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Proposed Revision to Reclamation Plan: Alternative Transition Area Development

1. Intent of Reclamation Plan Transition Area

The intent of developing a transition area at the Zavoral Site (Site), as indicated in the approved Reclamation Plan, is to provide a transition area using existing, on-site trees along the established woodland/forested edges and the newly planted prairie areas. The method selected for development of this transition area relied primarily on the transplantation of suitable on-site trees to areas along the existing woodland edge within Phase 1 Reclamation. The transplantation was to occur after complete vegetation removal, including existing trees, followed by final grading with engineered topsoil in an effort to minimize the spread and proliferation of invasive plant species within transplanted transition areas.

2. Implementation of the Reclamation Plan, dated April 18, 2013

The *Zavoral Tree Transplanting Results* and the *Annual Reclamation Report 2013*, documents the extensive efforts undertaken to establish transition areas through transplantation. The report demonstrates that the method selected for the development of the transition areas between the existing woodland and the planted prairie areas is not an effective means to accomplish the intent of the Reclamation Plan. The work prescribed in the Reclamation Plan indicates a tree spade between 65 inches to 90 inches will be used to transplant a minimum of 100 on-site white pine trees into the proposed transition area within Phase 1 Reclamation. Due to the rocky/stony on-site soils, including boulders and coarse material encountered throughout Phase 1 Reclamation, transplanting the required trees proved to be unachievable. Suitable trees identified as transplant candidates could not be successfully dug from the rocky and impenetrable parent soil. Furthermore, the primary problem with transplantation was that due to rocky conditions, suitable receiving holes for potential transplant trees could not be dug. A tremendous effort was made in an attempt to develop the transition area using the implementation method selected in the Reclamation Plan. These efforts were unsuccessful. After several dozen chosen transplant trees were damaged beyond use as a result of unsuccessful transplant attempts the transplanting was terminated.

3. Alternative Transition Area Development Plan

The Reclamation Plan recognizes the possibility that Site conditions experienced in the field may require modifications to the Reclamation Plan. These modifications are termed adaptive management techniques. Among other things, these techniques allow for changing the selected implementation methods in order to accomplish the goals and intent of the Reclamation Plan.

Figure 1: Preserved transition area to the east of the orange fence. Image is facing north.

To accomplish development of the transition area, an alternative plan has been developed. This plan also utilizes on site trees and provides transition areas by not clearing the perimeter areas which were originally approved for clearing and to make these areas into effective transition areas by adaptive management. The number of on-site trees that can be preserved with this approach far outweighs the original number of on-site trees to be transplanted. In portions of the Phase 1 Reclamation Area where there are no existing transition trees, 16 inch to 24 inch tall white pine seedlings are proposed for planting. This is the size that can be installed by hand. Transplanting of larger trees into the Phase 1 Reclamation Area is not a viable method of developing a transition area. Therefore the following adaptive management revisions are being proposed as methods to develop the transition area between the existing woodland and planted prairie.

3.1. Proposed Revisions to Reclamation Plan:

3.1.1 Preserve the Existing Perimeter Areas as Transition Areas

Within the Phase 1 Reclamation Area, existing transition areas have been preserved that were originally scheduled to be completely cleared of existing native and non-native vegetation and planted as native prairie. Several hundred small to medium sized (8-20' tall) mature trees have been preserved and occupy the area at moderate to high densities. Tree species that were identified within the existing transition area that are proposed to be preserved include: White Pine (*Pinus strobus*), Cottonwood (*Populus deltoides*), Quaking Aspen (*Populus tremuloides*), Paper Birch (*Betula papyrifera*), Red Oak (*Quercus rubra*), White Oak (*Quercus alba*), Box Elder (*Acer negundo*), American Elm (*Ulmus americana*), and Black Cherry (*Prunus serotina*). Also identified in this area are populations of invasive woody shrubs common buckthorn (*Rhamnus cathartica) ,* Siberian elm *(Zanthoxylem americanum*) and weedy herbaceous species spotted knapweed (*Centaurea maculosa)* sweet clover *(Melilotus* spp.).

3.1.2 Supplement Existing Transition Area with White Pine Seedlings

Within Phase 1 Reclamation where gaps occur in the existing transition areas along the northern edge of Phase 1 Reclamation, 16 inch to 24 inch tall white pine bare root tree seedlings will be installed by hand. The number of seedlings to be installed will be dependent on the size of the gaps where supplementation is necessary to achieve the goals and intent of the Reclamation Plan. The installation of the bare root seedlings will be accomplished by creating a receiving hole for the bare root seedlings and planting the bare root seedlings in a staggered and dispersed pattern to create a more natural transition between the forest edge and the prairie plantings. Installation of the bare root seedlings will take place in the early spring or fall, which are the optimum times to plant young trees. The installation of each bare root seedling will be followed by mulching, watering, and monitoring.

A qualified contractor will be responsible for installing bare root tree seedlings and will water all newly installed seedlings within 2 hours of installation to assure proper moisture levels and soil settling. The contractor will then return to the site within five days to add

any additional soil to the planting areas as needed to fill any voids left from soil settling. If necessary, bare root seedlings will be repositioned.

Bare root tree seedlings installed as described above will be monitored throughout the first two growing seasons to assure appropriate soil moisture levels are maintained. When soil moisture levels are low, supplemental watering will occur through a surface watering method brought on-site with a transportable watering tank. During dry periods, tree seedlings will be watered up to one time per week. When watering, mulch will be pulled back and the area around the roots thoroughly soaked. When watering is complete mulch will be replaced.

3.1.3 Vegetation Management of Transition Area
Annual Maintenance of Transition Area

In the preserved transition area described above in 3.1.1, rigorous reclamation and management activities will be completed in an effort to develop a high quality, natural forest/woodland transition zone. To minimize the spread and proliferation of invasive plant species, in the late fall, non-native, invasive and overly aggressive woody shrubs including common buckthorn and Siberian elm will be cleared from the preserved areas. Remaining stumps will be treated with an appropriate herbicide to prevent resprout. At the start of the following growing season, the herbaceous vegetation will be evaluated by the project ecologists. Non-native, invasive or overly aggressive herbaceous species including spotted knapweed and sweet clover will be selectively treated with herbicide in a sensitive and targeted manner. Following removal of non-native herbaceous species in the understory, areas of exposed soil (bare areas) will be seeded with the approved native prairie seed mix using a hand broadcast method at a rate of at least 50 seeds per square foot. When available, seed utilized during this portion of the project will be local ecotype.

Following initial restoration activities, the site will be continually and actively managed for a minimum of five years. Follow-up maintenance activities will include removal and treatment of any non-native, invasive and overly aggressive woody species, spot treatment of any non-native, invasive and overly aggressive herbaceous species and reseeding of bare areas as needed to meet performance goals described below.

3.1.4 Performance Monitoring of Transition Area
Annual Monitoring

Consistent with the Reclamation Plan, performance monitoring will take place. The preserved transition area as described above in 3.1.1 will be monitored annually following management and maintenance activities. Management and maintenance activities will be adjusted to assure that the following performance goals are met for the site as per the CUP, Condition #63:

- Areal vegetative coverage of at least 90% within 3 years post seed installation;
- Non-native, invasive or overlay aggressive woody and herbaceous species will account for no more than 20% areal cover at the end of the 5th growing season, post seed installation;
- At least 50% of the species seeded or plugged into the area will be present within the reclamation area within five years of initial restoration activities;

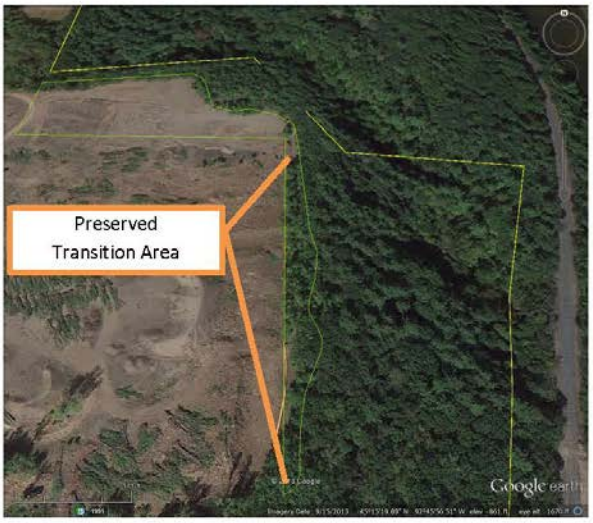
Bare root tree seedlings installed as described above in 3.1.2 will also be monitored on an annual basis to assure the following performance standards are met:

- Newly installed bare root tree seedlings will be required to meet a survival rate of at least 80%, survival rates of less than 80% will require replacement;

Trees that were transplanted as described above in section 2 will be monitored on an annual basis to assure the following performance goals are met as per the CUP, Condition #65:

- Transplanted trees will meet a survival rate of at least 80%. If survival rates are less than 80%, replacement will be required;
- If necessary, replacement tree species will be selected in consultation with the City of Scandia;

Aerial Imagery of Phase 1 Reclamation
Google Earth Imagery Date: September 15, 2013



Preserved Transition Area within Phase 1 Reclamation and located in the St. Croix Scenic Easement. Image is facing north.

Preserved Transition Area within Phase 1 Reclamation and located in the St. Croix Scenic Easement. Image is facing northeast.

Preserved Transition Area within Phase 1 Reclamation and located in the City's River District. Image is facing north.

Preserved Transition Area within Phase 1 Reclamation and located in the City's River District. Image is facing east.