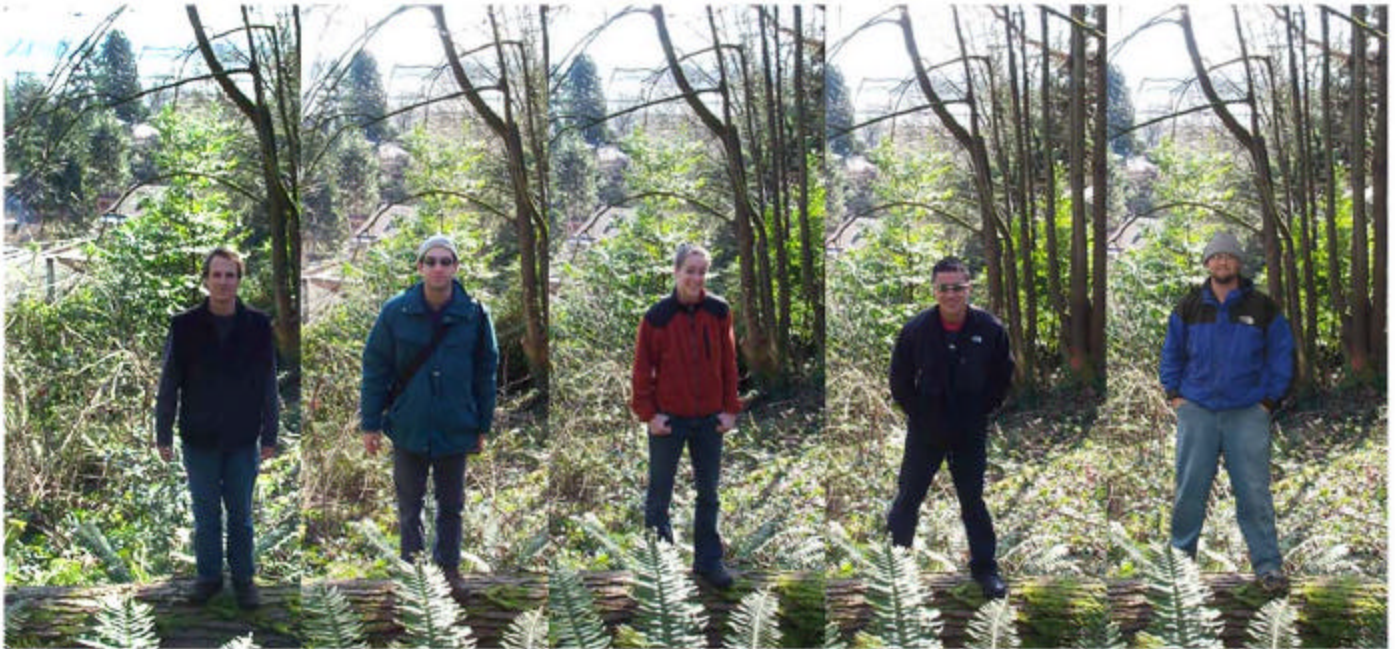


Leschi Natural Area

East Alder Street Entry

A Report for the Friends of Leschi Natural Area

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A Class Project for EHUF 480

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Abstract

The Leschi Natural Area consists of a network of greenspaces located on the slopes above Lake Washington. This area offers wildlife habitat as well as pedestrian trails with benches and great views. The Leschi neighborhood has had a long history of recreation, industry and development. The main goal of this project is to create a plan for the East Alder Entrance to the section of the Leschi Natural area located between East Alder Street and East Terrace Street. The area is currently dominated by invasive species that will be removed and replaced with native vegetation. A planting scheme and design has been developed in accordance with the “clump – gap” method described in the *Leschi Natural Area Native Reforestation Plan* developed by Anderson & Ray.

The planting design focuses on developing social and physical connections through the site. To this end, we have conducted a neighborhood survey and responded to concerns about safety, privacy and views through the design. The design consists of a path through the understory that connect the top and bottom of the site. Plant selections were made according to neighborhood, soil and climatic conditions. Slope stabilization methods are outlined to control erosion after the removal of the invasive vegetation. The appropriate plant selection, installation and aftercare procedures are also described in this report.

This plan meets all goals of the Friends of the Leschi Natural Area within the procedures described in the *Leschi Natural Area Native Reforestation and Management Plan*.

Site Description

This report is produced by University of Washington student members of the Plant Selection and Management Class (EHUF 480) during the winter quarter, 2004, taught by Linda Chalker-Scott. The report is a response to the RFP submitted by the Friends of Leschi Natural Area, a group associated with the Leschi Greenspace Committee of the Leschi Community Council. The report discusses the Leschi Natural Area site. The

site is triangular in shape and bordered by private property as well as city streets. It is circled by East Alder Street, Lake Dell Avenue, 33rd Avenue and East Terrace Street. 40 foot Seattle Department of Transportation right of ways are included in the site along the eastern and southern edges. The rest of the site is owned by Seattle Parks and Recreation. More information concerning the goals of the project and the specific characteristics of the site is given below.

Site History

The Leschi community has a diverse and rich history. This history dates back many decades. It is important to understand this because it gives meaning to a community that many don't know exists. This portion of this report will describe the Leschi's community history and it will also discuss a brief over view of the site-specific history of the Leschi natural area.

Beginning

The Leschi community is located in Seattle, Washington on the western banks of Lake Washington. This was a neighborhood served by a cable car that went from Pioneer Square to Lake Washington and along Yesler Way. Leschi is located south of Madrona Park and north of the Mount Baker neighborhood and the I-90 corridor. The area is known for its steep hillsides and ravines. This neighborhood is also considered one of the many scenic spots along the Lake Washington Boulevard.¹ The Leschi neighborhood, like other regional neighborhoods in this area has a landscape formed by glaciers, earthquakes, landslides, and tsunamis.

Native American Presence

Leschi's shoreline had been a seasonal Duwamish settlement. Hunting and fishing parties used the cove and protective hillside as a protective base. Social events were held on the land and trails radiated from the cove to Elliott Bay, Lake Union, and to points south and north. Frederick J. Grant, local historian and president of the Leschi

¹ Gould, 1938

cable car company, named the neighborhood “Leschi”. Nisqually Chief Leschi was known to visit this location and was a well-known and controversial presence in Western Washington during the 1850s.²

Colonization of Leschi

After initial pioneer settlement in the Leschi area, several new arrivals built cabins on the Leschi hills and along the shoreline. William Meydenbauer, owner of Seattle's famous Eureka Bakery, built a house in Leschi. He and his family used the shores to launch their exploration of the Lake Washington's eastside. The Meydenbauer's eventually settled on the east side of Lake Washington, on today's Meydenbauer Bay.

Once the Meydenbauers laid way to settlement of Leschi many recreational activities had begun to occur. Reasons to explore Leschi ravines included hunting, fishing, boating, picnic opportunities, and nature excursions. Those rough, informal events led to the eventual development of Leschi Park in the 1890's. This park became a local vacation and entertainment center.³

Industry

After settlement had occurred, Leschi soon became a location for industry. Henry Yesler and others in 1810 found Leschi's sturdy Douglas fir and Western hemlock trees. These trees were ideal for milling. When it became impracticable to haul logs up the steep inclines and over the high ridges to downtown Seattle, sawing and planing mills were then built along the Lake Washington's shoreline.⁴

Logging activity changed the old Indian trail from Leschi to Seattle. After entrepreneurs such as Henry Yesler, David Denny, John J. McGilvra and Thomas Burke bought or staked claims to portions of the lakefront others decided that the eastern perimeter of Seattle might be a good place for settlement. The Seattle Railroad Company in 1884 identified the Seattle-Leschi wagon road, formerly an old Indian trail, as a prime cable car route. By the late 1880s, the cable car line became a reality under

² Bagley, 1929

³ Morgan, 1924

⁴ Dorpat, 1990

the ownership of the Seattle Construction Company. Soon thereafter, soaring trestles were used to bridge Leschi's many ravines.⁵

Park System and civic structures

The Olmsted Brothers were hired by the city in 1903. They were commissioned to coordinate a park and boulevard system. A principal link in the Olmsted plan was Leschi Park and its hillsides. This commission led to the design of Leschi Park that has scenic trails that incorporates itself into the landscape.⁶

Also in 1909, Leschi Elementary School was constructed on a portion of Henry Yesler's Donation Land Claim. The building cost \$30,285 and was an eight-room brick structure with a sweeping view of Lake Washington. The old school now has been re-built and enlarged. This school also retains views of Lake Washington.⁷

Master Gardener

Leschi's gardens were also an important element. Leschi's garden in part was the creation of a man named Jacob Umlauff. The Seattle Railway Company hired the German-born Umlauff as Leschi's chief gardener. This man planted giant redwood trees (*Sequoiadendron giganteum*) in the park and across the hillsides of Leschi/Madrona. Many of these trees still stand today. Jacob Umlauff soon after became Seattle's Park Superintendent

Modern Times

The 1940 opening of the first floating bridge changed commercial and social dynamics of Lake Washington communities, as did the lowering of the lake in 1916 after construction of the Montlake cut. By the early 1940s, Leschi became a settled hillside community with a small commercial zone, an active marina, and some of Seattle's best views. After the opening of the first floating bridge, neighborhood issues focused on traffic, education, playgrounds, sanitation, crime, and housing conditions. These issues

⁵ Dorpat, 1990

⁶ Morgan, 1924

⁷ Bagley, 1929

are crucial for neighborhood representatives to this day. Leschi today remains a scenic hillside neighborhood with a rich and unusual history.⁸

Site-specific History

The Leschi Natural Area was once used as an old wagon trail. This trail was used to transfer goods into Seattle. This land later was owned by a resident in Leschi, and then sold to the city in good faith that land be kept as a green belt. The Seattle Department of Parks and Recreation purchased this land from this owner. Currently the Leschi Natural Area is unused and has been taken over by invasive, non-native vegetation.

Project Goals

The Leschi Natural Area is a 3.7 acre network of open space in the Leschi Neighborhood of Seattle, Washington. Each portion of the Natural Area has different species composition and value. The East Alder St. entry site is approximately one acre and has sweeping panoramic views of Lake Washington and the Cascades during the winter. Because of the location of this portion of the Natural Area, there are unique requirements for this site.

The goals for this site include creating a beautiful entry at East Alder, removal of invasives, reestablishing native flora, plans for a path linking East Alder and 33rd St. The largest goal is to address neighboring homeowners concern's in the design plan.

Creating a Functional Entry

- Thin existing dense vegetation at East Alder Entrance
- Provide clear visual clues to direct visitors into the Natural Area and away from neighboring properties

Removal of Invasives

- Much of the site is covered with three dominant invasive species

⁸ Schaefer, 1996

- *Hedera helix*
- *Prunus laurocerasus*
- *Rubus discolor*

For native flora to be successful these three invasives need to be removed completely from the site. Also, while not dominant all *Ilex aquifolium* also needs to be removed.

Reestablish Native Flora

- Plant native species in groups based upon shade tolerance, moisture requirements as well as historical plant associations.
- Plant a wide variety of species to give more structure to the landscape while also increasing the biodiversity of the site. Higher biodiversity of plants will encourage a wider variety of birds that frequent the site.

Design a Path Linking East Alder and 33rd St.

- Meandering path will switchback across the slope and have a loop.
- Three landings with benches are placed to take advantage of existing views of Lake Washington and the Cascades.
- Design of steps and guide rail.
- Obvious path will discourage foot traffic in new plantings.

Addressing Neighbors Concern's

- Surveys were used to ascertain main concerns and fears of Neighbors.
- Common concern of privacy will be incorporated in design plan
- Obvious location of entry will discourage wandering up driveways.

Site Analysis

Site Specifics (Appendix A)

The steepness of this site (Appendix B) is perhaps the greatest difficulty faced in any aspect of its development. Over the entirety of the site there are no slopes that are less than a 45% incline. This is clearly evident when looking at the terrain models of the site. While this terrain can add a dramatic element to the site aesthetically, it can also pose problems such as equipment access, transportation of materials, planting,

irrigation, and erosion. These problems although limiting, can be compensated for with careful planning.

The presence of invasive plants and non-native plant material are two constraints within the site. The invasive plants, mostly *Hedera helix* and *Rubus Discolor*, comprise about 80% of the ground cover vegetation. Since these plants need to be removed in order for native plants to thrive, there will be a great deal of disturbance. The presence of these plants combined with the steep slopes makes erosion control practices crucial to overall soil and watershed health. Because these plants will have to be removed all at once to ensure their eradication, steps will need to be taken in the way of bank stabilizers, in order to protect the native soil.

The non-native plants onsite also require removal to comply with the wishes of the city development plan for the greenbelt. While these plants are aggressive and therefore limit resources available to native plants, they do possess inherent value to the neighboring community. Plants onsite such as *Prunus lauraseracus* provide dense evergreen visual buffers for the residents around the greenbelt. Because of the site's impending development, the neighbors are concerned about their privacy and how the removal of plants will impact them. Through education about the benefits of native plants and careful planting around property boundaries, the concerns of the public and the city will all be met.

The accessibility and safety of the site entrances is an important issue to address. Because this site will become the major connector between lake Washington and the upper Leschi community great care needs to be taken to ensure the safety of the pedestrians. While the entrance on 33rd avenue is relatively quiet and benign, the lower entrance on Alder street poses great threat to pedestrians moving to and from the water. This street is very steep and sinuous, making it difficult for motorist and pedestrians to see one another. This can be explicitly identified when looking at the context terrain model in [Appendix C](#). Here one can see that one of the most dangerous places on Alder Street is precisely located at the lower entrance of the site. Since there is no sidewalk on the north side of the street people will be forced to cross the street in order to walk down to the water. The creation of a crosswalk here is essential.

Another important consideration for site entrance design is the relative location of a private access road to the lower entrance of the site. This road, which is less than 10 feet across, is located along the east boarder of the site. The homeowner that uses this as the main entrance to her home is concerned that greenbelt users will mistake her road as the entrance to the greenbelt. Because of the limited space in this area careful consideration will have to be taken to provide a distinct and effective lower entrance to the site.

The micro topography onsite also poses constraints for design. Along the southwest boarder of the site there is a small draw that is the natural place for water collection on the site. While there was no standing water at the times of our visits, due to the greater topography, we have hypothesized that this area could become waterlogged during spring and heavy periods of rain in the winter and fall. This would pose a great problem for people traveling through the site and would greatly increase the potential for erosion if people were allowed to walk through this drainage. Therefore trails need to be placed away from this draw for the best interests of the pedestrian and the site.

Climate Analysis

This site is comprised of south and southeast facing slopes. (Appendix D) This dictates that the Leschi Natural Area will be in sun for most of the day and will therefore be warm and dry. As this would usually indicate a sun tolerant planting palette the presence of many large trees provide cool shade. Because of the sites position on a steep slope it will experience up-slope drafts during the day time and down-slope drafts in the evening due to the rising and falling of warm air throughout the course of the day. Also the mid-slope location of this site might yield the presence of frost pockets during the early morning. This could have damaging effects on sensitive plant material that is not cold tolerant.

Soil Conditions

Soil Test Results

Soil samples were taken from the top, middle, and bottom of the ravine in the Leschi Natural Area and sent to the University of Massachusetts soil lab for testing. The data is listed in Table 1.

Table 1: Soil test results from the University of Massachusetts soil lab

	Top	Middle	Bottom
Soil pH	5.9	6.2	6.5
Macronutrients (ppm)			
NO3	13	6	14
NH4	4	3	3
P	5	5	22
K	130	160	244
Ca	1446	1280	1985
Mg	272	205	264
Micronutrients	Normal	Normal	Normal
CEC (Meq/100g)	11.8	8.5	12.3
Lead (ppm)	4	2	7
Aluminum (ppm)	66	62	15

The results from all three samples indicate that there are no major nutrient deficiencies. A cation exchange capacity (CEC) between 10 and 15 is normal and all the samples are near this range. The pH is only slightly acidic at the bottom site, but it is not alkaline enough to warrant amending the soil. A mulch of pine needles can be used at the bottom to lower the pH there, but fertilizer and amendments are not needed

or recommended. The Potassium level is very high at the bottom, so fertilizer with potassium is not necessary. The organic matter in this soil is adequate for most plants, but mulch should be added to reduce erosion, conserve moisture, and maintain nutrient levels.

Existing Vegetation

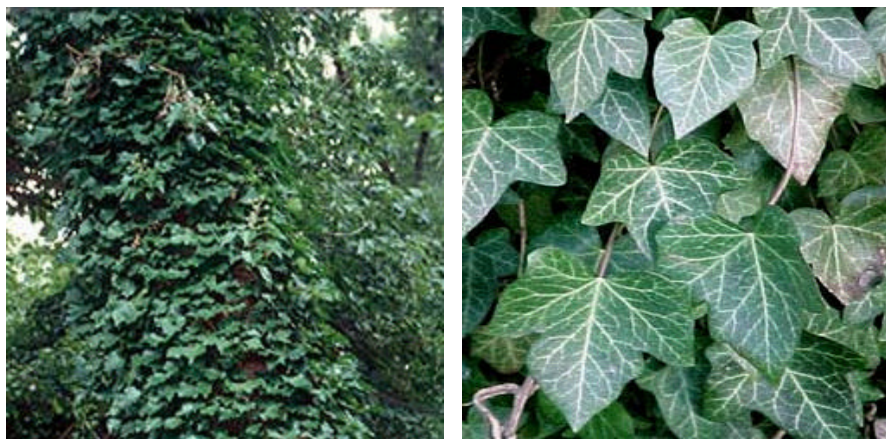
Species	Common name
<u>Trees:</u>	
<i>Abies grandis</i>	Grand fir
<i>Alnus rubra</i>	Red alder
<i>Arbutus menziesii</i>	Pacific madrone
<i>Populus trichocarpa</i>	Black cottonwood
<i>Salix spp.?</i>	Willow?
<i>Thuja plicata</i>	Western red cedar
<i>Tsuga heterophylla</i>	Western hemlock
Shrubs and small plants:	
<i>Acuba japonica</i>	Gold dust
<i>Gaultheria shallon</i>	Salal
<i>Holodiscus discolor</i>	Ocean spray
<i>Mahonia nervosa</i>	Oregon grape
<i>Polystichum munitum</i>	Sword fern
<i>Ranunculus spp.</i>	Buttercup
<i>Sambucus racemosa</i>	Red elderberry
<i>Symphocarpus albus</i>	Snowberry
Invasive:	
<i>Clematis spp.</i>	Clematis

<i>Geranium robertia</i>	Stinky bob
<i>Hedera helix</i>	English ivy
<i>Ilex aquilifolium</i>	Holly
<i>Prunus laurocerasus</i>	Portugese laurel
<i>Prunus lusitanica</i>	Cherry laurel
<i>Rubus discolor</i>	Himalayan blackberry

Invasive Species On-Site

Hedera helix

English Ivy

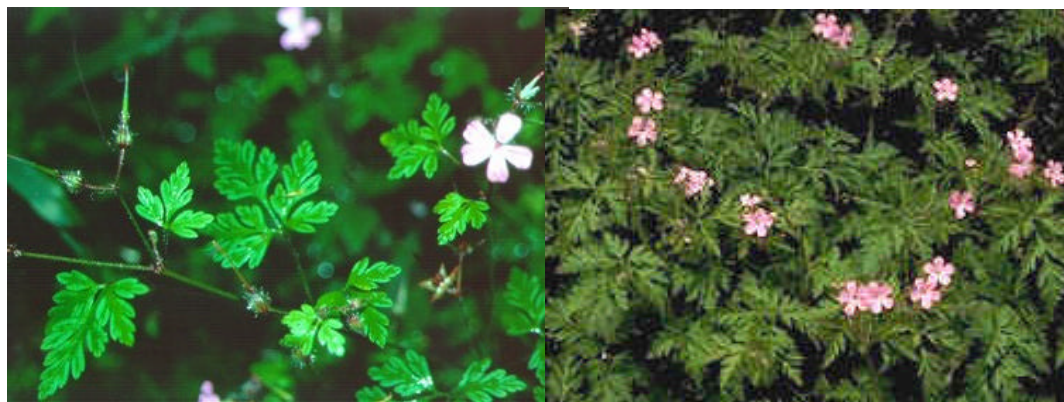


This plant is an evergreen climbing vine in the Araliaceae family. “English ivy is an aggressive invader that threatens all vegetation levels of forested and open areas, growing along the ground as well as into the forest canopy.”⁹ English Ivy is labeled a class C noxious weed because of its already wide spread invasion in Washington. This plant has invaded the entire the site and will need to be removed by hand. Also agreements will have to be made with the surrounding neighbors in order for them to control the ivy on their own properties so that the site is not recolonized by invasive species.

⁹ Swearingen, J., 2004

Geranium robertianum

Stinky Bob



Geranium robertianum is in the Geraniaceae family and is native to Europe, Asia, and parts of North Africa. This herbaceous plant can grow up to ten inches tall and is covered with glandular hairs; it is shade tolerant and readily grows intermixed with non-invasive plants.¹⁰ This plant has not heavily infested the site yet but should be removed due to its class C noxious weed status. If not controlled this plant could become hazardous to the plant diversity of the site once natives are established because it does not need disturbance in order to thrive. Like *Hedera helix*, *Geranium robertianum* can easily take over a site once new vegetation is established due to its deep shade tolerance.

Rubus discolor

Himalayan blackberry

¹⁰ Simon, B., 1998



Rubus discolor is in the Rosaceae family and is native to Western Europe. Despite its name there is no evidence that this plant comes from the Himalayan region.¹¹ This plant grows in dense thickets with long arching branches that are heavily barbed. These mounds can reach the extent of ten feet and are most common in disturbed sites and along watercourses. Once introduced this plant creates a monoculture of plants, shading out anything that attempts to grow around it. This is an extremely vigorous plant that is not grazed by animals due to its barbed thorns. These factors make this plant a high threat to the Leschi Natural Area.

Hazard Tree Assessment

A complete hazard tree assessment of the site was completed by a consulting arborist contracted by Seattle Parks and Recreation (SPR) in 2002. At that time, a total of 13 trees were noted for their hazard status. Since that assessment, four of those 13 trees have been removed and others have been pruned minimize risk. Information about the nine remaining hazard trees is outlined below. The following map shows the location and tag number of existing hazard trees. The information presented in this section is from the SPR report.

¹¹ California Native Plant Council, 2004



931 tree tag number

monitor

ivy removal

high hazard

At the southern entrance to the site an *Arbutus menziesii* (tag # 94) presents a hazard. This tree has a diameter of 28 inches a breast height and is in poor condition

according to the SPR report. The tree is about 40 feet tall with a single trunk. The canopy is extremely small

for the size of the tree, only about 12 feet in diameter, and leans to the northeast about 20 degrees from the vertical. Ivy has begun to climb up the base of the trunk to a height of about 10 feet from ground level. A residential house, parking area, the street and power lines are in the target area. There is decay on the tension side. Removal of this tree was recommended in the report. The tree is located on private property and the owner was notified of the hazardous condition.

An *Acer macrophyllum* (tag # 95) was also documented to be in poor condition in the 2002 report. This tree is located on the same private property as tree number 94. Tree number 95 has a diameter of 31 inches at breast height. This *Acer* has some of the street in its target area and the SPR report recommended that this tree be pruned back or thinned to reduce risk. The trunk of this tree is also covered in ivy to a height of about 10 feet above ground level. The owner of the property was notified of these findings and recommendations.

Another *Acer macrophyllum* (tag # 98) is located near the E. Alder entrance to the site. This tree has five codominant stems each measuring between 16 and 18 inches in diameter at breast height. This tree appears to be in good condition and appears to have been pruned and cleared of ivy by SPR since the 2002 report. However, this tree is located on a steep slope and the species is prone to failure. The large number of codominant stems increases this risk. The target for this tree is the street, parking area, two residential houses and power lines. This tree is in excellent health and its large size offers many benefits. The hazard level of this tree should be monitored so that its health can be protected and the tree can be preserved.

Tree number 96 is another *Acer macrophyllum*. This tag number actually refers to a close growing group of multi-trunked trees with diameters ranging from 10 to 18 inches at breast height. SPR has pruned some large branches to reduce the hazard potential of this tree. They currently have this tree listed on monitor status to watch for future hazard potential. There is some ivy growth on the trunks of this tree.

A large *Acer macrophyllum* (tag # 97) is located upslope. This tree has three codominant trunks with diameters ranging from 18 to 22 inches at breast height. The union between the trunks is a potential point of failure. There is currently no target for this tree but with the addition of the pathway the hazard will need to be reassessed.

Another *Acer macrophyllum* (tag # 198) is located on the northern edge of the site. This tree has a diameter of 41 inches at breast height. SPR has pruned this tree to reduce the hazard to adjacent homes. There is a “large wound at the base with extensive decay”¹² that will require monitoring into the future.

Towards the northeast corner of the site another *Acer macrophyllum* (tag # 199) presents a potential hazard. The trunk has a 45-inch diameter at breast height. This tree has a very low branching angle between two codominant stems. The tree is around 50 feet tall and may target the house to the east. This tree should also be monitored closely as pedestrian traffic increases through the site.

Two more *Acer macrophyllum* are located at the northeast corner of the site. Tree number 931 is a single-trunk tree with a diameter of 40 inches at breast height. Tree number 941 has multiple trunks with a diameter of 54 inches at breast height. Two of this tree’s three trunks are aimed at the adjacent house. There is evidence of removal of a fourth trunk “but the tree looks sound in this area”.¹³ Both of these trees have “unusual and unexplainable injuries” on their trunks.¹⁴ The SPR report contains claims from neighbors that these two trees have been poisoned. The trees currently appear to be in good health.

Increased use of the site will lead to increased potential hazard from the existing trees. All trees should be cleared of the ivy growth from both their trunks and branches. Any trees that are aimed at the new path should be monitored carefully to minimize hazard. Further assessment during spring or summer may be required. A few trees appeared to be either dead or in very poor health during our visits to the site. Their deciduous nature however made it very difficult to ascertain their true health during the winter. Regular hazard tree inspections should be conducted to make pedestrian travel through the site as safe as possible.

¹² Baker, 2002

¹³ Baker, 2002

¹⁴ Baker, 2002

Site Design

Concept Statement

The Leschi Natural Area has received a great deal of attention over the past few years. Some of this attention has come from a group of neighbors who are interested in restoring the area and willing to work to accomplish that goal. Other attention has come from the landscape architecture firm of Anderson & Ray who studied the site and produced a plan and planting strategy. The City of Seattle has also examined conditions on the site. While all of this attention has resulted in great progress, it seems to lack internal connections. Instead of a group with a common goal, the neighbors, Anderson & Ray and the City appear as separate parties conducting separate efforts.

Like many leftover greenspaces in Seattle, the Leschi Natural Area includes property that is part of the street network. The planned street was never built because of the steepness of the slope. During a discussion, our group noticed the value of all of these separate parties and efforts to the site. We began to think about the idea of making connections. We have developed this report and the design included within it as an attempt to make direct connections between the aforementioned elements. The main pathway in the plan is designed to provide pedestrian access and connecting the street ends at the top and bottom of the site. Plants were chosen based on existing vegetation and conditions as part of a restoration effort to connect the area with its native character. We have chosen to reuse as much material as possible in order to connect the future of the site with its past. We hope that these connections will result in the creation of a place that functions well socially, aesthetically and ecologically. We also hope that through the restoration process and beyond this site will be a meeting place where neighbors can connect with one another.

Conceptual Plant Restoration

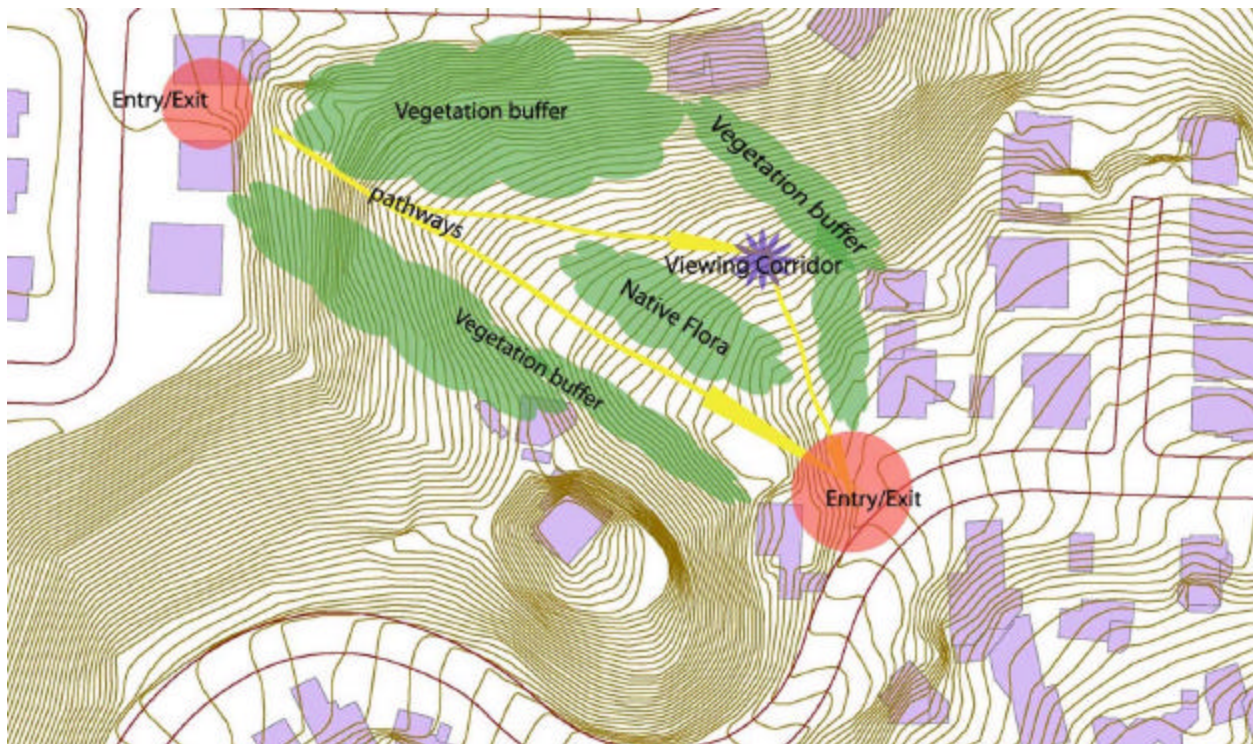
In developing a planting plan for the Leschi Natural Area our team was heavily influenced by the planting strategy developed by the landscape architectural offices of Anderson and Ray for the Leschi Natural Area. In their plan they used the designing principle of a 'clump-gap mosaic'.

“This principle requires adherence to the rule of diversity. Placement of plants in a clump-gap mosaic requires clumping individuals of one species together, then placing individuals of the same species away from the first group. As the process is repeated with different species, a mosaic pattern is formed. This pattern allows plants with specific growth requirements to find a suitable home within the plant community and either flourish or eventually disappear. The overlapping mosaic pattern improves the chances of developing a sustainable, multi-tiered covering of the ground.”¹⁵

We were impressed with the forethought of this design strategy in that it kept in mind the initial aesthetic of the planting pattern as well as the long-term health of the plant community. However in looking at the details of their plant palette we found that the plants chosen closely matched but were not exactly what we thought provided for the needs of the site. Anderson and Ray had picked a lot of coniferous trees in their planting design. While mainly at the bottom of the site, we thought that in the future these would still grow to impede the views of residents. There were also concerns from residents about *Pseudotsuga menziesii* being that it creates deep shade and drops dangerous branches in windstorms. Therefore our revision of Anderson and Ray’s planting plan involves more attention to view corridors and the selective elimination of various large coniferous trees.

¹⁵ Anderson, 2000

Concept Plan



Plant Palette

Acer circinatum

Vine maple



“Shrub or scraggly small tree to 23 feet tall, the sprawling branches often rooting and forming new colonies, stems pale green, becoming dull brown with age”¹⁶ offers bright fall foliage color.

17

¹⁶ Pojar, 1994. p. 93.

¹⁷ Photo Credit: John Hayden.

http://www.richmond.edu/~jhayden/recent_travels_portland/acer_circinatum_01w.JPG

Actostaphylos uva-ursi

Kinnikinnik

18



“Trailing, evergreen, the ascending tips usually no over 8 inches tall, often forming mats with long, flexible rooting branches, bark is brownish-red”¹⁹ copious amounts of red berries.

Almelanchier alnifolia

Serviceberry

20



“Shrub to small tree, ranging from 3 to 16 feet tall; stem smooth, bark dark-grey to reddish; often spreads by rhizomes or rooting branch ends and forms dense colonies”.²¹

¹⁸ Photo credit: Medicinal Plants of the Southwest : <http://medplant.nmsu.edu/ursi.htm>

¹⁹ Pojar, 1994. p. 67.

²⁰ Photo Credit: Forestry Images . <http://www.forestryimages.org/browse/detail.cfm?imgnum=1208089>

²¹ Pojar, 1994. p. 72.



Asarum caudatum

Wild Ginger

22

“Evergreen perennial with extensive rhizomes; stems trailing, rooting freely, often forming large mats.”²³

Blechnum spicant

Deer Fern



24

“Medium-sized, evergreen, tufted ant the end of a short, stout rhizome.”²⁵

²² Photo Credit: Wildflowers of Southern California. <http://www.clunet.edu/wf/nca/flowers/fwr-64.htm>

²³ Pojar, 1994. p. 317.

²⁴ Photo Credit: USDA Plant Database. http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=BLSP

²⁵ Pojar, 1994. p. 420.

Cornus nutallii

Pacific Dogwood

26



“Much-branched, irregular trees to 65 feet tall; bark blackish-brown, smooth, becoming finely ridged with age.”²⁷

Corylus cornuta

Beaked Hazelnut

28



“Generally 3 to 12 feet tall with many stems; twigs, leaves and bud scales covered in long white hairs at least when young, hairless after first season; densely clumped or spreading widely by suckers.”²⁹

²⁶ Photo Credit: USDA Plant Database. http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=CONU4

²⁷ Pojar, 1994. p. 51.

²⁸ Photo Credit: Forestry Images. <http://www.forestryimages.org/browse/detail.cfm?imgnum=1208100>

²⁹ Pojar, 1994. p. 92.

Polystichum munitum

Sword Fern

30



“Large (to 5 feet tall), evergreen, with erect leaves forming a crown from a stout, woody, scaly rhizome.”³¹

Ribes sanguineum

Red-flowering Currant

32



“Erect, unarmed, 3 to 10 feet tall, stems crooked, bark reddish-brown; young growth finely hairy.”³³

³⁰ Photo Credit: WSA Native Plant Database.
<http://cahedb.wsu.edu/nativePlant/scripts/webDisplayPlant.asp?ID=nv065>

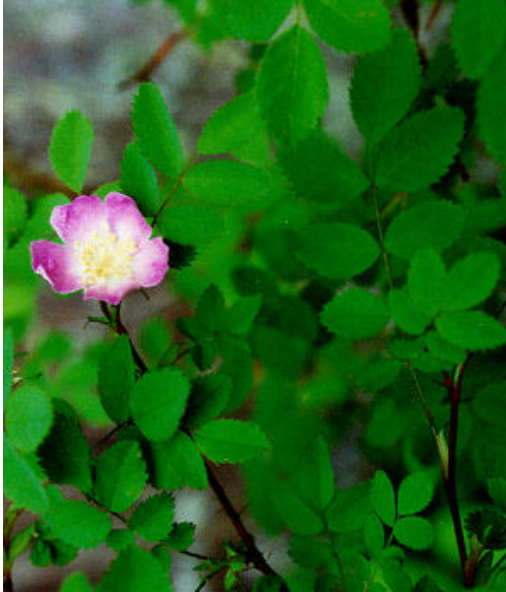
³¹ Pojar, 1994. p. 421.

³² Photo Credit: Central Washington Native Plants Photo Collection.
<http://www.cwnp.org/photopgs/rdoc/risanguineum.html>

³³ Pojar, 1994. p. 84.

Rosa nutkana

Nootka Rose



34

“Spindly, to 10 feet tall, with a pair of large prickles at the base of each leaf other prickles usually absent except on some new growth.”³⁵

Rubus parviflorus

Thimbleberry



36

“Erect, unarmed, 6 inches to 10 feet tall; young growth glandular-hairy; bark shredding; usually forming dense thickets through an extensive network of rhizomes.”³⁷

³⁴ Photo Credit: University of Puget Sound BIO 377 class page
http://www.ups.edu/faculty/kirkpatrick/fieldbotany/family_pages/Rosaceae/rosa_nutkana.htm

³⁵ Pojar, 1994. p. 74.

³⁶ Photo Credit: Forestry Images <http://www.forestryimages.org/browse/detail.cfm?imgnum=0806021>

³⁷ Pojar, 1994. p. 77.

Sambucus racemosa

Red Elderberry

38



“Shrub to small tree, to 20 feet tall, with soft, pithy twigs; bark dark reddish-brown, warty; foliage with strong, characteristic odor.”³⁹

Tsuga heterophylla

Western Hemlock

40



Grows up “to 200 feet tall with a narrow crown, a conspicuously drooping leader, gracefully downsweeping branches and delicate, feathery foliage; bark rough, reddish-brown, scaly, thick and furrowed in old trees; twigs slender, roughened by the peg-like bases whose needles have fallen.”⁴¹

³⁸ Photo Credit: USDA Plant Database. http://plants.usda.gov/cgi_bin/plant_profile.cgi?symbol=SARA2

³⁹ Pojar, 1994. p. 70.

⁴⁰ Photo Credit: Central Washington Native Plants Photo Collection.
<http://www.cwnp.org/photopgs/tdoc/tsheterophylla.html>

⁴¹ Pojar, 1994. p. 30.

Vaccinium ovatum

Evergreen Huckleberry

42



“Erect, bushy, to 12 feet tall; young stems somewhat hairy.”⁴³

This plant also has copious amounts of edible, dark, shiny berries.

Pinus Contorta

Shore Pine

44



Usually grows “ to 65 feet tall, often with crooked trunk and irregular, pillowy crown; bark moderately thick... with scaly or deeply furrowed into plates, dark brown to blackish.”⁴⁵

⁴² Photo Credit: Rainyside Gardeners.

http://www.rainyside.com/features/plant_gallery/nativeplants/Vaccinium_ovatum.html

⁴³ Pojar, 1994. p. 58.

⁴⁴ Photo Credit: Pepinieres des Laurains

<http://www.popilaurains.com/Pinus%20contorta.jpg>

⁴⁵ Pojar, 1994. p. 38.



Taxus brevifolia

Western Yew

46

“Evergreen shrub to small tree, 6 to 50 feet tall, up to 12 inches in diameter; branches droop; trunk often twisted and fluted; bark reddish, papery, scaly to shreddy.”⁴⁷ Bright red, inedible berries surrounding seeds.

Acer macrophyllum

Big-leafed Maple

48



This tree is “large, often multi-stemmed, to 115 feet tall; young bark green and smooth, older bark grey-brown, ridged, and often covered with mosses, lichens and ferns.”⁴⁹

Photo Credit: Chemsoc

http://www.chemsoc.org/exemplarchem/entries/2003/aberdeen_Murdoch/mm/Taxus_brevifolia.gif

⁴⁷ Pojar, 1994. p. 40

⁴⁸ Photo Credit: Humboldt Redwoods State Park

<http://www.humboldtredwoods.org/images/bigleaf%20maple.jpg>

⁴⁹ Pojar, 1994. p. 45.

Site Preparation

The site must be properly prepared to allow the maximum survival rate of new plants. This preparation consists of many steps outlined in this section. These steps are: removal of invasives, composting, slope stabilization, mulching, soil preparation, truck access and parking and perimeter concerns. While not all of these steps are necessary across the entire site, their completion will play a strong role in determining the ultimate success of the landscape installation.

REMOVAL OF INVASIVES

The most pressing concern relating to site preparation is the removal of the invasive species currently dominating the site. The slope stabilization and mulching steps outlined in this document should be done immediately following the removal of the invasives.

English Ivy (*Hedera helix*) is a very aggressive species that will compete with and eventually dominate new, native plants installed on the site. We recommend that the removal of the invasive species be done carefully, by hand, in order to avoid damage or unintended removal of existing non-invasive plants or mosses. The removal of this material by hand can be accomplished using a pair of pruners or shears. Although it is effective to also remove the root material we recommend that disturbance to the soil be minimized, especially on slopes, in order to avoid slope stabilization issues. The benefits of this care and attention must be balanced against the increased amount of labor associated with the removal of invasives by hand. A careful mapping of existing non-invasive plants and mosses could be used to determine areas of higher plant variety where the increased labor is justified.

Where it is determined that hand labor is not necessary or practical, we recommend that invasive species be removed by mechanical mowing or weed-eating of all visible plant material. The cuttings from this process should be collected and removed from the site in to minimize potential sprouting and re-invasion of the site. After mowing and removing all visible plant material the area should be covered with

layer of mulch at least 6 inches thick. This layer of mulch will maximize the stress placed on the targeted invasive species and make re-growth difficult.

If removal of the clippings is not possible they should be transported carefully and piled in an area of the site that has been designated for composting. This pile should be maintained according to standard composting procedures. These procedures are outlined below. Any *finished* compost can be spread as a mulch and fertilizer around either newly installed or established plants.

COMPOSTING PROCEDURES

The following procedures outline a yard waste composting process. It should be understood that material from invasive species such as *Hedera helix*, *Ilex aquifolium* and *Rubus discolor* must be completely composted or it can lead to re-invasion of the site.

1. **Find a Location for the Pile-** Your pile can be built anywhere except up against a structure such as a house or fence. Macroorganisms, i.e., bugs, etc., will assist you in the composting process. You want them in the pile, not in the house. Locate your pile at least 2 feet from any structure.
2. **Set up a Compost Bin (Optional)-** A bin is unnecessary. You can just build your pile on the ground. However, bins are useful for keeping your pile looking neat, retaining heat and moisture, and avoiding the negative effects of wind and weather. If you live in a rural area where food wastes are composted in your pile, a bin can help deter pests. If you want to use a bin, you may build one or buy one.
3. **Prepare the Materials (Optional)-** Ensure you have both nitrogens (grass, manure) and carbons (leaves, dried hay) available, and shred those carbons that are more than 1-2" in size.
4. **Build the Pile-** You may simply throw in organic materials as they become available. This will result in a very slow decomposition process, but may be

appropriate if you are not in need of the finished compost. Material (esp. woody debris) will compost faster if it is shredded prior to its addition to the pile.

If you are building a pile using the batch process for faster decomposition, follow these steps:

- Wet the Ground Under the Pile
- Put Twigs or other unshredded carbon on the bottom of the pile to provide some aeration at the base.
- Layer the rest of your materials, alternating nitrogen and carbon layers. •Add water as you go.
- End with a carbon layer.

5. Cover the Pile (Optional)- Experts disagree on whether a cover is necessary. If you live in a region that is excessively dry or excessively wet, cover the pile with a black plastic garbage bag to retain moisture or guard against rain.

6. Monitor the Pile (Optional)- Check to see that your pile becomes hot within a few days. The pile's heat should peak again after turning. After that, it should peak again every time you turn it, although the peak temperature will be lower and lower with each turn.

Also monitor the moisture content of your pile. When you pick up a handful of material, it should feel like a wrung-out sponge.

7. Turn the Pile (Optional)- Turning the pile means stirring it up by some method. Turn the pile to decrease composting time. Turning the pile allows all the material to be exposed to the hot center and increases aeration. I turn mine once a week to once a month

The finished compost will take up only 25 - 40% of the space occupied by the

original pile. When the individual materials can no longer be identified and the pile resembles dark rich soil, the compost is completed. It will smell sweet, woody, and earthy. It will crumble through your fingers.

From beginning to end, the composting process can take from 6 weeks to 2 years. Hot composting times will be much less than cold composting. Factors noted in the instructions above will determine how long the process takes. Everything matters -- how often the pile is turned, what materials went into the pile, the condition of the materials, moisture, adequate air, presence of insulation around the pile, size of the pile, etc.

If you add materials as you get them, instead of building batches of compost, you will find that after 6 months to two years, the inside and bottom of the pile, i.e., the matter you added first, has become compost. You may remove this from the bottom of the pile and use it. Return the rest of the materials to the bin or pile location to continue decomposing.⁵⁰

SLOPE STABILIZATION

The layer of woody invasive species occupying the site is currently functioning to stabilize the steep slopes. Special precautions must be taken immediately following the removal of invasives to avoid compromising the stability of these slopes. There are several methods recommended for slope stabilization. Paths should be cut or filled along slopes prior to implementation of these methods. These methods can be combined to create a system that is appropriate for various conditions.

1. **Facines**- Facines are bundles of sticks, twigs and branches cut from live plants, bunched parallel to one another, and tied into bunches with biodegradable twine or string. Facines are installed by staking them into shallow trenches dug across the face of the slope. The live cuttings of twigs root into the soil and introduce vegetation that will further stabilize the slope as it grows.

⁵⁰ Mastercomposter.com, 2004

2. Linear Retaining Elements- Retaining elements are tree trunks, large branches and other linear, rigid elements that can be placed in a cross-slope orientation. These large features can act as informal retaining walls in order to lend stability to a slope.

3. Grid Retaining Elements- For instances where linear elements such as facines or tree trucks are not appropriate, grid materials such as jute netting, welded wire mesh or other geotextile materials may be used. The material should be spread out across the slope and fastened securely using stakes no shorter than 36". Grid retaining elements must be installed prior to planting. Holes may be cut into the material to allow planting to be installed through the grid.

4. Cross-slope Planting- It is possible to stabilize less significant slopes by installing plants across the face of the slope and covering the area with mulch.

MULCHING

Once the invasive species have been removed and slopes have been stabilized, areas should be covered with a thick layer of mulch. The mulch layer should be at least 6-8 inches thick. Mulch should be applied as soon as possible following the invasive removal and slope stabilization.

Mulching will be a critical aspect of establishing a successful landscape as it serves many purposes. It provides a protective layer over the soil to minimize erosion and compaction from rainfall and foot traffic. Mulch also blocks sunlight from reaching the soil, thereby inhibiting the growth of the invasive species. The mulch also moderates soil temperatures and moisture levels by acting as an insulator from both extreme heat and cold. As the mulch biodegrades it transfers nutrients into the soil.

There are many materials that can be used for mulching. We recommend an organic mulch, such as coarse woodchips, for the following reasons:

- The coarse texture allows for movement of water and air while protecting the soil from compaction.
- Coarse woodchips break down slowly and therefore will provide a long lasting layer of mulch.

- As they biodegrade, nutrients are transferred into the soil to be made available as fertilizer for plants

TRUCK ACCESS AND PARKING

The Leschi Natural Area presents some difficult obstacles for truck access and parking. It is assumed that the impact on parking will be minimal because neighbors who will walk to the site will do the majority of work. If workers are driving to the site, carpooling is recommended to alleviate parking congestion issues. Commercial delivery of materials should be transported in small trucks to maximize the number of potential delivery locations. When possible, deliveries should be scheduled between 10:00 AM and 3:00 PM to avoid rush hour conflicts. The majority of deliveries should take place at the top of the site to avoid blockage of E. Alder Street. If delivery of materials is necessary on E. Alder Street adequate personnel should be present to warn drivers of the blockage around the blind turn. The convenience and privacy of adjacent properties should be considered at all times.

PERIMETER CONCERNS

Safety should be considered during construction. At the end of each day, any hazardous areas or situations should be adequately marked or barricaded to avoid accidents.

Perimeter concerns such as runoff and sediment control should also be considered. It may be necessary to install silt fencing along the eastern edge of the property bordering E. Alder Street to control water quality of any surface runoff. All street and sidewalk surfaces should be swept clean of debris following all deliveries and at the end of each day. Security is not anticipated to be an issue, however all tools and easily transported materials should be secured at the end of each workday. It is recommended that a monthly schedule or plan be circulated to all adjacent neighbors so that they are kept current on all happenings on the site.

Plant Procurement and Planting

Nursery Stock

Plants are generally available from nurseries in three different categories: container stock, balled & burlapped (B&B) and bare-root stock. Each of these categories of plants has pros and cons. Container plants are very readily available from nurseries year round. They are easy to store and transport. They can be expensive and are prone to root problems due to poor practices as production nurseries. Plants that are purchased balled in burlap are usually larger than those in containers. They are also readily available from nurseries but they are more difficult to transport than containers. B & B plants are difficult to store as their exposed rootball can dry out quickly. The price of B & B stock is usually slightly less than container plants. B & B plants are usually field grown and therefore not as prone to root defects as container plants. Bare-root plants can be difficult to find. They are generally only for purchase during the winter and early spring, while the plant is still dormant. Bare-root plants rarely have defects in their root structure. They adapt quickly to new soil types and can establish more quickly than either container or B & B stock. Bareroot stock is usually less expensive than container or B & B stock.

Salvaged Plants

Plants can also be obtained by salvage. In their 2000 report, Anderson & Ray describe salvaging strategies and methods. We agree with their belief that native plant salvage is a good practice that could be applied to the Leschi Natural Area.

Plant Selection

The plant material for this project will come mostly from volunteers salvaging plants from development sites and road-widening projects⁵¹, and the rest will be bought through matching grants. Fall through winter is the best time to salvage native plants, but care must be given to insure the roots or root ball does not dry out. If the plants are to be stored before planting, a capillary bed can be built to reduce the amount of watering needed.

⁵¹ Anderson, 2000

The larger and more sensitive plants will be container or balled in burlap (B&B) and some stock may be bare root. The quality of individual plants should be checked before planting to identify any root problems. The budget is limited for this project, so it is important to insure that the more expensive plants will survive in the long term. Nursery grown plants establish better than salvaged plants, but the salvaged plants are free.

Any plants purchased at a nursery should be inspected for quality. This inspection should begin at the nursery. Nursery staff should be helpful and knowledgeable about the plants that they are selling and the practices of their production nurseries. The plants at the nursery should be properly water, weeded and fertilized. The nursery should have a return policy that allows for refunds or replacement for plants of unacceptable quality. Plants should also be inspected either at the nursery or prior to planting. Plants should be free of pests and disease. Roots should be evenly distributed and should not circle, kink or girdle each other. Plant shoots should have a normal, vigorous growth pattern with good taper. Plants should not be crown pruned at the nursery.⁵²

Plant Installation

All plantings should be done after the stairs and trail are finished and close to the time invasives are removed. The largest trees and shrubs should be planted first and then the smaller plants. Installation should be done in the fall, but can be done in spring if irrigation and aftercare is maintained.

The planting hole must be twice as wide and at least as deep as the plants roots. A small mound is left in the middle of the hole to spread the roots over. All the container media or non-native soil and burlap should be removed so the roots can be examined. Any girdling or circling roots should be cut away and the roots should be spread out radially from the root crown when placed in the hole. The root crown should be flush with the soil line and not below it. The hole is then back filled with native soil and can be topped with the container media and wood chips.

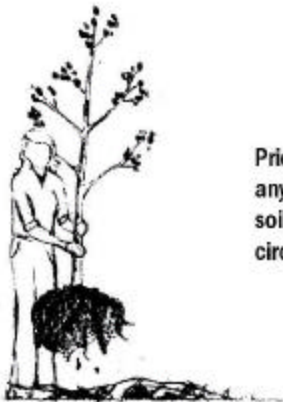
⁵² Chalker-Scott, 2004 *Nursery Plant Inspection*

The plant must then be watered in to allow the roots and the soil to settle and stabilize. If necessary, stakes can be used to stabilize the plant, but should be removed immediately after the plant is established. Irrigation is critical during this period, so the site should be monitored at least weekly.



Typical planting detail for plants that are "balled in burlap"

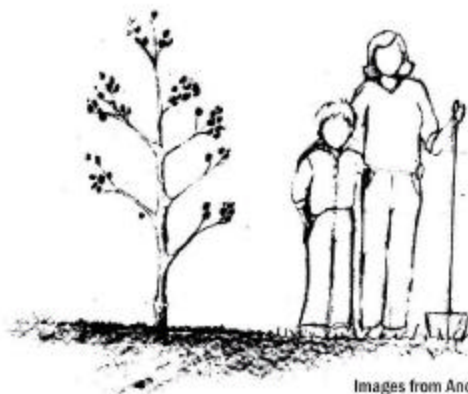
Plants that arrive balled in burlap should be planted as soon as possible. Store plants in the shade and keep the rootball moist.



Prior to planting, the rootball of the tree should be completely unwrapped and any burlap, twine or wire should be discarded. Remove as much of the clay soil as possible from the roots of the plant. Inspect the roots for any kinked, circling or girdling roots and remove them with clean pruners.



Inspect the size of the exposed rootball and dig a hole that is at least twice as wide as the roots of the plant. The hole should be no deeper than the roots of the plant and should have a small mound at the center of the bottom of the hole to spread the roots over. Rough up the edges of the planting hole to remove any soil glazing from the digging process. Place the plant into the hole and gently arrange the roots so that they spread away from the center of the hole in a radial pattern ensuring that no roots are kinked or looped. Backfill the hole with native soil and water deeply to settle the soil around the roots.



Construct a "soil moat" around the top of the hole to keep water in the area of the roots. Cover the area with a thick layer of mulch. Taper the thickness of the mulch down around the plant to keep it away from the trunk. Water regularly and deeply until the plant becomes established and then gradually decrease the amount of irrigation.

Images from Anderson, 2000

Typical planting detail for container plants



Plants that arrive balled in containers can be stored in the shade. They should be watered regularly and checked at least daily to be sure that they do not dry out.



Prior to planting, the rootball of the plant should be removed from the container. Remove as much of the container media as possible from the roots of the plant. Inspect the roots for any kinked, circling or girdling roots and remove them with clean pruners.



Inspect the size of the exposed rootball and dig a hole that is at least twice as wide as the roots of the plant. The hole should be no deeper than the roots of the plant and should have a small mound at the center of the bottom of the hole to spread the roots over. Rough up the edges of the planting hole to remove any soil glazing from the digging process. Place the plant into the hole and gently arrange the roots so that they spread away from the center of the hole in a radial pattern ensuring that no roots are kinked or looped. Backfill the hole with native soil and water deeply to settle the soil around the roots.



Construct a "soil moat" around the top of the hole to keep water in the area of the roots. Cover the area with a thick layer of mulch. Taper the thickness of the mulch down around the plant to keep it away from the base of the plant. Water regularly and deeply until the plant becomes established and then gradually decrease the amount of irrigation.

Images from Anderson, 2002

After Care and Maintenance

Introduction: Importance of maintenance

Aftercare and maintenance is not just an important consideration in landscape design, it is a necessity. This necessity determines whether or not a landscape will remain intact and succeed, or fail due to the lack of care and maintenance after installation. This section of the report will discuss aftercare and maintenance and it will describe an overview of needs to ensure a successful landscape after design construction and plant installation.

Invasive plant control

Invasive plants are a problem throughout many landscapes. Species that are of specific concern in the Pacific Northwest have been discussed previously in this report. Invasive plants are classified by specific characteristics. These characteristics include high vegetative reproduction, high tolerance to stress, short juvenile periods that lead to rapid growth, having easy seed germination processes that allow for rapid reproduction and nitrogen fixations. Most importantly non-native species cause economic or environmental harm.

As stated in the previous section, the most efficient action to deal with invasive species is to remove these plants from the site. Hand removal is ideal. It is possible to use chemical or other non-manual means to remove these plants, but due to the vast amount of ivy that exist, using a large quantity of chemicals would harm the native species. Hand removal is the preferred method for removal of invasive species.

There are many alternative aftercare procedures to deal with invasive species once they are removed. Once invasive plants are removed, these species should be suppressed enough not return. In the event these plants do return management needs to occur. If invasive plants are left to grow and reestablish in the landscape with no intervention, newly planted native vegetation can be lost. In the event that invasive

plants do return, they should be removed quickly before they are given the opportunity to establish or spread.

Unfortunately nature works in unpredictable ways. There is no guarantee that invasive plants will always be absent from the landscape. Invasive plants are spread throughout the landscape in many ways. Humans often make the mistake of planting plants that might not belong in the landscape. Birds and other animals naturally spread seeds with no discretion. With this in mind, landscape managers need to understand that even after invasive species have been removed, there is a chance that they will return.

With a site of this proportion, it is important to inspect the landscape frequently. *Hedera helix* for example grows at an alarming rate. In a period of one year these plants have the ability to cover a canopy.⁵³ Once this occurs, the ivy flowers and blocks out any sun that a tree would normally receive. This competition for light can kill any existing tree in a short time period. This quarterly inspection of the landscape and hand removal of any reoccurring invasive species would be ideal landscape aftercare and maintenance.

Plant Mortality

Plant Mortality occurs for many different reasons. These reasons include soil conditions, plant location, plant stress and other issues such as plant aftercare and maintenance. Plant mortality is directly related to aftercare and maintenance. Aftercare and maintenance is required for plants to remain healthy.

In the Leschi Natural Area we propose to conserve existing plants, plant native flora and fauna, and relocate plants into more suitable areas. These proposals create an important reason to reduce plant mortality. Although plant mortality can be viewed as a negative occurrence it can also be viewed as a window into landscape conditions. These conditions can determine whether or not a specific location in the landscape is suitable for plant. Acknowledging plant mortality can reduce cost, maintenance time and environmental impacts on the landscape.

⁵³ Ivy Removal Project, 2004

When transplanting plants, it is important to recognize what needs to be done in order to reduce mortality rates. Plants used in this site will either be new plants or existing plants in the landscape. For the most part, non-invasive plants in the landscape that are large, mature and fully-grown will be left alone. The plants that would be reused are smaller shrubs and trees that can easily be moved from existing locations.

Installing plants away from impacts such as soil compaction and pedestrian traffic is important. Plants that suffer from compaction due to human foot traffic and maintenance vehicles have a higher mortality rate. Compaction affects the amount of water that roots are receiving and furthermore adds unnecessary stress on roots. It is important to keep heavy loads away from tree roots and plant roots.

It is important to prepare site conditions correctly when transplanting and reusing plants. Details of site preparation are described in the section labeled site preparation and plant procurement and planting. Post-installation is a crucial time for because they are plants extremely vulnerable. Plants are vulnerable because of the many stressors that plants go through once installed. These stressors can include root stress from root damage, water loss and adjustment to new soil and climatic conditions. With this stated, it is very important that plants be watered.

Adequate water is essential for newly planted trees and shrubs. The need for irrigation is determined by topography, exposure, plant requirements and climate. Early in the growing season, roots will actively grow into moist soil, while the top has few leaves. Over watering during crucial times such as these can endanger root growth and function.⁵⁴ When plants are adequately watered and care for, plant mortality is highly reduced.

Irrigation regimen

As stated in the prior section irrigation is extremely important. It determines whether or not plants survive. Irrigation regimens vary depending on plants used in a site and where they are located. When selecting plants it is imperative to have an understanding of climatic conditions, drought seasons and plant needs.

⁵⁴ Harris, Clark, Matheny, 2004

It is important not to over water plants. The Leschi Natural Area has dry summers and generally moist winters. Depending on whether plants are planted in the wet winter months or the dry summer months it determines the water regimen. When plants are planted in the moist winter months (which is recommended) plants do not require an intensive water regimen. In our specific location water will be provided naturally during that time.

During the summer months, container-grown and b and b plants may require rather frequent watering. Water demands can fluctuate depending on soil texture, plant size, leaf size and rootball size. When container or b and b plants are transplanted, water previously retained in the rootball can move into the soil around and below the root ball. If the rootball soil is coarser than the surrounding soil, its moisture content can be reduced below field capacity by capillary forces.⁵⁵

Daily irrigation may cause surrounding soils around plants to remain extremely wet. For the first few weeks, water need only be adequate to rewet the root ball. If drip irrigation is not available, a berm can be established outside the root ball that is high enough to retain water that will rewet the roots.⁵⁶ This regimen should be practiced until roots are established and able to collect water by their own personal means.

Pruning

Pruning is another important aspect of aftercare and management. This is important because it serves many different purposes. Pruning can revitalize plants, train young plants, is a form of health maintenance, it has aesthetic and monetary value, allows for plant size control, and creates view improvements and deters the public to prune erroneously and illegally which can damage overall plant health if done improperly. This section will discuss these individual reasons as to why it is important to prune and other considerations that needed to be taken for aftercare and maintenance in regards to pruning.

Pruning revitalizes plants. This revitalization follows a kill or cure approach. This approach can either decrease or increase flowering. Depending on what users want in

⁵⁵ Harris, Clark, Matheny, 2004

⁵⁶ Harris, Clark, Matheny, 2004

regards to revitalization plants can be manipulated into a desired intention. Pruning allows for maintenance to control young plants. This is very important for the first three to five years of a plants life. It can be used to limit plants to a single leader, and it can also be used to maintain good branch spacing.

Pruning also has seasonal considerations. For example light pruning can be accomplished anytime. Light pruning does not inflict damaging stress onto plants. In regards to the four seasons in a year, during the springtime, no deciduous trees should be pruned, especially when leaves begin to leaf out. This also means it is not recommended to prune when plants are in flowering season. Ideally it is recommended to prune after spring flowering time. Summer usually revitalizes a plant. When pruning in the summer it is important to take into consideration underlying trees and leaves. These trees and leaves are more susceptible to sun burn under warmer dry weather conditions. Fall is usually the best time for deciduous trees to be trimmed and during the winter plants become dormant and cold damage may occur near prune cuts.

Trees need to be assessed individually in the natural area. The Leschi Natural Area will need tree pruning approximately every three to five years. This is recommended so plants do not create a safety hazard as they get more mature and more difficult to maintain. Regular pruning can be used to keep future maintenance costs low and create less liability.

Mulch

Mulching provides many benefits to the landscape. It is important to choose appropriate site-specific mulch. Wood chips that are two inches or larger is a recommended form of mulch. Mulch skirts help maintain healthy soil conditions and protect trees from maintenance damage. The mulch after installation should be maintained to a condition similar to the time of installation.

There should always be an approximate six to eight inch layer of coarse mulch on the ground. This is best for weed control and water conservation. This thick layer of mulch does not allow weeds to receive sunlight restricting photosynthesis to occur. Water is retained underneath the mulch. The mulch acts as a barrier between the sun and air to moderate soil temperatures.

It regards to maintenance it is important to keep mulch away from trunks. This allows root crowns to perform its necessary functions. This also decreases the amount of disease that can occur when trunks are in anaerobic conditions. Keeping the root zone uncovered and weed free reduces competition around the plant.

Addition of organic material from organic mulching may decrease or even eliminate the need for fertilization. In some instances, nitrogen deficiency may occur after installation of organic mulch; most other nutrients increase under mulching. A fine textured, rapidly decomposing mulch in close contact with a low nitrogen soil will be most likely to cause nitrogen deficiency symptoms in mulched plants.⁵⁷ Nitrogen levels can be increased through fertilization.

It is important not to use mulch materials that might be infested with disease organisms to which plants are susceptible. Even though composting would kill any pathogens, it is better not to compost diseased material. Do not mulch plantings in soils that remain wet. The lack of drying under mulch may encourage disease development.

⁵⁸

Staking

Staking may be needed to protect trunks, anchor roots, and support tops of young trees that may otherwise not be able to stand independently. The extent of staking for trees depends on trunk strength, tree conformation, expected wind conditions, amount of vehicular and foot traffic, type of landscape planting, and level of follow-up maintenance. Many young trees can stand-alone; others may need support to stand against the wind or to grow upright as desired.

Staking needs to be removed one year after plant installation or sooner upon individual tree assessment. Trees that are able to stand on their own need to have stakes removed. This ensures that trees do not become dependant on the stakes. When trees become dependent on stakes, energy is focused on crown growth and little is emphasized on trunk growth. This creates a situation where trees are susceptible to blowing over in a heavy windstorm.

⁵⁷ Harris, Clark, Matheny, 2004

⁵⁸ Harris, Clark, Matheny, 2004

Stakes should be placed as low as possible on the trunk and never higher than 1/3 of the tree height. Material used to attach the trees to the stakes should be flexible enough to allow movement “all the way down to the ground so that trunk taper develops correctly.”⁵⁹

Erosion Control

As stated previously, the Leschi Natural Area is comprised of steep slopes created by natural elements. This area is susceptible to landslides and mudslides if erosion is not controlled. Currently the ivy holds the landscape stable and erosion is not evident. The slope stabilization methods described in the site preparation section should be employed to minimize problems of erosion.

Bench and Stair Maintenance

Proposed benches and stairs need little maintenance. Many benches will be created from trees that have fallen or been cut down. Maintenance includes removing of new plant growth on benches and a possible paint coating that prevents decay and wood rot. Stair maintenance includes removing of collected debris and dirt.

Budget Analysis

Small Plant Material Installation

	PLANT PRICES				
Common Name	4inch	1 Gal	2 Gal	5 Gal	Bare Root
Kinnikinnik	\$ 1.25				
Serviceberry		\$ 4.50	\$ 9.45	\$ 21.00	
Wild Ginger	\$ 1.65	\$ 3.75			
Deer Fern		\$ 3.75	\$ 7.95		
Western Dogwood		\$ 4.50			\$ 1.75
Beaked Hazelnut		\$ 3.25	\$ 6.50	\$ 12.00	

⁵⁹ Chalker-Scott, 2004 *The Myth of Staking*

Sword Fern		\$ 3.00				
Red-Flowering Currant		\$ 4.00			\$ 2.25	
Nootka Rose		\$ 3.00	\$ 6.00		\$ 1.25	
Thimbleberry		\$ 2.75	\$ 6.00		\$ 2.85	
Red Elderberry		\$ 3.00	\$ 6.00		\$ 1.25	
Western Hemlock		\$ 3.00	\$ 6.00	\$ 12.00	\$ 1.55	
Evergreen Huckleberry		\$ 6.00				
Pacific Yew		\$ 6.00	\$12.75			
Shore Pine		\$ 3.00	\$ 6.00	\$ 12.00	\$ 1.85	
NUMBER OF PLANTS INSTALLED						
	4inch	1 Gal	2 Gal	5 Gal	Bare Root	Species Totals
Kinnikinnik	110					\$ 137.50
Serviceberry		70				\$ 315.00
Wild Ginger	85					\$ 140.25
Deer Fern		50				\$ 187.50
Western Dogwood					10	\$ 17.50
Beaked Hazelnut		10				\$ 32.50
Sword Fern		105				\$ 315.00
Red-Flowering Currant					35	\$ 78.75
Nootka Rose					40	\$ 50.00
Thimbleberry		45				\$ 123.75
Red Elderberry					15	\$ 18.75
Western Hemlock					5	\$ 7.75

Evergreen Huckleberry		30				\$ 180.00
Pacific Yew		15				\$ 90.00
Shore Pine					10	\$ 18.50

PLANT MATERIAL COST			\$ 1,712.75
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Plant material cost	\$ 1,712.75
Plant material disposal	\$ 436.50
Gravel for Landings/Stairs	\$ 1,000.00
Railroad Ties	Salvage
Railings and Boardwalk	\$ 650.00
Initial Installation Costs	\$ 3,799.25

Aftercare Costs	
First year Irrigation	\$630
Replacement Plant Material*	\$ 513.83

Larger Plant Installation with Park Benches

	PLANT PRICES					
Common Name	4inch	1 Gallon	2 Gallon	5 Gallon	Bare Root	
Kinnikinnik	\$ 1.25					
Serviceberry		\$ 4.50	\$ 9.45	\$ 21.00		
Wild Ginger	\$ 1.65	\$ 3.75				
Deer Fern		\$ 3.75	\$ 7.95			
Western Dogwood		\$ 4.50			\$ 1.75	
Beaked Hazelnut		\$ 3.25	\$ 6.50	\$ 12.00		
Sword Fern		\$ 3.00				
Red-Flowering Currant		\$ 4.00			\$ 2.25	
Nootka Rose		\$ 3.00	\$ 6.00		\$ 1.25	
Thimbleberry		\$ 2.75	\$ 6.00		\$ 2.85	
Red Elderberry		\$ 3.00	\$ 6.00		\$ 1.25	
Western Hemlock		\$ 3.00	\$ 6.00	\$ 12.00	\$ 1.55	
Evergreen Huckleberry		\$ 6.00				
Pacific Yew		\$ 6.00	\$12.75			
Shore Pine		\$ 3.00	\$ 6.00	\$ 12.00	\$ 1.85	
NUMBER OF PLANTS INSTALLED						
	4inch	1 Gallon	2 Gallon	5 Gallon	Bare Root	Species Totals
Kinnikinnik	110					\$ 137.50
Serviceberry		50	10	10		\$ 529.50
Wild Ginger	50	35				\$ 213.75
Deer Fern		30	20			\$ 271.50
Western Dogwood		10				\$ 45.00
Beaked Hazelnut				10		\$ 120.00
Sword Fern		105				\$ 315.00

Red-Flowering Currant		35				\$ 140.00
Nootka Rose					40	\$ 50.00
Thimbleberry			45			\$ 270.00
Red Elderberry			15			\$ 90.00
Western Hemlock			5			\$ 30.00
Evergreen Huckleberry		30				\$ 180.00
Pacific Yew			15			\$ 191.25
Shore Pine				10		\$ 120.00

PLANT MATERIAL COST			\$ 2,703.50
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Plant material cost	\$ 2,703.50
Plant material disposal	\$ 436.50
Gravel for Landings/Stairs	\$ 1,000.00
Railroad Ties	Salvage
Railings and Boardwalk	\$ 650.00
Park Benches	\$ 329.97
Initial Installation Costs	\$ 5,119.97

Aftercare Costs	
First year Irrigation	\$630
Replacement Plant Material*	\$ 811.05

* assuming 30% plant mortality rate

Timeline for Onsite Work

The schedule provided in this section presents ideal conditions. It may be preferable to separate the site into three or four sections and then begin work on a new section each April. This will reduce the workload and make the labor more manageable.

Year 1

April-June:

Begin removal of invasives, path construction, slope stabilization and mulching. Work should be done in accordance to methods outlined in this report.

July-September:

Continue work outlined above, slope stabilization and mulching should be completed by the end of September. Provide supplemental water to existing native vegetation as necessary. Check for and remove weeds in cleared areas every other week.

October-December:

Install new plants during the wetter fall period so that they can establish roots more easily. Monitor hazard trees while the leaves are off and branch structure is easily visible. Check mulch thickness to minimize soil compaction and erosion during the winter months, add more if less than 6 inches thick. Check for and remove weeds in cleared or planted areas once per month.

December-April:

Watch for damage to trees during winter storms. Check for and remove weeds in cleared or planted areas once per month.

Years 2 & 3

April-September:

Check for and remove weeds in planted areas every other week. Provide irrigation as necessary.

October-April:

Replace dead plants with new stock. Check for and remove weeds in planted areas once per month. Check mulch thickness to minimize soil

compaction and erosion during the winter months, add more if less than 6 inches thick.

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Plant Material Sources

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http://members.shaw.ca/nativeplants/streamside_inventory.html

http://www.woodbrook.net/bare_root_plants.htm

<http://www.nwplants.com/business/wholesale/whlbr/>

Benches and Building Material Sources

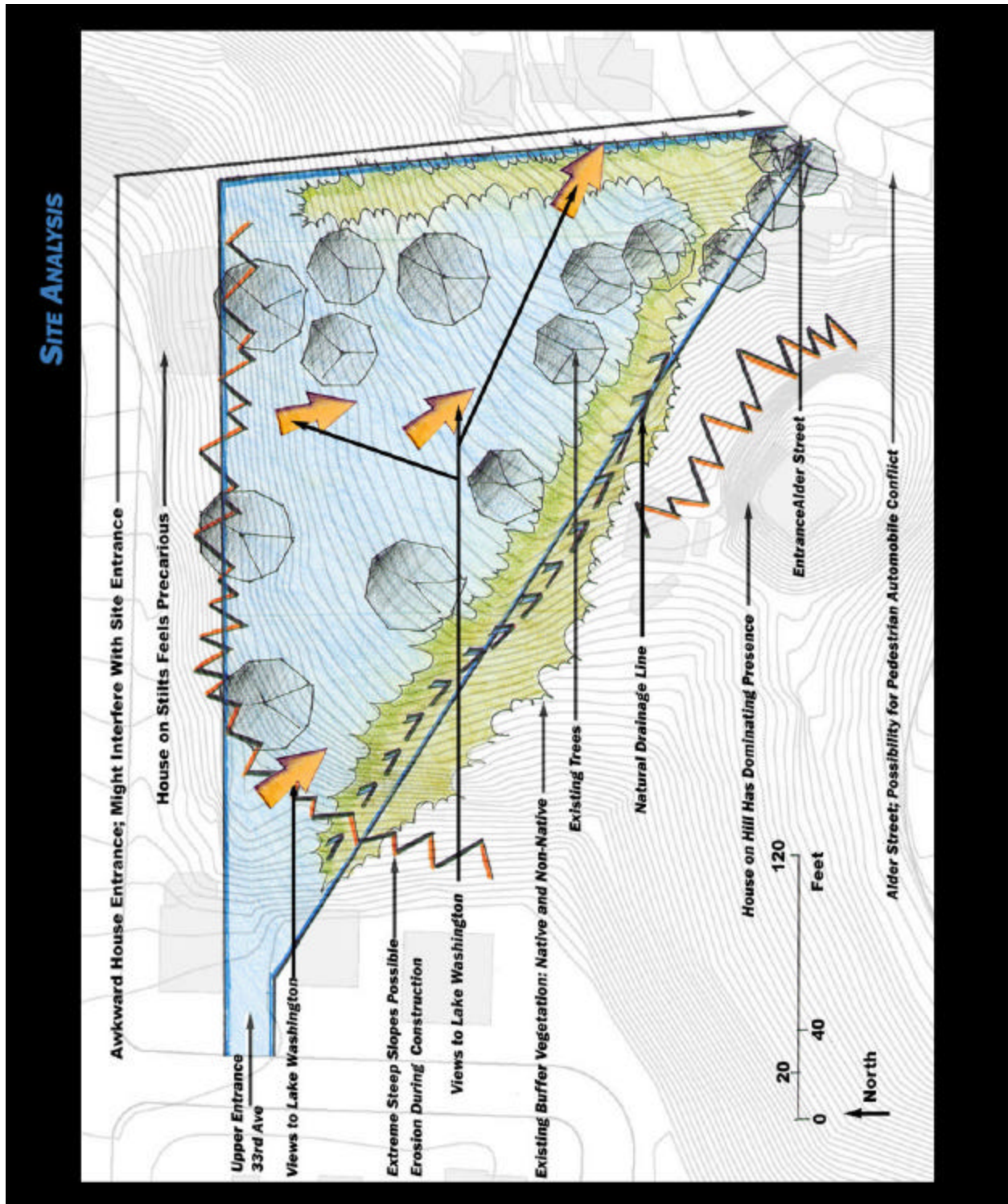
<http://www.amazon.com/exec/obidos/tg/detail/-/B0000630MZ/002-1336677-5668057?v=glance>

<http://www.dunnlumber.com>

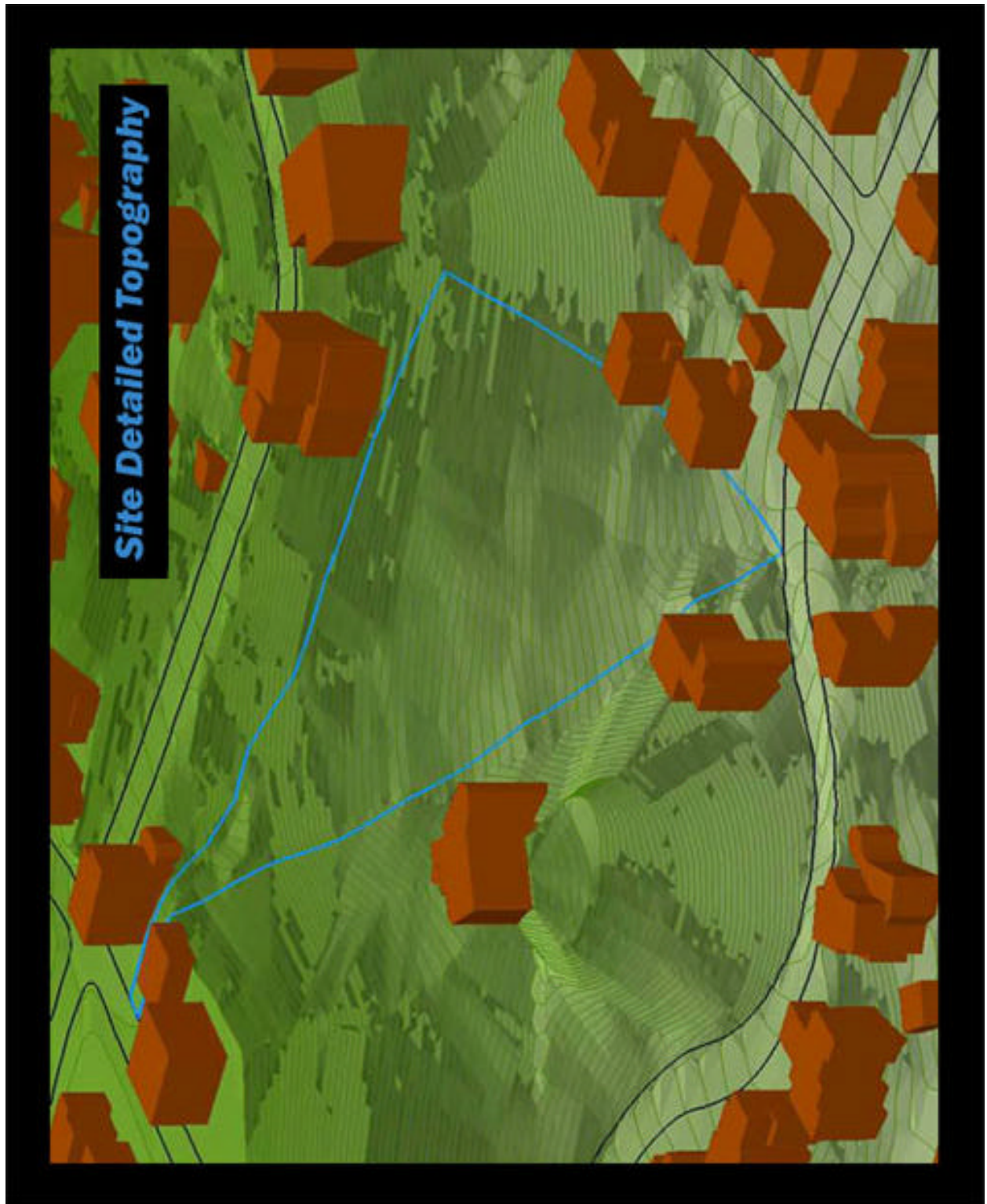
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Disposal Cost Sources

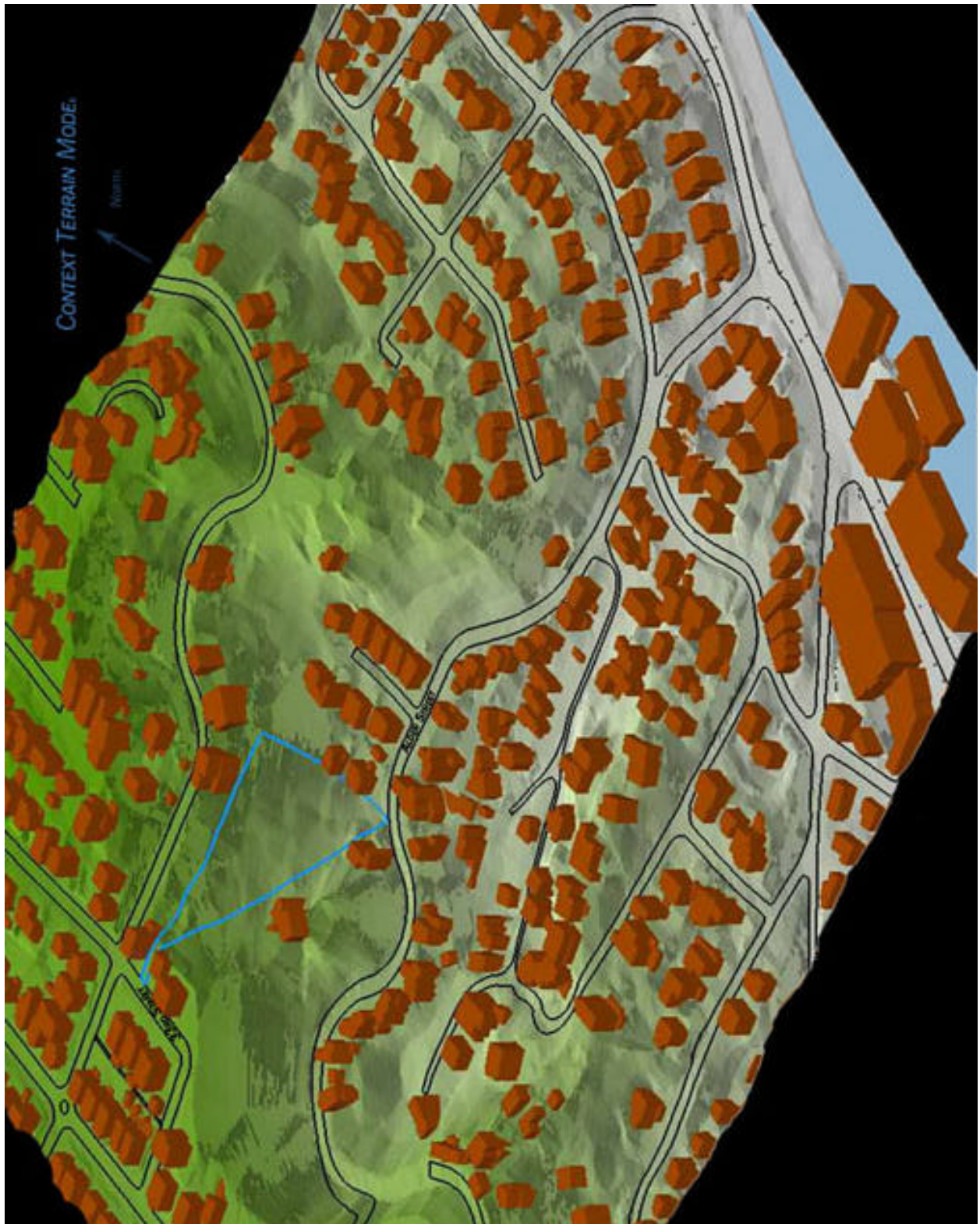
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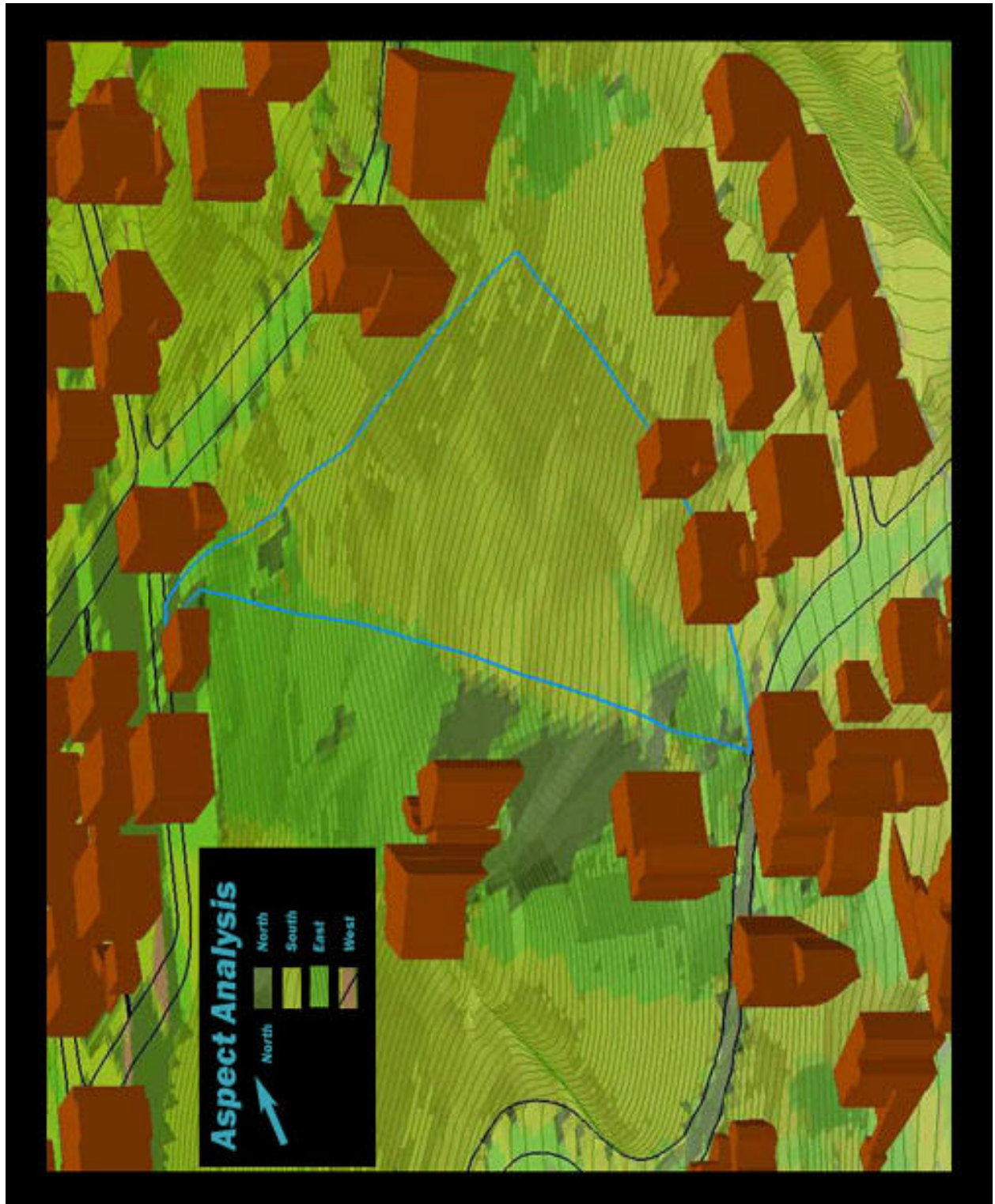
Appendix B



Appendix C



Appendix D



APPENDIX – Survey Letter

February 2004

Dear Leschi Resident,

This is a survey from the University of Washington's Environmental Horticulture program. This survey is completely voluntary. We are requesting that you please complete this survey and return it, with the included stamped envelope. Feel free to return your responses via-email to the Environmental Horticulture contact address if more convenient. Your opinions are greatly appreciated and will help assist us in our informational studies. Below is a brief overview of our project.

Project location: Leschi Natural Area, (East Alder Street entry to the Leschi Natural Area)

Client: Friends of Leschi Natural Area, Leschi community Council

Ownership: Seattle Department of Parks and Recreation.

Project Overview and goals:

1. Create a beautiful entry at East Alder Street.
2. Reestablish native flora
3. Meet neighbors concerns about maintaining privacy, considering the future installation of a path from 33rd Ave. to East Alder Street.

Environmental Horticulture contact:

Vince Viet Nguyen/206-890-1279/Vincey@u.washington.edu

Community contact:

John Osa-Barber/206-324-1548/Barber-osa@comcast.net

This survey is conducted solely to collect information to inform the Environmental Horticulture students as they develop different design concepts for the East Alder Street Entry. Please answer and return survey as soon as possible.

Thank you for your time.

Please call or contact via e-mail with any questions or concerns.

EHUF 480

APPENDIX – SURVEY SHEET

Survey questions:

What would you like to see happen, in regards to the redesigning of the Leschi neighborhood natural area between East Alder and 33rd Avenue?

What design elements would you like to see incorporated into a new potential design for a path and entrance?

What design elements do you NOT want to see in a new potential design for a path and entrance?

What types of plants and vegetation would you like seen incorporated into a design.

Do you have any concerns with privacy and or safety, if so, what would you suggest be done to provide more privacy if this project site is redesigned.

Is there any known history of the site, property owners, prior use and so on.