

Tree and Shrub Inventory Plan

Center to Grand Forks Transmission Line Project

Case No. PU-09-670

Prepared for:



February 2012

Introduction

Minnkota Power Cooperative, Inc. (Minnkota) proposes to construct, own, and operate an approximate 250-mile-long 345 kV transmission line from the Center 345 kV Substation near Center, North Dakota to the Prairie Substation adjacent to Grand Forks, North Dakota. The project is called the Center to Grand Forks Project (case number PU-09-670). Minnkota will comply with the North Dakota Public Service Commission (Commission) tree and shrub replacement specifications. Minnkota proposes to contract HDR Engineering and McCain and Associates for the tree and shrub inventory. The tree and shrub mitigation specifications are found in Appendix A of this Tree and Shrub Inventory Plan (Plan). Specifically, this Plan outlines the process for completing the tree and shrub inventory within the 150-foot-wide right-of-way (ROW).

Within the Commission's tree and shrub mitigation specifications (Appendix A), Specification number 8 states that "The width of clear cuts through windbreaks, shelterbelts and all other wooded areas shall be limited to 50 feet or less unless otherwise approved by the NDPSC." Minnkota requests that the Commission approve clear clearing the entire 150-foot-wide ROW easement, if warranted.

Inventory Methods

Minnkota will inventory trees and shrubs, including those considered invasive species, to be cleared within the 150-foot-wide ROW easement. Inventories will be documented on standard forms and will include the inventory location, species present, and number of trees and shrubs in the location. An example form is found in Appendix B.

Windbreaks, Shelterbelts, and Other Planted Areas

In windbreaks, shelterbelts, and other planted areas, trees and shrubs anticipated to be cleared regardless of size will be counted by direct stem count. Trees that are one-inch or greater diameter at breast height (DBH) will be inventoried for replacement. Inventoried trees will be categorized into two separate groups:

- 1) one-inch to two inches DBH
- 2) greater than two inches DBH

In windbreaks, shelterbelts, and other planted areas, shrubs that form colonies (such as buffalo currant, chokecherry, dogwood, plum, pussy willow, sandbar willow, western snowberry, and Woods rose) and that are cut flush with the ground surface and not cleared, so as to leave the naturally occurring seed bank and root stock intact will not be direct stem counted. Instead, the area will be delineated on an aerial photo and indicated on construction drawings to not be cleared or have the ground disturbed. If ground disturbance occurs, Minnkota will conduct a direct stem count of the disturbance area or estimate the number of stems cleared using a Commission approved sampling estimate method (see Shrub Sampling Method, Appendix C).

Native Growth Areas

In native growth areas, trees that are one-inch or greater diameter at breast height (DBH) will be inventoried for replacement. Further, trees placed in the inventory will be categorized into two separate groups:

- 1) one-inch to two inches DBH
- 2) greater than two inches DBH

In high-density woodland areas, a Commission approved sampling method may be used in place of individual counting (see Tree Sampling Method, Appendix D).

In native growth areas, shrubs that form colonies (such as buffalo currant, chokecherry, dogwood, plum, pussy willow, sandbar willow, western snowberry, and Woods rose) and that are cut flush with the ground surface and not cleared, so as to leave the naturally occurring seed bank and root stock intact will not be direct stem counted. Instead, the area will be delineated on an aerial photo and indicated on construction drawings to not be cleared or have the ground disturbed. If ground disturbance occurs, Minnkota will conduct a direct stem count of the disturbance area or estimate the number of stems cleared using a Commission approved sampling estimate method (see Shrub Sampling Method, Appendix C).

Shrub Sampling Method

Per the Commission's Tree and Shrub Mitigation Specifications (Inventory Specification No. 6 in Appendix A), in high-density woodland areas, Minnkota proposes the following sampling method for the shrub inventory. The dimensions of the entire woodland stand within the ROW will be delineated to determine the area of the woodland. Shrub counts will be made in representative sample site areas within the woodland. Transect will be developed and the circular sample sites placed along the transect. The number of sample sites within a woodland stand will be dependent on woodland size and uniformity. A smaller, more uniform woodland stand would require fewer sample sites than a larger, less uniform woodland stand.

The sample sites will be 0.001 acres (3.72-foot radius circles). A rope 3.72 feet in length will be attached to a central stake and rotated in a circle (Appendix C). Shrubs within the circle will be counted. Tree and shrub density for the entire woodland area within the ROW will be calculated based on the average density from all of the sample locations within the woodland, weighted against the woodland size.

Tree Sampling Method

Per the Commission's Tree and Shrub Mitigation Specifications (Inventory Specification No. 6 in Appendix A), in high-density woodland areas, Minnkota proposes the following sampling method for the tree inventory. The dimensions of the entire woodland stand within the ROW will be delineated to determine the area of the woodland. Tree and shrub counts will be made in representative sample site areas within the woodland. Transect will be developed and the circular sample sites placed along the transect. The number of sample sites within a woodland stand will be dependent on woodland size and uniformity. A smaller, more uniform woodland stand would require fewer sample sites than a larger, less uniform woodland stand.

The sample sites will be 0.10 acres (37.42-foot radius circles). A rope 37.42 feet in length will be attached to a central stake and rotated in a circle (Appendix D). Trees and shrubs within the circle will be counted. Tree and shrub density for the entire woodland area within the ROW will be calculated based on the average density from all of the sample locations within the woodland, weighted against the woodland size.

Appendix A

Tree and Shrub Mitigation Specifications

Inventory

1. Trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds (e.g., *Caragana arborescens*, *Elaeagnus angustifolia*, *Rhamnus cathartica*, *Tamarix chinensis*, *T. parviflora*, *T. ramosissima*, *Ulmus pumila*), shall be inventoried before cutting. The inventory shall record the location, number, and species of trees and shrubs.
2. In windbreaks, shelterbelts and other planted areas, trees or shrubs anticipated to be cleared, regardless of size, shall be inventoried for replacement.
3. In native growth areas, trees anticipated to be cleared that are 1 inch diameter at breast height ("dbh") or greater shall be inventoried for replacement.
4. In native growth areas, shrubs anticipated to be cleared in the permanent right-of-way shall be inventoried for replacement.
5. In native growth areas outside the permanent right-of-way, shrubs shall be cut flush with the surface of the ground, taking care to leave the naturally occurring seed bank and root stock intact. If soil disturbance is necessary, the native topsoil shall be preserved and replaced after construction. Shrubs shall be allowed to regenerate naturally where native topsoil is preserved and replaced. Where native topsoil is not preserved and replaced, shrubs anticipated to be cleared shall be inventoried for replacement.
6. In native growth areas, trees and shrubs may be inventoried by actual count or by sampling method that will properly represent the woody vegetation population. A sampling plan developed by the company, filed with the North Dakota Public Service Commission (Commission) and approved prior to the start of construction shall define the sampling method to be used for trees, for tall shrubs and for low shrubs. The data from the sample plots shall be extrapolated to the total acreage of the wooded area to be cleared to determine the species and quantity of trees and shrubs to be replaced.

Clearing for Construction

7. Trees and shrubs shall be selectively cleared, leaving mature trees and shrubs intact where practical.
8. The width of clear cuts through windbreaks, shelterbelts and all other wooded areas shall be limited to 50 feet or less unless otherwise approved by the NDPSC. [Minnkota will clear within the 150-foot-wide ROW easement, if warranted.]
9. If the area of trees or shrubs actually cleared differs from the area inventoried, the difference in number of trees and shrubs to be replaced shall be noted on the inventory.

Replacement

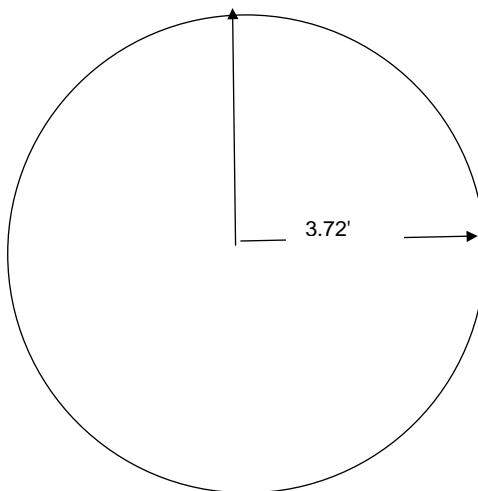
10. Prior to tree/shrub replacement, documentation identifying the number and variety of trees removed as well as the mitigation plan for the proposed number, variety, type, location and date of replacement plantings shall be filed with the NSPSC for approval.
11. Tree replacement shall be on a 2 to 1 basis with 2-year-old saplings. Shrub replacement shall be on a 2 to 1 basis with stem cuttings.
12. Trees and shrubs shall be replaced by the same species or similar species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.
13. Landowners shall be given the option of having replacement trees/shrubs planted off the right-of-way on the landowner's property or waiving that requirement in writing and allowing those replacement trees/shrubs to be planted at alternative locations.
14. At the conclusion of the project, documentation identifying the actual number, variety, type, location, and date of the replacement plantings shall be filed with the NDPSC.
15. Tree/shrub replacements shall be inspected once a year for three years, on about the anniversary of the plantings, and, on or shortly before October 1 of each year, a report shall be submitted to the NDPSC documenting the condition of replacement planting and any woodlands work completed. If after three years from the anniversary of the plantings the survival rate is less than 75%, the NDPSC may order additional planting(s).

Appendix C

Shrub Sampling Method

Sample Plot

- Circular sample plots with a radius of 3.72 feet, or area equivalent to 0.001 acres created with a central stake and rope.
- The rope, 3.72 feet in length, anchored to the central stake and rotated in a circle



Shrub Counts

- Direct stem counts from each plot
- Talled on work sheet by species

Woodland size

- GPS points taken in the field around boundary
- GIS used to calculate acreage

Calculations

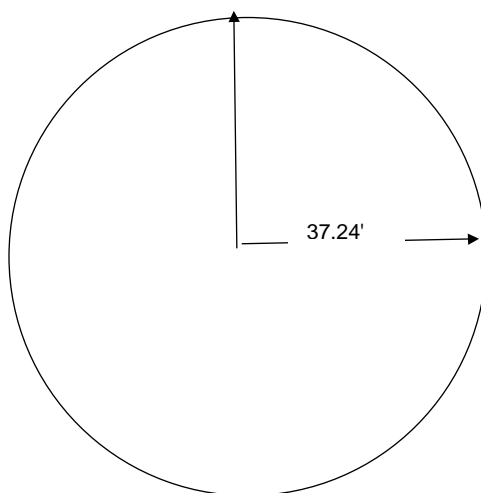
- Average determined from all plots sampled in a woodland area or area is equivalent to stems/0.001 acre
- Converted to a per acre basis (average times 1000)
- Total number per woodland determined by multiplying average number per acre with woodland size

Appendix D

Tree Sampling Method

Sample Plot

- Circular sample plots with a radius of 37.24 feet, or area equivalent to 0.10 acres created with a central stake and rope.
- The rope, 37.24 feet in length, anchored to the central stake and rotated in a circle



Tree Counts

- Direct stem counts from each sample site
- Talled on work sheet by species

Woodland size

- GPS points taken in the field around boundary
- GIS used to calculate acreage

Calculations

- Average determined from all plots sampled in a woodland area or area is equivalent to stems/0.10 acre
- Converted to a per acre basis (average times 10)
- Total number per woodland determined by multiplying average number per acre with woodland size