SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

June 16, 2022

Ms. Jennifer Kindred
Seattle City Light
PO Box 34023
Seattle, Washington 98124-4023

SUBJECT: COST-BENEFIT ANALYSIS REPORT
North Substation Property
7500 8th Avenue Northeast, Seattle, Washington
Project Number: 1267-004-03

Dear Ms. Kindred:

SoundEarth Strategies, Inc. (SoundEarth) has prepared this letter report to present the findings of the cost-benefit analysis conducted for the North Substation Property, located at 7500 8th Avenue Northeast in Seattle, Washington (the Property; Figure 1). This report supplements SoundEarth's Interim Environmental Characterization Report dated August 24, 2017 (SoundEarth 2017a), and Supplemental Environmental Characterization Report and Remedial Work Plan dated December 5, 2017 (SoundEarth 2017b), and includes the following:

- A summary of the environmental conditions and soil sampling conducted to date at the Property
- An analysis of the costs associated with the remedial excavation of contaminated soil from impacted portions of the Property and adjoining rights-of-way (ROWs)
- An analysis of the costs and physical and administrative requirements of Seattle City Light (SCL) associated with the engineering controls that could be implemented to minimize the direct contact exposure risk associated with contaminated soil left in place beneath the Property

This report also provides SoundEarth's recommendations for addressing the contaminated soil, which are based on the evaluation of the costs and benefits of each remedial alternative.

BACKGROUND

The Property consists of a nearly rectangular tax parcel (King County Parcel No. 0525049003) that covers approximately 201,327 square feet (4.62 acres) of land. The Property is currently occupied by an active SCL substation. The Property is a large and well-established substation with prominent and valuable landscaping that has been carefully designed and maintained for decades by SCL landscaping professionals and vegetation management teams to fit the aesthetic of the neighborhood. The value of the landscaped environments surrounding the substation is widely recognized and provides tangible and intangible benefits, including but not limited to the monetary value of the vegetation, visual buffering between the substation and neighboring properties, and a high level of biodiversity and pollinator habitat. The results of the environmental characterization conducted at the Property indicate that dieldrin and lead are present in soil within the landscaped areas at concentrations exceeding Washington State Model Toxics Control Act (MTCA) cleanup levels. Given the loss of aesthetic and monetary value associated with the landscape removal required to implement a full remediation of the contaminated soil and the significant

restoration time frame involved in replacement of these mature landscaped environments, the results of the site characterization have prompted a detailed evaluation of the costs and benefits of various alternatives for addressing the contaminated soil. This evaluation has been conducted to develop a recommended remedial alternative that effectively minimizes the exposure risk to the public and SCL employees while maintaining the benefits and inherent value of the existing landscaped environments.

A Property plan is shown on Figure 2.

SUMMARY OF PREVIOUS INVESTIGATIONS AND PROPERTY CONDITIONS

SoundEarth previously conducted two soil investigations in landscaped areas around the substation, including on-Property areas and the sidewalk planter areas in the 8th Avenue Northeast and Northeast 75th Street ROWs in May and September 2017. These investigations are summarized in the following sections.

Near-Surface Soil Investigation (May 2017)

On May 18, 2017, SoundEarth conducted a near-surface soil investigation to assess the concentrations of metals, petroleum hydrocarbons, pesticides, and herbicides in 11 designated areas (Areas 1 through 11). The near-surface soil investigation consisted of collecting 33 soil samples at depths of 0 to 6 inches below ground surface (bgs) from each of the 11 areas (3 discrete samples per area) located along the western, southern, and southeastern Property boundaries, as shown on Figure 2.

Sample results indicated that at least one discrete soil sample collected from Areas 1 through 10 contained dieldrin at concentrations exceeding the applicable MTCA Method B cleanup level for direct contact. Concentrations of lead exceeding the MTCA Method A cleanup level for unrestricted land use were detected in soil samples collected from Area 2, located along the western Property boundary, and Areas 5 and 7, located along the southern Property boundary. Petroleum hydrocarbons, herbicides, other pesticides, and metals were not detected at concentrations exceeding applicable MTCA cleanup levels in any of the composite or discrete near-surface soil samples. Analytical results for dieldrin and lead for the soil samples collected during this investigation are presented on Figures 2 and 3, respectively.

Results of this investigation were presented in the Interim Environmental Characterization Report prepared by SoundEarth dated August 24, 2017 (SoundEarth 2017a).

Hand Auger Soil Investigation (September 2017)

On September 12, 2017, SoundEarth conducted a hand auger soil investigation to further assess the depth of dieldrin and lead contamination in sampling Areas 1 through 10 at the Property. The investigation consisted of advancing 11 hand auger borings to a maximum depth of 4 feet bgs, as shown on Figure 4.

In Areas 2, 3, 4, 6, and 10, located along the eastern and western Property boundaries, dieldrin concentrations did not exceed the MTCA Method B cleanup level for direct contact in any of the discrete hand auger samples collected at depths of 1 and 2 feet bgs, indicating that the impacts observed in these areas during near-surface soil sampling are limited to the upper 1 foot of soil. In Areas 1, 5, and 8, located along the northwestern and southern Property boundaries, dieldrin concentrations exceeding the cleanup level were detected in the samples collected at a depth of 1 to 1.5 feet bgs, but were not detected in the samples collected at a depth of 2 feet bgs, indicating that impacts in these areas are limited to the upper 2 feet of soil. The deepest dieldrin impacts appear to be present in Area 7, along the southwestern

Property boundary, where dieldrin concentrations exceeding the cleanup level extend to a depth of at least 2 feet bgs, but do not extend below 3 feet bgs.

The depth of dieldrin impacts in Area 9, located at the southeastern corner of the Property, could not be fully evaluated due to tree roots and rocky conditions encountered at a depth of 1 foot bgs in the attempted hand auger borings. Based on the concentration of 1,200 micrograms per kilogram (µg/kg) detected in the sample collected at a depth of 1 foot bgs in this area, which was the highest dieldrin concentration detected during the hand auger investigation, it is likely that dieldrin impacts extend to a greater depth in this area.

Lead impacts in soil at the Property appear to be more limited in extent. In Areas 2 and 5, where lead concentrations exceeding the MTCA Method A cleanup level for unrestricted land use were detected in near-surface soil samples, lead concentrations did not exceed the cleanup level in the samples collected from 1 foot bgs, indicating that lead impacts in these areas are limited to the upper 1 foot of soil. In the eastern portion of Area 7, lead concentrations exceeding the cleanup level extended to a maximum depth of 1.5 feet bgs, indicating that lead impacts in this area are limited to the upper 2 feet of soil. Analytical results for dieldrin and lead for the soil samples collected during this investigation are also presented on Figure 4.

Results of this investigation were presented in the Supplemental Environmental Characterization Report and Remedial Work Plan prepared by SoundEarth dated December 5, 2017 (SoundEarth 2017b).

TREE INVENTORY AND APPRAISAL SUMMARY

SoundEarth subcontracted with Urban Forestry Services | Bartlett Consulting (Bartlett) of Mount Vernon, Washington, to conduct a tree and landscape appraisal at the Property. The trees and landscaped plants in Areas 1 through 11 were inventoried in July 2021 by an International Society of Arboriculture Certified Master Arborist. Bartlett provided a landscape value using the Council of Tree and Landscape Appraisers' *Trunk Formula Technique and the Replacement Method in the Guide for Plant Appraisal, 10th Edition* dated October 2020.

Based on Bartlett's assessment, much of the landscaping is over 40 years old and consists of large hydrangeas, Japanese maples, and a diverse and unique palate of shrub and groundcover species that provide the benefit of visual softening and buffering between the substation and neighboring properties. The plants and garden beds were observed to be in good overall condition; however, vegetation in some areas exhibited visible herbicide damage or irrigation issues that were impacting tree and plant health. Although impacts visible in some areas were noted as potential herbicide damage, the results of the environmental site characterization conducted by SoundEarth did not indicate the presence of elevated levels of herbicides in soil. Bartlett observed that some areas are likely to have thick mats of fibrous roots beneath the tree canopy due to close tree placement and trees that are growing in root-restricted landscapes. These conditions have the potential to impact the success of tree retention during soil removal. Bartlett also observed that some areas, particularly near the southeastern corner of the Property, contain large, very mature trees and shrubs, including Japanese maples, camelias, and large hydrangeas, that would take multiple decades to replace if removed during soil excavation.

Bartlett concluded that many of the trees and shrubs throughout the landscaped areas are in good condition and would not be recommended for removal if not for the proposed excavation of soil in these areas. In particular, 11 of the 34 trees at the Property were deemed to be in good health and structure

and were determined to provide excellent landscape benefits. These trees and the value they provide, would take many decades to replace if removed and, therefore, are recommended as a high priority for protection. The 11 trees recommended for retainment are located along the southern and eastern Property boundaries in Areas 6, 7, 8, 9, and 10, and include high-value Japanese maples, devil's walking stick, catalpa, and *Eucryphia cordifolia*. The tree identified as high priority in Area 6 is not located within a planned excavation area; however, Bartlett indicated that the roots of this tree would be impacted by excavation activities in other portions of Area 6 and in Area 7. Although the other trees and shrubs in these areas were not designated by Bartlett as high priority for protection, their removal, and the associated soil excavation to depths between 12 and 36 inches in these areas, would likely present difficulties related to high-priority tree preservation. Additionally, contaminated soil would need to remain in place within the critical root zones of these trees in most cases.

The total appraised value of the trees and shrubs at the Property was determined by Bartlett to be $71,139, which comprises a value of $54,095 for trees and a value of $17,044 for shrubs and groundcover. These costs represent the replacement value of the trees, shrubs, and groundcover vegetation for all evaluated landscaped areas as determined by Bartlett; taking into account the size, health, and structure of each tree, as well as the landscape benefits each tree provides. As this appraised value does not account for the labor and other costs associated with replacing or repairing these landscapes, this appraisal underrepresents the true cost associated with the removal and replacement of the landscapes at the Property.

To account for the costs of the replacement and repair of the landscaped areas that are not reflected in Bartlett's appraised value above, SoundEarth has also estimated the additional costs associated with the planting labor ($175 per tree, assuming that 2-inch-caliper trees are planted) and tree establishment watering ($300 per tree) for the replacement trees planted at the Property, based on recent costing provided by SCL arborists. These costs are included in the cost evaluation for each of the remedial alternatives presented subsequently in this letter report.

Additional detail regarding Bartlett's methodologies for the inventory and appraisal, field observations, individual tree and shrub conditions and values, and recommendations can be found in the Tree and Landscape Appraisal report that is provided as Attachment A.

ENVIRONMENTAL FATE AND TRANSPORT

The contaminants of concern (COCs) at the Property include dieldrin and lead. Based on observed patterns in soil, dieldrin is thought to derive from the former application of pesticides and/or fertilizers for vegetation management on the Property and in the landscaping strips of the adjacent ROWs. Presumed repeated application over time may have led to dieldrin accumulating in the uppermost soil horizon. Soil impacts from lead are thought to be the result of historical surface water runoff from substation equipment and fencing to the landscaped areas surrounding the Property.

The principal contaminant fate and transport mechanism for dieldrin and lead in soil at the Property is adsorption. Because both contaminants have a strong capacity for adsorption to soil and low aqueous solubility, downward leaching of dieldrin and lead through most soil profiles is typically limited to near-surface soil (i.e., low risk of affecting groundwater quality). Because of their chemical composition, dieldrin and lead are generally persistent in the environment and degrade relatively slowly over time.

EXPOSURE PATHWAYS

Based on contaminant fate and transport mechanisms for dieldrin and lead, the environmental media of concern at the Property is limited to near-surface soils. Potential receptors at risk from exposure associated with the presence of dieldrin and lead in soil at the Property are human and ecological receptors. The potential human receptors include SCL substation employees, landscape maintenance/utility workers, environmental field personnel, construction workers, and pedestrians passing by the Property. The potential exposure pathways include dermal contact and ingestion (direct contact) with contaminated soil and inhalation of airborne soil.

Dermal Contact and Ingestion (Direct Contact) of Contaminated Soil

The dermal contact pathway of exposure may occur if a receptor disturbs or otherwise comes into direct contact with contaminated soil, leading to the potential absorption of contaminants into the body through the skin. The exposure pathway for direct contact of contaminated soil may be complete for SCL substation employees, landscape maintenance/utility workers, environmental field personnel and construction workers during remedial work, and pedestrians passing the Property if they were to enter areas where contaminated soil is present and come into contact with contaminated soil.

Inhalation of Airborne Soil

The exposure pathway for inhalation of airborne soil particles during excavation and construction activities on the Property is considered complete for potential receptors including environmental field personnel and construction and utility workers.

Other exposure pathways, including leaching to groundwater, groundwater dermal contact and ingestion, and vapor inhalation, are considered incomplete for the Property based on the available data and the fate and transport characteristics of the applicable COCs.

REMEDIAL ACTION OBJECTIVES

The primary remedial action objective (RAO) for the Property is to mitigate/eliminate potential exposure pathways for human receptors, including direct contact and inhalation of airborne soil. This RAO can be met either through remedial excavation of contaminated soil or use of engineering controls. The use of engineering controls would achieve this RAO by effectively limiting access to areas where contaminated soil is present and limiting exposure to contaminants once access to these areas is gained, thereby minimizing the potential exposure pathways. The secondary RAO is to maintain existing landscaping features to the extent feasible given the maturity of the existing landscapes and their inherent value.

Under MTCA, the use of engineering controls as a remedial alternative is permitted for sites or portions of sites that contain relatively low levels of hazardous substances and where full removal of contamination is impractical (Section 370 of Chapter 173-340 of the Washington Administrative Code). At sites with elevated concentrations of contaminants such as pesticides and metals, similar to those present at the Property, a commonly used remedial action is the placement of containment caps over contaminated soil to eliminate the direct contact and inhalation of airborne soil exposure pathways for potential receptors. Containment caps can consist of hard materials such as concrete or asphalt or soft materials such as clean soil, gravel, grass, or mulch, which must be maintained over time to ensure that the cap remains protective of human health and the environment. The Washington State Department of Ecology (Ecology) has effectively used the containment cap remedial approach at numerous sites throughout Washington State,

including at more than 90 parks and play areas with elevated concentrations of metals in near-surface soil. At these sites, contaminated soil has been capped in place with wood chips or gravel and/or signs have been placed to notify the public of the soil conditions. Ecology also regularly approves the use of hard or soft containment capping as a remedial action at large properties, such as former orchards, where the full removal of soil contaminated with metals and/or pesticides is either cost-prohibitive or infeasible due to site conditions.

COST-BENEFIT ANALYSIS

A cost-benefit analysis was performed to compare two remedial alternatives (remedial excavation versus engineering controls with partial remedial excavation) and to evaluate their relative feasibility and cost-effectiveness for implementation at the Property given current and future Property conditions and considering future physical, administrative, and other obligations related to the engineering controls. Each of the evaluated remedial alternatives is described in the following sections.

Remedial Excavation Alternative

This alternative includes the full excavation and disposal of dieldrin- and lead-contaminated soil to depths ranging from 12 to 36 inches bgs in all impacted areas of the Property and adjoining ROWs, which would include Areas 1 through 10. This alternative also includes restoring the disturbed areas to match existing grade and replace existing landscaping conditions to the extent practicable. Figure 5 provides an illustration of the conceptual implementation of this alternative, including the extent of proposed excavations. The key assumptions for this alternative include the following:

- A street use permit and a Utility Major Permit would be obtained from the Seattle Department of Transportation (SDOT) to allow for excavation of areas located in the ROW. An Urban Forestry Permit is also required for removal of trees in the ROW.
- Temporary security fencing would be installed around the Property.
- Traffic control measures would be implemented in accordance with a traffic control plan approved by SDOT.
- Temporary sediment and erosion control measures would be installed and maintained for the duration of the project. Dust control measures would also be implemented during soil disturbing activities.
- The majority of the vegetation would be removed from the remedial excavation areas during excavation activities to allow for full removal of contaminated soil. Based on Bartlett's tree protection recommendations, a Vactor truck may be used to remove soil within the critical root zones of high-priority trees in areas where only 12 inches of soil removal is required. This method is recommended for use only during high humidity weather conditions but is not recommended under saturated soil conditions. This method is also recommended for use only during the dormant season of the applicable trees. Therefore, an effort would be made to preserve the trees designated as high priority for protection in applicable Areas 6A and 10, if weather and soil saturation conditions allow. An effort would also be made to preserve trees that are located outside the areas designated for excavation to the extent possible depending on tree and root structure. In areas where greater than 12 inches of soil removal is required, it would not be possible to preserve the vegetation without leaving contaminated soil in place in the critical root zone. Therefore, all trees in these areas would be removed.

- Dieldrin- and lead-contaminated soil would be excavated to depths between 12 and 36 inches bgs, depending on the remedial area (see Table 1). In locations where trees and shrubs would not be preserved, soil would be removed using an excavator unless the area is not accessible for this equipment. In Areas 6A and 10, where an effort would be made to preserve high-priority trees if weather and soil saturation conditions allow, and in areas that are inaccessible for an excavator, an air knife and vacuum truck would be used to remove soil. The total amount of contaminated soil to be removed during this remediation work is estimated at approximately 1,000 cubic yards.
- Dieldrin- and lead-contaminated soil would be transported and disposed as a non-hazardous waste at a licensed Resource Conservation and Recovery Act (RCRA) Subtitle D landfill facility.
- Performance and confirmation soil sampling and laboratory analysis for dieldrin and lead would be performed to determine compliance with soil cleanup standards.
- Excavation areas would be backfilled with imported clean fill material to match existing grade, and the landscaping within each excavated area would be restored with similar vegetation to that which was removed. According to the City of Seattle Director's Rule regarding tree replacement requirements, two trees are required to be planted for every one tree removed. Therefore, this alternative assumes that 62 trees will be planted to replace the 31 trees that are removed from the Property. The additional 31 trees may be planted at the Property or at other City of Seattle properties.

The estimated cost to implement this alternative is presented in Table 2. The estimated present worth cost of this alternative is $673,000. This cost includes Bartlett's appraised replacement cost for the existing vegetation throughout the remedial excavation areas, with the exception of the costs associated with the three high-priority trees that would be retained (if possible) in Areas 6 and 10 (total appraised cost of $64,381). This also includes the additional costs associated with the purchase of the 31 required additional trees and the planting and establishment watering of all 61 trees ($49,910).

Engineering Controls with Partial Remedial Excavation Alternative

This alternative includes the establishment of engineering controls to prevent direct contact with and manage dieldrin- and lead-contaminated soils that would be left in place on the Property, but would include removal of contaminated soil from all impacted ROW areas, as well as from on-Property areas with low-value or minimal vegetation. The majority of the impacted areas at the Property are heavily vegetated with mature trees, shrubs, and groundcover vegetation, which have a high monetary and aesthetic value. To maintain the benefits provided by these landscaped areas, some of which would take decades to replace if removed, the existing landscaping in Areas 6A and 7 through 10 (Figure 6) would be maintained. These areas are generally characterized by a high density of shrubs and groundcover vegetation, which physically limit contact with soil and thereby present a relatively low risk of direct contact exposure to contaminated soils. Portions of these areas that are currently void of vegetation would be supplemented with new plantings and/or covered with a minimum of 6 inches of mulch, which would physically minimize the exposure risk for human and ecological receptors that may be present in these areas. A perimeter fence would also be installed along the Property boundary in these areas to prevent access to contaminated soils.

Contaminated soil is also present in Areas 1 through 5, located in the ROW landscaping strips along the western and southern Property boundaries, and in Area 6B, located near the southwestern Property corner. These areas are characterized by minimal vegetation, with the exception of grass and eight

Japanese maple trees that provide relatively few benefits to the Property and neighboring properties and that can be easily and cost-effectively replaced. Due to the ROW location of the majority of these areas and the limited amount of vegetation that is present, the greater accessibility of these areas presents a higher risk of direct contact exposure to human receptors. However, because all of these areas are fully covered by grass, current conditions do not present a risk of direct contact or inhalation exposure unless ground disturbance were to occur. As the removal of the existing vegetation from these areas does not result in a significant loss of benefits from a monetary or aesthetic perspective, this alternative assumes the full excavation of contaminated soil from these areas.

Figure 6 provides an illustration of the conceptual implementation of this alternative, including the extents of areas to be maintained or excavated and the proposed fencing alignments. The key assumptions for this alternative include the following:

- A street use and grading permit and a Utility Major Permit would be obtained from SDOT. An Urban Forestry Permit is also required for removal of the Japanese maple trees located in Areas 1 through 4 in the ROW.
- Temporary security fencing would be installed around the portions of the Property where remedial excavation will be conducted.
- Traffic control measures would be implemented in accordance with a traffic control plan approved by SDOT.
- Temporary sediment and erosion control measures would be installed and maintained for the duration of the project. Dust control measures would also be implemented during soil disturbing activities associated with excavation and the installation of fencing.
- The eight Japanese maple trees located in Areas 1 through 4 would be removed.
- Dieldrin- and lead-contaminated soil would be removed using an excavator to a depth of 12 inches bgs in Areas 2, 3, 4, and 6B, and to a depth of 24 inches bgs in Areas 1 and 5. Soil in the vicinity of the critical root zone of the trees at the southern end of Area 6 would be removed using a Vactor truck. The total amount of contaminated soil removed during this remediation work is estimated at approximately 300 cubic yards.
- Dieldrin- and lead-contaminated soil would be transported and disposed as a non-hazardous waste at a licensed RCRA Subtitle D landfill facility.
- Performance and confirmation soil sampling and laboratory analysis for dieldrin and lead would be performed in the areas where excavation is conducted to determine compliance with soil cleanup standards.
- Areas 1 through 5 and 6B would be backfilled with imported clean fill to match existing grade and restored with grass, as well as similar trees in Areas 1 through 4. According to the City of Seattle Director's Rule regarding tree replacement requirements, two trees are required to be planted for every one tree removed. Therefore, this alternative assumes that 16 trees will be planted to replace the eight trees that are removed from Areas 1 through 4. The additional eight trees may be planted at the Property or at other City of Seattle properties.
- The portions of Areas 6A and 7 through 10 that are currently void of vegetation would be supplemented with additional groundcover plantings and/or covered with a minimum of 6 inches

of mulch to minimize the exposure risk for human and ecological receptors that may be present in these areas. Existing vegetation in these areas would be maintained in its current condition.

- A low-profile decorative fence would be installed along portions of the eastern, western, and southern Property boundaries where contaminated soil would remain in place to discourage human receptors from accessing these areas.
- Signage would be affixed to the fencing to provide warning/notification of the known environmental conditions.
- The landscaping and supplemental groundcover vegetation and/or mulch would be inspected on an annual basis to evaluate the condition of trees, shrubs, and groundcover and to verify that a minimum thickness of 6 inches of mulch is present in any areas void of vegetation. Routine landscape maintenance would be performed; maintenance would include, but not be limited to, mowing, pruning, fertilizing, replanting, and placement of mulch. The condition of the fencing installed around areas of the Property where contaminated soil remains in place would also be inspected on an annual basis. Estimated costs for this alternative include maintenance and inspection costs for 20 years.

The estimated cost to implement this alternative is presented in Table 3. The estimated present worth cost of this alternative is $290,000. Approximately $159,000 of this total cost is associated with the excavation of contaminated soils and restoration of Areas 1 through 5 and 6B. This cost includes the additional costs associated with the purchase of the 8 required additional trees and the planting and establishment watering of all 16 trees ($12,880). The remaining $131,000 is associated with the implementation and long-term monitoring of engineering controls.

COST-BENEFIT ANALYSIS CONCLUSIONS AND RECOMMENDATIONS

The capital and long-term costs to implement the remedial excavation and engineering controls alternatives are estimated at $673,000 and $290,000, respectively. For each alternative, it is intended for contaminated soil to be removed from Areas 1 through 5, resulting in the removal of all contamination in the city ROW and the removal of associated off-Property exposure risks. For the engineering controls alternative, long-term costs have been assigned for annual landscape and fencing inspections and maintenance for 20 years.

The cost for the full removal of contaminated soils from all impacted areas of the Property and adjoining ROWs (i.e., the most permanent alternative) is more than double the cost for implementation of engineering controls, including those costs associated with the removal of soil from Areas 1 through 5 and 6B. The estimated cost for full removal of contaminated soil and landscaping restoration includes the appraised replacement cost of the trees, shrubs, and groundcover vegetation. Additionally, because the appraised value does not consider the costs of labor and other costs that may be associated with the reparation of the damaged landscapes following excavation activities, additional estimated costs associated with the planting and establishment watering of the replacement trees have also been included to more accurately reflect the true costs associated with the removal of this vegetation. In addition to the monetary value of the vegetation at the Property, the trees and shrubs are generally in good condition and would not be recommended for removal or replacement but for the proposed excavation activities. This vegetation provides significant unquantifiable benefits in terms of visual softening and buffering between the neighboring properties and substation equipment, as well as a high

level of biodiversity and pollinator habitat. Additionally, the majority of the landscaped areas are very mature and some of the trees and the values they provide would take decades to restore if removed.

While the full removal of contaminated soil from the Property provides the benefit of permanently eliminating the direct contact exposure pathway for receptors, the engineering controls with partial remedial excavation alternative significantly reduces the exposure risk through the implementation of engineering controls that would effectively limit access to areas where contaminated soil is present or break the applicable exposure pathways. This alternative also includes the removal of contaminated soil in higher risk ROW areas where contaminated soil is more accessible to human receptors and where the monetary and aesthetic benefits of the existing vegetation are minimal. The majority of the areas where contaminated soil would remain in place are densely vegetated and, upon implementation and proper management of the proposed engineering controls, present a low risk of exposure. Areas that are not currently densely vegetated would be supplemented with additional groundcover vegetation and/or mulch to minimize the potential exposure risk to human and ecological receptors as part of the institution and engineering control implementation. This alternative would allow for the vast majority of the existing vegetation, including all of the trees identified by Bartlett as high priority for protection, and for the value they provide to be maintained.

Based on the cost-benefit analysis, the added cost to implement a full remedial excavation alternative, including the removal and replacement of existing landscaping features, is disproportionate to the benefits of implementing engineering controls to prevent direct contact with the remaining impacted soils located on Property, which allows for the preservation of the valuable landscapes currently present at the Property. SoundEarth recommends the implementation of the engineering controls with partial remedial excavation alternative as described above. This alternative provides the following benefits as compared to the full remedial excavation alternative:

- The engineering controls with partial remedial excavation alternative effectively addresses the direct contact exposure risk to potential receptors at the Property through the use of a soft containment cap, which is a widely used alternative for sites with similar contaminant levels as those at the Property and similarly low levels of risk to human health and the environment associated with leaving the contaminated soil in place.
- This alternative allows for the well-established landscaped areas to remain in place and maintains the quantifiable and unquantifiable benefits of the existing landscaping, including visual softening and buffering between the neighboring properties and substation equipment and a high level of biodiversity and pollinator habitat.
- This alternative provides an effective solution to mitigate or eliminate the exposure pathways to potential receptors without the high cost and significant loss of landscaping value associated with the full removal of contaminated soil. Although the landscaping can be replaced, restoration of these areas to their current mature state would take multiple decades to achieve.

SEATTLE CITY LIGHT OBLIGATIONS

SCL's long-term physical and administrative obligations associated with the implementation of engineering controls to address remaining soil contamination at the Property would include the following:

- Periodic inspections and maintenance of the landscaping features, including groundcover vegetation and mulch, as well as the installed perimeter fencing and signage that would be required to ensure that Property conditions remain protective of workers and pedestrians at the

Property. A Long-Term Monitoring Plan would be prepared to specify inspection and maintenance activities and associated documentation requirements for maintaining landscaping features, fencing, and signage.

- Future uses of the Property would be limited to activities that do not result in a release of or create a new exposure to the residual contamination remaining on the Property.
- Health and safety documentation would be updated to present the known physical, chemical, and biological hazards; hazard monitoring protocols; and administrative and engineering controls required to mitigate the identified hazards.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with SoundEarth's agreement with the client. This report is solely for the use and information of SoundEarth's client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report are derived, in part, from data gathered by others, and from conditions evaluated when services were performed, and are intended only for the client, purposes, locations, time frames, and project parameters indicated. SoundEarth does not warrant and is not responsible for the accuracy or validity of work performed by others, or for the impacts of changes in environmental standards, practices, or regulations subsequent to performance of services. SoundEarth does not warrant the use of segregated portions of this report.

CLOSING

SoundEarth appreciates the opportunity to provide technical services for this project. Please contact any of the undersigned at 206-306-1900 with questions.

Respectfully,

SoundEarth Strategies, Inc.

Levi Fernandes, PE
Senior Environmental Engineer

Clare Tochilin, LG
Associate Geologist

Ryan Boxby, LG
Managing Principal

Attachments: Figure 1, Property Location Map
Figure 2, Soil Sub-Sample Analytical Results for Dieldrin
Figure 3, Soil Sub-Sample Analytical Results for Lead
Figure 4, Hand Auger Soil Sample Analytical Results for Dieldrin and Lead

Figure 5, Remedial Excavation Alternative
Figure 6, Engineering Controls Alternative
Table 1, Remedial Alternative Summary
Table 2, Remedial Excavation and Disposal Alternative Cost Estimate
Table 3, Engineering Controls with Partial Remedial Excavation Alternative Cost Estimate
Attachment A, Tree and Landscape Appraisal Report

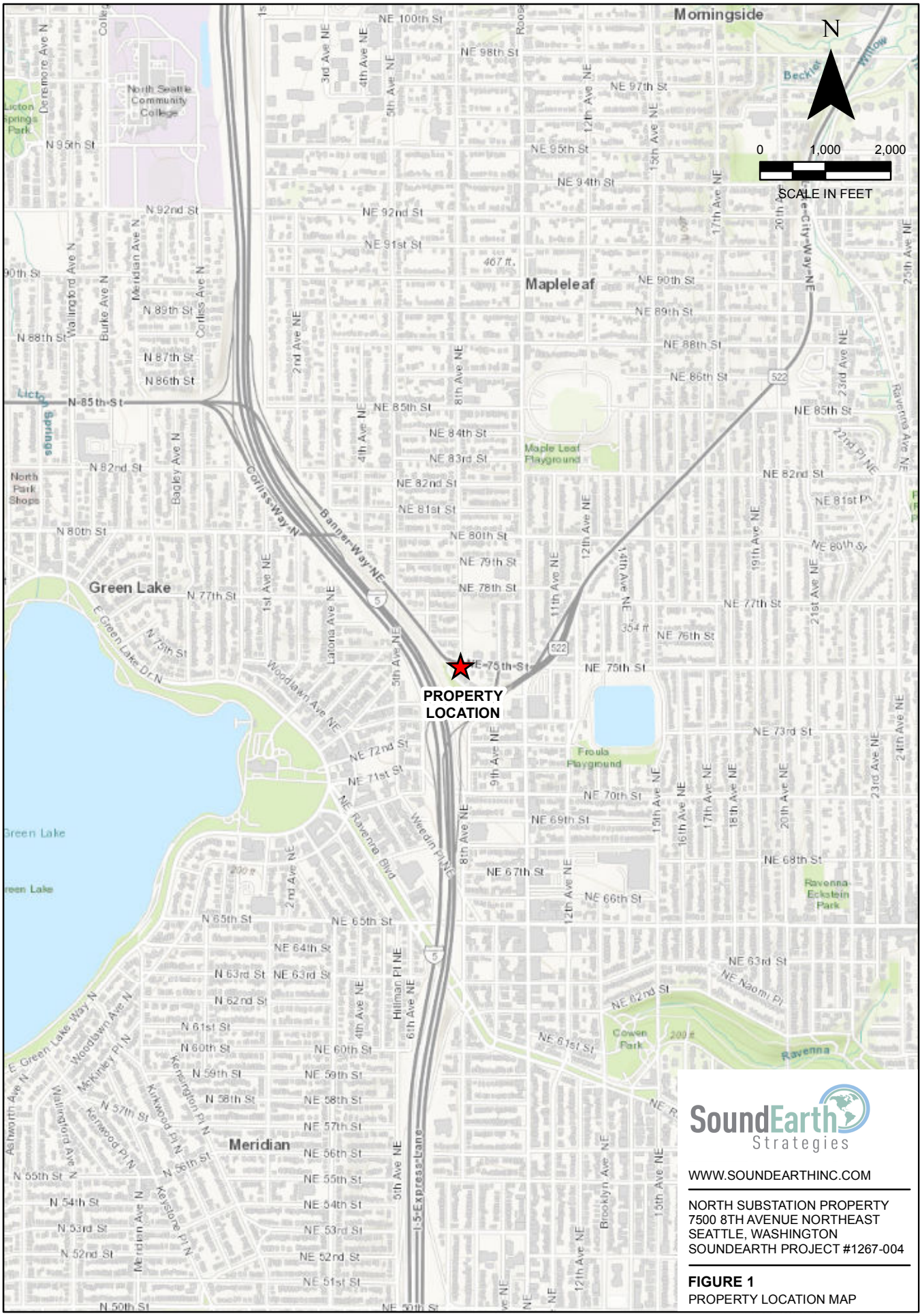
CJT/RKB:kgw

REFERENCES

SoundEarth Strategies, Inc. (SoundEarth). 2017a. Letter regarding Interim Environmental Characterization Report, North Substation Property Vegetation/Landscape Investigation, 7500 8th Avenue Northeast, Seattle, Washington. From Clare Tochilin and Rob Roberts. To Shannon Straws, Seattle City Light. August 24.

_____. 2017b. Letter regarding Supplemental Environmental Characterization Report and Remedial Work Plan, North Substation Property Vegetation/Landscape Investigation, 7500 8th Avenue Northeast, Seattle, Washington. From Clare Tochilin and Rob Roberts. To Shannon Straws, Seattle City Light. December 5.

FIGURES



SoundEarth Strategies

WWW.SOUNDEARTHINC.COM

NORTH SUBSTATION PROPERTY
7500 8TH AVENUE NORTHEAST
SEATTLE, WASHINGTON
SOUNDEARTH PROJECT #1267-004

FIGURE 1
PROPERTY LOCATION MAP

10/22/2021

P:\1267 SEATTLE CITY LIGHT\1267-004 NORTH SUBSTATION\TECHNICAL\CAD\2021\# - COST BENEFIT ANALYSIS\1267-004_2021_DL.DWG

9TH AVENUE NORTHEAST

NORTHEAST 78TH STREET

NORTHEAST 75TH STREET

8TH AVENUE NORTHEAST

SEATTLE CITY LIGHT NORTH SUBSTATION

N

0 30 60

APPROXIMATE SCALE IN FEET

AREA 10: SS3 110, SS2 240, SS1 <21

AREA 9: SS2 2,200, SS3 160, SS1 <16

AREA 8: SS3 160, SS3 60, SS2 150, SS1 50, SS2 1,300, SS3 18

AREA 5

AREA 7: SS2 100, SS1 190, SS1 <15

AREA 6: SS1 63, SS2 380, SS3 51

AREA 11: SS1 <14

AREA 1: SS1 44, SS2 56, SS3 100

AREA 2: SS1 60, SS2 140, SS3 110

AREA 3: SS1 490, SS2 420, SS3 360

AREA 4: SS1 76, SS2 180, SS3 81

SS2 53, SS3 24

LEGEND

- DISCRETE SUB-SAMPLE LOCATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SS3 — SAMPLE ID
- 160 — DIELDRIN RESULT (µg/kg)
- DENOTES CONCENTRATION EXCEEDS MTCA METHOD B CLEANUP LEVEL
- SAMPLE AREA
- µg/kg — MICROGRAMS PER KILOGRAM
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT

	Dieldrin (µg/kg)
MTCA Method B Cleanup Level	62.5

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SEATTLE, WASHINGTON
SOUNDEARTH PROJECT #1267-004

FIGURE 2

SOIL SUB-SAMPLE ANALYTICAL RESULTS FOR DIELDRIN

10/22/2021

P:\1267 SEATTLE CITY LIGHT\1267-004 NORTH SUBSTATION\TECHNICAL\CAD\2021\# - COST BENEFIT ANALYSIS\1267-004_2021_LEAD.DWG

9TH AVENUE NORTHEAST

NORTHEAST 78TH STREET

NORTHEAST 75TH STREET

8TH AVENUE NORTHEAST

SEATTLE CITY LIGHT NORTH SUBSTATION

N

0 30 60

APPROXIMATE SCALE IN FEET

AREA 10: SS3, SS2, SS1

AREA 9: SS3, SS2, SS1

AREA 8: SS3 54, SS2 110, SS1 120

AREA 5: SS3 60, SS2 310, SS3 270

AREA 7: SS2 78, SS1 52

AREA 6: SS1 210, SS1, SS2, SS3

AREA 11: SS1, SS2, SS3

AREA 1: SS1, SS2, SS3

AREA 2: SS1 51, SS2 280, SS3 100

AREA 3: SS1 110, SS2 72, SS3 75

AREA 4: SS1, SS2, SS3

LEGEND

- DISCRETE SUB-SAMPLE LOCATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SS3 — SAMPLE ID
- 54 — LEAD RESULT (mg/kg)
- DENOTES CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL
- SAMPLE AREA
- mg/kg — MILLIGRAMS PER KILOGRAM
- MTCA — WASHINGTON STATE MODEL TOXICS CONTROL ACT

	Lead (mg/kg)
MTCA Method A Cleanup Level	250

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FIGURE 3
SOIL SUB-SAMPLE ANALYTICAL RESULTS FOR LEAD

10/22/2021

P:\1267 SEATTLE CITY LIGHT\1267-004 NORTH SUBSTATION\TECHNICAL\CAD\2021\# - COST BENEFIT ANALYSIS\1267-004_2021_SD.DWG

9TH AVENUE NORTHEAST

SEATTLE CITY LIGHT NORTH SUBSTATION

8TH AVENUE NORTHEAST

NORTHEAST 75TH STREET

N

0 30 60

APPROXIMATE SCALE IN FEET

AREA 10

Area	Depth (feet bgs)	Dieldrin (µg/kg)
10	1	29
	2	<13

AREA 9

Area	Depth (feet bgs)	Dieldrin (µg/kg)
9	1	**1,200**

AREA 8

Area	Depth (feet bgs)	Dieldrin (µg/kg)
8	1	**78**
	2	<11

Area	Depth (feet bgs)	Lead (mg/kg)
7 (HA2)	1	**950**
	1.5	**270**
	2	100

Area	Depth (feet bgs)	Dieldrin (µg/kg)
7 (HA1)	1	**87**
	2	**110**
	3	<13
	4	16

AREA 7

Area	Depth (feet bgs)	Dieldrin (µg/kg)
6	1	16
	2	<12

AREA 6

Area	Depth (feet bgs)	Dieldrin (µg/kg)	Lead (mg/kg)
5	1	**270**	76
	2	38	--

AREA 5

AREA 11

AREA 1

Area	Depth (feet bgs)	Dieldrin (µg/kg)
1	1	**81**
	2	45

AREA 2

Area	Depth (feet bgs)	Dieldrin (µg/kg)	Lead (mg/kg)
2	1	22	60
	2	<11	--

AREA 3

Area	Depth (feet bgs)	Dieldrin (µg/kg)
3	1	<10
	2	<10

AREA 4

Area	Depth (feet bgs)	Dieldrin (µg/kg)
4	1	<10
	2	<11

	Dieldrin (µg/kg)	Lead (mg/kg)
MTCA Cleanup Level	**62.5**	**250**

LEGEND

⊕	HAND AUGER BORING
✱	DISCRETE SUB-SAMPLE LOCATION
	PROPERTY BOUNDARY
	PARCEL BOUNDARY
	SAMPLE AREA
mg/kg	MILLIGRAMS PER KILOGRAM
µg/kg	MICROGRAMS PER KILOGRAM
BGS	BELOW GROUND SURFACE
RED	DENOTES CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVELS FOR SOIL
MTCA	WASHINGTON STATE MODEL TOXICS CONTROL ACT

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FIGURE 4
HAND AUGER SOIL SAMPLE ANALYTICAL RESULTS FOR DIELDRIN AND LEAD

11/1/2021

P:\1267 SEATTLE CITY LIGHT\1267-004 NORTH SUBSTATION\TECHNICAL\CAD\2021\# - COST BENEFIT ANALYSIS\1267-004_2021_EXCA.DWG

9TH AVENUE NORTHEAST

DRIVEWAY

AREA 10

AREA 9

SS3

HA1

SS1

SS2

PAVED STAIRWAY

DRIVEWAY

SS1

SS3

HA1

SS2

AREA 8

SS1

SS3

HA1

SS2

NORTHEAST 75TH STREET

PAVED WALKWAY

AREA 7A

SS3

HA2

AREA 5

AREA 7B

SS2

HA1

SS1

SS1

AREA 6A

SS1

SS2

HA1

SS3

SEATTLE CITY LIGHT NORTH SUBSTATION

AREA 11

SS1

SS2

SS3

HA1

AREA 1

AREA 2

AREA 3

AREA 4

AREA 6B

8TH AVENUE NORTHEAST

N

0 30 60

APPROXIMATE SCALE IN FEET

LEGEND

- HAND AUGER BORING
- DISCRETE SUB-SAMPLE LOCATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SAMPLING AREA OUTLINE
- AREA TO BE EXCAVATED TO A DEPTH OF 12 INCHES BGS
- AREA TO BE EXCAVATED TO A DEPTH OF 24 INCHES BGS
- AREA TO BE EXCAVATED TO A DEPTH OF 36 INCHES BGS

BGS BELOW GROUND SURFACE

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SOUNDEARTH PROJECT #1267-004

FIGURE 5
REMEDIAL EXCAVATION ALTERNATIVE

11/1/2021

P:\1267 SEATTLE CITY LIGHT\1267-004 NORTH SUBSTATION\TECHNICAL\CAD\2021\#- COST BENEFIT ANALYSIS\1267-004_2021_IECA.DWG

9TH AVENUE NORTHEAST

SEATTLE CITY LIGHT NORTH SUBSTATION

8TH AVENUE NORTHEAST

NORTHEAST 75TH STREET

N

0 30 60

APPROXIMATE SCALE IN FEET

DRIVEWAY

AREA 10

AREA 9

PAVED STAIRWAY

DRIVEWAY

AREA 8

PAVED WALKWAY

AREA 7A

AREA 7B

AREA 6A

AREA 5

REMOVE 4 JAPANESE MAPLE TREES

REMOVE 1 JAPANESE MAPLE TREE

REMOVE 3 JAPANESE MAPLE TREES

AREA 11

AREA 1

AREA 2

AREA 3

AREA 4

AREA 6B

SS1 SS2 SS3 HA1 HA2

LEGEND

- HAND AUGER BORING
- DISCRETE SUB-SAMPLE LOCATION
- PROPERTY BOUNDARY
- PARCEL BOUNDARY
- SAMPLING AREA OUTLINE
- FENCE ALIGNMENT
- AREA TO BE EXCAVATED TO A DEPTH OF 12 INCHES BGS, BACKFILL AND RESTORE WITH GRASS
- AREA TO BE EXCAVATED TO A DEPTH OF 24 INCHES BGS, BACKFILL AND RESTORE WITH GRASS
- MAINTAIN EXISTING LANDSCAPING AND APPLY 3" OF MULCH AND/OR ADDITIONAL GROUNDCOVER VEGETATION

BGS BELOW GROUND SURFACE

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NORTH SUBSTATION PROPERTY
7500 8TH AVENUE NORTHEAST
SEATTLE, WASHINGTON
SOUNDEARTH PROJECT #1267-004

FIGURE 6
ENGINEERING CONTROLS ALTERNATIVE

TABLES

Table 1
Remedial Alternative Summary
North Substation Property
7500 8th Avenue Northeast
Seattle, Washington

Area	Excavation and Disposal Scenario	Engineering Controls Scenario	Notes
1	Remove four trees. Excavate to a depth of 24 inches bgs. Backfill with 24 inches clean fill. Restore with grass and similar trees.	Remove four trees. Excavate to a depth of 24 inches bgs. Backfill with 24 inches clean fill. Restore with grass and similar trees.	Four trees are not recommended for retainment in Area 1. See Tree and Landscape Appraisal in Attachment A.
2, 3, and 4	Remove four trees. Excavate to a depth of 12 inches bgs. Backfill with 12 inches clean fill. Restore with grass and similar trees.	Remove four trees. Excavate to a depth of 12 inches bgs. Backfill with 12 inches clean fill. Restore with grass and similar trees.	One tree is not recommended for retainment in Area 2. Three trees are not recommended for retainment in Area 3. See Tree and Landscape Appraisal in Attachment A.
5	Excavate to a depth of 24 inches bgs. Backfill with 24 inches clean fill. Restore with grass.	Excavate to a depth of 24 inches bgs. Backfill with 24 inches clean fill. Restore with grass.	No trees are located in Area 5.
6A	Retain one tree, if possible (#109). Excavate to a depth of 12 inches bgs. Backfill with 12 inches clean fill. Restore landscaping.	Maintain existing landscaping. Apply a minimum of 4 to 6 inches of mulch and additional groundcover vegetation, as needed. Install fencing and signage.	Tree #109 identified as high priority for protection.
6B	Excavate to a depth of 12 inches bgs. Backfill with 12 inches clean fill. Restore with grass.	Excavate to a depth of 12 inches bgs. Backfill with 12 inches clean fill. Restore with grass.	
7A	Excavate to a depth of 24 inches bgs. Backfill with 24 inches clean fill. Restore landscaping.	Maintain existing landscaping. Apply a minimum of 6 inches of mulch and additional groundcover vegetation, as needed. Install fencing and signage.	
7B	Remove 10 trees. Excavate to a depth of 36 inches bgs. Backfill with 36 inches clean fill. Restore landscaping.	Maintain existing landscaping. Apply a minimum of 6 inches of mulch and additional groundcover vegetation, as needed. Install fencing and signage.	Trees #115, #118, #119, and #120 are identified as high priority for protection. However, excavation depth does not allow for tree preservation in excavation scenario.
8	Remove six trees. Excavate to a depth of up to 24 inches bgs. Backfill with 24 inches clean fill. Restore landscaping.	Maintain existing landscaping. Apply a minimum of 6 inches of mulch and additional groundcover vegetation, as needed. Install fencing and signage.	Tree #128 identified as high priority for protection. However, excavation depth does not allow for tree preservation in excavation scenario.
9	Remove three trees. Excavate to a depth of 36 inches bgs. Backfill with 36 inches clean fill. Restore landscaping.	Maintain existing landscaping. Apply a minimum of 6 inches of mulch and additional groundcover vegetation, as needed. Install fencing and signage.	Trees #129, #130, and #131 identified as high priority for protection. However, excavation depth does not allow for tree preservation in excavation scenario.
10	Retain two trees, if possible (#132 and #133). Remove four trees. Excavate to a depth of 12 inches bgs. Backfill with 12 inches clean fill. Restore landscaping.	Maintain existing trees and vegetation. Apply a minimum of 6 inches of mulch and additional groundcover vegetation, as needed. Install fencing and signage.	Trees #132 and #133 identified as high priority for protection.

NOTE:

bgs = below ground surface

Table 2
Remedial Excavation Alternative Cost Estimate
North Substation Property
7500 8th Avenue Northeast
Seattle, Washington

CAPITAL COST ITEM	SOUNDEARTH/ SUBCONTRACTORS	SEATTLE CITY LIGHT	GENERAL CONTRACTOR	QTY	UNIT	UNIT PRICE	COST	TOTALS
Planning and Design								
Remedial Work Plan/Design	X			1	lump sum	$ 5,000	$ 5,000	
Landscape Architect Design	X			1	lump sum	$ 10,000	$ 10,000	
Contaminated Materials Management Plan			X	1	lump sum	$ 1,065	$ 1,065	
Tree Vegetation and Soil Protection Plan (TVSPP)			X	1	lump sum	$ 2,200	$ 2,200	
Subtotal								**$ 18,265**
Health and Safety								
Site Specific Health and Safety Plan (Consultant)	X			1	lump sum	$ 1,500	$ 1,500	
Site Specific Health and Safety Plan (Contractor)			X	1	lump sum	$ 100	$ 100	
Subtotal								**$ 1,600**
Permits								
Street Use Permit			X	1	lump sum	$ 500	$ 500	
Utility Major Permit for Right-of-Way Excavation		X		1	lump sum	$ 5,000	$ 5,000	
Tree Cutting Permit for Right-of-Way Trees		X		1	lump sum	$ 1,000	$ 1,000	
Subtotal								**$ 6,500**
Soil Excavation and Disposal								
Mobilization/Demobilization			X	1	lump sum	$ 12,500	$ 12,500	
Private Utility Locating			X	1	lump sum	$ 1,080	$ 1,080	
Install/Remove Site Security Perimeter Fencing			X	1,100	feet	$ 4.50	$ 4,950	
Construction Stormwater and Erosion Control			X	1	lump sum	$ 2,200	$ 2,200	
Maintenance and Protection of Traffic Control, Including Flagging			X	20	day	$ 200	$ 4,000	
Clearing and Grubbing (Areas 6, 7, 8, 9, and 10)			X	9,000	sf	$ 1	$ 9,000	
Tree Stump Removal (6- to 12-inch diameter)			X	27	ea	$ 230	$ 6,210	
Tree Stump Removal (>12-inch diameter)			X	9	ea	$ 700	$ 6,300	
Vactor and Load Contaminated Soil			X	200	cubic yard	$ 375	$ 75,000	
Excavate and Load Contaminated Soil			X	800	cubic yard	$ 110	$ 88,000	
Transport Contaminated Soil			X	1,600	ton	$ 18	$ 28,800	
Disposal Contaminated Soil			X	1,600	ton	$ 50	$ 80,000	
Confirmation Soil Sampling and Chemical Analysis	X			1	lump sum	$ 11,000	$ 11,000	
Construction Monitoring	X			20	day	$ 1,800	$ 36,000	
Subtotal								**$ 365,040**
Restoration								
Import and Place Backfill Aggregate (Type 17)			X	800	ton	$ 33	$ 26,400	
Import and Place Topsoil, 60/40 Blend			X	500	cubic yard	$ 92	$ 46,000	
Import and Place 3 Inches Mulch, Arborist Wood Chip			X	300	cubic yard	$ 85	$ 25,500	
Area 1 (Tree and Groundcover Cost)			X	1	lump sum	$ 6,188	$ 6,188	
Area 2 (Tree and Groundcover Cost)			X	1	lump sum	$ 3,324	$ 3,324	
Area 3 (Tree and Groundcover Cost)			X	1	lump sum	$ 3,432	$ 3,432	
Area 4 (Tree and Groundcover Cost)			X	1	lump sum	$ 802	$ 802	
Area 5 (Groundcover Cost)			X	1	lump sum	$ 1,043	$ 1,043	
Area 6 (Tree, Shrub, and Groundcover Cost, Excluding Tree #109 to be Retained)			X	1	lump sum	$ 1,990	$ 1,990	
Area 7 (Tree, Shrub, and Groundcover Cost)			X	1	lump sum	$ 18,334	$ 18,334	
Area 8 (Tree, Shrub, and Groundcover Cost)			X	1	lump sum	$ 17,522	$ 17,522	
Area 9 (Tree, Shrub, and Groundcover Cost)			X	1	lump sum	$ 7,545	$ 7,545	
Area 10 (Tree, Shrub, and Groundcover Cost, Excluding Trees #132 and #133 to be Retained)			X	1	lump sum	$ 4,201	$ 4,201	
Additional Tree Purchase Costs (assumes planting of 62 trees to replace 31 removed trees)			X	31	per tree	$ 660	$ 20,460	
Tree Planting Costs (assumes planting of 62 trees to replace 31 removed trees)			X	62	per tree	$ 175	$ 10,850	
Tree Establishment Watering Costs (62 trees)			X	62	per tree	$ 300	$ 18,600	
Irrigation (Installation Cost)			X	9,000	square feet	$ 4	$ 36,000	
Subtotal								**$ 248,191**
Project Management, Reporting, and Closure Support								
Project Management	X			1	year	$ 3,000	$ 3,000	
Cleanup Action Report	X			1	report	$ 10,000	$ 10,000	
Regulatory Support	X			1	lump sum	$ 5,000	$ 5,000	
Subtotal								**$ 18,000**
TOTAL CAPITAL COST								**$ 658,000**

FUTURE O&M AND OTHER DIRECT COST ITEMS[1]	ANNUAL COST[2]	Present Worth Cost of Annual Monitoring Real Discount Rate = 1.3%	
Landscape Maintenance (3 years)	$ 5,000	$ 14,618	
		Subtotal	**$ 14,618**
TOTAL PRESENT WORTH COST			**$ 15,000**
TOTAL COST			**$ 673,000**

NOTES:

Cost rounded up to nearest $1,000.

[1]Additional direct costs, such as project management, regulatory communications and reporting, and other technical support services not specifically listed, are not included in any future annual costs.

[2]Annual cost is year 2021 cost.

% = percent

O&M = operation and maintenance

QTY = quantity

SoundEarth = SoundEarth Strategies, Inc.

Table 3
Engineering Controls with Partial Remedial Excavation Alternative Cost Estimate
North Substation Property
7500 8th Avenue Northeast
Seattle, Washington

CAPITAL COST ITEM	SOUNDEARTH/ SUBCONTRACTORS	SEATTLE CITY LIGHT	GENERAL CONTRACTOR	QTY	UNIT	UNIT PRICE	COST	TOTALS
Planning and Design								
Remedial Work Plan/Design	X			1	lump sum	$ 5,000	$ 5,000	
Contaminated Materials Management Plan			X	1	lump sum	$ 1,065	$ 1,065	
Tree Vegetation and Soil Protection Plan (TVSPP)			X	1	lump sum	$ 2,200	$ 2,200	
Subtotal								**$ 8,265**
Health and Safety								
Site Specific Health and Safety Plan (Consultant)	X			1	lump sum	$ 1,500	$ 1,500	
Site Specific Health and Safety Plan (Contractor)			X	1	lump sum	$ 100	$ 100	
Subtotal								**$ 1,600**
Permits								
Street Use Permit			X	1	lump sum	$ 500	$ 500	
Utility Major Permit for Right-of-Way Excavation		X		1	lump sum	$ 5,000	$ 5,000	
Tree Cutting Permit for Right-of-Way Trees		X		1	lump sum	$ 1,000	$ 1,000	
Subtotal								**$ 6,500**
Soil Excavation and Disposal - Areas 1 through 6								
Mobilization/Demobilization			X	1	lump sum	$ 12,500	$ 12,500	
Private Utility Locating			X	1	lump sum	$ 720	$ 720	
Install/Remove Site Security Perimeter Fencing			X	500	feet	$ 4.5	$ 2,250	
Construction Stormwater and Erosion Control			X	1	lump sum	$ 2,200	$ 2,200	
Maintenance and Protection of Traffic Control, Including Flagging			X	5	day	$ 200	$ 1,000	
Tree Stump Removal (6- to 12-inch diameter)			X	8	ea	$ 230	$ 1,840	
Vactor and Load Contaminated Soil			X	10	cubic yard	$ 375	$ 3,750	
Excavate and Load Contaminated Soil			X	290	cubic yard	$ 110	$ 31,900	
Transport Contaminated Soil			X	480	ton	$ 18	$ 8,640	
Disposal Contaminated Soil			X	480	ton	$ 50	$ 24,000	
Confirmation Soil Sampling and Chemical Analyses	X			1	lump sum	$ 4,000	$ 4,000	
Construction Monitoring	X			5	day	$ 1,800	$ 9,000	
Subtotal								**$ 101,800**
Restoration								
Import and Place Backfill Aggregate (Type 17) (Areas 1 through 6)			X	320	ton	$ 33	$ 10,560	
Import and Place Topsoil, 60/40 Blend (Areas 1 through 6)			X	100	cubic yard	$ 92	$ 9,200	
Area 1 (Tree and Groundcover Cost)			X	1	lump sum	$ 6,188	$ 6,188	
Area 2 (Tree and Groundcover Cost)			X	1	lump sum	$ 3,324	$ 3,324	
Area 3 (Tree and Groundcover Cost)			X	1	lump sum	$ 3,432	$ 3,432	
Area 4 (Tree and Groundcover Cost)			X	1	lump sum	$ 802	$ 802	
Area 5 (Groundcover Cost)			X	1	lump sum	$ 1,043	$ 1,043	
Area 6 (Import and Place Mulch, Arborist Wood Chip)			X	20	cubic yard	$ 85	$ 1,700	
Area 7 (Import and Place Mulch, Arborist Wood Chip)			X	60	cubic yard	$ 85	$ 5,100	
Area 8 (Import and Place Mulch, Arborist Wood Chip)			X	23	cubic yard	$ 85	$ 1,955	
Area 9 (Import and Place Mulch, Arborist Wood Chip)			X	20	cubic yard	$ 85	$ 1,700	
Area 10 (Import and Place Mulch, Arborist Wood Chip)			X	18	cubic yard	$ 85	$ 1,530	
Additional Groundcover Vegetation (Areas 6A and 7 through 10)			X	1	lump sum	$ 5,000	$ 5,000	
Perimeter Fencing (Material and Installation)			X	770	linear feet	$ 12	$ 9,240	
Additional Tree Purchase Costs (assumes planting of 16 trees to replace 8 removed trees)			X	8	per tree	$ 660	$ 5,280	
Area 1 through 4 Tree Planting Costs (assumes planting of 16 trees to replace 8 removed trees)			X	16	per tree	$ 175	$ 2,800	
Area 1 through 4 Tree Establishment Watering Costs (16 trees)			X	16	per tree	$ 300	$ 4,800	
Signage			X	1	lump sum	$ 1,000	$ 1,000	
Subtotal								**$ 74,654**
Project Management and Reporting								
Project Management	X			1	year	$ 3,000	$ 3,000	
Cleanup Action Report	X			1	report	$ 10,000	$ 10,000	
Long-Term Monitoring Plan	X			1	lump sum	$ 5,000	$ 5,000	
Subtotal								**$ 18,000**
TOTAL CAPITAL COST								**$ 211,000**

FUTURE O&M AND OTHER DIRECT COST ITEMS[1]	ANNUAL COST[2]	Present Worth Cost of Annual Monitoring (Real Discount Rate = 1.3%)	
Landscape Maintenance (20 years)	$ 3,000	$ 52,536	
Inspections and Documentation (20 years)	$ 1,500	$ 26,268	
		Subtotal	**$ 78,804**
TOTAL PRESENT WORTH COST			**$ 79,000**

TOTAL COST ASSOCIATED WITH EXCAVATION AND RESTORATION OF AREAS 1 THROUGH 5 AND 6B	**$ 159,000**
TOTAL COST ASSOCIATED WITH ENGINEERING CONTROLS AND MONITORING	**$ 131,000**
TOTAL COST	**$ 290,000**

NOTES:

Cost rounded up to nearest $1,000.

[1]Additional direct costs, such as project management, regulatory communications and reporting, and other technical support services not specifically listed, are not included in any future annual costs.

[2]Annual cost is year 2021 cost.

% = percent

QTY = quantity

ATTACHMENT A

TREE AND LANDSCAPE APPRAISAL REPORT

Seattle City Light North Substation

Tree and Landscape Appraisal

PREPARED FOR:

Sound Earth Strategies
Attn: Clare Tochilin, LG
2811 Fairview Ave,
Suite 2000
Seattle, Washington 98120

PREPARED BY:

Anna Heckman
Urban Forestry Services | Bartlett Consulting
ISA Board Certified Master Arborist #PN-6153B
ISA Tree Risk Assessment Qualified
ASCA Tree and Plant Appraisal Qualified

Urban Forestry Services
BARTLETT CONSULTING
Divisions of The F.A. Bartlett Tree Expert Company

Table of Contents

Summary

Soil remediation work at the Seattle City Light North Substation, located at 7500 8th Ave NE, is expected to impact the landscape surrounding the substation and buildings. This landscape is mature, in fair to good condition and if full of horticulturally diverse trees and shrubs.

The landscape surrounding the substation was divided into 11 proposed soil removal areas based on the depth of soil recommended for removal. Trees and landscape plants in each area were inventoried and provided a landscape value using the Trunk formula Technique and the Replacement method in the 10th Edition of the Tree and Landscape Appraisal book.

The 36 trees appraised on site were valued at over **$54,000**. Many trees in the project area are in good condition and would not be recommended for removal outside of this project. Nine of these trees are recommended as a high priority for protection (#109, 115, 118-120, 128-131). These large trees have good health and structure and provide good landscape benefits.

Other trees with good health and structure are recommended to retain in areas where soil removal will be minimal. Soils cannot be fully removed from under the canopy of the trees, however, with further assessment soil removal can be strategically designed to improve soil replacement results and retain trees.

The palm trees and other smaller but high value landscape shrubs may be bare root transplanted in the fall and winter with minimal soil disturbance prior to soil removal operations. Detailed tree protection, landscape plant recommendations and tree removal permit requirements can be provided once final decisions are made regarding the prioritization of landscape trees over volume of soil to remove.

Introduction

A project to remove and replace contaminated soils at the Seattle City Light (SCL) North Substation at 7500 8th Ave NE in Seattle, WA is in the planning phase. This soil removal and replacement project will impact many trees and plants within the landscape beds and along the street right of way around the substation. Many trees and shrubs will likely require removal. These plants have value and in in many cases are not replaceable.

Sound Earth Strategies was contracted by Seattle City Light to lead the soil removal project. I was hired as a subcontractor by Sound Earth Strategies on June 29th, 2021 to conduct a Tree inventory and Appraisal for up to 30 trees at the substation. I visited the substation to collect data on July 21 and July 29th, 2021.

Assignment

Sound Earth Strategies provided a focus area map for the substation that identified eleven different areas where contaminated soil was found and is recommended for remediation (Appendix 1). The depth of soil removal required to decrease contamination was identified for each area. I was asked to inventory the trees within each soil removal area and provide an appraised value for each area. I was also asked to identify and provide general costs of replacement for the shrubs and ground cover for each landscape area and identify areas or trees of high value. I am to provide general recommendations for trees and provide options to work with and around trees where possible. These recommendations will be used to assist Sound Earth Strategies and SCL in their planning decisions for the upcoming soil replacement project.

Limits of the Assignment

This tree appraisal only considers the replacement value of the trees, shrubs and groundcover for each landscape. This appraisal does not include the costs of labor and other costs associated with replacing or repairing a damaged landscape because all the trees and plants are currently undamaged. This appraisal therefore underrepresents the true costs associated with tree protection, transplanting, or removal, restoration or repairing individual plants. This appraisal should not be used for budgeting, fines, fees, or payment in lieu.

Information contained in this report covers only those items that were examined and reflects the condition of those items at the time of inspection. There is no warranty or guarantee that problems of deficiencies of the plans or property in question may not arise in the future.

Care has been taken to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

Illustrations, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys.

This tree inventory is not a tree risk assessment. As such, no trees were assessed for risk in accordance with industry standards, nor are there any tree risk ratings or risk mitigation recommendations provided within this report.

Methods

Both Single and multi-stem trees with trunk diameters near six inches were identified on site with aluminum tags starting with # 101. Tree locations are identified on a site map (Appendix A) and species, size, health, structure and retention recommendations are documented in a table (Appendix B).

The equivalent single diameter for multi stem trees was calculated using the combined trunk area method documented in the City of Seattle Directors Rule 16-2008. Trees less than five (5) inch combined diameter were removed from the tree appraisal and categorized as shrubs for appraisal purposes. Five-inch trees are smaller than the Six (6") inch significant tree size, but are often too large to be directly replaced within 3 years.

Shrubs and groundcovers were tallied within each area or estimated based on the size of the planting area and observed coverage.

The Approach, Method and Technique selected for this appraisal can be referenced in *Guide for Plant Appraisal,* 10th Edition, second printing, authored by the Council of Tree and Landscape Appraisers. The Council is made up of seven professional landscape and horticultural organizations who regularly review and revise the methods used.

For large trees that cannot be directly replaced, an extrapolation of costs to reproduce the tree can be conducted using the Trunk Formula Technique. The Trunk Formula Technique uses the price of the largest commonly available tree of matching species and extrapolates the price of that replacement tree per square inch to that of the tree being appraised. This cost is then depreciated by the health, structure, and form of the tree, as well as for functional and external limitations associated with the resilience of the tree species, its placement on the site and the landscape benefits each tree contributes to the whole. Some trees can be large and healthy and not significantly contribute to landscape values, and other trees may be in poor condition but provide significant value to a landscape.

Additional costs are then estimated to include the costs associated with cleaning and preparing the damaged area for replacement, replanting a new tree, and the maintenance and management required to replace or reproduce what was lost. These additional costs are added to the depreciated tree costs to provide the final appraisal result.

For this assignment, additional costs were not included in the appraised value in an effort to reduce the variability and number of unknowns associated with each area. This provides a more direct comparison between each tree; however, it underestimates the actual costs associated with replacing trees.

Direct costs for replacement were estimated for shrubs and ground covers depending on the recommended and most available replacement pot size for each species.

The choice of the Approach, Method, and Technique associated with tree and plant appraisals impacts the outcome of the appraisal result. We recognize this choice of appraisal method as

well as the observations used in this assessment are inherently subjective, and prone to variation, therefore, we use our professional experience and judgement to defend our observations and to provide a professional opinion for each assignment.

Observations

The North Substation is landscaped on all four sides. Many of the mature trees and shrubs are over 40 years old and are visible on Google Earth historic photos. The mature gardens consist of large hydrangeas, Japanese maples and a diverse and unique palate of shrub and ground cover species. The plants and garden beds were in good condition overall. Some areas had visible herbicide damage or irrigation issues that were impacting tree and plant health.

Some trees are in good locations to provide visual softening and buffering between neighbors and the transmission lines and substation building. In some cases, tree placement is too close to each other. In other areas, trees are growing in low soil volume root restricted landscape beds. These areas likely have thick mats of fibrous roots under the tree canopy that will impact the success of soil removal and tree retention. Surface roots were visible in some areas, and shrubs impacted exploration in others. Further investigation will be required to investigate these areas for high value trees. My observations of the plant conditions in each of the project areas are summarized below.

The west side of the substation (Areas 1-4) consists of eight street trees in dispersed groups in the right of way. These maple trees are in fair health and are an appropriate species for under power lines. These trees provide relatively few benefits and can be effectively replaced with new trees planted in well prepared soil. Lifted pavement and curbs near many of the trees is indicative of shallow roots and conditions that will eventually require root pruning to decrease infrastructure impacts. Area 11, a 2-foot planter strip between the sidewalk and the substation wall is filled with pollinator habitat flowers. This is a great landscape that can be easily replaced or improved with soil removal.

Photo 1. Trees 106-108 in Area 3 within the ROW. This ROW planting is similar to others in Area 1-4 along the west side of the substation.

The south west side of the substation (Areas 6 and 7) contain 11 trees in a well-maintained lawn and garden landscape. This area has a large diversity of flowering shrubs and ground covers. Trees in this area buffer the view of the substation wires and building and provides a public garden space and path. Many trees in this area are smaller and grouped close together. Some of the larger trees have higher value and are well placed for retention.

Photo 2. Trees #109-117 in Area 7 are grouped to form a grove over a garden path.
Photo 3. Trees #118-120 in Area 7 soften the view of the building and substation.

South of the substation (Area 8) is a mature landscape full of unusual tropical plants. Mexican fan palms, pomegranate, and banana trees create a unique visual buffer between neighboring homes, the road and the large building. Only eight plants met the diameter to be counted as trees for appraisal in this area. The remaining were considered shrubs. The south aspect and the radiant heat from the building make this a great location for this unique landscape.

Photo 4. Trees #120-128 and plants in Area 8.

The south east and east side of the property contain large multi stem Japanese maples, camelias and very large hydrangeas and one unusual tree anemone (#131) with flowers similar to a stewartia. The largest of these trees provide excellent visual buffering value for neighbors and will take many decades to replace if removed.

Photo 5. Trees #129-131 in Area 9. The shrubs in this area are very mature.

The general tree locations can be found in Appendix 1 and the data for individual trees and appraised values are located in Appendix 2. The combined tree and landscape values for each soil removal focus area are below in Table 1. If the focus areas size and locations change, these comparative numbers will require recalculation.

TABLE 1: NORTH SUBSTATION COMBINED AREA PRELIMINARY PLANT COSTS

Area ID	Soil loss depth (ft.)	# Trees impacted	Tree Cost	Shrub and Groundcover Cost	Total Cost	Tree Retention Recommendation
NSS01	2	4	$5,065	$1,123	**$6,188**	No
NSS02	1	1	$2,041	$1,283	**$3,324**	No
NSS03	1	3	$2,470	$963	**$3,432**	No
NSS04	1	0	$0	$802	**$802**	No
NSS05	2	0	$0	$1,043	**$1,043**	No
NSS06	1	1	$1,826	$1,990	**$3,816**	Yes - 109
NSS07	3	10	$15,248	$3,085	**$18,334**	Yes 115, 118, 119, 128
NSS08	2	6	$13,538	$3,984	**$17,522**	Yes 128
NSS09	3	3	$6,505	$1,040	**$7,545**	Yes 129, 130, 131
NSS10	1	6	$7,402	$1,410	**$8,812**	Yes 132, 133
NSS11	0	0	$0	$321	**$321**	No
Total		**34**	**$54,095**	**$17,044**	**$71,139**	

Recommendations

The combined landscape values in Table 1 are closely corelated with both the total number and size of trees located within each area. Not all trees in an area are recommended for retention. Where tree retention is recommended, the corresponding tree numbers are identified in Table 1.

Larger, healthier, and well-placed trees in the landscape are recommended for retention. These trees and the values they provide will take many decades to replace. If these trees are chosen for retention, specific planning and preservation guidance should be provided by a qualified arborist to ensure trees are not damaged beyond repair.

The following protection recommendations apply to all trees and provide general guidance and options to consider for tree retention decision making.

- Soils should be retained under the dripline of these trees to protect roots. For most trees identified on the site, the dripline is equivalent to the Critical Root Zone area and in many cases the restricted soil areas are much smaller than the standard CRZ.

- Where just one foot of soil is planned for removal, a vactor truck may be an option to remove soil without excessively damaging roots. Soil removal should only be conducted during high humidity weather but not under saturated soil conditions. Tree roots should be kept moist and protected from drying out.

- Trees located in areas requiring 2-3 feet of soil removal that are worthy of retaining may have some soil removed from within the CRZ. Soil removal plans for these locations will require further investigation.

- Trees located in areas with restricted root space will likely have thick root mats near the soil surface under their canopy. These root mats are difficult to work in and impede access to the soil. Additional investigation in these restricted root areas is recommended. This includes taking additional soil samples to improve the precision of soil contamination depth measurements and soil removal recommendations.

The following areas have individual trees worthy of retaining. Further investigation prior to deciding to remove or retain them.

Area 06. Three Japanese maples (#109-111) are planted on the corner of NE 75th St and 8th Ave NE above the sidewalk and are not located directly in a soil removal area. These trees have high value, and their roots will be impacted with soil excavation in both Area 6 and Area 7.

Area 07. Few trees can be retained in this area with three feet of soil removal required. Trees #115, 118 and 119 are high value and are located near the north fence line. The catalpa (#120) is unique and prominent on the landscape; however, it is not in good health and would require structural bracing to retain.

Area 08 – This area has many landscape plants that can be transplanted bare root during the dormant season to soil removal. The palm and banana trees have small root balls and can be transplanted with little soil disturbance or offsite soil movement. Japanese maple (#128) has a high value and is recommended for retention.

Area 09 – This area calls for three feet of soil removal. Trees cannot be retained in this area unless the soil under their driplines is retained. The Eucryphia is an unusual species and is recommended for retention. This tree will likely require guying to maintain stability after soil removal and replacement. Trees 129 and 130 are growing in restricted root areas.

Area 10 – Two large Japanese maples (#132, 133) are recommended for retention. These trees are not as large or as valuable as others on the site but are the best trees in this area and provide valuable screening for neighbors.

The remaining areas without tree retention recommendation have a low overall landscape value and low individual tree values. These areas are recommended for full landscape removal and replacement. Some tree removals may require permitting and planning or mitigation plans with Seattle Department of Transportation. Additional data on landscape shrub species, individual tree protection recommendations or replacement planting can be provided in future assignments.

If you have any questions about my observations or recommendations provided in this report, please feel free contact me.

Anna Heckman

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Additional Resources

Tree protection through construction

Oregon State University. 2009. Tree Protection on Construction and Development Sites. A best management Practices Guidebook for the Pacific Northwest. https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em8994.pdf

Jamieson, S. Getting to the Root of Tree Stability and Construction. The Landscape Contractor https://www.bartlett.com/resources/treestabilityandconstruction.pdf

Fredrich. Preventing Construction Damage to Trees. Bartlett Research Laboratory Technical Report. https://www.bartlett.com/resources/preventing-and-mitigating-construction-damage-to-trees.pdf

Critical Root Zone

Barborinas, J. Critical Root Zone Delineation, Urban Forest Nursery, Mount Vernon, WA http://www.urbanforestnursery.com/extras/criticalrootzone.html

The Critical Root Zone, Tree and Natural Area Preservation, City of Austin TX https://austintexas.gov/page/tree-and-natural-area-preservation

Mature Tree Care.

Plant Health Care Recommendations for Mature Trees. Bartlett Tree Research Laboratories Technical Report. https://www.bartlett.com/resources/plant-health-care-rec-mature-trees.pdf

Mature Tree Care, Trees for Seattle. City of Seattle, WA. https://www.seattle.gov/trees/planting-and-care/mature-tree-care

The Arbor Day Foundation. 2020. Benefits of Trees: The Value of Trees to a Community. https://www.arborday.org/trees/benefits.cfm

American Horticulture Industry Association. 2014. American Standard for Nursery and Landscape stock. ANSI Z60.1, Columbus OH.

Council of Tree and Landscape Appraisers. 2019. Guide for Plant Appraisal 10th edition. International Society of Arboriculture, Atlanta GA.

Pacific Northwest Chapter of the International Society of Arboriculture. 2007 Species Ratings for Landscape Tree Appraisal. Silverton, OR

Appendix I – Tree Inventory Map


9TH AVENUE NORTHEAST
AREA 10
AREA 9
AREA 8
AREA 7
AREA 6
AREA 5
AREA 11
AREA 1
AREA 2
AREA 3
AREA 4
8TH AVENUE NORTHEAST
NORTHEAST 78TH STREET
SEATTLE CITY LIGHT NORTH SUBSTATION
LEGEND
HAND AUGER BORING
DISCRETE SUB-SAMPLE LOCATION
PROPERTY BOUNDARY
PARCEL BOUNDARY
SAMPLING AREA OUTLINE
AREA TO BE EXCAVATED TO A DEPTH OF 12 INCHES BGS
AREA TO BE EXCAVATED TO A DEPTH OF 24 INCHES BGS
AREA TO BE EXCAVATED TO A DEPTH OF 36 INCHES BGS
BGS
BEGIN GROUND SURFACE
SoundEarth Strategies
NORTH SUBSTATION
7000 8TH AVENUE NORTHEAST
SEATTLE, WASHINGTON
SOUNDEARTH PROJECT #1267-004
FIGURE 5
REMEDIAL EXCAVATION PLAN

Appendix II – Tree Inventory Table

Area ID	Tree Id	Tree Name	Combined DBH	Stems	Health	Structure	PreservationValue	Trunk Formula Cost	Comments
NSS01	101	Acer palmatum	11.4	6	Fair	Good	Excellent	$1,869	Retain if possible
NSS01	102	Acer palmatum	5.7	5	Poor	Good	Fair	$637	
NSS01	103	Acer palmatum	8.8	6	Fair	Fair	Fair	$1,080	
NSS01	104	Acer palmatum	10.2	6	Good	Good	Good	$1,479	
NSS02	105	Acer palmatum	12.0	5	Fair	Good	Good	$2,041	
NSS03	106	Acer palmatum	8.1	6	Very Poor	Fair	Poor	$832	
NSS03	107	Acer palmatum	7.8	5	Poor	Good	Fair	$909	
NSS03	108	Acer palmatum	6.5	4	Fair	Fair	Good	$729	
NSS06	109	Acer palmatum	12.5	6	Fair	Excellent	Excellent	$1,826	Partially located in Area 6
	110	Acer palmatum	13.0	2	Good	Fair	Fair	$1,529	Tree will be damaged by Area 7 excavation
	111	Acer palmatum	20.3	3	Fair	Good	Excellent	$5,499	Tree will be damaged by Area 7 excavation
NSS07	112	Acer palmatum	6.4	3	Poor	Good	Fair	$804	
NSS07	113	Acer palmatum	7.4	5	Poor	Fair	Fair	$831	
NSS07	114	Acer circinatum	8.6	6	Poor	Fair	Fair	$962	
NSS07	115	Acer palmatum	8.7	3	Fair	Excellent	Fair	$1,185	
NSS07	117	Acer palmatum	7.0	4	Fair	Fair	Fair	$869	
NSS07	118	Aralia spinosa	5.8	3	Excellent	Excellent	Excellent	$1,082	Retain
NSS07	119	Acer palmatum	13.7	5	Good	Good	Good	$2,357	Retain
NSS07	120	Catalpa bignonioides	14.6	3	Fair	Poor	Fair	$1,811	Must be braced if retained
NSS07	121	Washingtonia robusta	14.0	1	Good	Good	Fair	$1,872	Transplant
NSS07	122	Chamaecyparis obtusa	12.0	1	Good	Fair	Fair	$3,476	
NSS08	123	Chamaecyparis obtusa	6.0	1	Good	Fair	Fair	$1,050	
NSS08	124	Washingtonia robusta	8.0	1	Good	Good	Fair	$1,306	Transplant
NSS08	125	Washingtonia robusta	12.0	1	Good	Good	Good	$2,637	Transplant
NSS08	126	Washingtonia robusta	8.0	1	Good	Good	Fair	$1,306	Transplant

Area ID	Tree Id	Tree Name	Combined DBH	Stems	Health	Structure	PreservationValue	Trunk Formula Cost	Comments
NSS08	127	Washingtonia robusta	10.0	1	Good	Good	Fair	$1,905	Transplant
NSS08	128	Acer palmatum	18.5	6	Good	Good	Good	$5,334	Retain
NSS09	129	Acer palmatum	15.3	6	Excellent	Good	Good	$2,845	Retain
NSS09	130	Acer palmatum	11.0	3	Excellent	Good	Excellent	$1,926	Retain
NSS09	131	Eucryphia cordifolia	6.7	2	Excellent	Good	Excellent	$1,734	Retain
NSS10	132	Acer palmatum	13.3	2	Good	Good	Fair	$2,586	Retain
NSS10	133	Acer palmatum	11.0	3	Good	Good	Fair	$2,025	Retain
NSS10	135	Camellia sp	5.6	4	Good	Good	Fair	$629	
NSS10	136	Camellia sp	6.7	5	Good	Good	Fair	$709	
NSS10	138	Camellia sp	7.3	2	Good	Good	Fair	$787	
NSS10	140	Camellia sp	5.9	4	Good	Good	Fair	$667	