

May 10, 2023

Zachary Evans, P.E.
Capital Project Manager II
City of Shoreline Public Works
206-801-2428
zevans@shorelinewa.gov

Re: Pump Station 30 – Arborist Report

DCG/Watershed Reference Number: 181216.11

Dear Zachary:

We are pleased to present you with the findings of our tree inventory and assessment for the proposed Pump Station improvement project on parcels #25481000 -35, -30 in Shoreline, WA. Lars Freeman-Wood, an ISA Certified Arborist® and Qualified Tree Risk Assessor with DCG/Watershed, visited the subject property on April 6, 2023 to inventory and assess trees within the project area.

The intent of this tree inventory was to screen for, identify, and assess any trees meeting the City of Shoreline’s significant tree definition that may be impacted by the proposed project. Tree attributes including species, size, and condition, were assessed during the on-site inventory, and are summarized in the enclosed Tree Inventory Table. Tree locations are shown on the enclosed Tree Inventory Sketch.

This arborist report has been prepared for the following purposes:

- Describe the tree inventory and assessment methods;
- Summarize tree inventory and assessment results;
- Document relevant municipal code and outline any necessary tree replacement or replanting requirements;
- Discuss the effects of the proposed development on existing tree conditions; and
- Provide construction strategies for the protection of trees to be retained.

Introduction

Study Area

The study area includes the subject parcels and adjacent vegetation which may be affected by the proposed project. The subject properties total approximately 21,666 square feet in size (according to King County Assessor) and are currently the site of a stormwater retention pond. Single-family residential parcels border the subject property to the south and west. See Figure 1 for a map of the study area and site vicinity.



Figure 1. Vicinity map showing study area (parcel boundary highlighted in yellow). Imagery: [King County iMap](#).

Current Site Conditions

The study area has a stormwater retention pond with Western red cedar and arborvitae planted on the parcels. Trees in the study area are discussed in detail below.

Methods

All significant trees in the study area were identified and assessed in the field using a Basic Assessment according to International Society of Arboriculture (ISA) standards to collect species name (scientific and common), number of stems, diameter, height, average crown radius, overall condition rating, and general assessment notes. Attributes were recorded for additional off-site and right-of-way trees with critical root zones extending into the project site.

According to Shoreline Municipal Code (SMC) 20.20.048, significant trees are defined as:

Any healthy tree six inches or greater in diameter at breast height (dbh) excluding those trees that qualify for complete exemptions from Chapter 20.50 SMC, Subchapter 5, Tree Conservation, Land Clearing, and Site Grading Standards, under SMC 20.50.310(A). (Ord. 955 § 1 (Exh. A), 2022; Ord. 669 § 1 (Exh. A), 2013).

Additionally, SMC 20.20.048 recognizes landmark trees as *Any healthy tree over 24 inches in diameter at breast height (dbh) that is worthy of long-term protection due to a unique combination of size, shape, age, location, aesthetic quality for its species or any other trait that epitomizes the character of the species, and/or has cultural, historic or ecological importance or is a regional erratic. Long-term protection and recognition of any landmark tree may be obtained through the landmark tree designation program as detailed in SMC 20.50.350(F). (Ord. 955 § 1 (Exh. A), 2022).*

All inventoried trees were assigned a unique identification number. Each assessed on-site tree (trees located on the subject property) was tagged with a 1.25-inch aluminum tag that was affixed to the trunk at eye level. Off-site trees and ROW trees were assigned a digital ID number.

KPG Interdisciplinary Design located some of the subject trees and provided survey data to DCG/Watershed prior to the tree inventory. Survey data and proposed site plans were provided to DCG/Watershed in AutoCAD and PDF formats.

Tree data and geospatial locations were collected in the field using an iPad with the ArcGIS Field Maps application, with several tree points adjusted visually based on the survey. GPS data is believed reliable for general planning and most regulatory purposes. However, accuracy is variable and should not be considered equivalent to a professional land survey. No warranty is expressed or implied.

Diameter

The diameter-at-breast-height (DBH) of all significant trees in the study area, was measured at 4.5 feet above the average surface of the ground. Methodology for measuring and calculating

the diameter of trees with multiple trunks, major leans, or on steep slopes followed those outlined in the *Guide for Plant Appraisal, 10th Edition*, written by the Council of Tree and Landscape Appraisers (CTLA) and published by ISA (CTLA 2020). To measure trees with multiple trunks, the total diameter of multi-stemmed trees was calculated by taking the square root of the sum of each diameter squared; this allows for comparison to other single-stemmed trees and for more accurate permitting and tree retention calculations.

Estimated Height

The height of trees was visually estimated.

Canopy Radius

Canopy radius, also known as dripline, was measured horizontally from the center of the trunk to the outermost branch tips. For trees with uneven crowns, the average of two perpendicular radii was recorded.

Condition

A basic visual assessment was used to evaluate the health and condition of trees within the study area in accordance with ISA and CTLA standards. The condition determination was based on current conditions and considered the health, structural integrity, and form of the tree, in addition to characteristics of each species. Each tree was given an overall condition rating from *Excellent* to *Very Poor* as summarized below in Table 1. For the purposes of this report, any tree found in *Very Poor* or *Dead* condition is not considered to be “healthy”, and therefore does not meet the criteria for a significant tree.

Table 1. Tree Condition Ratings (adapted from CTLA 2020).

Rating Category	Condition Components	
	Health	Structure

Excellent	High vigor and nearly perfect health with little or no twig dieback, discoloration, or defoliation.	Nearly ideal and free of defects.
Good	Vigor is normal for species. No significant damage due to diseases or pests. Any twig dieback, defoliation, or discoloration is minor.	Well-developed structure. Defects are minor and can be corrected.
Fair	Reduced vigor. Damage due to insects or diseases may be significant and associated with defoliation but is not likely to be fatal. Twig dieback, defoliation, discoloration, and/or dead branches may compromise up to 50% of the crown.	A single defect of a significant nature or multiple moderate defects. Defects are not practical to correct or would require multiple treatments over several years.
Poor	Unhealthy and declining in appearance. Poor vigor. Low foliage density and poor foliage color are present. Potentially fatal pest infestation. Extensive twig and/or branch dieback.	A single serious defect or multiple significant defects. Recent change in tree orientation. Observed structural problems cannot be corrected. Failure may occur at any time.
Very Poor	Poor vigor. Appears dying and in the last stages of life. Little live foliage.	Single or multiple severe defects. Failure is probable or imminent.
Dead	No live branches or buds remain above the base of the trunk. Tree is in a stage of decay.	Failure is probable or imminent.

Results

Tree Inventory and Assessment Findings

A total of 26 trees were assessed within the study area. Of those trees, 14 trees were located on-site and met the criteria for a significant tree. An additional eight off-site trees and four ROW trees were also inventoried and assessed. On-site trees were all Western red cedar (*Thuja plicata*).

Off-site trees in the study area included three Western red cedar (*Thuja plicata*), two Western hemlock (*Tsuga heterophylla*), two Mugo pines (*Pinus mugo*), one cherry (*Prunus spp.*), one common holly (*Ilex aquifolium*), one Japanese maple (*Acer palmatum*), one Port Orford cedar (*Chamaecyparis lawsonia*), and one Douglas fir (*Pseudotsuga heterophylla*).

A detailed table of all trees inventoried can be found in the enclosed Tree Inventory Table.

Diameter

Significant on-site trees range in DBH from 13.8 inches to 30.3 inches.

Landmark Trees. Four on-site trees meet the criteria for a Landmark Tree (Tree #3430, 3436, 3438 and 3443). Additionally, four off-site or ROW trees meet the criteria for Landmark Tree (Tree #5, 6, 11, 12).

Height

The estimated height of on-site significant trees are all approximately 50 feet.

Canopy radius

The canopy radius of all on-site significant trees ranges from 14 feet to 16 feet.

Condition

Of the 14 significant on-site trees, all were found to be in *Good* condition with normal vigor, well-developed structure and no significant damage, defects or disease.

A total of 11 off-site and ROW trees were found to be in *Good* condition with normal vigor, well developed structure and no significant damage, defects of disease. One off-site tree (Tree #7) is *Dead*.

Discussion

Effects of Proposed Development

The majority of the significant trees can be retained, both on and off-site or in the ROW, as they are in *Good* condition and won't be negatively impacted. Specific exceptions for removal are

noted in the section below. All trees being retained should have protection measures followed according to the recommendations listed in the Tree Protection Recommendations section below.

Tree Removal Recommendations

Tree #3430 will need to be removed to accommodate the construction of the valve vault and wet well. If the project proposes to run the forced main along NE 170th St and 12th Pl NE, ROW Trees #11 and 12 will also need to be removed. If an alternative path for the forced main along the west property line can be utilized, ROW Trees #11 and 12 would not require removal.

In addition to the inventoried significant trees, there are several non-significant arborvitae (*Thuja occidentalis*) along NE 170th St that are in *Good* condition and can be retained. There are also several arborvitae within the property along the west fence line that are in *Poor* or *Dead* condition and should be removed.

Tree Unit Calculations

The removal of Tree #3430 would require three replacement trees to be planted. The removal of Trees #11 and 12 would require three replacement trees each.

Tree Protection Recommendations

All retained trees, including those on-site, in the ROW, and on adjacent properties will require protection measures during construction. Trees can be damaged quickly and irreversibly by construction activities, especially by heavy machinery and exposure to chemicals. The following best management practices follow the industry standards for tree protection (ANSI A300 Part 5, 2019), and should be adhered to whenever work is being performed.

Tree Protection Zones and Fencing

The critical root zone (CRZ) is the area that contains tree roots critical to the health and stability of the tree. It can be approximated by an area with a radius of one foot for every diameter inch of the trunk. However, topography and site conditions may greatly affect where critical roots are growing.

Per SMC 20.50.370.B, The tree protection zone (TPZ) is the area within the critical root zone in which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees, especially during construction or development. All construction activities, including staging and driving machinery, should be located outside of the TPZ. Verification of site conditions and long-term health of the tree by an ISA certified arborist may be required for intrusions into the TPZ.

Per SMC 20.50.370.A, the TPZ and other tree protection measures for preserved trees should be shown on the site development plans, including grading and drainage plans and temporary erosion and sediment control (TESC) plans.

Tree Protection Fencing Requirements

- Fencing should be placed at the outer edges of the tree protection zone.
- Fencing should be four to six feet high, and constructed of chain link, wire-mesh, or high-visibility plastic fencing.
- Fencing should include visible warning signs, such as “Tree Protection Area – Keep Out”, spaced no further than 15 feet apart.
- Fencing and signage should be installed prior to the start of construction and remain in place for the duration of the project.

Minimize Grade Changes

The grade should not be altered in the TPZ. Most tree roots grow in the top six to 18 inches of soil and are highly susceptible to damage from grade changes. If the grade is lowered, roots critical to health and stability will be removed. If the grade is raised, roots can suffocate from lack of oxygen. Per SMC 20.50.370.G, rock walls shall be constructed around the tree, equal to the dripline, when existing grade levels are lowered or raised by the proposed grading.

If an increase in grade within the TPZ is recommended and approved, these best management practices should be followed:

- Do not place fill or other organic matter against the trunk.
- Do not compact soils.
- If the fill to be applied is no more than two to four inches, it should be a coarser texture than the existing soil.

If a decrease in grade within the TPZ is recommended and approved, these best management practices should be followed:

- No more than six inches of soil should be removed from the existing grade.
- Consider retaining walls or terraces to avoid excessive soil loss. Support for retaining walls should not impact major structural roots. Soil excavation by hand or hydro-vac prior to mechanical auguring is recommended to avoid root impacts.
- Spread two to four inches of mulch over the exposed area to buffer the root’s environment change.
- Apply supplemental water during dry months to encourage new root growth.

Root pruning

If any excavation or construction is proposed within the dripline, critical root zone, or tree protection zone, roots must be protected or properly pruned to ensure tree health and stability. Prior to excavation within a tree's root zone (either within or outside of the TPZ), exposing roots using high-pressure air (pneumatic) or water (hydraulic) excavation is recommended. Any roots over one inch that are exposed after excavation should be clean cut by hand. On development projects with a project arborist, or when the City requires arborist consultation, the project arborist should be consulted before root pruning. Per SMC 20.50.370.E, all root pruning of roots over 3-inch diameter should be overseen by the project arborist or designee.

Canopy pruning

All construction activities should stay out of the canopy zone. However, if the canopy of a tree will conflict with construction, the canopy could be raised to avoid aerial conflicts after consulting with the project arborist or designee. Any pruning of trees should be done by / overseen by a certified professional through the International Society of Arboriculture (ISA) or Tree Care Industry Association (TCIA). No other pruning should be necessary and could negatively impact the health of the trees.

Maintenance

The impacts of construction are stressful to trees, which may not show the signs of stress for up to five to ten years after being impacted. Per SMC 20.50.370, applying additional woodchip mulch and providing supplemental irrigation may be necessary to reduce tree stress during construction. Per SMC 20.50.370.I, mulch with a layer of four inches to five inches of wood chips in the critical root zones of retained trees; and ensure one inch of irrigation or rainfall per week during and immediately after construction and from early May through September until reliable rainfall occurs in the fall.

Replacement Of Pavement Over Roots

Pavement repair is often necessary work that is performed within a tree's root zone. Care should be taken to protect roots during these activities. Tree protection measures for working around tree roots should be described and submitted as part of any required permit documentation.

These best management practices for replacing pavement over roots include the following:

- Pavement should be broken into manageable pieces and carefully removed.
- Equipment and materials should be kept outside of the TPZ.
- Base rock should remain in place for feeder roots. Only remove rock if it is obscuring roots that need to be pruned.

During hot, dry months, care should be taken to keep the exposed roots and surrounding soil moist through the application of mulch, wet burlap, or other approved measures. Measures should be applied immediately and kept in place until overlay surface is in place, ideally within the same day.

Trenching, Excavation, and Tunneling

Trenching and excavation within the critical root and tree protection zones should be avoided to reduce root loss and to help preserve the structural integrity of the tree. Alternative routes outside the CRZ should be considered for underground infrastructure. If no alternative path is possible, consider using air excavation to create a trench or tunneling at least 18 inches below the soil to reduce the loss of roots.

The following best practices for trenching are as follows:

- Keep equipment and excavated material farthest away from the tree and out of the TPZ.
- Backfill should be replaced the same day it was excavated to reduce root desiccation.
- Cover exposed roots with wet burlap immediately; burlap should be kept moist.
- Chemicals, debris, trash, or other materials should not be mixed with backfill.
- Backfilled soil should match and not exceed the compaction of the surrounding soil.
- Water the tree's root zone to keep impacted roots moist.

Limitations of This Study

The findings of this report are based on the best available science and are limited to the scope, budget, and site conditions at the time of the assessment. Although the information in this report is based on sound methodology, internal physical flaws (such as cracking or root rot) or other conditions that are not visible cannot be detected with this limited basic visual screening. Trees are inherently unpredictable. Even vigorous and healthy trees can fail due to high winds, heavy snow, ice storms, rain, age, or other causes.

This report is based on the current observable conditions and may not represent future conditions of the trees. Changes in site conditions, including clearing and grading, will alter the condition of remaining trees in a way that is not predictable.

The conclusions contained within this report have been made for permitting purposes only and are not intended for tree risk assessment purposes.

Please call if you have any questions or if we can provide you with any additional information.

Sincerely,

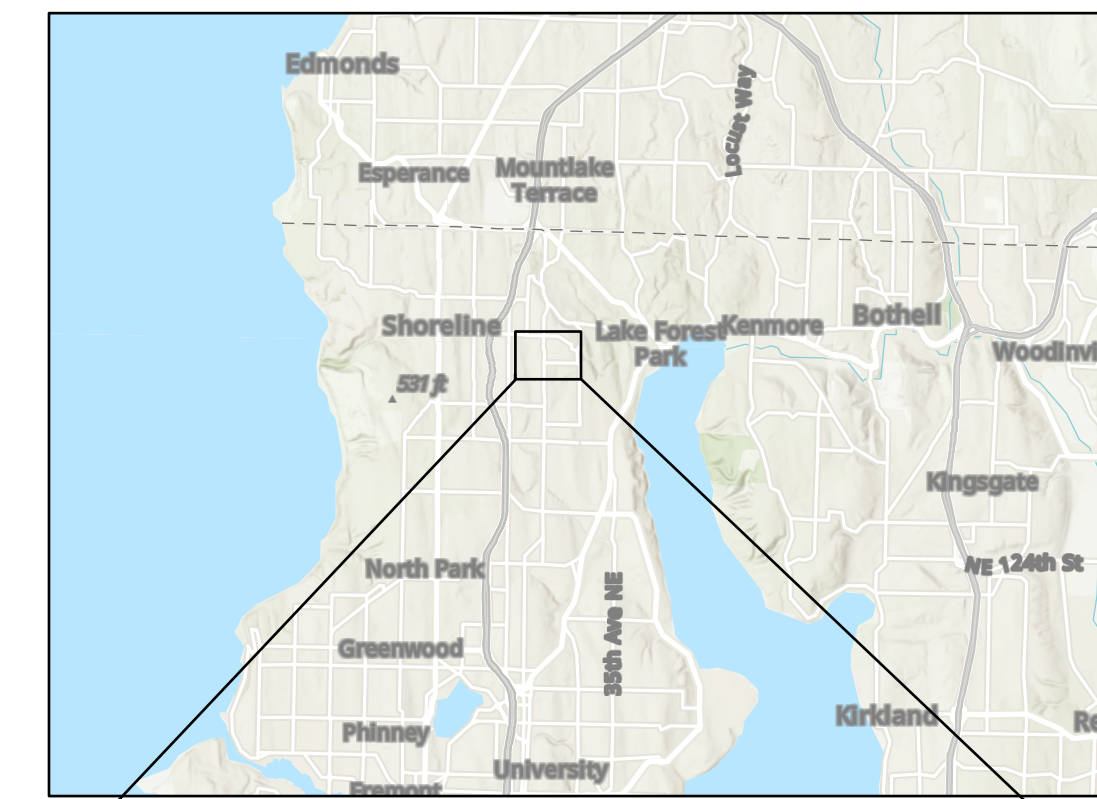
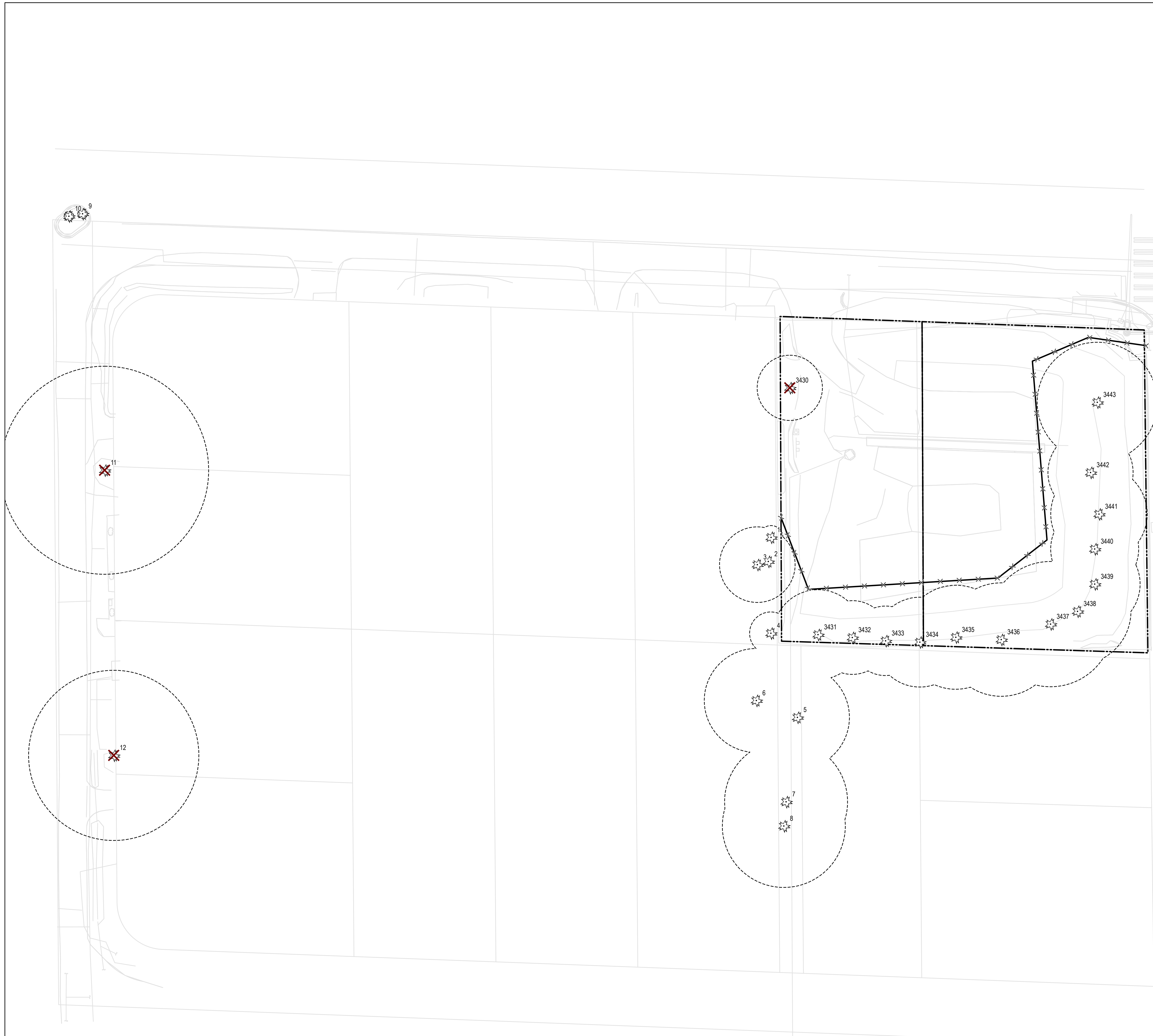
A handwritten signature in blue ink that reads "Lars Freeman-Wood". The signature is written in a cursive style.

Lars Freeman-Wood
ISA Certified Arborist® WE-8769AU
Tree Risk Assessment Qualified (TRAQ)
ISA Certified Utility Specialist®

References

- American National Standard (ANSI) A300 (Part 5). 2019. Tree, Shrub, and Other Woody Plant Management Standard Practices (Management of Trees and Shrubs During Site Planning, Site Development, and Construction). Londonderry, NH: Tree Care Industry Association.
- Council of Tree & Landscape Appraisers (CTLA). 2020. Guide for Plant Appraisal: 10th Edition, Revised. Atlanta, GA: International Society of Arboriculture.
- Dunster, J. 2017. Tree Risk Assessment Manual, Second Edition. Champaign, IL: International Society of Arboriculture.

TAG #	TREE NAME	# STEMS	COMB DBH (IN)	HEIGHT (FT)	RADIUS (FT)	CONDITION	SIGNIFICANT	NOTES
3430	Thuja plicata (Western red cedar)	3	30.3	50	16	Good	Yes	Growing on rock wall
3431	Thuja plicata (Western red cedar)	1	19.0	50	14	Good	Yes	
3432	Thuja plicata (Western red cedar)	1	15.6	50	14	Good	Yes	Codominant at 5ft
3433	Thuja plicata (Western red cedar)	1	14.7	50	14	Good	Yes	
3434	Thuja plicata (Western red cedar)	1	19.0	50	14	Good	Yes	
3435	Thuja plicata (Western red cedar)	1	22.0	50	14	Good	Yes	
3436	Thuja plicata (Western red cedar)	1	24.0	50	14	Good	Yes	
3437	Thuja plicata (Western red cedar)	1	26.5	50	14	Good	Yes	
3438	Thuja plicata (Western red cedar)	1	22.6	50	14	Good	Yes	
3439	Thuja plicata (Western red cedar)	1	19.2	50	14	Good	Yes	
3440	Thuja plicata (Western red cedar)	1	18.6	50	14	Good	Yes	
3441	Thuja plicata (Western red cedar)	1	20.4	50	14	Good	Yes	
3442	Thuja plicata (Western red cedar)	1	18.0	50	14	Good	Yes	
3443	Thuja plicata (Western red cedar)	1	25.4	50	14	Good	Yes	
1	Prunus sp. (Cherry species)	3	10.5	25	9	Good	Yes	Off-site, attributes estimated
2	Ilex aquifolium (English holly)	5	10.4	20	6	Good	Yes	Off-site, attributes estimated
3	Thuja plicata (Western red cedar)	1	16.0	55	15	Good	Yes	Off-site, attributes estimated
4	Acer palmatum (Japanese maple)	3	12.9	25	20	Good	Yes	Off-site, attributes estimated
5	Thuja plicata (Western red cedar)	1	22.0	70	16	Good	Yes	Off-site, attributes estimated
6	Thuja plicata (Western red cedar)	1	22.0	70	16	Good	Yes	Off-site, attributes estimated
7	Tsuga heterophylla (Western hemlock)	1	26.0	80	16	Dead	Yes	Off-site, attributes estimated. Peeling bark, decay present
8	Tsuga heterophylla (Western hemlock)	1	26.0	80	16	Good	Yes	Off-site, attributes estimated
9	Pinus mugo (Mugo Pine)	1	2.0	6	2	Good	No	Off-site, attributes estimated
10	Pinus Mugo (Mugo Pine)	1	2.0	6	2	Good	No	Off-site, attributes estimated
11	Chamaecyparis lawsoniana (Lawson falsecypress)	1	44.0	60	12	Good	Yes	Off-site, attributes estimated
12	Pseudotsuga menziesii (Douglas-fir)	1	36.0	80	22	Good	Yes	Off-site, attributes estimated



VICINITY MAPS

LEGEND

- TREE TO RETAIN
- TREE TO REMOVE
- TREE PROTECTION FENCING (265 FT)
- CRITICAL ROOT ZONE
- SUBJECT PARCEL BOUNDARY

NOTES

1. CRITICAL ROOT ZONE DEFINED AS 1 IN. OF RADIUS FOR EVERY 1 IN. OF DIAMETER



PUMP STATION 30 TREE PROTECTION PLAN

PROJECT:
 NE 170TH ST & 15TH AVE NE
 SHORELINE, WA

PRINCIPLE: JKB
 PM: LF
 FIELDWORK: LF

DRAFTED BY: NB
 JOB NO.: 181216.11
 DATE: 05/09/2023

NO.	DESCRIPTION	DATE
1	DRAFT	05/09/2022

NOT FOR CONSTRUCTION

PERMIT LEVEL DESIGN

05/09/2023

TREE PROTECTION PLAN