textured soils. Low drought tolerance and high moisture use. Low forage palatability, provides cover to reptiles and amphibians (USDA Plants).

Elymus glaucus (blue wildrye) is a perennial bunch grass, 50 cm to 150 cm in height. It provides excellent erosion control, has rapid establishment, and has a high drought tolerance and low moisture use. It tolerates coarse, medium, and fine soils with a pH range of 5.8 to 8.5, and grows well in moist open forests and clearings (USDA Plants).

Festuca altaica (Altai fescue) is a perennial, erect bunch grass, 30 cm to 80 cm in height. Has fibrous, medium to deep roots, which are excellent for soil stabilization. Reproduction is sexual by seed, or vegetative by rhizomes and tiller. Requires medium to fine, dry to moist soil, with a fair to rich nutrient regime. Good for livestock and wildlife as forage and cover. Highly palatable. Early- to late-successional status.

Festuca rubra (red fescue) is a perennial graminoid. Root type is fibrous and tufted, and of medium depth. Early- to late-successional status. Reproduction is sexual by seed, or vegetative by rhizomes and tillers. Tolerates coarse to fine, moist to wet soil habitat, with a fair to rich nutrient regime. Valuable as turf and pasture land, and as a surface stabilizer. Can be invasive in disturbed areas.

Festuca saximontana (rocky mountain fescue) is a bunch grass, 30 cm to 90 cm in height. Provides good erosion control, and adapts easily to dry habitats, primarily on rocky slopes, clearings, and interior grasslands.

Oryzopsis asperifolia (rough-leaved ricegrass) is a perennial, erect to prostrate, bunch grass, 20 cm to 70 cm in height. Root type is shallow and, fibrous with short rhizomes. Reproduction is sexual by seed, or vegetative by tillers. Tolerates coarse to medium, dry to moist soil habitat.

Early- to late-successional status. The nutrient regime is poor to fair. Valuable as soil stabilizer in forested areas. Has understory forage value for livestock and wildlife. High palatability.

Phleum alpinum (alpine timothy) is a perennial bunch grass, decumbent, 20 cm to 50 cm in height. Root type is fibrous, with short rhizomes with a shallow depth. Early- to mid-successional status. Reproduction is sexual by seed, or vegetative by rhizomes and tillers. Tolerates medium to fine, moist to wet soil, with a poor to rich nutrient regime. Valuable in alpine meadows and bogs, and as erosion control for montane slopes. Tolerant of saline, alkaline, and acidic soil conditions. Good forage for livestock and wildlife, particularly montane ungulates.

Poa alpina (alpine bluegrass) is a perennial bunch grass, erect, 10 cm to 30 cm in height, with fibrous, shallow roots. Early- to late-successional status. Reproduction is sexual by seed, or vegetative by tillers. Has slow growth. Requires coarse to fine, dry to moist soil habitat, with a poor to fair nutrient regime. Valuable as erosion control in subalpine and alpine regions on dry slopes. Excellent as forage for livestock and wildlife. Winter forage value for montane ungulates.

Poa palustris (fowl bluegrass) is a long-lived, erect, perennial graminoid, 30 cm to 100 cm in height. The root type is fibrous from rhizomes, with a minimum soil depth of 0.3 m. Early- to mid-successional status. Sexual reproduction by seed, or vegetative by rhizomes and tillers. Requires medium to fine, moist to wet soil, with a fair to rich nutrient regime. High forage value to livestock and wildlife. Can provide cover for wildlife and waterfowl in surrounding riparian areas.

Trisetum spicatum (spike trisetum) is a perennial, erect bunch grass, 10 cm to 50 cm in height. The root type is fibrous with a shallow depth. Reproduction is sexual by seed, or vegetative by tillers. Early- to mid-successional status. Requires medium to moist soil habitat, with poor to fair nutrient regime. Valuable in open woods, and as erosion control on montane slopes. Good as forage for livestock and wildlife, particularly montane ungulates.

Forbs

Achillea millefolium (yarrow) is a perennial herb, erect, 30 cm to 100 cm in height. Root type is fibrous from rhizomes, with a shallow to medium depth. Early- to late-successional status. Reproduction is sexual by seed, or vegetative by rhizomes. Requires coarse to medium, dry to moist soil, with a poor to fair nutrient regime. Valuable as erosion control on dry or eroded slopes, and as a rapid colonizer after a disturbance. Able to withstand infertile conditions. Important wildlife value as forage for sage grouse chicks.

Cornus canadensis (bunchberry) is a low, perennial herb, erect, evergreen, 5 cm to 20 cm tall. Early- to late-successional status. Reproduction is sexual by seed, or asexual by rhizomes. Tolerates sandy loam to some clay soil. Prefers moist, well-drained soil habitats that are low in organic matter. Can tolerate a wide range of nutrient regimes and many different ecosites. Able to revegetate sites from seeds and rhizomes in the seedbed. Has the ability to neutralize and tolerate mild acidity. Valuable as erosion control and as forage for mule, black-tailed deer, birds, and small mammals. Preferred food of grouse.

Epilobium angustifolium (fireweed) is a perennial herb, erect, 60 cm to 150 cm tall. Root type is rhizomatous. Tolerates coarse to fine, moist soil, with a poor to rich nutrient regime. Reproduction is sexual by seed, or vegetative by rhizomes. Good for use in disturbed and heavily burned sites. The seed requires stratification and scarification. Provides good cover and forage value for wildlife.

Equisetum arvense (common horsetail) is an erect forb. The growth rate is rapid, rhizomatous, with a rooting depth of 0.15 and a pH tolerance of 4.0–7.0. It is adapted to coarse, fine, and medium textured soils. It has low drought tolerance and high moisture use. Propagation by bare root, seed, sprigs, or tubers (USDA Plants).

Fragaria virginiana (wild strawberry) is an herbaceous, perennial forb. Propagation is by seed, rhizomes, or stolons. Best suited to high elevations with frost. Valuable to First Nations as food and tea (USDA Plants).

Heracleum maximum (common cow parsnip) is a perennial, erect forb, growing to a height of 2.4 m, with a minimum root depth of 0.3 m. Propagation via seed. Slight toxicity. Adapted to coarse, fine, and medium textured soils. Requires high moisture and a pH of 5.4–7.3. Medium palatability to browsing and grazing animals (USDA Plants).

Linnaea borealis (twinflower) is a dwarf forb/herb sub-shrub plant, growing 10 cm to 15 cm tall, located in the boreal shield and Atlantic maritime ecozone. Provides excellent groundcover. Grows well in moist, wet, shaded, acidic soil environment. Natural habitat is found in woodland and freshwater aquatic ecosystems (Native Plants Database).

Linum lewisii Scribn. (blue flax) is a tufted perennial forb, 20 cm to 70 cm tall, with fibrous and tap roots. Reproduction is sexual by seeds. Establishes in soils of medium to coarse texture, and dry to mesic areas, with poor to fair nutrient regime. Early colonizer of disturbed areas provides erosion control, tolerant to drought and weekly saline conditions. Provides forage for ungulates, seed and cover for small bird species. Early-successional status (USDA Plants).

Nuphar polysepala (Rocky Mountain pond-lily) is a perennial forb. Root system is rhizomatous, minimum 0.3 m deep. Sexual reproduction by seeds. Adapted to coarse, fine, and medium textured soils. Low drought tolerance (USDA Plants).

Petasites frigidus (palmate coltsfoot) is a fast-growing, perennial forb. Reproduction is sexual by seed, or asexual by rhizomes. It is found in streamsides, bogs, and moist forests. It is suitable to sandy, loamy, and clay soils with a wide pH range and high moisture content (E-Flora BC).

Rubus pedatus (five-leaved bramble) is a perennial herb. It is shade tolerant, and found in montane boreal to subalpine climates, with moist to mesic, low-nitrogen soils. It is particularly common in semi-open coniferous forests (E-Flora BC).

Senecio triangularis (arrow-leaved groundsel) is a long-lived, erect, perennial forb. Growth form is rhizomatous, with a moderate growth rate, and a mature height of 1.2 m. It is tolerant of fine and medium textured soils with a pH of 6.2–7.8, and has a high moisture use. The minimum root

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depth is 2.5 cm. Propagation is by seed, and it is highly palatable to some mammals (USDA Plants).

Sparganium emersum (European bur-reed) is a perennial forb found in forests and riparian wetlands. Grows up to 2 m tall. Root system is rhizomatous, requires wet to aquatic soil (Jepson Flora Project, 2013).

Symphyotrichum ciliatum (rayless alkali aster) is an annual, erect herb, 10 cm to 70 cm tall. It tolerates moist, saline, and alkaline soil, often in riparian areas. Common in the steppe and lower montane zones. Forms a taproot system (E-Flora BC).

Vicia Americana Muhl. (American vetch) is a trailing or climbing, erect forb, 40 cm to 80 cm in height, with a medium to deep taproot with rhizomes. Reproduction is sexual by seeds, and vegetative by rhizomes. Establishes in soils of medium to coarse texture, and mesic to moist areas, with fair to rich nutrient regime. It is a good soil stabilizer, shade tolerant, and nitrogen-fixing plant. Provides good forage value for wildlife and livestock. Early- to late-successional status.

Sources

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