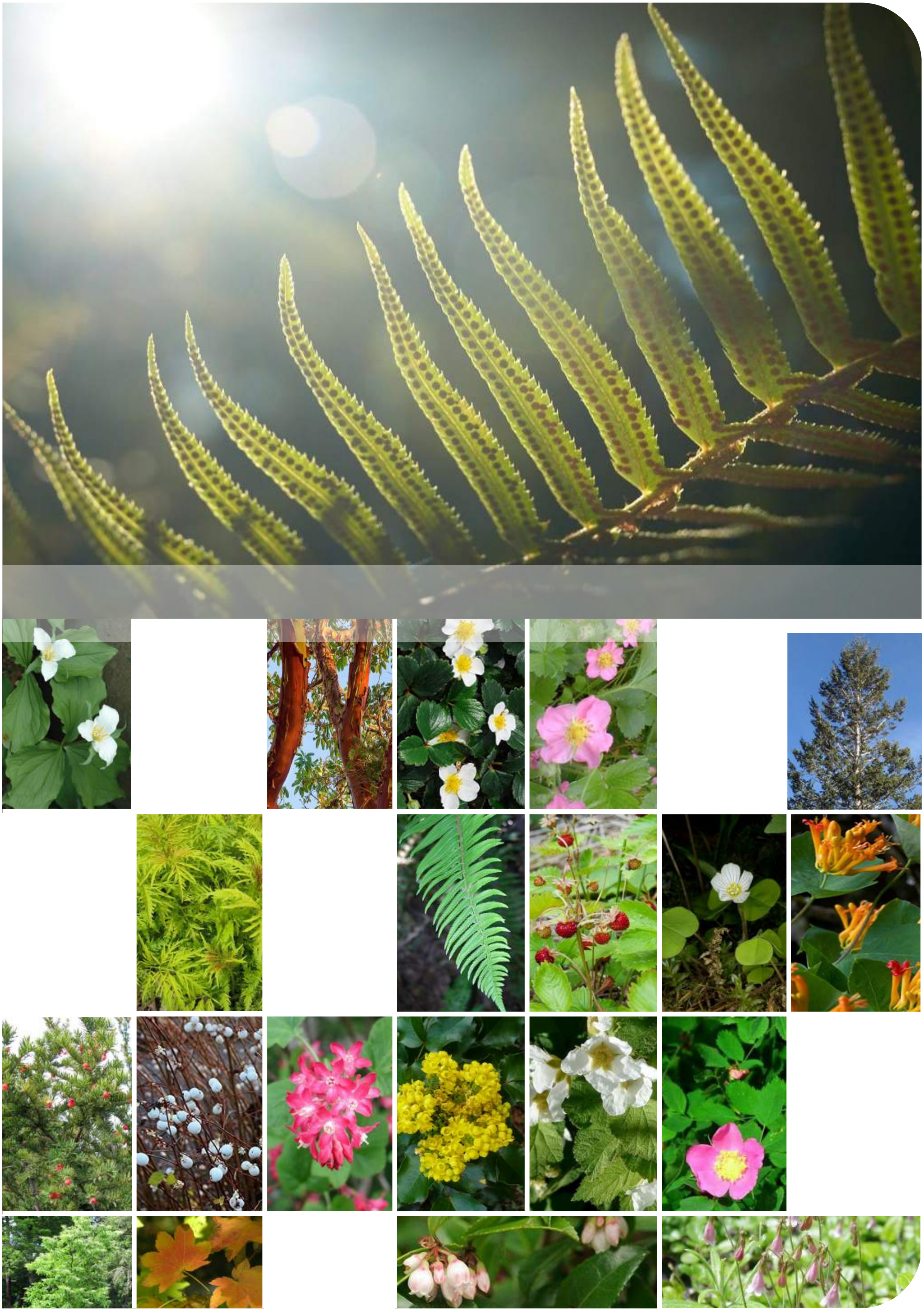


Colman Park Vegetation Management Plan Draft

NOVEMBER 28, 2018

Table of Contents

1.0 Overview and Project Summary

1.1 PROJECT SUMMARY

Colman Park is a 24.3-acre park in the Mount Baker neighborhood of Seattle, Washington, located just south of the Lacey V. Murrow Memorial Bridge along Lake Washington and inland to 31st Avenue South.

The vision for Colman Park is to provide a place of enjoyment for all. An inviting and beautiful entry at the western edge will connect to a restored and healthy hillside of thriving, native vegetation, and provide joggers, walkers, bicyclists, car and bus riders with an enhanced experience, and view opportunities at the upper slope. The revitalized landscape will establish a welcoming, desirable destination hub, where summer days will connect local and surrounding neighbors, celebrating community, while sharing in seasonal activities, and enjoying the magnificence of Lake Washington views.

1.2 PROJECT DESCRIPTION

The project goal is to restore the 1.71 acres of forested parkland in Colman Park. Currently, the park hillside has been impacted by high-growing, dense trees such as bigleaf maples and invasive non-native vegetation. The trees on the western slope were cut approximately 25 years ago, leaving behind scores of bigleaf maple stumps which later produced dozens of suckers. The result of these remaining suckers created vegetative growth, that now results in a dense thicket-like wall.

Our vision is a city with diverse, invasive-free, sustainable forested parklands. An aware and engaged community will support Seattle's urban forest. Individuals, neighborhoods, non-profits, businesses, and City government will work together to protect and maintain this resource. Like buildings, an urban forest provides an architectural framework for the city. This framework is often called a "green infrastructure". The urban forest is a continual reminder that even though we reside in a large city we are inextricably tied to the natural environment.

The Green Seattle Parnership goal is to promote a livable city by re-establishing and maintaining healthy forested parklands throughout the city. The Colman Park Vegetation Management Plan is an important part of our overall urban forestry restoration goals at Seattle Park and Recreation. The overall objectives include: 1.) Restore all 2,500 acres of Seattle forested parklands by 2025. 2) Establish financial and volunteer resources to provide long-term maintenance and ensure the sustainability of forested parklands. 3) Galvanize an informed, involved, and active community around forest restoration and stewardship.

1.3 PROJECT GOALS

Implement the Colman Park vision and facilitate forest parkland restoration in the following ways:

- Revitalize the neighborhood and the extended, greater city with a restored park habitat.
- Beautify the upper slope with the implementation of a new, healthy landscape.
- Replace colonizing species and invasives with native plants.
- Provide an amenity that the entire community can enjoy for years.
- Improve and increase view opportunities into the park from adjacent streets and arterials, while adding more "eyes" on the park to diminish undersirable activities.
- Encourage community park stewardship to enhance public perception and user activity.
- Open up the western entrances to create safety and comfort for visitors
- Establish a long-term plan to provide continued stability of the hillside and overall landscape.

1.4 SITE, LOCATION, AND CONTEXT

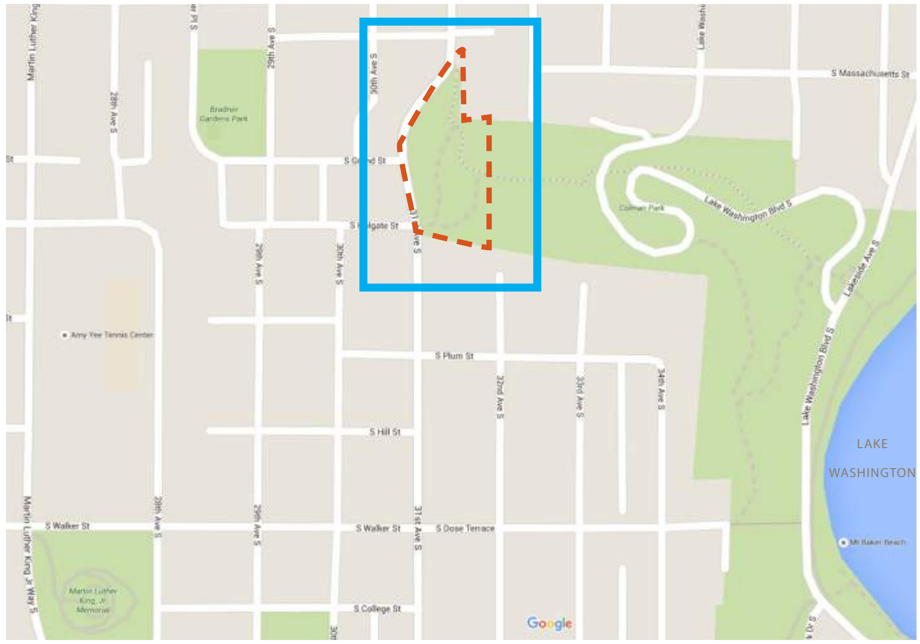
PROJECT SITE:

"Upper" Colman
"Colman Vista"
"Upper slope"
"West entryway"

BORDERS:

S Massachusetts St
S Holgate St
Colman Park P-Patch
31st Ave S

PROJECT SITE LOCATION



PROJECT SITE CONTEXT MAP

1.5 PUBLIC INVOLVEMENT AND MEETINGS

Public meetings took place in 2016, Colman Vista Restoration #1, Discovery, Colman Vista Restoration #2, Vision, and Colman Vista Restoration #3, Consensus. These meetings gained input and feedback regarding the scope of the Colman Park Vista project ,where there was overwhelming support of restoring the Olmsted vision of the park by removing the bigleaf maple trees and restoring the park's vegetative health. The first meeting provided an overview of the project including reports by the geotechnical consultant and arborist, and asked for input from the community. The second meeting reported on the comments and feedback received from the first meeting and presented three different design options for feedback.

Friends of Colman Park Vista (FoCPV) is a group of community members and Mt. Baker neighbors who received a Small and Simple Neighborhood Matching grant from the Seattle Department of Neighborhoods to fund the evaluation of the slope by a geotechnical consultant, the development of a Vegetation Management Plan, and a recommended native plant list by a certified arborist and Seattle Parks and Recreation's plant ecologist.

2.0 Historical Context

2.1 HISTORY

HISTORY OF THE PARK

The historic Olmsted Plan for the park was prepared by the Olmsted Brothers in 1910. The original design for the Park had envisioned that the western edge of the Park would be covered with native and adaptive plants consisting of low-growing trees and shrubs to create a beautiful entry into the park and provide view opportunites at the upper edge of the slope.

The neighborhood surrounding the upper slope was almost entirely African American in the 1970s. Neighbors who have lived in the community for 30, 40, 50 years have attended the Public Meetings for this project and have stated that they feel this area of the Park has been ignored, mismanaged, and neglected for decades due to this being a historically, predominantly African American community. In the late 1970s the upper park access was blocked with fences, and the public was unable to enter Colman Park from the Upper Colman Park Vista. Many of these neighbors still live in the community and have expressed anger that the public vista has been allowed to become blocked, that what was once the park entrance has become overgrown, and that the entry into the park feels unwelcoming and unsafe.

TIMELINE OF EVENTS

1910 - Design Completed

1934 - Parks Nursery

1974 - P-Patch Developed

1978 - Fence Installed Blocking Entry at Upper Colman Park

1991 - Tree Pruning Request

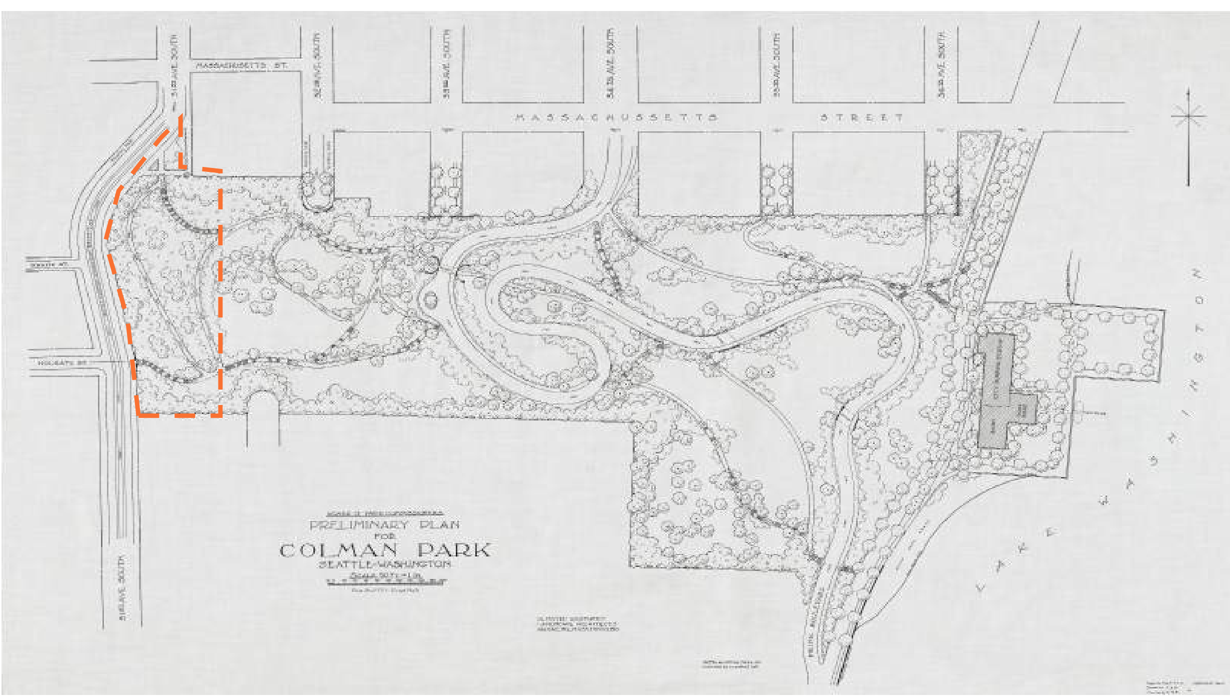
2004 - Community Petition

2014 - Colman Park Vista group initiated

2016-Colman Vista Restoration #1 - Public Meeting - Discovery

2016- Colman Vista Restoration #2 - Public Meeting - Vision

2016-Colman Vista Restoration #3 - Public Meeting - Consensus



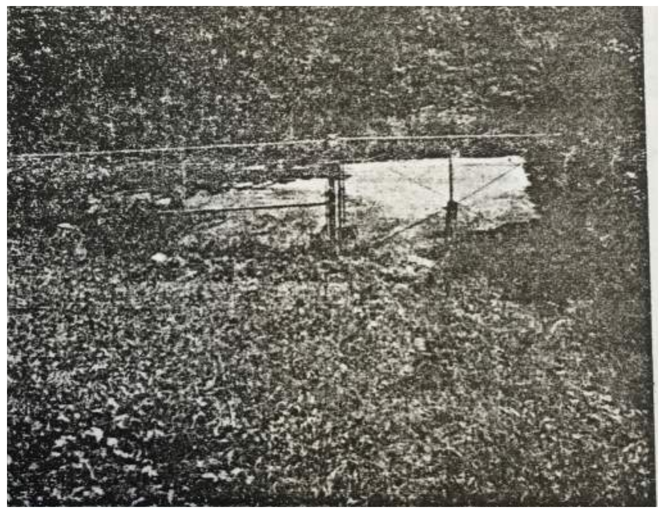
Colman Park - Preliminary Plan 1910
Board of Parks Commisioners
Olmsted Brothers, Landscape Architects
Original plan for Colman Park (source: Olmsted Online)

2.2 HISTORICAL PHOTOS

1947

1971

1978 Fence/blockades installed



1978 Fence installed bloacking access

1991

3.0 Existing Conditions

3.1 EXISTING VEGETATION

Along 31st Avenue South, the western edge of Colman Park, stands an existing guard rail with a well-maintained, short, dense laurel hedge running along the sidewalk for the entire length of the park's boundary. The sidewalk is bordered by a curb that would prevent major storm water runoff from the street above. Power and communication lines are limited to the sidewalk and street area. Two steep staircases at the southwestern and northwestern corners of the park appear to be in good shape with sides covered in moss but no obvious cracks or apparent uplift by tree roots. An unpaved path (approximately an average of 35 to 45 feet from the street level) runs in a north-south direction, perpendicular to the street, and is a natural terrace between the steep upper slope and lower slope areas.

The western boundaries of Colman Park reveal heavy vegetation with a variety of trees, shrubs, and understory plants. The current understory includes tall bushes, saplings, ferns, smaller low-lying plants, some berry and some ivy vines. Most of the understory plants are thriving and are in various stages of growth with several of them noted to be either budding or flowering, indicating that the shade and moisture levels provided by the current canopy are ideal for the current plant community. The present undergrowth is in patches of thicket-like areas of either larger bushes with ferns, or areas of low-lying smaller plants, with small clearings in between. The clearings typically found in densely forested areas contain broken and decaying branches and leaf matter, important nutrient sources for the detritivores of the park's food web. Invasive plants and noxious weeds, such as English ivy, Himalayan blackberry, and some dandelion species were not often observed, a testament to the success of the current invasive plant removal by city volunteers and the Green Seattle Partnership.

Most of the trees on site consist of solitary or clump bigleaf maples and other deciduous species, with trunks ranging from approximately 3-20 inches in diameter and occasional trunks >20 inches on the steeper slope area near 31st Street. Several larger, mature evergreen trees with trunks measuring >2 feet in diameter were also observed, especially in the lower slope area. The majority of the tree trunks are straight, with very few leaning, and any clump bigleaf maples exhibit an outward and upward curvature. A few of the bigleaf maples do appear to be either top heavy or have some root exposure, with only a few smaller trees leaning.

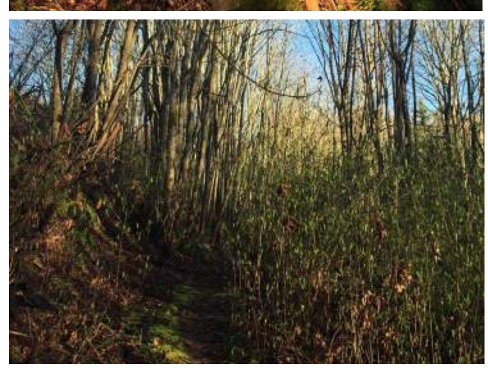
3.2 LANDSCAPE ECOLOGY

The existing landscape as reported by a certified arborist presents as:

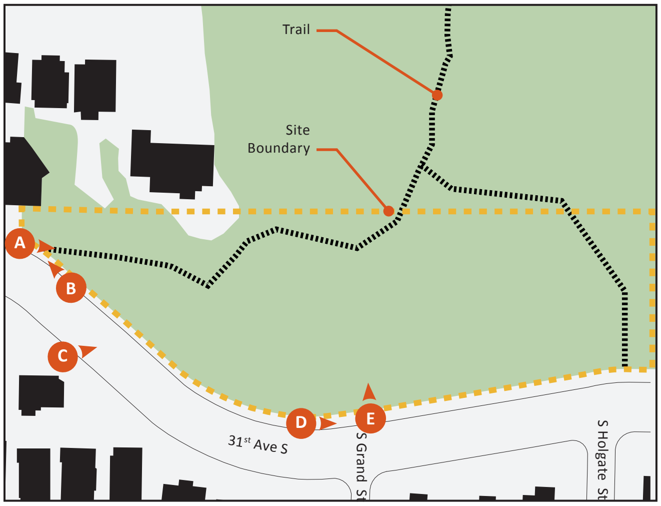
Stump sprout trees are unsustainable over long-term
- Poor forest structure
- "Stump sprout" architecture is inherently weak
- Basal trunk decay has been observed

Dense vegetation below the steep slope
- Mix of native, introduced, and invasive species
- Mature conifers and ornamental shrubs
- Recent plantings along trails has been observed

Bare ground on steep slope
- Maple understory sparse and lacking in diversity
- Invasive species present
- Native tree and shrub seedlings present
- Evidence of restoration efforts: recent plantings of fern and perennials



3.3 SITE PHOTOS



KEY PLAN

North

A SIGNAGE AT NORTH ENTRANCE

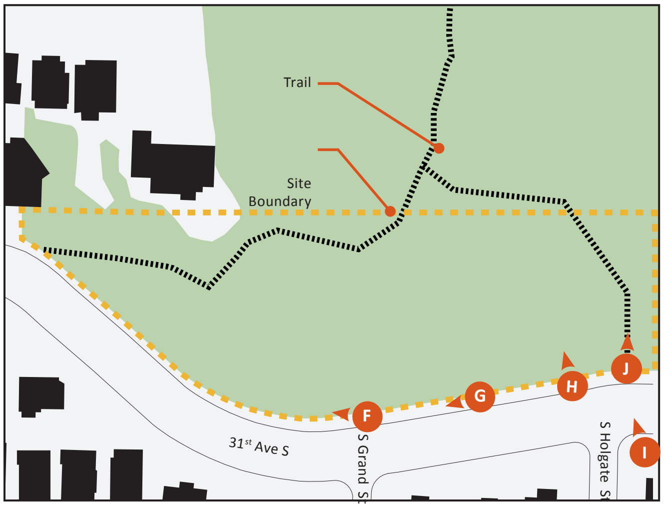
B NORTH ENTRANCE & ADJACENT RESIDENCE

C VIEW FROM ACROSS 31ST AVE S

D PARK EDGE CONDITION AT 31ST AVE S & S GRAND ST

E COLMAN VISTA FROM EASTERN SIDEWALK

SITE PHOTOS, CONTINUED



KEY PLAN

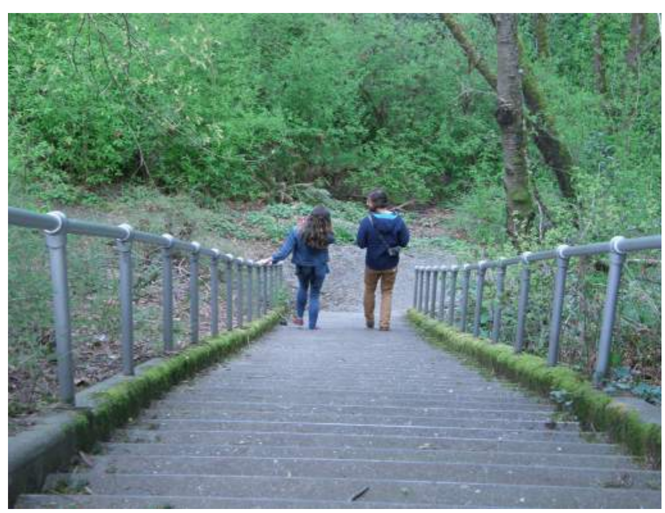
North

F **GUARD RAIL DETAIL**

G **LOOKING NORTH ALONG S 31ST AVE**

H **COLMAN VISTA DETAIL**

I VIEW OF SOUTH ENTRANCE FROM ACROSS S 31ST AVE



J **SOUTH ENTRANCE STAIRCASE DETAIL**

3.4 OPPORTUNITIES AND CONSTRAINTS VISUAL SUMMARY

OPPORTUNITIES

- 01 Upper slope: view opportunities from ridgeline
- 02 Native vegetation
- 03 Mt. Baker Park connectivity
- 04 Multi-modal connectivity (bicycle, bus)

CONSTRAINTS

- 01 Guard rail
- 02 Steep slope
- 03 No ADA access
- 04 Invasive vegetation

4.0 Geotechnical Findings Presentation

Based on the report by Associated Earth Sciences, Inc. dated April 27, 2016, their opinion is the proposed park restoration is feasible from a geotechnical standpoint. If proper mitigation measures are taken, they do not foresee a significant risk of erosion, sloughing, slumping, or other soil movements on the subject hillside resulting from the removal of the existing deciduous trees.

The full Geotechnical report, including recommendations, is attached in Appendix F.

Regional Geology
- Dense glacial till "cap"
- Dense advance outwash below "cap"
- Dense/hard older glacial deposits extending down below lake level

Overall Stability
- No recent activity
- No significant settlement, tilting, or cracking of road and sidewalk

Stormwater Management
- Curbs prevent direct run off from road or sidewalk
- No daylighting pipes observed

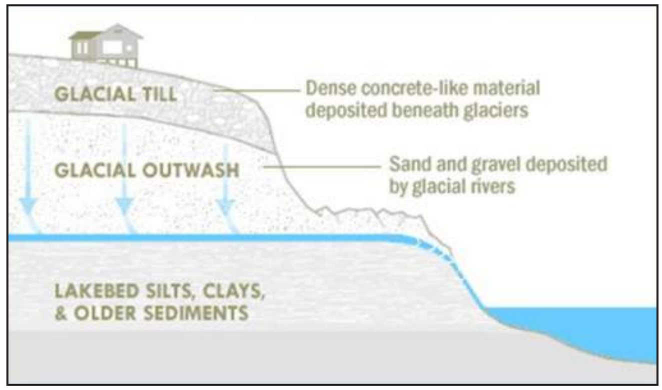
Topography
- Steep grades (3H:1V average; 1.5H:1V maximum)
- Very steep cut banks (near-vertical)

Soils
- Colluvium and Topsoil: 1-2 feet thick
- Recessional Outwash: 1.5 to 3.5 feet thick
- Glacial Soils: medium dense to dense

Stability
- No evidence of significant erosion
- No evidence of recent sloughing
- No evidence of recent slumping

Tree Removal Considerations
- Overall stable soil conditions
- Existing deciduous trees provide shallow soil support, however seasonally, tree canopies play a key role in reducing erosion and soil loss through coverage during rain events
- Removal feasible if shallow root network is restored

Hillslope Restoration
- Slope disturbance should be minimized during all work
- Bare/disturbed areas should be protected to prevent erosion and soil loss
- Slope should be replanted with groundcover immediately
- Strategize planting during fall season to ensure survival success.



Existing conditions at Colman Park

Example implementation photos courtesy of nurserytrees.com

5.0 Vegetation Management Plan

5.1 VEGETATION MANAGEMENT SUMMARY

Seattle Parks and Recreation, Green Seattle Partnership (GSP) plant ecologists and arborists, have developed a comprehensive, vegetative management plan that aims to revitalize the landscape health of Colman Park.

5.2 VEGETATION PLAN IMPLEMENTATION

UPPER SLOPE

Bigleaf maple and non-native invasive tree removal

- Retain small sections of cut logs to be placed perpendicular to the slope as a soil protection aid. Retaining some cover with large woody debris will aid protection of the slope from surface erosion. This also reduces the amount of woody material to be removed from the site.
- Retain non-hazardous standing dead trees to act as bird habitat snags and increase wildlife bio-diversity; remove standing dead trees that have been declared hazardous.
- Retain as much of existing ferns and shrubs as possible. Tree removal work can be expected to impact existing vegetation.
- Work of this scale on steep slopes should be done during the dry season.

Slope planting

- Proposed native planting plan will be determined by the Seattle Parks and Recreation, GSP plant ecologist, arborist and arboriculturist .
- Protect any exposed soil and stabilize the slope with Stormwater and Erosion Control BMPs identified within the Construction Stormwater Pollution Prevention Plan (CSPPP) prepared by the plant ecologist.
- Plant selections will be of native species; plant material sizing and staging to be determined by the plant ecologist and will vary according to environmental conditions.
- Plant ecologist will specify a variety of trees and shrubs to establish a high density coverage and maintain the slope.

Establishment period maintenance and follow up during the first 3-5 years

- Plant establishment phasing and maintenance schedules will be determined and monitored by the Seattle Parks and Recreation, GSP plant ecologist.

LOWER AND MID SLOPE

Selective removal of suppressed trees to thin out crowded stand conditions.

- Identify weak and highly suppressed trees for removal.
- Access for removal of large woody debris and brush is limited. Plan for methods of retaining woody debris as is done for natural area restoration sites as an alternative for removing all debris.

Install ferns, low growing shrubs and ground cover plants during the dormant season.

- Manually irrigate plant material approximately every two weeks during summer months, and weekly during periods of extreme heat or drought.
- Irrigation schedules will vary, as they are weather dependent; schedules will be determined by the Seattle Parks and Recreation, GSP plant ecologist.

Treatment to prevent re-growth of cut stumps of big leaf maple and other trees to be specified by the Seattle Parks and Recreation, GSP plant ecologist:

Localized herbicide treatment specific to stumps will disable plant re-growth, while maintaining soil structure and stability at steep areas during new plant establishment. Herbicide treatment will remain localized to the tree stump and not migrate to adjacent soils and vegetation via stormwater run-off. In addition, removal of recurring sprouts at the stumps with weeding rotations will be included in the maintenance plan.

In the first years after re-planting of cleared areas, particularly on the slope, the site would be vulnerable to significant impacts from extreme weather events in the form of rain storms and heat waves. Stormwater and Erosion Control BMP's specified by the Seattle Parks and Recreation, GSP plant ecologist will provide measures for slope protection during these vulnerable periods.

5.3 COLMAN PARK - PLANT PALETTE (PER ARBORIST AND ECOLOGIST RECOMMENDATIONS)

#	PLANT TYPE	COMMON NAME	BOTANICAL NAME
1	Groundcover	Western Trillium	Trillium ovatum ssp ovatum
2	Groundcover	Vanilla Leaf	Achlys triphylla
3	Tree	Pacific Madrone	Arbutus menziesii
4	Groundcover	Beach strawberry	Fragaria chiloensis
5	Shrubs	Oceanspray	Holodiscus discolor
6	Small tree	Vine maple	Acer circinatum
7	Groundcover	Twinflower	Linnea borealis ssp longiflora
8	Shrub	Low Oregon grape	Mahonia nervosa
9	Shrub	Evergreen huckleberry	Vaccinium ovatum
10	Shrub	Salal	Gaultheria shallon
11	Groundcover	Sword fern	Polystichum munitum
12	Shrub	Orange honeysuckle	Lonicera ciliosa
13	Groundcover	Oregon oxalis	Oxalis oregana
14	Tree	Cascara	Rhamnus purshiana
15	Shrub	Pacific rhododendron	Rhododendron macrophyllum
16	Shrub	Baldhip Rose	Rosa gymnocarpa
17	Shrub	Red flowering currant	Ribes sanguineum
18	Shrub	Tall oregon grape	Mahonia aquifolium
19	Shrub	Thimbleberry	Rubus parviflorus v. parviflorus
20	Tree	Scouler's willow	Salix scouleriana
21	Tree	Douglas fir	Pseudotsuga menzeisii
22	Shrub	Red elderberry	Sambucus racemosa v. racemosa
23	Tree	Pacific dogwood	Cornus nuttallii
24	Shrub	Common snowberry	Symphocarpos albus var. laevigatus
25	Tree	Pacific Yew	Taxus brevifolia
26	Groundcover	Fringecup	Tellima grandiflora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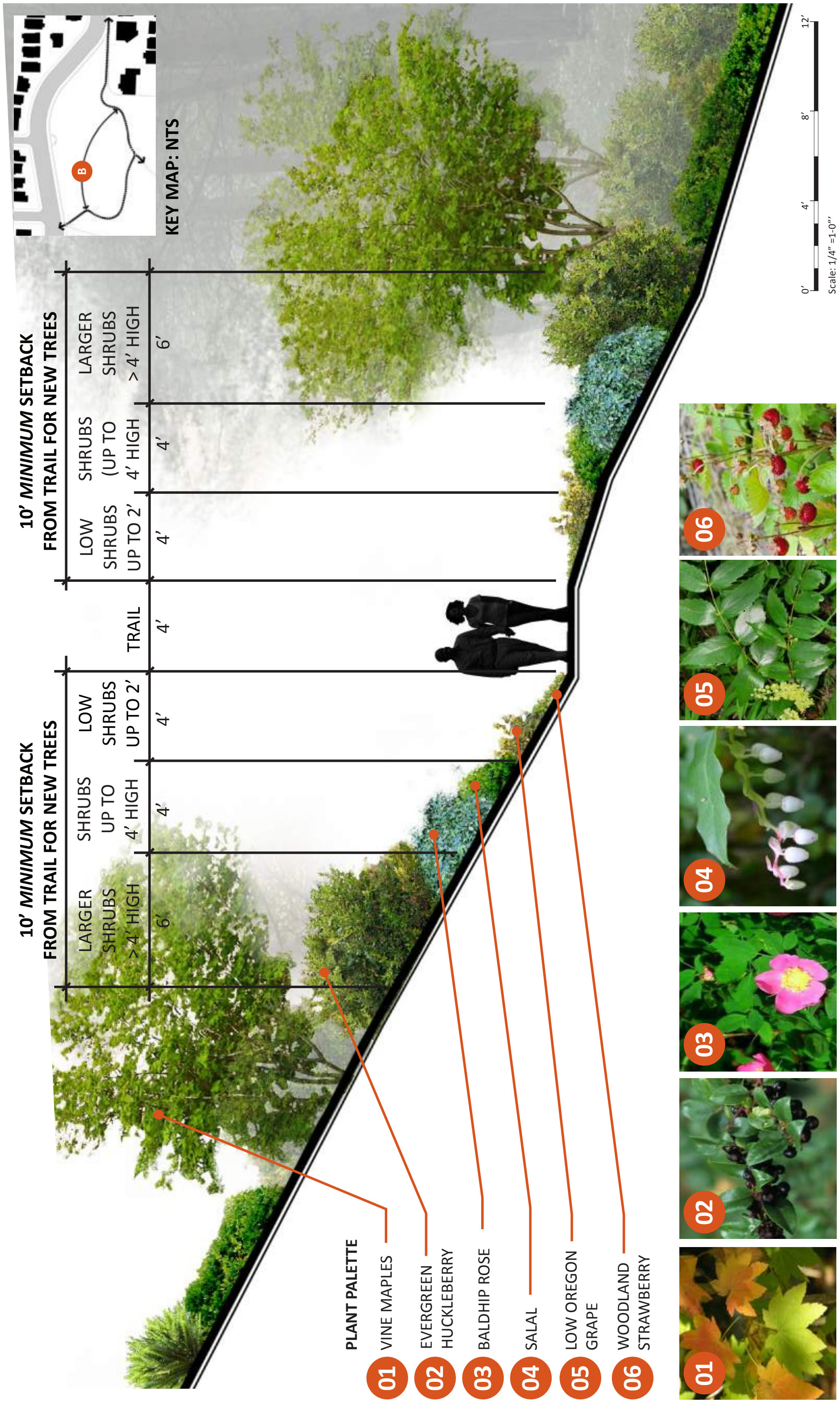
5.4 VEGETATION PLAN

5.5 SECTION A - COLMAN VISTA - UPPER TRAIL



5.6 SECTION B - COLMAN VISTA - LOWER TRAIL

Appendix A

Arborist Report

Urban Forestry Services, Inc.
Arboricultural Consulting

DRAFT

June 22, 2016

Colman Park Vista Project
Arborist Recommendations - Vegetation Management Plan

Introduction

The current condition of vegetation within the project area is in less than desirable condition relative to the stated goals of the study - dense cover of multi-trunk big leaf maple trees with poor structure that block views, and shade out understory vegetation in the steep slope area; closely spaced mature specimens of ornamental conifers, trees, and shrubs dominate the area below the slope. Many of these plants have poor form and low live-crown ratios due to being shaded out by the adjacent vegetation. These conditions are largely the result of long-term landscape development without adequate intervals of stewardship and landscape management.

Recommendations in the 1996 Anderson plan for the Colman Park slope included coppicing the big leaf maple trees every 5 years, eliminating some trees at each rotation, and fostering the development of lower growing trees and shrubs with a target of eliminating the tall trees over 30 years. Had that schedule been adhered to, the character of vegetation on the slope would be very different from what is there today. The current size and crowded condition of the big leaf maple trees is the combined result of 20 years of growth following the initial coppicing and deferred maintenance. While the Anderson plan provided very good recommendations for the time it was produced, not all of the components of that plan would be applicable to current site conditions and to some current best management practices in vegetation management and restoration.

The project team has identified a strong consensus for restoring the view and improving access to the park from 31st Avenue South. **In deciding on an approach to achieve those objectives, we cannot emphasize enough the importance of having committed resources and expertise for site care during the first 5 to 7 years after planting that is appropriate to the specific restoration plan chosen.** No matter what approach is used, its success or failure will hinge on those first years of aftercare and adaptive landscape maintenance.

Provided below is a summary of potential options for methods of re-vegetation and subsequent landscape management requirements. The installation, maintenance, and

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anticipated challenges should be carefully considered in moving ahead with any specific plan of action.

Colman Park Vista Restoration Goals and Objectives

The key goals and objectives that have been identified for a new planting scheme are to

- Restore views into and through the park.
- Improve use access to the park.
- Adhere to an Olmsted inspired design scheme.
- Utilize careful selection of vegetation for site specific adaptations and sustainability.

Colman Park Vista Restoration Site Details

The physical areas to be addressed in the plan for vegetation improvements are

- Steep slope with big leaf maple stump sprouts.
- Lower area with dense, mature mix of native and ornamental trees and shrubs.
- Main entries, stairs, and trails.

We have provided recommendations for vegetation management and plant selection as related to the conditions and future goals for each of those areas.

Restoration Options and Methods

1. Single-phase Tree Removal and New Planting

Removal of all of the undesired trees and installation of new plantings in a single phase would result in an immediate and dramatic change to the visual and ecological conditions of the site. Removal of all the big leaf maples and other tall trees in one operation may offer the benefit of immediate change in light and views, but will have significant trade-offs in the amount of effort that will be required to plant and maintain a new landscape.

Specific considerations to this approach are dependent on correct timing within the growing season to conduct removal and planting work, methods to mitigate the full exposure of the slope and retained plants, and providing for an intensive schedule for aftercare and irrigation during the first growing season.

One of the challenges is the use of plants adapted to bright light conditions to help ensure optimal establishment and coverage. Many of these plants will not thrive over time as the larger species establish and shade cover increases.

A similar slope restoration project was undertaken nearby on Seattle Parks property at the foot of Dose Terrace, south of the stairway. This project was a joint effort between the community and Seattle Parks. It began in 1997, with removal of big leaf maple trees and post-planting site maintenance provided and led by John Hushagen of Seattle Tree Preservation, Inc. In personal communication, John related that there was far greater growth of blackberry and brush smothering the new plantings than had been anticipated and that a single crew day for annual maintenance to manage that brush was sorely inadequate. In addition to planning for more frequent maintenance visits, he feels there would have been better overall success and less undesired invasive growth had the maple trees been removed in stages.

In the first years after re-planting of cleared areas, particularly on the slope, the site would be vulnerable to significant impacts from extreme weather events in the form of rain storms and heat waves. Additional measures for protecting the slope and summer irrigation are recommended.

With these considerations in mind, listed below are key data points to include in planning, budgets, and implementation schedules.

1) Upper Slope - 44,000 square feet
   a) Big leaf maple removal
      i) Inventory the number of trees to be removed for budgeting and scheduling.
      ii) Retain small sections of cut logs to be placed perpendicular to the slope as a soil protection aid. Retaining some cover with large woody debris will aid protection of the slope from surface erosion. This also reduces the amount of woody material to be removed from the site.
      iii) Retain as much of existing ferns and shrubs as possible. Tree removal work can be expected to impact existing vegetation.
      iv) Work of this scale on steep slopes should be done during the dry season.

   b) Slope planting
      i) Protect any exposed soil with coir fiber erosion blanket, anchored with landscape pins and larger wood debris retained from tree removal work. The bio-degradable coir fiber serves as an "instant" organic mulch cover that is mechanically fastened to the slope. The logistics and effectiveness for installation are better than for applying wood chips on steep slopes.
      Estimated costs are $10 per square foot.
      ii) Cut slits through the erosion blanket for planting as needed and keep soil disturbance to an absolute minimum during planting operations.
      iii) Use a minimum 2-gallon size for shrubs and 1.5" caliper for trees. Plant selection may be native species or combination of native and woodland ornamental species.
      iv) Plant with a mix of a variety of trees and shrubs for high density coverage.
      Estimated costs are $7 per square foot.

v) One-half inch diameter emitter tubing drip irrigation with 24" in-line emitter spacing offers a labor-efficient method for establishing new plants on slopes. It can be operated from a standard hose bib. It is more efficient with less potential for water run-off issues than overhead impact sprinklers. The pressure regulated emitters provide equal water distribution over long runs and on slopes that standard soaker hoses cannot deliver.
Estimated cost is approximately $0.25 per linear foot in materials.

c) Establishment period maintenance and follow up during first 5 years
   i) Year 1 irrigation: An optimal operating schedule for deep watering with the emitter tubing is once per week with 6 to 8 hour run times.
   ii) Years 2 through 5: Reduce irrigation frequency by one week each year as plantings become established. Water every 2 or 3 weeks during years 2 and 3, every; 4 weeks in year 4, and during extreme heat periods in year 5. -
   iii) Monitor and weed as needed every 2 weeks between May and September. Weeding should be conducted by individuals able to identify significant weed species at early stages of growth and be trained for working safely on steep slopes.
   iv) Annual fall replacement planting as needed.

2) Lower Slope - 31,500 square feet
   a) Selective removal of suppressed trees to thin out crowded stand conditions.
      i) Identify weak and highly suppressed trees for removal.
      ii) Access for removal of large woody debris and brush is limited. Plan for methods of retaining woody debris as is done for natural area restoration sites as an alternative for removing all debris.
      iii) Provide 3-inch depth of wood chip mulch.
   b) Install ferns, low growing shrubs and groundcover plants during the dormant season.
   c) Irrigate by hand or with soaker hoses every two weeks on average during summer, weekly during periods of extreme heat or drought.

2. Staged Tree Removal and Replacement Planting

Removal of the big leaf maples and other tall trees in an organized sequence of stages offer benefits of allowing intermittent light and changing the vegetation content with less severe ecological and maintenance impacts over the long run.

The potential for excessive undesirable growth is avoided. There will be less water stress to newly establishing plantings than with a completely cleared slope. Plant selection can include both shade and sun for long term performance as the maple canopy is phased out. This offers greater potential for establishing strong vegetative cover with less demand for workers to traverse the slope for maintenance.

1) Upper Slope - 44,000 square feet
   a) Big leaf maple removal
      i) Inventory the number of trees to be removed for budgeting and scheduling.
      ii) Divide into two segments of removal with consideration for ease of access for stage two.
      iii) Conduct stage two removals 2 or 3 years after stage one removals.
      iv) Retain small sections of cut logs to be placed perpendicular to the slope as a soil protection aid. Retaining some cover with large woody debris will aid protection of the slope from surface erosion.
      v) Schedule work during the dry season.
      vi) Retain existing ferns and understory shrubs.
      i) Schedule work during the dry season.

   d) Slope planting
      i) Use coir fiber erosion blanket as described above. Much less material will be needed under this scenario.
      ii) Overall new planting quantities may be as much as one-half less under this scenario. Estimated costs could be closer to $3 per square foot over the entire slope area.

      iii) Use a minimum 1-gallon size for shrubs and 1 " caliper for trees. Plant selection may be native species or combination of native and woodland ornamental species.
      iv) Emitter drip irrigation tubing is still a good option. .

   e) Establishment period maintenance and follow up during first 5 years
      i) Year 1 irrigation: With the benefit of high canopy cover, irrigation may be reduced to every two weeks the first year.
      ii) Years 2 through 5: Reduce irrigation frequency by one week each year as plantings become established.
      iii) Monitor and weed as needed every 3 weeks between May and September. Weeding should be conducted by individuals able to identify significant weed species at early stages of growth and be trained for working safely on steep slopes.
      iv) Annual fall replacement planting as needed. Plant mortality can be expected to be much lower with this option.

3) Lower Slope - 31,500 square feet
   a) Same as shown in section 1 above.

3. Treatment to prevent re-growth of cut stumps of big leaf maple and other trees

Due to concerns for the the potential of herbicide run-off toward the P-Patch, we advise against the use of any herbicides for stump treatment. The logistics of the steep slope conditions makes the use of stump grinders prohibitive.

Another alternative to managing stump sprouts is to

- Cut stumps as flush as possible to grade.
- Pin a solid layer of cardboard over the entire stump and root flare.
- Cover the cardboard with wood chip mulch.
- Pin erosion jute over the top to hold the wood chip mulch in place over the cardboard. This will help suppress and shade out the sprouting response of the stump.
- Include removal of any recurring sprouts with weeding rotations.

Colman Park Existing Slope Conditions:

Existing ferns and other desirable slope vegetation could be retained if selective staged removal of the maples is done. Additional sword fern and companion groundcovers, possibly other shrubs, would be planted at the same time.

Example of slope preparation for restoration planting after a slide event on a steep slope:

1. Coir fiber erosion blanket placed over bare soil after a slide event.

2. The same slope with the addition of sand bags and new plant installation. Large woody debris was added over much of the coir blanket. Natural leaf fall from adjacent trees covered the surface over the following years.

3. Close up of newly planted vine maple with coir fiber and sand-bags. For the Colman project, retaining larger woody debris from the maple removals would take the place of sand bags used in this example.

Example of vegetation competition around new plants on a site that was completely cleared before planting:

1. Weed control should be provided several times during the growing season to suppress rapidly growing grasses, blackberry, and brush that can quickly overcome new plantings.

Appendix B

Geotechnical Report

associated earth sciences incorporated

April 27, 2016
Project No. TE160115A

BCRA
414 Stewart Street, #200
Seattle, Washington 98101

Attention: Mr. Alan McWain

Subject: Geotechnical Slope Assessment
Colman Park Restoration
South Grand Street & 31st Avenue South Vicinity
Seattle, Washington

Dear Mr. McWain:

Associated Earth Sciences, Inc. (AESI) is pleased to submit this report describing our geotechnical slope assessment concerning the planned restoration of Colman Park in Seattle, Washington. AESI's geotechnical services for this project were completed in general accordance with our proposal dated March 30, 2016, and were authorized by your email on April 1, 2016.

SITE AND PROJECT DESCRIPTION

The project site comprises a portion of an existing municipal park located in the Mount Baker neighborhood of Seattle, as shown on the attached "Vicinity Map" (Figure 1). This park is roughly delineated by South Massachusetts Street on the north, by South Holgate Street on the south, by 31st Avenue South on the west, and by Lake Washington Boulevard on the east. Our specific area of study for this project is a steep, forested hillslope at the westernmost (upper) end of the park, adjacent to 31st Avenue South. The attached "Site and Exploration Plan" (Figure 2) illustrates our study area.

We understand that Colman Park was designed by the Olmstead Brothers Landscape Architects in 1910. They envisioned the upper portion of the park to serve as a view corridor extending outward to Lake Washington and beyond. However, in recent decades, the view corridor has been blocked by colonizing deciduous trees. Park restoration plans call for cutting or removing

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Everett Office | 2911 ½ Hewitt Avenue, Suite 2 | Everett, WA 98201 P | 425.259.0522 F | 425.827.5424
Tacoma Office | 1552 Commerce Street, Suite 102 | Tacoma, WA 98402 P | 253.722.2992 F | 253.722.2993
www.aesgeo.com

these colonizing trees from the hillslope and then planting groundcover, bushes, and lower-growing trees.

PURPOSE AND SCOPE

The purpose of our geotechnical evaluation was to characterize general surface and near-surface conditions at the site in order to derive opinions regarding erosion and landsliding risks and mitigations related to the proposed tree removal. Our scope of work included the following items.

- Performed a visual surface reconnaissance of the subject hillslope and immediate vicinity;
- Reviewed topographic maps, geologic maps, lidar images, and aerial photos pertaining to the site;
- Advanced four hand borings (designated HB-1 through HB-4) at widely spaced locations across the hillslope;
- Analyzed geotechnical data in context with the planned restoration plan; and
- Prepared this written report presenting our conclusions and recommendations.

FIELD EXPLORATION PROCEDURES

We explored surface and near-surface conditions at the site on April 8, 2016. The number, locations, and depths of our explorations were completed within site access and budgetary constraints. Our exploration procedures are described below. The various types of sediments, as well as the depths where characteristics of the sediments changed, are indicated on the exploration logs presented in Appendix A. Soil contact depths shown on the logs should be regarded as only an approximation; the actual changes between sediment types are often gradational and/or undulating.

The conclusions and recommendations presented in this report are based, in part, on conditions encountered by our explorations completed for this study. Due to the nature of subsurface exploratory work, it is necessary to interpolate and extrapolate soil conditions between and beyond the field explorations. Differing subsurface conditions could be present outside the area of the explorations due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of any variations between the field explorations might not become fully evident until a later time.

Hand Borings

All hand borings were performed by an AESI geotechnical engineer and geologist. Each boring was advanced using a hand auger with a 4-inch-diameter cutting barrel. Materials encountered in the exploration pits were studied and classified in the field by our representatives. Relative soil densities were estimated on the basis of hand auger turning resistance and hand probe tip resistance. Before leaving the site, we backfilled all auger holes with excavated soils and then foot-tamped the surface.

SITE CONDITIONS

The following text sections describe our observations and findings related to current site conditions, including development, vegetation, regional and local topography, regional geology, local soils, and local ground water. Our sources of information include topographic and geologic maps published by the U.S. Geological Survey (USGS).

Regional and Local Topography

Colman Park extends from the topographic crest of Mt. Baker Ridge downward to Lake Washington. This regional hillslope has a vertical relief of about 300 feet over a horizontal distance of about 1500 feet, which corresponds to an overall gradient of approximately 5H:1V (Horizontal:Vertical). The park occupies a large topographic gully feature that has a relatively broad concave shape at the top and becomes more sharply defined near the bottom.

Our geotechnical evaluation encompassed the uppermost portion of Colman Park, extending from the 31st Avenue South sidewalk (at an elevation of about 275 feet) downward to a community pea patch (at an elevation of about 200 feet). Local site grades across this study area are steepest at the top and gradually become more moderate near the bottom. We estimated to the maximum gradient to be on the order of 1.5H:1V and the average gradient to be about 3H:1V. Site Photographs 3A and 3B (Figure 3) depict typical topographic conditions at the upper part of the site. Locally steeper cut slopes ranging up to 3 or 4 feet high, with near-vertical inclinations, are present along the uphill side of the trails and footpath.

Existing Development

The project site is undeveloped except for concrete stairways at the northern and southern ends, and a gravel pedestrian trail that curves around the eastern (lower) side. There is also a narrow footpath traversing through the middle of the site in a roughly north-south direction, as approximately shown on Figure 2. Both concrete stairways appear to be quite old but are in generally good condition; we did not observe any significant cracking or deformation that might be related to slope movements.

A municipal sidewalk and raised curb extend around the western (upper) edge of the site, adjacent to 31st Avenue South. These concrete features, which are shown in Site Photographs 4A and 4B (Figure 4), appear to be in very good condition. We did not observe any cracking, warping, settlement of the sidewalk or curb, nor any other evidence of soil movement along the top of the hillslope. A 6-inch-diameter plastic pipe is visible immediately behind the curb in several locations, but we could not determine the purpose of this pipe.

Existing Vegetation

The project site is heavily vegetated with a variety of trees and undergrowth. Existing undergrowth includes tall bushes, saplings, ferns, low grasses, and some berry vines. This undergrowth tends to exist in patches, with small clearings between. Most of the trees consist of solitary or clump maples and other deciduous species, with trunks ranging from about 3 to 18 inches in diameter. However, we did observe several mature evergreen trees with trunks measuring several feet in diameter.

We gave particular attention to the shape and orientation of the tree trunks, because this can provide information about the behavior of hillslope soils. Most tree trunks appear to be fairly straight or, in the case of clump maples, curved outward. Some trunks exhibit a downslope curvature, which typically results from "soil creep" (a very slow, downslope migration of surficial soils). We did not observe a consistent occurrence of upslope-leaning trunks, which often indicates "slumping" (a relatively sudden rotational failure of the deeper soils).

Regional Geology

The 2005 USGS document titled *The Geologic Map of Seattle – A Progress Report* depicts several geological units in the Colman Park vicinity. The topographically and stratigraphically highest unit is a *glacial lodgement till* deposit that forms a cap over the crest of Mt. Baker Ridge and wraps around the upper edge of the park. Lodgement till typically comprises a very dense, unsorted mixture of silts, sands, gravels, and cobbles. Thicknesses can range from a few feet to several tens of feet. As a historical note, the 1962 USGS document titled *Preliminary Geologic Map of Seattle and Vicinity, Washington* shows glacial lodgement till extending the entire vertical range of Colman Park.

Although not indicated on either geologic map, *recessional outwash* commonly mantles lodgement till. Recessional outwash is glacially deposited (but not glacially overridden) and typically consists of loose to medium dense sands, gravelly sands, and/or silty sands. Thicknesses usually range from only a few feet up to about 10 feet.

According to the 2005 geologic map, the lodgement till is underlain by glacial *advance outwash*. This glacially overridden deposit typically consists of dense to very dense sands, sandy gravels, or gravelly sands. Thicknesses can range from several tens of feet to several hundred feet. The geologic map shows that advance outwash is exposed across the upper portion of Colman Park, such that it encompasses the entire project site.

Below the advance outwash deposit, the 2005 geologic map shows a pre-Olympia fine-grained glacial soil consisting of hard, laminated to massive silt and clay with some sandy interbeds. Thicknesses can range from a few feet to several tens of feet. The geologic map shows these silts and clays exposed across the middle portion of Colman Park, closely downslope from the project site.

Two additional pre-Olympia glacial deposits are mapped across the lower portion of Colman Park. These older deposits consist of hard or dense, randomly sorted mixtures of gravel, sand, silt, and clay.

It should be noted that the geologic map shows "landslide material" mantling all of the above-described soils throughout Colman Park, but no details are given. We infer that this material likely comprises a relatively thin layer of sands, silts, and gravels derived from the glacial lodgement till and/or glacial advance outwash deposits exposed in the uppermost portion of the park. Such material is often called *colluvium* when the specific source or depositional mechanism is not clearly known.

Local Soil Deposits

All four of our exploratory hand borings disclosed fairly uniform near-surface soil conditions at the project site, but the observed soils were not necessarily consistent with the above-referenced geology map. Our soil observations are described on the stratigraphic logs contained in Appendix A and are summarized in the paragraphs below. We infer that variations between the observed soils and the mapped soils might simply reflect the great difference in scale; our hand borings revealed surficial soils within a depth of only about 3 to 5 feet, whereas the geologic map generally focuses on soil deposits having a greater thickness.

Colluvium/Topsoil: In all hand borings, we observed 1 to 2 feet of loose, moist, dark brown, silty, fine sand and sandy silt, with some organics and roots. This surficial layer likely represents a combination of colluvium (soil that migrates downslope from higher locations) and topsoil (organic-rich soil that develops on the ground surface).

Recessional Outwash: All hand borings disclosed a layer of loose to medium dense, silty, fine sand below the colluvium/topsoil layer. The thickness ranged from about 1½ to 3½ feet. Based on the density, texture, and stratigraphic position, this sand layer appears to be recessional outwash, which often gets deposited over other glacially overridden soils.

Weathered Glacial Soil: Below the recessional outwash deposit, at depths ranging from about 2½ to 5½ feet below ground surface, our hand borings revealed medium dense to dense, mottled, silty sands with some gravel. We interpret these soils to be the upper, weathered portion of either a lodgement till or advance outwash deposit. Due to the higher density and gravel content, it was difficult to penetrate more than about 6 inches into this deposit with our hand auger and hand probe.

Surface Water and Ground Water

During our site reconnaissance, we looked for runnels, channels, and other indicators of surface water erosion. There were no obvious indications of such erosion, although it should be noted that the heavy vegetative undergrowth obscured the ground surface in many areas. We also observed that the presence of a raised concrete curb along the eastern (downslope) edge of the 31st Avenue sidewalk likely prevents surface water from flowing directly onto the hillslope over most of the sidewalk span.

We encountered slow ground water seepage in hand boring HB-2 at a depth of approximately 3 feet below surface grades. In all other hand borings, the observed soils were merely moist rather than wet or saturated. However, these observations apply only to local conditions at the time of exploration; more seepage zones might be present during the winter months or immediately after periods of heavy precipitation.

GEOTECHNICAL CONCLUSIONS

In our opinion, based on our surface and near-surface observations, the proposed park restoration is feasible from a geotechnical standpoint. If proper mitigation measures are taken, we do not foresee a significant risk of erosion, sloughing, slumping, or other soil movements on the subject hillslope resulting from removal of the existing deciduous trees. This overall conclusion is supported by the following findings and considerations.

- Published geologic maps show that the subject site and immediate vicinity is underlain by dense to very dense glacial soils consisting of lodgement till over advance outwash over various older sediments. All of these glacially overridden soils possess a high shear strength and are inherently resistant to deep-seated sloughing and slumping.
- Our on-site hand borings disclosed a thin layer of colluvium and topsoil mantling the subject hillslope, underlain by a slightly thicker layer of recessional outwash. The sandy composition of these surficial soils makes them moderately well-drained and, therefore, less prone to surface erosion than other less-permeable soil types.
- The presence of small but very steep cut slopes along the uphill side of the trails and footpath indicates that the shallow on-site soils possess a moderately high degree of cohesion and erosion resistance.
- Our on-site hand borings confirmed the presence of medium dense to dense sandy soils below the hillslope, at depths ranging from about 2½ to 5½ feet below ground surface.

These sandy soils appear to correspond to the aforementioned glacially overridden deposits.

- The age and orientation of the on-site trees do not indicate that any slumping or sloughing has occurred in recent decades.
- The deciduous trees that are being proposed for removal tend to have relatively shallow root systems that, depending on the size and type of tree, have a root penetration likely ranging from about 2 to 4 feet. In comparison with mature evergreen trees, these shallow roots do not provide a significant amount of deep soil stabilization.
- The roots of the existing deciduous trees provide significant stability for the near-surface soils, and these roots will gradually decay after a tree has been cut. However, the roots will help maintain shallow soil stability for several years after tree cutting, thereby maintaining interim stability as new plant roots become established.
- The existing raised curb located along the eastern (downslope) edge of the 31st Avenue sidewalk provides an effective and permanent barrier against water flowing directly over the hillslope.

RECOMMENDATIONS

In order to minimize the possibility of adverse impacts to the subject hillside during and after future tree removal, we recommend that various geotechnical mitigation measures be incorporated into the park restoration work plan, as outlined below. It should be noted that the project arborist will likely recommend additional mitigation measures associated with existing and/or future vegetation management.

- Because the existing groundcover vegetation provides valuable resistance to shallow soil erosion, we recommend that existing groundcover be preserved on the hillslope to the greatest extent practical. This should include taking care to avoid disturbing the plants with foot traffic or machinery.
- We recommend that any existing or new areas of bare soil be revegetated as part of the restoration process. This revegetation should be completed using native groundcover plants and leafy bushes with a hardy root network, as selected by the project landscape architect. Ideally, the majority of new plants would be evergreens, such that they maintain their leaves during the wintertime rainy season.
- Temporary erosion-control measures should be installed on areas that are being revegetated. These measures could include any or all of the following: jute or coir matting; organic mulch or wood chips; and straw wattles. In areas where revegetation is impractical or undesired, we recommend placing a 2-inch-thick (minimum) layer of crushed gravel or a 4-inch-thick (minimum) layer of wood chips for permanent erosion-control purposes.

- If any sources of concentrated runoff water are discovered during park restoration work, they should be diverted away from the hillslope or terminated above the hillslope. In particular, the existing 6-inch-diameter plastic pipe located along the top of the hillslope should be inspected for leaks or discharges and then fixed as needed. Furthermore, no new water sources should be introduced on or immediately above the hillslope.

CLOSURE

AESI has prepared this report for the exclusive use of our clients, for specific application to this project. Within the limitations of scope and schedule, our services have been performed in accordance with generally accepted local geotechnical engineering practices in effect at the time our report was prepared. No other warranty, express or implied, is made.

We appreciate the opportunity to have been of service on this project. If you have any questions, please call our office at 253-722-2992 or 425-827-7701.

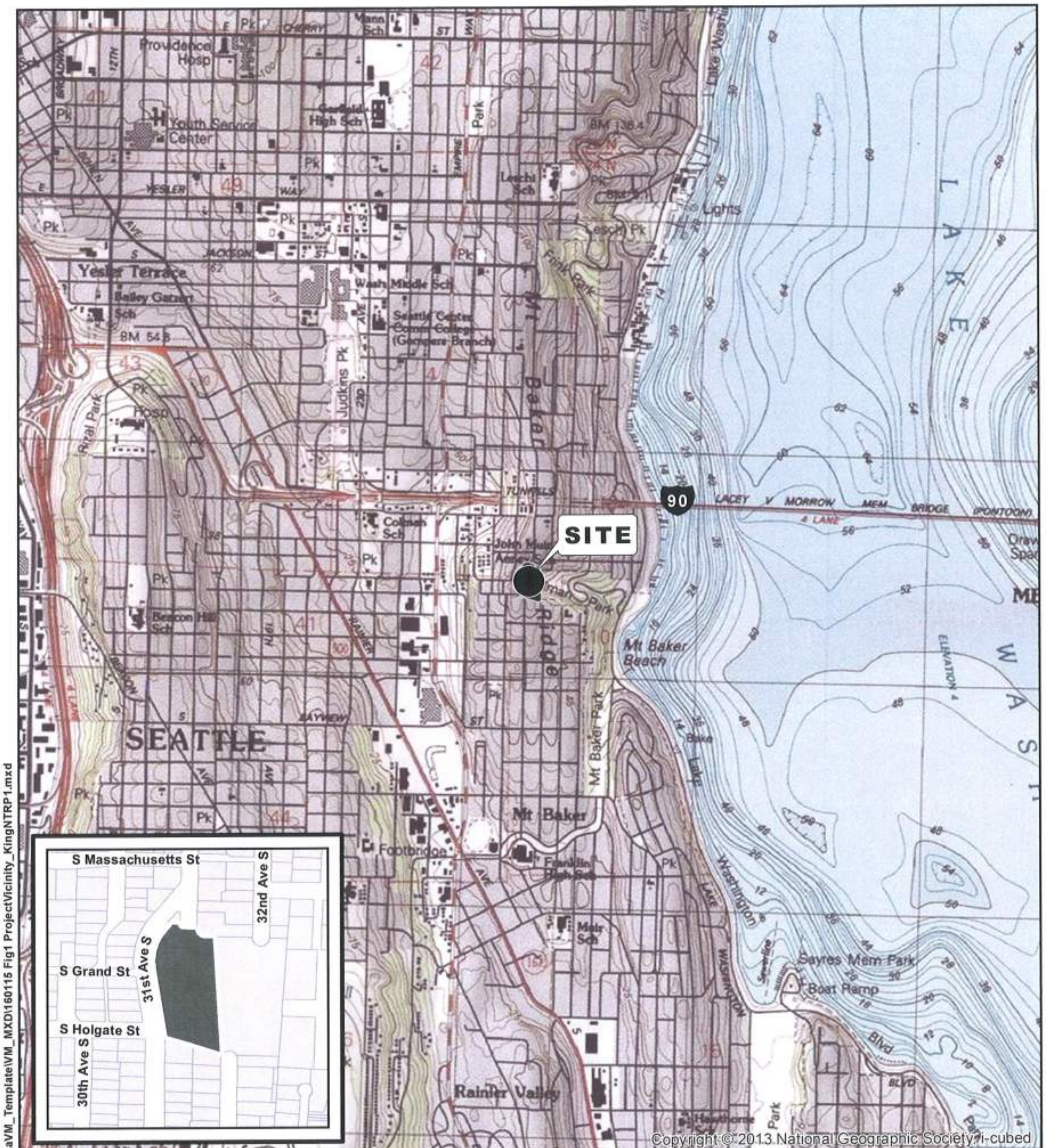
Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Tacoma, Washington

4/27/16 — 4/27/16

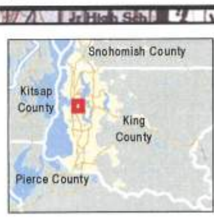
James M. Brisbine, P.E., L.G., L.E.G.
Senior Associate Geotechnical Engineer

Jon N. Sondergaard, L.G., L.E.G.
Senior Principal Engineering Geologist

Attachments: Figure 1. Vicinity Map
Figure 2. Site and Exploration Plan
Figure 3. Site Photographs (3A and 3B)
Figure 4. Site Photographs (4A and 4B)
Appendix A. Hand Boring Logs



Document Path: G:\GIS_Projects\aTemplates\NTRP\aVM_Template\VM_MXD\160115 Fig1 ProjectVicinity_KingNTRP1.mxd



DATA SOURCES / REFERENCES:
USGS: 24K SERIES TOPOGRPAHIC MAPS
KING CO: STREETS, PARCELS

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

N

0 1000 2000
FEET

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

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VICINITY MAP

COLMAN PARK RESTORATION
SEATTLE, WASHINGTON

PROJ NO.	DATE:	FIGURE:
KE160115A	4/16	1

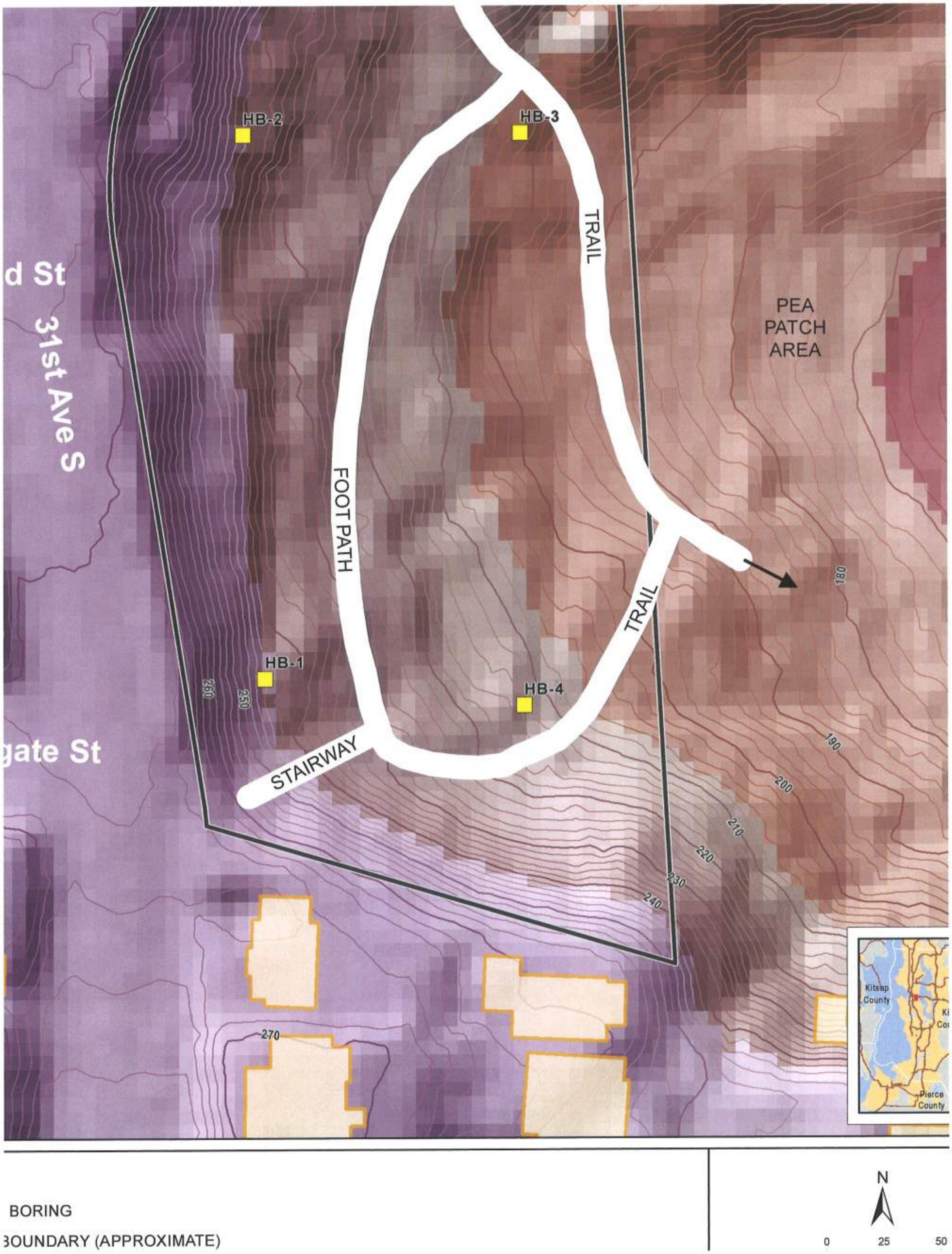
HB-2
HB-3
HB-1
HB-4
TRAIL
TRAIL
FOOT PATH
STAIRWAY
PEA
PATCH
AREA
d St
31st Ave S
gate St
180
190
200
210
220
230
240
250
260
270
Kitsap
County
Pierce
County
BORING
3OUNDARY (APPROXIMATE)
N
0
25
50

Photo 3A: TYPICAL HILLSLOPE VIEW LOOKING SOUTH

Photo 3B: TYPICAL HILLSLOPE VIEW LOOKING NORTH

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SITE PHOTOGRAPHS

COLMAN PARK RESTORATION
SEATTLE, WASHINGTON

PROJ NO.	DATE:	FIGURE:
TE160115A	4/16	3

160115 Colman Pk \ 160115 F3 Site Photos.cdr

Photo 4A: 31ST AVENUE SIDEWALK VIEW LOOKING SOUTH

Photo 4B: 31ST AVENUE SIDEWALK VIEW LOOKING NORTH

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SITE PHOTOGRAPHS

COLMAN PARK RESTORATION
SEATTLE, WASHINGTON

PROJ NO.	DATE:	FIGURE:
TE160115A	4/16	4

160115 Colman Pk \ 160115 F4 Site Photos.cdr

APPENDIX C

Hand Boring Logs

Major Division	Subdivision	Fines	Symbol	Description
Coarse-Grained Soils - More than 50%(1) Retained on No. 200 Sieve	Gravels - More than 50%(1) of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines(5)	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥12% Fines(5)	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50%(1) or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines(5)	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥12% Fines(5)	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50%(1) or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT(2) blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50

	Consistency	SPT(2) blows/foot
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

(3) Estimated Percentage

Component	Percentage by Weight
Trace	<5
Some	5 to <12
Modifier (silty, sandy, gravelly)	12 to <30
Very *modifier* (silty, sandy, gravelly)	30 to <50

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols

Sampler Type
Blows/6" or portion of 6"
2.0" OD Split-Spoon Sampler (SPT)
Bulk sample
Grab Sample

Sampler Type Description
3.0" OD Split-Spoon Sampler
3.25" OD Split-Spoon Ring Sampler
3.0" OD Thin-Wall Tube Sampler (including Shelby tube)
Portion not recovered

Cement grout surface seal
Bentonite seal
Filter pack with blank casing section
Screened casing or Hydrotip with filter pack
End cap

(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
ATD = At time of drilling
Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 12%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

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EXPLORATION LOG KEY

FIGURE A1

blocks \ dwg \ log_key.dwg LAYOUT: Layout 4 -2014 Qty Chng

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Exploration Log

Project Number	Exploration Number	Sheet
TE160115A	HB-1	1 of 1

Project Name	Colman Park Restoration	Ground Surface Elevation (ft)	245
Location	Seattle, WA	Datum	N/A
Driller/Equipment	Hand Auger	Date Start/Finish	4/8/16,4/8/16
Hammer Weight/Drop	N/A	Hole Diameter (in)	4 inches

Depth (ft)	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Colluvium / Topsoil Loose, moist, dark brown, fine SAND and SILT, some roots (SM/ML).					
				Recessional Outwash Loose to medium dense, moist, brown, silty, fine SAND, trace gravel (SM).					
				Weathered Glacial Soil Medium dense to dense, moist, mottled brown and gray, silty, fine SAND, some gravel (SP). Bottom of exploration boring at 3.75 feet No ground water seepage observed.					
5									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: JMB
Approved by: JNS

AESIBOR 160115.GPJ April 21, 2016

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Exploration Log

Project Number	Exploration Number	Sheet
TE160115A	HB-2	1 of 1

Project Name	Colman Park Restoration	Ground Surface Elevation (ft)	243
Location	Seattle, WA	Datum	N/A
Driller/Equipment	Hand Auger	Date Start/Finish	4/8/16,4/8/16
Hammer Weight/Drop	N/A	Hole Diameter (in)	4 inches

Depth (ft)	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Colluvium / Topsoil					
				Loose, moist, dark brown, fine SAND and SILT, some roots (SM/ML).					
				Recessional Outwash					
				Loose to medium dense, wet, brown, silty, fine SAND, trace gravel (SM).					
				Becomes moist.					
5									
				Weathered Glacial Soil					
				Medium dense to dense, moist, mottled brown and gray, silty, fine SAND, some gravel (SP).					
				Bottom of exploration boring at 5.75 feet Slow ground water seepage observed at 3 feet.					

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: JMB
Approved by: JNS

AESIBOR 160115.GPJ April 21, 2016

associated earth sciences incorporated

Exploration Log

Project Number	Exploration Number	Sheet
TE160115A	HB-3	1 of 1

Project Name	Colman Park Restoration	Ground Surface Elevation (ft)	203
Location	Seattle, WA	Datum	N/A
Driller/Equipment	Hand Auger	Date Start/Finish	4/8/16,4/8/16
Hammer Weight/Drop	N/A	Hole Diameter (in)	4 inches

Depth (ft)	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Colluvium / Topsoil Loose, moist, dark brown, silty, fine SAND, some roots (SM).					
				Recessional Outwash					
	Grab	S-1		Loose to medium dense, moist, brown, silty, fine SAND (SM).					
	Grab	S-2							
				Weathered Glacial Soil Medium dense to dense, moist, mottled brown and gray, silty, fine SAND, some gravel (SP).					
5				Bottom of exploration boring at 4.75 feet No ground water seepage observed.					

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: JMB
Approved by: JNS

AESIBOR 160115.GPJ April 21, 2016

associated earth sciences incorporated

Exploration Log

Project Number	Exploration Number	Sheet
TE160115A	HB-4	1 of 1

Project Name	Colman Park Restoration	Ground Surface Elevation (ft)	213
Location	Seattle, WA	Datum	N/A
Driller/Equipment	Hand Auger	Date Start/Finish	4/8/16,4/8/16
Hammer Weight/Drop	N/A	Hole Diameter (in)	4 inches

Depth (ft)	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Colluvium / Topsoil					
				Loose, moist, dark brown, silty, fine SAND, some roots (SM).					
				Recessional Outwash					
				Loose to medium dense, moist, brown, silty, fine SAND (SM).					
				Becomes gravelly at 2.5 feet (possible weathered glacial soil).					
				Bottom of exploration boring at 2.5 feet Terminated due to refusal. No ground water seepage observed.					
5									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: JMB
Approved by: JNS

AESIBOR 160115.GPJ April 21, 2016

Appendix D

Stantec Peer Review and Field Assessment

Stantec

May 15, 2017
File: 2002005308

Attention: Jon Jainga, Urban Forestry Manager
City of Seattle, Seattle Parks and Recreation
100 Dexter Avenue North
Seattle, Washington 98109

Dear Mr. Jainga,

Reference: Peer Review and Field Assessment for the Proposed Colman Park Vegetation Management Plan

In accordance with the scope of work outlined in the approved Proposal for Peer Review/Field Assessment for the Proposed Colman Park Vegetation Management, dated March 2, 2017, Stantec has reviewed the Colman Park Vegetation Management Plan Draft (Plan) dated July 29, 2016 prepared by BCRA (and sub-consultants), which describes a methodology and reasoning for removal of specific types of vegetation hindering views of Lake Washington with subsequent replacement with new vegetation types for an area along 31st Avenue South on the west side of Colman Park. Additionally, because many areas within the park contain environmental critical areas (ECAs), including; but not limited to, landslide and steep slope hazards, erosion hazard areas, and wetland areas, Stantec has also reviewed applicable regulations, ordinances and policies (e.g., Tree Protection Ordinance, Seattle Municipal Code [SMC] 25.11; the Environmentally Critical Area Code, SMC 25.09), and the City of Seattle's Tree Management Policy (Number 060-P 5.6.1) to determine relevance for the subject area on the west side of Colman Park.

This memorandum provides a summary of the site evaluations conducted by Stantec personnel during the April 2017 site investigation, a brief overview of regulations and ordinances related to the proposed action, and recommendations on vegetation type suitability, re-vegetation phasing/sequencing, and potential adverse effects of the proposed work by BCRA on existing ECAs. The focus and scope of this evaluation was restricted to the western side of the park from Colman vista or steep upper slope of Colman Park along 31st Avenue South down through a lower slope area to where the two western end trails converge (the Site), as shown in Figure 1, which extends to just before the Colman Park P-Patch. However, because Colman Park continues on to the shore of Lake Washington, some overall recommendations are provided for the forested/wet area directly downgradient of the Site as well. Additionally, a photo record, visually depicting the vegetation and available ecological habitat at the Site the day of the site investigation, is provided as Attachment 1.

VEGETATION AND HABITAT EVALUATION

On April 19, 2017, a Stantec environmental biologist conducted a 2.5 hour general site inspection of the western end of Colman Park with a focus on the current vegetation and habitat of the Site (Figure 1). The Stantec environmental biologist first observed a guard rail with a well-maintained,

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short, dense laurel hedge running along the sidewalk for the entire length of the western end of the park. The sidewalk is bordered by a curb that would prevent major storm water runoff from the street above. Power and communication lines are limited to the sidewalk and street area. Two steep staircases at the southwestern and northwestern corners of the park appear to be in good shape with sides covered in moss but no obvious cracks or apparent uplift by tree roots. An unpaved path (approximately an average of 35 to 45 feet from the street level) runs in a north-south direction, perpendicular to the street, and is a natural terrace between the steep upper slope and lower slope areas.

Although a comprehensive plant inventory was not performed, the initial observation of Colman Park reveals heavy vegetation with a variety of trees, shrubs, and understory plants. The current understory includes tall bushes, saplings, ferns, smaller low-lying plants, some berry and some ivy vines. Most the understory plants are thriving and are in various stages of growth with several of them noted to be either budding or flowering, indicating that the shade and moisture levels provided by the current canopy are ideal for the current plant community. The present undergrowth is in patches of thicket-like areas of either larger bushes with ferns, or areas of low-lying smaller plants, with small clearings in between. Clearings, just like those that would be observed in densely forested areas not found in an urban area, contain broken and decaying branches and leaf matter, important nutrient sources for the detritivores of the park's food web. Invasive plants and noxious weeds, such as English ivy, Himalayan blackberry, and some dandelion species were not often observed, a testament to the success of the current invasive plant removal program.

Most of the trees of the Site consist of solitary or clump big leaf maples and other deciduous species, with trunks ranging from about 3 to approximately 18-20 inches in diameter and occasional trunks >20 inches on the steeper slope area near 31st Street. A number of larger, mature evergreen trees with trunks measuring >2 feet in diameter were also observed, especially in the lower slope area. The majority of the tree trunks are straight, with very few leaning, and any clump big leaf maples exhibit an outward and upward curvature. A few of the big leaf maples do appear to be either top heavy or have some root exposure), with only a few smaller trees leaning (see photos #16 and #18 in Attachment 1).

It should be noted that although dead and deteriorating trees can initially appear unsightly and may pose some danger potential to people or property, removal of the dead tree can negatively impact wildlife that is dependent on these trees. Although cavities were not noted in the trees of the steep upper slope or lower slope areas, there were cavities in mature larger trees just south of the P-Patch, with one Northern Flicker (cavity nesters belonging of the Piciformes order) observed perching on and around a dead tree with multiple large cavities (see photo #43 and 44 in Attachment 1).

No scat or tracks were noted during the brief Site visit, but there is evidence that small animals are possibly utilizing the bases of big leaf maples as burrows (see photo #13 in Attachment 1). Invertebrate species that were observed include bees, flies, gnats, a few spider species, pill bugs, and earthworms. Additionally, a variety of mosses were observed hanging from trees, growing on

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Jon Jainga, Urban Forestry Manager
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the trunks of trees near the ground and along pathways, as well as lichens and a couple of mushroom species.

No streams, seeps/springs, or obvious run off of water was noted throughout the Site, however the area to the immediate south of the P-Patch becomes increasingly marshy with seeps/springs. This marshy area extends down to a broader area of standing water, with small streams trickling downhill from those seeps/springs into a frog pond (see photo #41 in Attachment 1), with various emergent and wetland area plants noted throughout. The frog pond is approximately 450 feet from the upper steep slope area. Although no amphibians, tadpoles or egg masses were noted in the pond the day of the site visit, the sign for this pond noted several native frogs and toads known to be in the area. A song sparrow (*Melospiza melodia*) was observed bathing in a smaller puddle of standing water just west of the frog pond (see photo #34 in Attachment 1).

This park appears to contain a highly active and diverse avian community. Over the course of this brief site visit, several species of birds were heard calling and observed flying and perching on trees and bushes of various heights within the steep upper slope and lower slope areas. A bird nest was spotted high up in a cluster of big leaf maples at the southwest corner of the upper slope area (see photo #3 in Attachment 1). Signage at top of the southwest entrance staircase noted that Cooper's hawks (*Accipiter cooperii*) of the Accipitriformes order are currently nesting in the area and warned residents to avoid using rat poison. Based on the size and overall shape of the nest, it is possible this nest belongs to this species of hawk. In addition to the avian species already noted, the following birds belonging to the Passeriformes order were observed mostly within the lower slope area: black-capped chickadee (*Poecile atricapillus*), golden-crowned kinglet (*Regulus satrapa*), American crow (*Corvus brachyrhynchos*), Steller's jay (*Cyanocitta stelleri*), song sparrow and American Pipit (*Anthus Rubescens*). Two avian species, the house sparrow (*Passer domesticus*) and American robin (*Turdus migratorius*), were not observed but identified at the Site by bird song. This is a substantial amount of bird sightings, given the short time spent observing wildlife in this upper portion of Colman Park. In addition to the birds sighted at the Site, we suspect the site likely supports a local bat population. Proximity to water, multiple perching and nesting opportunities and intact canopy conditions are ideal for a variety of Pacific Northwest bat species (Hayes and Wiles 2013[4]).

Based on the site visit, it is very apparent that by allowing Colman Park to grow and become densely shaded for decades, it has led to a healthy canopy that provides structure and viable habitat for several birds to thrive. Tree removal as proposed in the BCRA report, would expose an area that has not been in full sunlight for decades, and could potentially and dramatically alter the composition of the ecological community of Colman Park. This could potentially lead to a reduction of overall wildlife diversity in the area by shifting the current wildlife balance and would remove significant and valuable nesting, perching, and foraging habitat for multiple wildlife species.

GEOLOGICAL EVALUATION

The City of Seattle designates slopes with magnitudes greater than 40 percent and vertical relief of at least 10 feet as geologically hazardous (steep slope/landslide hazards). It is our opinion that

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this designation encompasses the western portion of the park, and the entire area where tree removal has been requested by the adjacent neighbors. This portion of the park has slope magnitudes of generally 50 to 80 percent with topographic relief of about 75 feet.

On April 19, 2017, a Stantec geologist conducted a site reconnaissance to observe the current topography, general soil stability, drainage features, and vegetation cover. In general, our observations were consistent with the conditions described by Associated Earth Sciences, Inc. (AESI) in the ECRA report. We observed several trees with slight curvature indicating slight to moderate amounts of soil creep. We also observed areas of exposed soils comprised of silty-sand with gravel and organics. These soils appear similar to those described by AESI. As an added note, our observations occurred at a time following one of the most severe rainfall winters on record. If erosion and slope instability were to be occurring on the site as a result of surface hydrology, we would expect this condition to express itself during our site visit.

The AESI report discusses the mapped geologic units as well as shallow soils encountered in their explorations. In general, we concur that the site is likely underlain by variable thicknesses of colluvium which overlie one or more of the mapped geologic units. While it is possible for the uppermost portion of the steep slope to be underlain by glacial till, most steep slope areas adjacent to till planes are typically underlain by advance outwash due in part to their low resistance to erosion.

Landslide activity is common at or just above the contact between outwash sands and underlying fine-grained deposits. As noted in the AESI report, this contact appears to be located in the central portion of Colman Park (based on Geologic Map of Seattle). Many landslides have been documented along the east-facing slope north of Colman Park. These landslides consist of shallow colluvial sloughing, groundwater blow-outs, and relatively deep-seated rotational slides.

In order to evaluate the global slope stability of the site area, deep borings located west to east across the site, laboratory testing of subsurface soils, and slope stability analyses would be necessary. These analyses, in conjunction with groundwater elevations in the borings, could be utilized to determine factors of safety for global and local slope stability. Without knowing the current factors of safety for slope stability, it would not be prudent to conduct work that could possibly decrease stability.

It is our opinion that the steep slope areas are relatively stable in their current configurations. Removing trees and root systems would likely lead to shallow slide activity and erosion of the near-surface soils unless new vegetation is in place and fully established before the following wet season. Typically, new vegetation does not provide soil stabilization until root systems are fully established. This can take five years or more to occur. Therefore, re-vegetation after tree removal would not necessarily be effective for some time increasing the short-term risk of slope failure. If large areas of vegetation are removed, we would expect more precipitation and surface water to infiltrate into the near-surface soils. This could lead to increased water table elevations near the outwash-silt contact which may promote generalized de-stabilization of the steep slope area of the Site.

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RELEVANT REGULATIONS, ORDINANCES, CODES, POLICIES, AND PARTNERSHIPS

Under the existing Seattle Municipal code (SMC), several regulations exist that govern tree and vegetation removal and maintenance such as SMC 15.43, SMC 25.09, and SMC 25.11. However most of these pertain to private, commercial and industrial properties.

Of these SMCs, SMC 25.09 is relevant and applicable to the proposed vegetation removal and re-vegetation plan for the western end of Colman Park, in that it's still applicable due to the regulation trees and vegetation in ECAs such as wetlands, streams, shorelines, landslide-prone areas, wildlife habitats, and associated buffers for ECA areas. Trees and other vegetation in ECAs are essential for maintenance of a naturally functioning state to maintains slope stability and prevent erosion, protect water quality, and provide diverse wildlife habitat. As a result, the City of

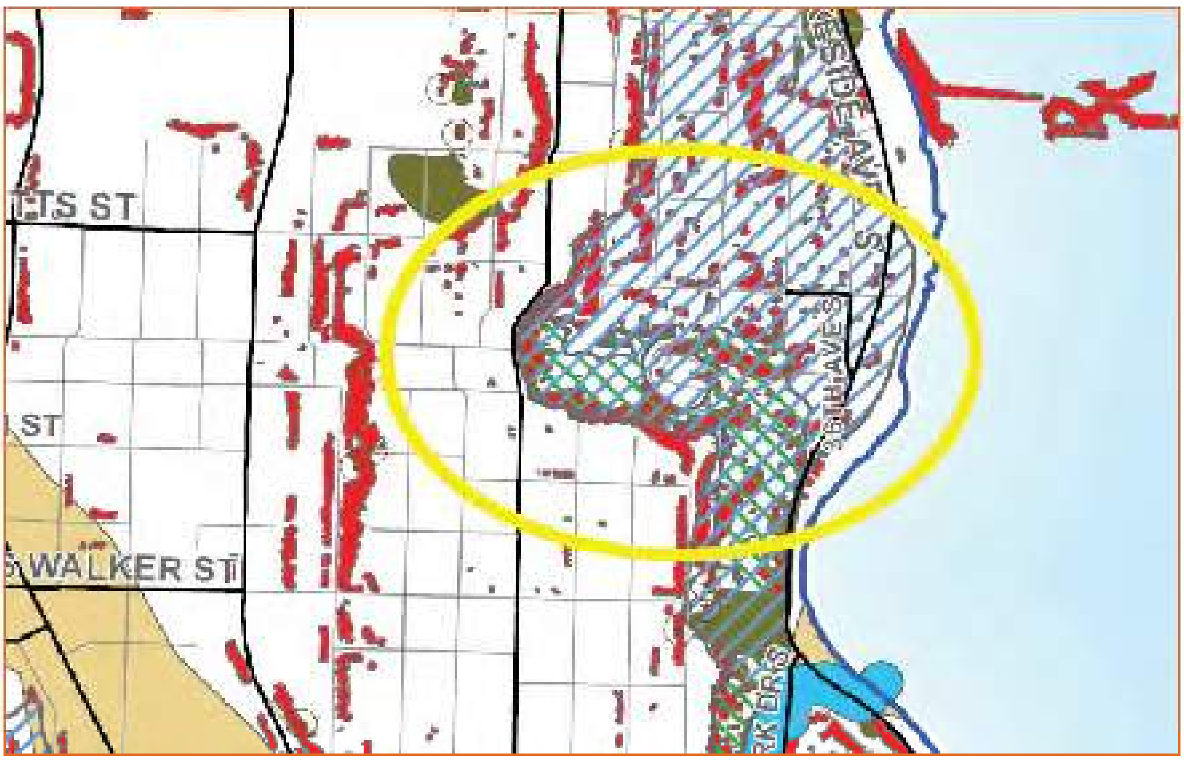

Figure 2 – Environmental Critical Areas of Colman Park
(http://www.seattle.gov/dpd/research/GIS/webplots/Critical_Areas_Map.pdf)

Seattle protects trees and vegetation within landslide-prone critical areas (including steep slopes), steep slope buffers, riparian corridors, shoreline habitat, shoreline habitat buffers, wetlands and wetland buffers. Within these areas, the ECA code only allows removal, clearing, or other actions that may harm trees and vegetation in limited situations. Based on the map of ECAs maintained

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by Seattle Department of Construction and Inspections (SDCI)(provided as *Attachment 2* and a close-up of Colman Park in Figure 2), the Site contains the following ECAs: potential slide areas, known slide areas, 40% steep slope or greater, and wildlife habitat.

The City of Seattle also has a Tree Management Policy (Number 060-P 5.6.1) that was developed for Seattle Parks and Recreation Department (City of Seattle, 2001). The purpose of the Tree Management Policy is to maintain, preserve and enhance the urban forest within parks, to increase the overall tree canopy, tree health and tree longevity within parks; and to ensure that parks trees are managed in a manner that is consistent with other departmental and municipal policies. Specifically, Section 4.11 notes that trees and forested areas are recognized as important habitat for native wildlife, and that trees and undeveloped landscapes will be managed for wildlife habitat in accordance with the department's Wildlife and Habitat Management Plan. Additionally, Section 4.12 emphasizes that the relationship of vegetation to slope stability will be a primary consideration in proposed re-vegetation on steep slopes.

Consistent with maintaining the overall tree canopy in Seattle's urban parks, several collaborative efforts to increase Seattle's green spaces, particularly Seattle's urban forests have been in place for decades. Trees for Seattle is essentially the oversight for all of the City of Seattle's urban forestry efforts (http://www.seattle.gov/trees). City of Seattle's Trees for Seattle clearly states that tree removal is not allowed solely for view improvement and that the practice of tree topping is prohibited on all parks properties. Trees for Seattle notes that the City of Seattle, Forterra, and Seattle's residents have joined together to form the Green Seattle Partnership, a group that is working to restore 2,500 acres of forested parkland by 2025. Volunteers remove invasive plants, plant new native trees and understory plants, and perform long term maintenance.

The City of Seattle also has an Urban Forest Stewardship Plan (UFSP), written in 2007 and last updated in 2013 (City of Seattle, 2013), that was created with the goal to increase Seattle's tree canopy coverage to at least 30 percent by 2037. SDCI's Environmentally Critical Areas: Tree & Vegetation Overview supports this goal for the city by emphasizing that the removal of trees and non-invasive vegetation is not considered normal and routine maintenance (SDCI, 2014).

CONCLUSIONS AND RECOMMENDATIONS

Seattle's forested parklands are all that remains of the vast forests that once covered the entire Puget Sound area. Today, the City's Natural Areas and Greenbelts provide a glimpse of that past legacy and continue to provide important natural and ecological areas that help create an interconnected system of open spaces throughout Seattle's neighborhoods. The City of Seattle's Draft Natural Area Greenbelt Supplemental Use Guidelines (City of Seattle, 2015) state that natural Areas and Greenbelts include densely wooded and vegetated areas, often with steep hillsides that provide unique environmental resources wildlife needs to thrive. This is consistent with habitat currently observed at the Colman Park Site.

Seattle's UFSP provides a policy framework that guides decision-making and identifies principles, priorities, goals, and strategies that will help Seattle preserve, protect, maintain, and restore its urban forest over the next 24 years (City of Seattle, 2013). The Plan provides the foundation to direct and integrate management of the many issues and opportunities posed by Seattle's urban forest resources. A healthy, well-managed urban forest provides numerous ecosystem, economic, and social functions and values for the city (City of Seattle, 2013).

Urban trees have equally important benefits to the environment by decreasing flooding from storm water runoff, sequestering carbon dioxide, and providing shade to areas and buildings that lead to a reduction in energy use. Trees intercept rain water, slow storm water runoff and protect water quality. Tree roots absorb water that is eventually transpired into the atmosphere; and fallen leaves help build soil, which in turn retains moisture (Fazio, 2010). Trees and other plants improve air quality by capturing particulate matter and absorbing pollutants. Analysis of research plot data done in the Seattle's Forest Ecosystem Values study determined that Seattle's urban forests remove approximately 725 metric tons of pollutants every year (Green Cities Research Alliance, 2012).

Therefore, it is the collaborative goal as part of the Green Seattle Partnership to restore and maintain sustainable urban forest parkland. This is currently being accomplished through the intensive work and collaboration between the City of Seattle, Forterra, community groups and non-profits, businesses, schools, and thousands of volunteers working together to restore and actively maintain the City's forested parklands. To date over 1,200 acres are in restoration (City of Seattle, 2015). This remarkable project is made possible by 1,000s of volunteers working to ensure that the urban forest of our city, consistent with the goals of the city, continue to provide environmental benefits from storm water retention, carbon sequestration, and wildlife and habitat diversity.

The reality is that the current established canopy of the Site provides just that, a valuable urban forest parkland that affords habitat that would be otherwise lost if the current trees are removed and replaced with the lower vegetation and dwarf tree species suggested in the proposed re-vegetation plan. The proposed re-vegetation plan for Colman Park would do the opposite of the goals outlined in the Tree Management Policy set forth for the Seattle Parks and Recreation Department and the principles set forth in the UFSP, by removing rather than maintaining and preserving the urban forest and would decrease the current and overall tree canopy by planting dwarf species and shrubs in the steep upper slope and lower slope areas of the Site. Colman Park, in its current state, is an urban park that provides the public with aesthetic and recreational enjoyment while providing wildlife habitat and refugia for multiple species.

From our observations and site assessment, the slope is stable, the trees appear healthy and the ecosystem appears to be functioning at a high level. As such, we do not recommend any tree removal at this time as a preventive measure for slope and soil management. Trees at Colman Park should only be removed if a certified arborist has determined that the tree is a hazard, and a proper permit approved by the City of Seattle is obtained, as outlined in City of Seattle's Tree Management. Alternatively, proper pruning of trees by a certified arborist should be part of regular park maintenance and as part of the urban park stewardship program. If any additional native vegetation is desired, we recommend planting of shade tolerant native species that continue to aid in prevention of slope erosion. We also recommend that because so few invasive plants were observed that the Seattle Parks program of invasive plant removal continue to be

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maintained. There are adequate resources by way of the Green Seattle Partnership that could be utilized to enhance Colman Park in a sustainable way without removal of valued and essential canopy habitat.

REFERENCES

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Seattle Department of Construction and Inspections (SDCI). 2014. Environmentally Critical Areas: Tree & Vegetation Overview.

Regards,

Wayne S. Wright, PWS, CF-P
Principal Scientist
Phone: 425.289.7380
Wayne.wright@stantec.com

Attachments: Attachment 1 – Photo Record
Attachment 2 – SDCI Environmental Critical Areas Map
Figure 1 – Project Site
Figure 2 – Environmental Critical Areas of Colman Park

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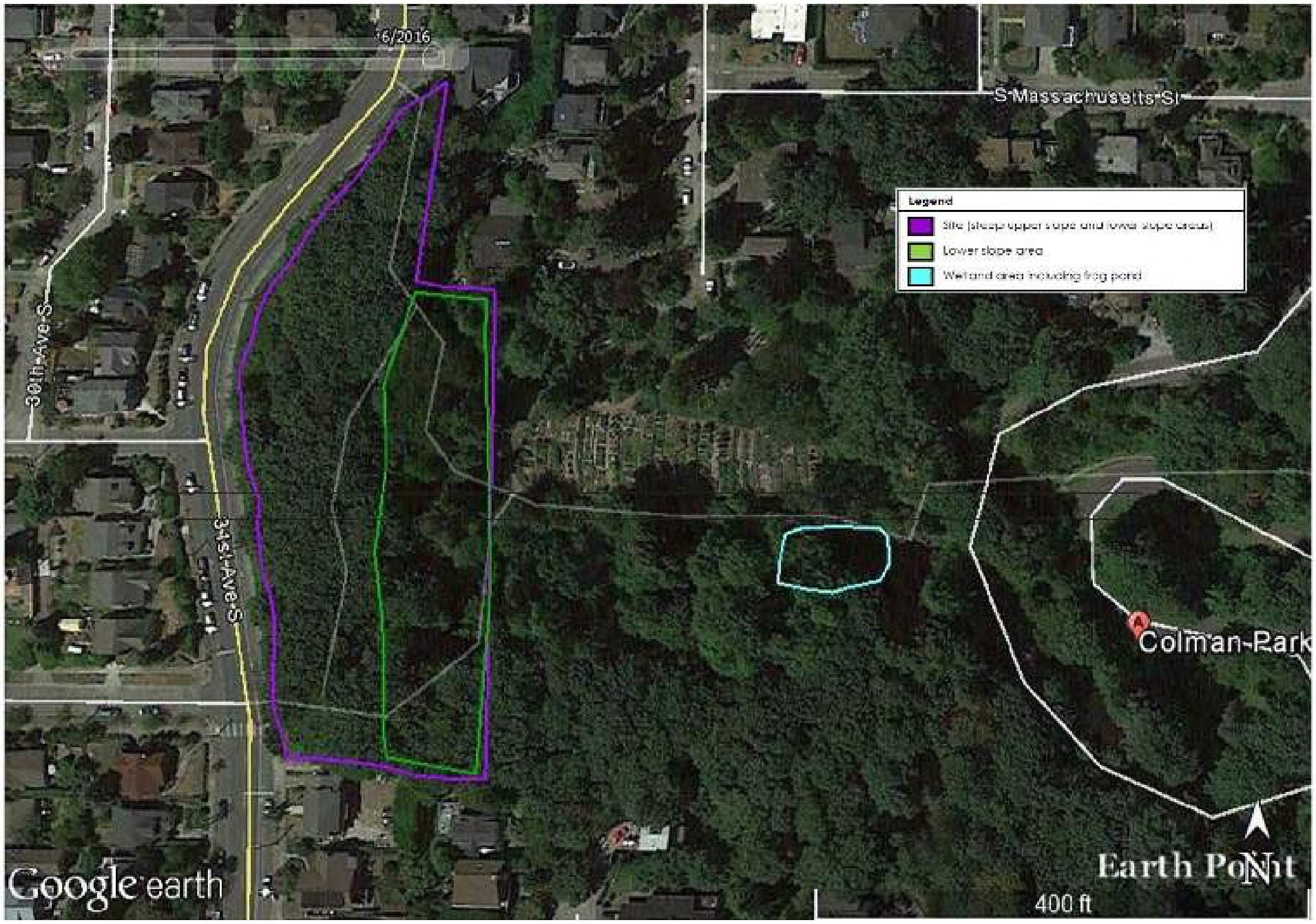


Stantec

Figure 1
Project Site
Peer Review and Field Assessment for the Proposed Colman Park Vegetation Management Plan

ATTACHMENT 1
PHOTO RECORD

The following Photo Record is documentation of site habitat conditions and representative vegetation present within upper slope area of Colman Park. The survey conducted on April 19, 2017 documents conditions specific to the Site (i.e. steep upper slope area and lower slope area), with some observations related to the Colman Park P-Patch and densely forested, potential wetland area to the south and southeast of the P-Patch.

1) Street level – 31st Avenue South	**2) Steep upper slope area**
	
Facing east showing cross walk to southwest staircase of the park. Guard rail and well-manicured laurel hedge lines the entire length of the upper slope along 31st Avenue South.	Facing north from midway down southwest staircase. View of upper slope indicates mix of open areas with leaf debris, shrub, sword fern, some berry species, and big leaf maples that are mostly upright. Soil appears to be held in place with no visible erosion.
3) Steep upper slope area	**4) Steep upper slope area**
	
Nest spotted high up in a cluster of big leaf maples at the southwest corner of the Site. Signage at top of staircase noted this is a Cooper's hawk nesting area.	Active fungi and moss community throughout the Site

5) Steep upper slope area

Larger big leaf maples with some smaller woody debris but indicates trees are curved upright with no slumping of the soil.

6) Steep upper slope area

From the southwest corner looking down the southern side of the upper slope; residences are to the right up a steep slope of the southern end of the park. Upper slope cross-section of established and dense understory with various tree and plant species showing no sign of slope erosion. Trees in this area appear to be upright and not falling over.

7) Lower slope area

Example of upper slope area low-lying vegetation. Saxifrage spp. and ornamental perennials.

8) Steep upper slope area

Close-up of big leaf maple cluster with no obvious slumping of soil or slope around the base.

9) Steep upper slope 	10) Unpaved trail between upper and lower slope 
View looking west towards 31st Avenue South at bottom of southwest staircase.	Farther down the unpaved trail – collection of smaller big leaf maples, some salmonberry vines, and laurel species.
11) Lower slope area 	12) Steep upper slope area 
Established trees with various birds seen perched.	Hillside of steep upper slope showing various low-lying plants (Ranunculus spp., Saxifrage spp., etc.) vines, and shrubs.

13) Steep upper slope area

Utilization of big leaf maple tree bases as small animal burrows.

14) Lower slope area

Close up of golden-crowned kinglet utilizing mature trees for perching; heard calling.

15) Unpaved trail between upper and lower slope

Facing north. An unpaved path runs in a north-south direction, perpendicular to the road and is a natural terrace between the steep upper slope and lower slope areas.

16) Steep upper slope area

Facing west looking up towards 31st Avenue South. Example of one of only a few big leaf maples that are top heavy and would make a good candidate for removal.

17) Upper steep slope area

Wide angle of southern side of steep upper slope area to the left of the southwest staircase. Invasive English ivy noted.

18) Upper steep slope area

Exposed roots along the southern side of the steep upper slope area to the left of the southwest staircase.

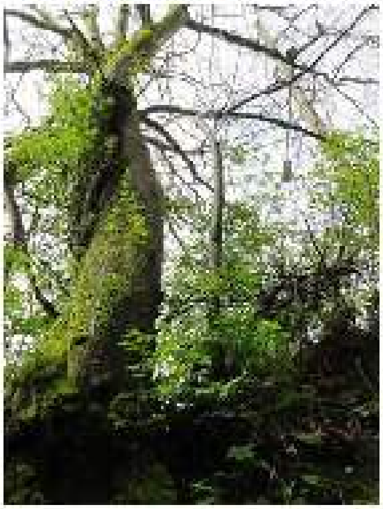
19) Upper steep slope area

Variety of understory plants.

20) Upper steep slope area – street level

Northwest staircase entrance.

Colman Park Habitat Survey

21) Steep upper slope area	22) Unpaved trail between upper and lower slope
	
Mature tree on extreme steep slope at northwest corner with roots exposed. Potential candidate to remove.	Red elderberry.
23) Steep upper slope area	**24) Lower slope area**
	
Northwest staircase on the upper steep slope. Bushes and low lying plants and ferns are holding soil. A few smaller big leaf maples are leaning here but most are upright.	Winding staircase on the northern side of the upper steep slope as it becomes the lower slope area.

Colman Park Habitat Survey

25) Lower slope area

Example of healthy canopy that the variety of bird species were observed perching in and exhibiting mating behaviors.

26) Lower slope area

Lower slope area just west of the forest area near P-Patch.

27) Upper slope area

Example of larger downed tree on the Site.

28) Lower slope area

Crab apple spp.

Colman Park Habitat Survey

29) Lower slope area 	30) Lower slope area 
Facing east looking towards Colman Park P-Patch.	Facing southwest looking at the lower end of the lower slope area. Well-established cedar and other coniferous trees.
31) Lower slope area 	32) Lower slope area 
Song sparrow observed calling in cherry blossom tree.	Salmonberry vines.

Colman Park Habitat Survey

33) Forested area south of P-Patch	34) Wet area south of P-Patch
	
Alternative picturesque path to P-Patch from lower slope area.	Song sparrow bathing in standing water.
35) Wet area south of P-Patch	34) Frog Pond southeast of the Site
	
Skunk cabbage and several other wetland and emergent plants noted in this area.	Frog pond close-up.

41) Frog Pond southeast of the Site

Signage for the Frog Pond area.

42) Wet area south of P-Patch

Large downed tree, complete uprooted with several inches of water where tree roots used to be. This location is approximately 12 feet east of the frog pond.

43) Forested area south of P-Patch

Northern flicker (cavity nester) observed on several trees within far southeast corner of the forested area south of the P-Patch.

44) Forested area south of P-Patch

Although dead and deteriorating trees can initially appear unsightly and may have some danger potential for danger to people or property, removal of them can negatively impact wildlife that is dependent on these trees. Northern flicker was seen on side of this tree before it flew to an adjacent tree (see Photo 43).

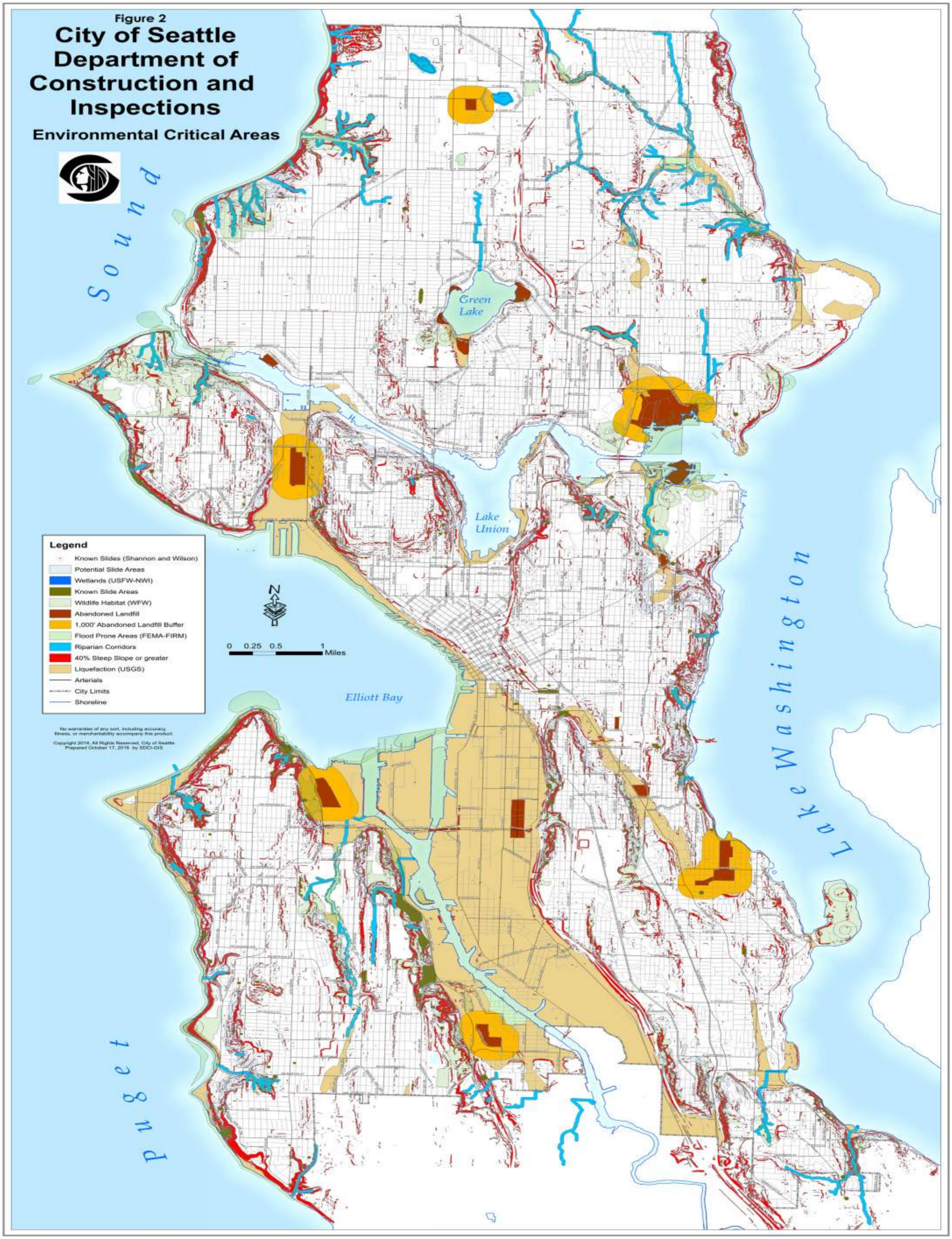


Figure 2
City of Seattle Department of Construction and Inspections
Environmental Critical Areas
Puget Sound
Lake Washington
Green Lake
Lake Union
Elliott Bay
N
0 0.25 0.5 1 Miles
Legend
Known Slides (Shannon and Wilson)
Potential Slide Areas
Wetlands (USFW-NWI)
Known Slide Areas
Wildlife Habitat (WFW)
Abandoned Landfill
1,000' Abandoned Landfill Buffer
Flood Prone Areas (FEMA-FIRM)
Riparian Corridors
40% Steep Slope or greater
Liquefaction (USGS)
Arterials
City Limits
Shoreline
No warranties of any sort, including accuracy, fitness, or merchantability accompany this product.
Copyright 2016, All Rights Reserved, City of Seattle
Prepared October 17, 2016 by SDCI-GIS