



**KJOLHAUG** ENVIRONMENTAL SERVICES COMPANY  
*Providing Sound, Balanced, Comprehensive Natural Resource Solutions*

## Memorandum

**Date:** July 15, 2021

**To:** The City of Ramsey, MN

**CC:** Tracey Rust, Sotarra

Mark Kjolhaug, Kjolhaug Environmental Services Company (KES)

**From:** Kyle Uhler, Kjolhaug Environmental Services Company (KES)

**Re:** Site Tree Survey Methods – Trott Brook Site Ramsey, MN (KES 2021-108)

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The Trott Brook Site will be surveyed for the presence and extent of significant trees. The site was located in Section 9 and 10, Township 32N, Range 25W, City of Ramsey, Anoka County, Minnesota. Generally, the site was located north of Trott Brook, west of Nowthen Boulevard NW, and south of 173<sup>rd</sup> Ave NW (**Figure 1**).

The 196-acre site was comprised of approximately 27.55 acres of trees grouped into two woodland types; Natural and Planted. The purpose of this memo is to provide additional information about the proposed tree survey methods for the Trott Brook site.

### **Natural Woodland Areas Sampling Method**

Within the natural woodland areas (**Figure 1**) all significant trees will be surveyed as defined by the City of Ramsey, MN Code of Ordinances *Sec. 117-327*. Significant trees shall include:

- a. All species of oak that have a DBH of four inches or greater;
- b. All evergreen species that have a DBH of four inches or greater;
- c. All other trees that have a DBH of eight inches or more; and
- d. All dead or diseased trees will be included in the survey.

The natural woodland represents the long-term character of the Trott Brook site. Much of the natural woodland can be seen in the 1964 MNHAPO Imagery (**Figure 2**).

## **Planted Woodland Areas Sampling Method**

Within the planted woodland areas, a Fixed Radius Plot Sampling (FRPs) method is proposed to sample significant trees. All significant trees within the FRPs will be surveyed as defined by the City of Ramsey, MN Code of Ordinances *Sec. 117-327*. FRPs are a common method utilized by foresters for developing management plans and commercial timber sales. The FRPs method is utilized on large relatively homogenous “stands” of trees. Stands are defined by the Natural Resources Conservation Services (NRCS) as, relatively uniform with respect to age, dominant crown cover, density, species composition, and landform. This method samples all individual trees at a defined distance from a center point. The plot locations are located throughout contiguous stands of trees at systematically centered 1/10<sup>th</sup> acre plots. We chose 1/10<sup>th</sup> acre plot size because of scalability e.g., every tree in a plot equals 10 trees per acre (**Figure 3**).

There are clear benefits to FRPs as they reduce the amount of labor and people on-site, are ideal for evenly aged stands or plantations with low diversity and produces simple statistics, trees per acre and basal area per acre (ACES, 2020). The 2002 Proceedings of the Oklahoma Academy of Science concluded that FRPs were the most time-efficient sampling method and produced the most accurate estimate of all stems in a stand regardless of size. Furthermore, this method was shown to yield an 88% relative accuracy based on the total number of trees sampled (Nowak 2008). The drawback to a FRPs would be that it can minimize larger individual trees within the stand that are not recorded. This drawback is diminished greatly because the area was planted less than 30 years ago and has low diversity. So, one would not expect significant size variation between sampled individuals and non-sampled individuals of the same species.

The fix plot method will provide accurate and cost-effective sampling method to determine the volume of trees per acre in the planted area. The planted woodland area is perfectly suited for a FRPs subsampling method due to;

- Similarly aged stand that was established between the 1991 USGS aerial image and the 2003 FSA (**Figure 4**).
- The trees are uniformly dense because they were planted.
- Species composition is low. Area dominated by planted Scots pine, Colorado blue spruce, and white spruce trees.
- The landform is similar throughout the planted woodland i.e., trees planted under similar constraints will produce uniform morphology.

## **Proposed Sampling Method Effects on Labor Cost**

The Trott Brook site has approximately 16.58-ac of planted trees with an estimated density of ~300 trees per acre. If this tree stand is greater or equal to past surveys that would produce  $\geq 4,974$  trees in the planted woodland. One crew can record approximately 30 trees per hour (depending on understory conditions), that equals ~165+ hours of tagging trees (not including accessing the site, data quality control, data packaging, and figure creation).

Utilizing the fixed plot sampling would reduce the time tagging in the planted woodland to approximately ~17 hours with a total time saving of ~148 hours of labor.

## **Summary**

This method will produce; (1) the total basal area, species, location, and health condition for all trees in the natural woodland, (2) a per acre relative basal area, relative species abundances, and relative health condition for the planted woodland areas. The proposed study methods will result in an accurate and efficient tree survey for the Trott Brook Property in Ramsey, MN.

Thank You

## **References**

Alabama Cooperative Extension System (ACES). (2020, January 6). *Fixed-Radius Plots as Inventory Method in Southern Forests*. <https://www.aces.edu/blog/topics/forestry/fixed-radius-plots-as-inventory-method-in-southern-forests/>

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