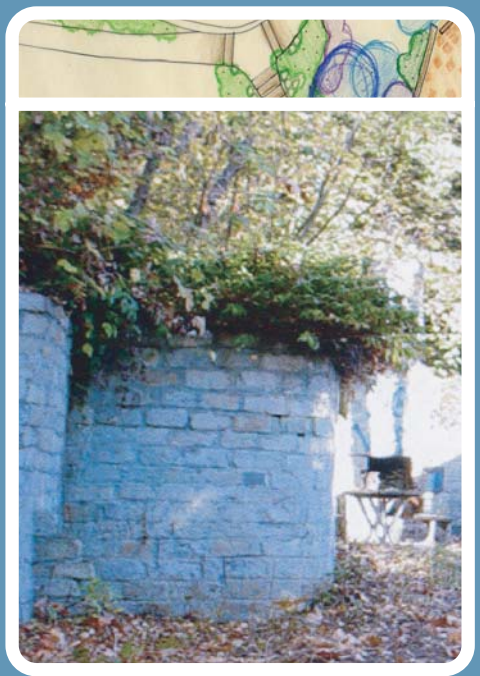

Frink Park

caretaker's cottage site

restoration & design

Frink Park

FRINK PARK: CARETAKER'S COTTAGE SITE LANDSCAPE RESTORATION AND DESIGN

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ABSTRACT

Frink Park is a 17.2 acre forested park located on the hillside above Lake Washington in Seattle's Leschi neighborhood. It was included as part of the Olmsted plan because it offered exceptional views of the lake and distant mountains, and served as a greenbelt along Lake Washington Blvd. In 2002, in response to a request by the Friends of Frink Park, students from the University of Washington's Sustainable Community Landscapes program designed a plan for revitalizing the overgrown and isolated caretaker's cottage site.

This site in particular stands out from the rest of Frink Park in that it contains the remnants of the structures associated with the old caretaker's cottage. In a park that strives to preserve the native landscape, human influence is visible here where the park's caretaker once lived. These urban ruins provide a source of intrigue and a unique opportunity to explore the integration of human presence in nature through planting and design. The distinctive character of this site makes it more alluring to the public and could become a park attraction if its identity can be made more apparent.

The student's design attempts to alleviate or mitigate the site and design issues of human use and safety, view potential, forest health, and park identity, while melding remains of a former home site with an ungroomed, naturalistic space. In doing so, they strive to maintain and uphold the Olmsted vision for Frink Park. For much of the site, the proposal recommends forest restoration; however, there are several places where human intervention is evident, specifically the entrance and the old cottage site. They chose to retain the human aspect of the site's history, while elucidating the breaking down of these elements by nature, primarily in the form of vegetation.

INTRODUCTION

Site Location

Frink Park is located in Seattle's Leschi neighborhood and is a total of 17.2 acres in size (Seattle Parks and Recreation 2002). This proposal addresses the Caretaker's Cottage site within Frink Park, located in the eastern portion of the park at the corner of S. Frink Pl. and Lake Washington Blvd. (see Figure 1).

Figure 1. Frink Park and Caretaker's Cottage location.

Site history

Olmsted Associates were commissioned in 1903 to develop a comprehensive scheme for Seattle parks and boulevards that, in the words of John Charles Olmsted would "secure and preserve for the use of the people as much as possible these advantages of water and mountain views and of woodlands" that would be "well distributed and conveniently located" (Williams 1999). In this master plan the city was to be linked by a chain of parks that would surround the bodies of water. Identified by extensive surveying, many of these areas offered breathtaking views that had often been traditional Native American gathering spaces (Mendelson 2001). The parks worked with existing topography and native vegetation to create a system of distinct, naturalistic public spaces that would provide weary urbanites a place to renew themselves (Williams 1999).

Frink Park was given to the residents of Seattle by John Frink, a prominent Seattle businessman, as part of the Olmsted master plan (Friends of Frink 2002). It joined many other parks in Seattle under this master plan after the citizens passed a bond supporting a $3.5 million budget (equaling over $57 million in today's economy) to enhance the city's park system. Built on a steep hillside, Frink Park was most prized for its commanding lake views, series of trails, and potential for a green connection to Lake Washington (Williams 1999).

Today, Frink Park is still valued for the same woodland park amenities that it was treasured for in the past. The volunteer organization, Friends of Frink Park, seeks to preserve, through stewardship and restoration, the urban forest that makes this park so unique and loved by the local residents. Numerous restoration work parties have been organized and carried out in collaboration with surrounding schools, residents, and environmental organizations such at EarthCorps (Friends of Frink 2002). In 2001, the Friends of Frink Park identified an opportunity in the University of Washington's Sustainable Community Landscapes program for aid in conducting research, creating sustainable designs and management plans, and restoring the natural systems in Frink Park (Friedman, 2002).

Project goals

We determined the main objectives of the design and restoration of the Caretaker's Cottage site through looking at goals set forth by the neighborhood residents and those laid out in the *Frink Park Concept Plan* (Sheldon & Associates 2000). We collated these objectives, which have significant overlapping ideas, and used the following goals as the framework for the project:

1. Remove invasive plant species and restore the native forest structure and function.
2. Enhance and restore wildlife habitat.
3. Create better visual access to the site to address safety concerns and open up outward vistas, while retaining the ungroomed, natural space.
4. Increase site use and diversity of user groups.
5. Integrate the Olmsted vision and strike a balance between the park's natural landscape and cultural landscape.

Project zones

For clarity and easy reference throughout the report, the site has been divided into four zones, delineated by topography, human use patterns, and vegetation (see Figure 2).

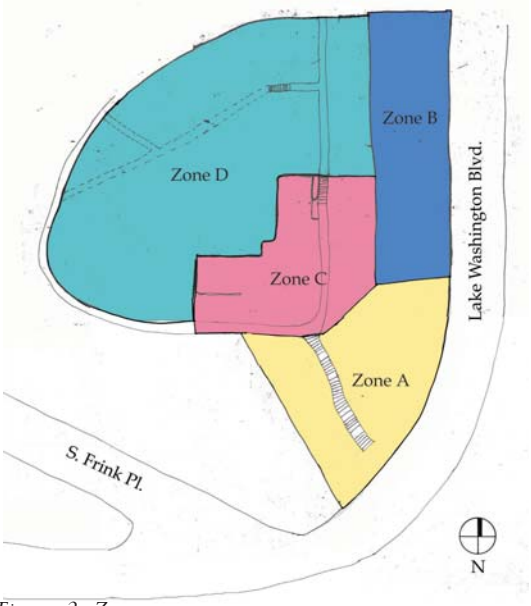

Figure 2. Zone map.

Zone A: Entrance is the low spot of our site and is adjacent to the intersection of S. Frink Pl. and Lake Washington Blvd. The entrance now consists of a kiosk, a relatively level spot planted with a young *Quercus rubra* (red oak), and concrete steps.

Zone B: Steep slope is north of the entrance and consists of the steep northeast facing slope adjacent to Lake Washington Blvd. The northernmost boundary of this zone is the line between the understory made up primarily invasives and a patch of sword fern.

Zone C: Cottage area is north of the intersection of S. Frink Pl. and Lake Washington Blvd. at the top of the entrance stairs. The cottage area consists of remnants of an old garage and patio; the cottage itself has been razed and there are no visible remains of the structure. Stone retaining walls, two concrete strips where the garage stood, a patio, and a fireplace are the remaining historical and human elements. This area is skirted with vegetation and has several trees within it, but is relatively open and level.

Zone D: Upper level is above the caretaker's home site and extends from the south-facing ridge overlooking S. Frink Pl. across the ridgeline to the northeast-facing ridge overlooking Lake Washington Blvd.

SITE ANALYSIS

Existing Vegetation

The *Frink Park Concept Plan* (Sheldon & Associates 2000) identifies eight distinct vegetation zones within Frink Park. The area addressed in this proposal is comprised of three of the eight vegetation zones. The two forest vegetation zones are identified as

Zone 1. Bigleaf maple/Pacific madrone (*Acer macrophyllum/Arbutus menziesii)* and

Zone 2b. Bigleaf maple/mixed conifer (*Acer macrophyllum*/mixed conifer).

The third vegetation zone is one of two developed zones in the park, identified as

Zone 7. The caretaker's site.

Zone 1. Bigleaf maple/Pacific madrone (Acer macrophyllum/Arbutus menziesii)

A grove of Pacific madrone dominates the canopy along the south-facing ridge that runs above S. Frink Pl. The lower section of the Pacific madrone grove is included in this proposal and consists of the upper level and the entrance area of the park. *Natrassia mangifera,* a fungal infection commonly found in Pacific madrone, is present in this stand and is being monitored by the Seattle Parks Department. The current management plan for these trees is for them to remain where feasible, be trimmed as necessary for safety, and be left to senesce for use as wildlife snags (Sheldon & Associates 2000). A healthy *Cornus nuttallii* (Pacific dogwood) is also located in this area.

The understory beneath the Pacific madrone consists of native understory species that are tolerant of well-drained soil such as *Corylus cornuta* (beaked hazelnut), *Mahonia nervosa* (Oregon grape), *Gaultheria shallon* (salal), *Holodiscus discolor* (oceanspray), and *Symphoricarpos albus* (snowberry). Except for a small open area where a recent revegetation project was done, the upper level is covered in invasive *Rubus discolor* (Himalayan blackberry), *Hedera helix* (English ivy), and *Cytisus scoparius* (Scot's broom). *Polystichum munitum* (Sword fern), *Pseudotsuga menziesii* (Douglas-fir), *Quercus spp*. (oak), and snowberry appear to have been planted during this previous project. Young Pacific madrone have established, presumably from the native seed bank after the area was cleared of English ivy. Along the trail above S. Frink Pl. the slope is covered in English ivy, *Ilex aquifolium* (English holly), *forsythia spp*., and *Laburnum anagyroides* (golden monkey chain).

Zone 2b. Bigleaf maple/mixed conifer (*Acer macrophyllum*/mixed conifer)

This forested vegetation zone comprises the northeast-facing steep slope above Lake Washington Blvd. A mixed canopy of *Populus trichocarpa* (black cottonwood), bigleaf maple, and Douglas-fir currently exists. English ivy covers the majority of this slope, though there are remnant patches of pure sword fern scattered throughout the hillside. Blackberry, *Clematis vitalba* (traveler's joy), golden chain tree, and *Prunus laurocerasus* (English laurel) are extensive, especially on the lower reaches of the slope. Except for a scattering of beaked hazelnut and the sword fern, there is little native understory.

Zone 7. The caretaker's site

The park entrance and the main level of the caretaker's site comprise the remaining vegetation zone. As a former home site, this area is dominated by invasive and ornamental species. The main home site is an open, grassy area surrounded by *Populus nigra var. italica* (Lombardy poplar), Douglas-fir, *Thuja plicata* (western red cedar), and bigleaf maple. A major effort to remove English ivy, Himalayan blackberry, and *Hypericum calycinum* (creeping St. Johnswort) occurred during the 2002 growing season. Roots and shoots of English ivy and creeping St. Johnswort remain under the soil surface throughout the area and are beginning to re-sprout. Areas of English holly, English laurel, and English ivy remain.

The park entrance area consists of a small grassy area surrounded primarily by non-native vegetation. In the center of the grass is a small red oak. The stairs leading into the park are lined with snowberry on either side, which has been pruned back off the steps. English laurel and English ivy are the dominant invasive species in the area. Last summer, large amounts of English ivy were removed on the small slope above the grassy entrance. For a more detailed description of the vegetation zones and an excellent overview of local forest ecology and succession, refer to Section 4.0 Forest Plan of the *Frink Park Concept Plan* (Sheldon & Associates 2000).

City ordinances

The Seattle Parks and Recreation Department, Seattle Department of Transportation, and Seattle City Light all have codes and ordinances salient to landscape issues. Those most relevant to this Frink Park site address public health, safety, and welfare; visibility and views; and land use. Because of their proximity to rights-of-ways (Lake Washington Blvd. and Frink Pl.), the zones on this site most affected by city ordinances are the entrance and the steep slope:

- Trees and shrubs must be maintained to provide an eight-foot clearance above sidewalks and 14 feet above roads.
- Trees must be planted a minimum of three-and-a-half feet from street curbs and two feet from sidewalk edges.
- Trees must be installed a minimum of five feet from any underground utility line.
- Trees must be planted 30 feet from a street intersection. Any plants installed within 30 feet of a curb line of any intersecting street cannot be more than two-feet high, measured from the ground up.
- Also relevant, because of views to Lake Washington from Frink Park, Seattle Municipal Code 25.05.675, which requires the maintenance of public views of significant manmade and natural features (City of Seattle Clerk's Office 2002).

Lake Washington Blvd. is a designated boulevard and would be affected visually by some of our proposed work, particularly revegetation of the steep slope. A *boulevard* is "a public place under the jurisdiction of the Department of Parks and Recreation . . . administered by the Superintendent related to a park." Thus, boulevards are governed by the Seattle Department of Transportation, as well as the Department of Parks and Recreation and permission for modification of adjacent properties may need to be given by the Parks and Recreation Superintendent (City of Seattle Clerk's Office 2002).

Soils

Understanding soil health and its connection to ecosystem health and function is important for planning and managing sustainable urban forests. Soil health is defined as the ability of a specific soil to sustain plant and animal productivity, maintain and enhance water and air quality, and support human habitation. As the foundation for ecosystem health, it provides a medium for root growth, supplies a balance of nutrients to plants, stores and releases moisture to plant roots, and supports a community of microorganisms that recycle nutrients through decomposition.

It is important to understand the differences between urban forest soils and unaltered wildland forest soils when discussing soil health. Urban soils exist as a result of human impact and modification and have been produced by the mixing and filling of land surfaces. Many urban soils show significant signs of disturbance and may have abrupt soil layers created from manipulation, incorporation of debris, and removal/addition of topsoil. These layers exhibit differences in soil texture, which inhibits the flow of water and air though the soil profile. This, in turn, limits available water and nutrients for plant absorption.

Soil samples were collected from the Caretaker's Cottage site on October 16, 2002 and sent to the University of Massachusetts at Amherst soil lab for analysis. Six core samples were taken from zones A–D. The samples were categorized by depth, from 0–6 in. and 6–10 in., and analyzed separately. Several 10-inch deep soil pits were dug in each zone to analyze the contrast between the organic (upper O horizon) and mineral soil horizons. Most of the soils across the site were difficult to dig and appeared to be very compact. This is most likely due to lower than normal rainfall contributing to dry soil conditions. An area of particular interest on this site is the location where the original caretaker's cottage once stood. The soil in this 21 ft x 28 ft plot appears to be distinctly different from the surrounding soil. Soil samples were taken from this site and processed separately from the other Zone C samples and labeled as "house site."

Soil samples to determine percent soil moisture and texture class were collected on December 7, 2002. One sample was taken from plots A, B, and D, while three samples were taken from plot C in an effort to represent the wide range of conditions in this zone. Soil-water infiltration tests were conducted adjacent to each sampling location.

Bulk Density

Bulk density (BD) is a measure of soil compaction that indicates how easily water, air, and nutrients flow through the soil. It is defined as the ratio of the mass of dry solids to the bulk volume of the soil occupied by those dry solids and is expressed as grams per cubic centimeter (g/cm^3). The BD range for

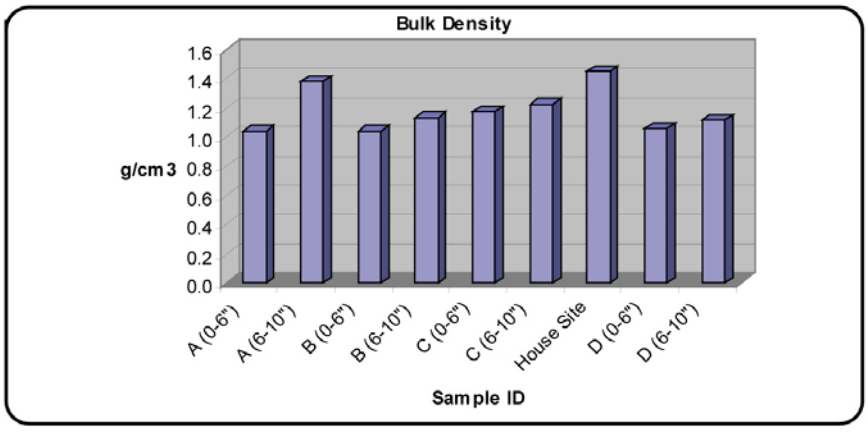

Figure 3. Soil bulk density.

normal healthy soils is between 1.0–1.4 g/cm^3 and can sometimes be as high as 1.6 g/cm^3, depending on soil texture. A BD of 1.5–1.6 g/cm^3 can restrict root growth, while soils with a BD of 1.7–2.3 g/cm^3 or higher are as dense as brick or concrete.

Except for the house site, all of the samples collected from this site show BD in the desired range for plant growth (see figure 3). The bulk density in the house site delete is 1.5 within the range that can restrict root growth.

Infiltration, Soil Moisture, and Texture

Infiltration is the process by which water enters the soil. The rate of infiltration is largely regulated by soil texture and existing moisture content. The maximum rate at which the soil can absorb water at a given initial soil moisture content is the infiltration capacity. Healthy soils have stable structure and continuous pores to the surface, allowing uninterrupted water flow into the soil during rain events. Reduced infiltration can cause an increase in runoff and contribute to of flooding urban streams and rivers, as well as stormwater retention systems. A low rate of infiltration is often the result of poor soil structure and can cause soils to become saturated at the surface during rainfall. Saturation leads to decreased soil strength and enhances erosion potential. In steep slope areas, soil layers may lose cohesion when they become saturated, leading to massive landslides.

The soil texture (sand, silt, clay) partly determines infiltration capacity. Sandy soils usually have a higher infiltration capacity than do clay soils. The amount of water in the soil also contributes to the infiltration capacity. Rate of infiltration is highest when the soil is dry and decreases as soils become wet.

We conducted infiltration tests to determine the infiltration capacity of the soil at the Caretaker's Cottage site (see Table 1). To do this, a 400 ml cylinder was placed on the soil surface and filled with water. We used a stopwatch to determine the time it took for 400 ml of water to drain into the soil. Because it had been raining, the test conducted Zone A demonstrated effects of an exposed site. The 400 ml of water took about 11 minutes to drain. This rate of infiltration, which is slower than at some of the other sites, is due to the lack of canopy cover at the entrance, resulting in a higher percent moisture.

Sample ID	texture class	% moisture	g/cm3 BD
A (0-6")	sandy loam	24.3	1.0
B (0-6")	sandy loam	12.0	1.0
C (0-6")	sandy loam	17.2	1.2
House Site	clay loam	26.4	1.5
D (0-6")	sandy loam	20.9	1.1

Table 1. Soil texture, moisture, and bulk density.

The extremely steep slope in zone B would not allow for accurate testing of soil infiltration. The sandy loam texture of the soil and the low initial moisture content indicate that it should be a reasonably well-drained soil; however, because of the extremely steep slope, this area will be highly prone to surface runoff and erosion.

We conducted four tests in Zone C, the first of which was directly where the house once stood. The infiltration rate here is very slow due to the high clay content of the soil. The moisture content of the soil is

also higher than any of the other tested areas. Soil structure appears to be very poor and this area is prone to surface runoff and erosion. The 400 ml of water took well over an hour to completely drain. The second test in this zone was conducted in the turf area, where we pulled turf aside to expose mineral soil. It took approximately six minutes for the water to fully infiltrate. The soil in the garage area of Zone C is extremely well drained, absorbing 400ml of water in just under two minutes. This capacity for infiltration could be due large pore spaces in this soil created by gravel and fill material. The final test in Zone C was done in the soil under the cedar at the northeast corner. The 400ml of water took about four and one-half minutes to drain. The soil here is somewhat compacted from pedestrian use, which could account for the slightly slower infiltration rate compared to the other sandy loam soils in the zone.

In the test conducted in Zone D, the 400ml of water drained into the soil in about ten minutes. The soil quality in this zone appears to be quite good. However, like Zone A, this area is has little canopy cover. This exposure to rain made the initial moisture content of the soil higher than Zones B and C, causing a slower infiltration rate.

Infiltration tests show that all areas of this site have well-drained soils with the exception of the house site in Zone C. Maintaining a vegetative layer or adding a protective organic mulch layer across the entire zone will increase infiltration capacity. Little can be done to change the soil texture; however maintaining an input of organic materials will improve soil structure.

Organic Matter

Soil organic matter is a crucial component in healthy soil systems. Organic matter binds particles into the granular soil structure characteristic of loose, easily-managed condition of productive soils. Organic matter increases the amount of plant-available water soil can hold, is the major source of plant available phosphorus and sulfur (important macronutrients), and is the primary source of nitrogen for most plants. Organic matter is also the main supply of carbon and energy to soil microorganisms. Soil organic matter drives the biochemical activity that is essential for ecosystem functioning.

The ideal range for total soil organic matter (SOM) is four to ten percent. Organic content of the 0–6 in. layer is most important because the nutrients in the OM will be available in the plant-rooting zone. Soil organic matter can take a long time to penetrate deep into the mineral soil layer, so it is common to see lower total SOM in the 6–10 in. samples. The 0–6 in. layer of Zones A, B, and D all show adequate SOM for desired plant growth (see Figure 4). In contrast, Zone C has a lower level of SOM than is desired. It is important that the soil in this area

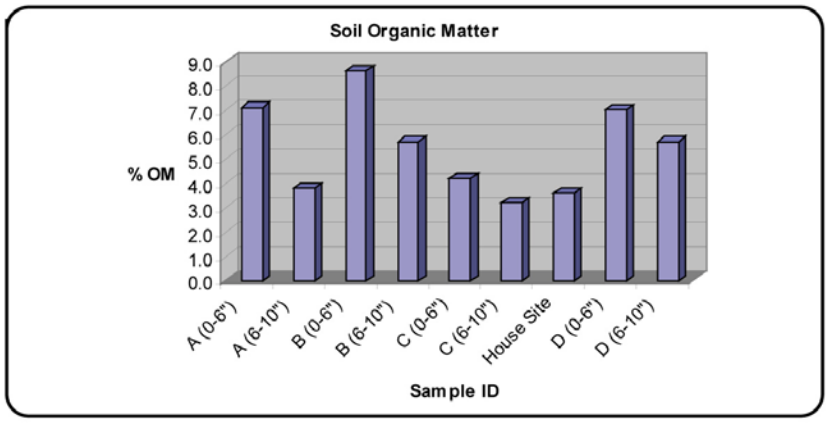

Figure 4. Soil organic matter.

be well mulched to maintain soil moisture, reduce compaction, prevent erosion, increase SOM over time, and contribute to plant and microbial health.

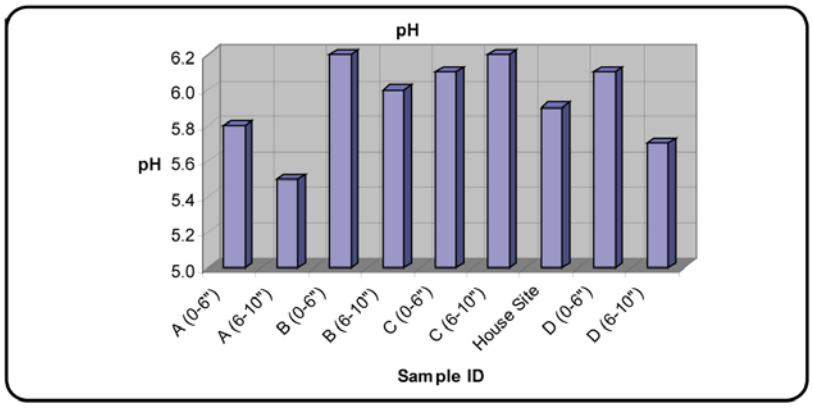

Figure 5. Soil pH.

pH

Soil pH is important because it gives an indication of the general chemical condition of the soil. Extreme pH levels can indicate nutrient deficiencies or toxic conditions. Most plants thrive in a soil pH of 5.5–7.5, and the majority do best in the middle of this range (University of Massachusetts 2002). The typical pH range for forest soils dominated by conifer species is 3.5–6.0. Soils in areas dominated by deciduous vegetation generally have pH in the range of 5.0–7.0 (Brady 1999). Soil pH is within the desired range in all zones (see Figure 5) and does not require adjustment.

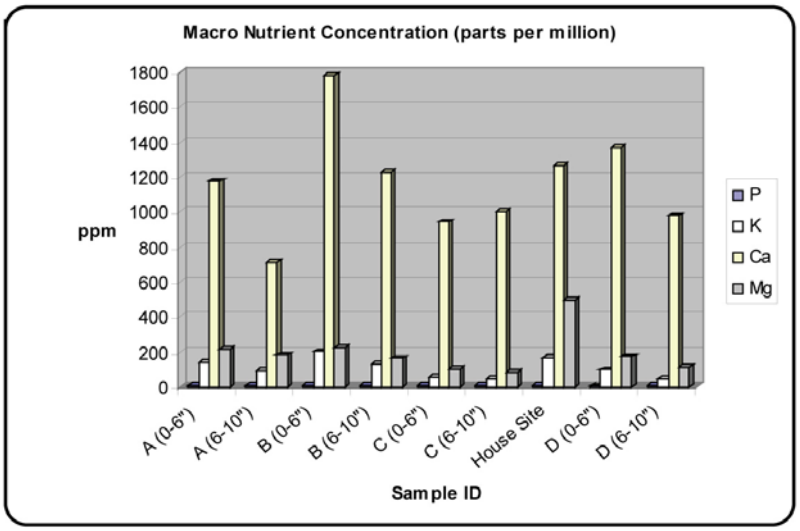

Figure 6. Macronutrient levels.

Nutrients

Lab analysis of individual nutrients shows medium to high levels of magnesium (Mg), calcium (Ca), and potassium (K) across the entire site, while levels of available nitrogen (N) and phosphorus (P) are very low (see figures 6 and 7). Nutrient levels appear to be out of balance, however existing vegetation does not show signs of nutrient deficiencies (low levels) or toxicity (high levels). These nutrient levels would only be of concern in very high or very low pH, where available nutrients can become "trapped," or unavailable, for plant uptake. Low nitrogen levels are not of concern and are likely due to the very dry soil

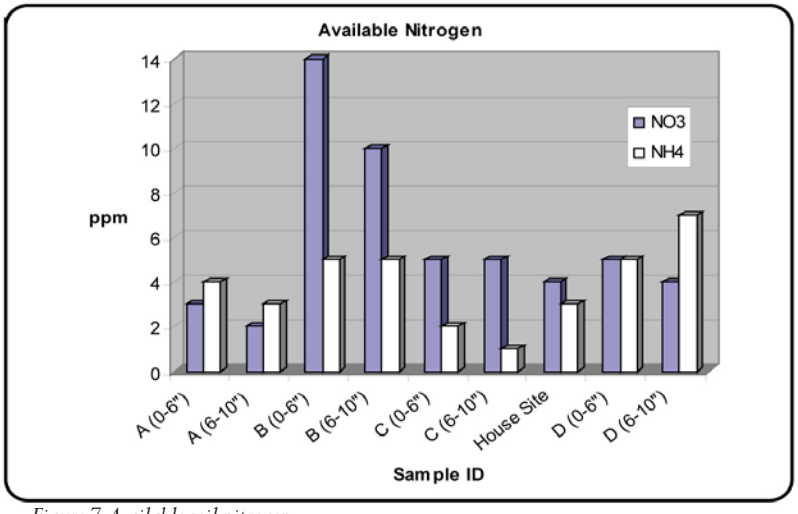

Figure 7. Available soil nitrogen.

conditions at the time samples were taken. Nitrification is restricted at very low moisture levels and nitrogen levels can fluctuate widely in a very short amount of time (Brady 1999).

Soils analysis has determined micronutrient levels are all normal, as are levels of lead and extractable aluminum, therefore we are not concerned with toxic levels of metals and other contaminants on this site.

Cation Exchange Capacity

Cation exchange capacity (CEC) is an indicator of the soil's ability to retain and supply nutrients. It refers to the availability of basic cations calcium (Ca^{++}), magnesium (Mg^{++}), potassium (K^{+}), and sodium (Na^{+}), as well as the acidic cations, hydrogen (H^{+}) and aluminum (Al^{+++}). The amount of these positively charged cations a soil can hold is described as the CEC and is expressed in milliequivalents per 100 grams of soil (meq/100g). The larger this number, the more cations the soil can hold. A clay soil will have a higher CEC than the sandy loam soils found in the Caretaker's Cottage site. However, increasing the organic matter content of any soil will help to increase the CEC because SOM also holds cations (CUSC 11/15/02). Cation exchange capacity is at a desirable level throughout the site, with the exception of Zone C (see Figure 8), which correlates with the low SOM content of this zone. As recommended earlier, adding and maintaining a mulch layer on this site will increase SOM and the nutrient-holding capacity of the soil over time.

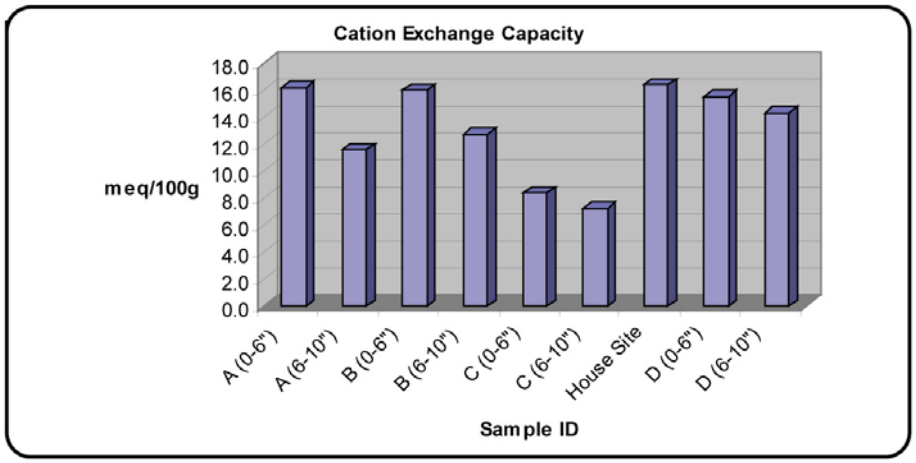

Figure 8. Cation exchange capacity.

Recommendations

Based on these results, the most important issues are returning balance to nutrient levels, increasing water-holding capacity, and maintaining soil moisture and erosion prevention. Increasing SOM can address all of these concerns. Adding a layer of woodchip mulch will protect areas susceptible to erosion as well as help control invasive plant species, such as English ivy. As the woodchip mulch decomposes, fine organic material will become incorporated into the mineral soil layer, increasing SOM and creating balanced nutrient availability and increased water-holding capacity. It is important, however, to make sure organic amendments are free from contaminants such as metals, pathogens, and invasive species.

An area of particular concern is the spot in Zone C where the caretaker's cottage once stood. Extensive removal of English ivy and other invasive plants occurred during the summer of 2002. Invasive species removal and management is always a good thing to strive for; however, this area has been left without a vegetative cover or a protective layer of organic mulch. Because of the high clay content, this exposed soil

currently shows signs of increased compaction, increased surface runoff, and increased erosion. A protective layer of organic woodchip mulch should be added as soon as possible to reduce these adverse effects of weathering and promote soil health.

Use and Safety Concerns

Once regarded by Olmsted Associates at the turn of the century as a woodland park of trails and views, Frink Park has since overgrown, and become overrun with invasive plants in many areas. At the Caretaker's Cottage site, the result is a dark, enclosed interior and a nondescript wall of greenery. From the outside, the uninviting fortress of dense shrubs appears to be a private residence that discourages the public from exploring this section of the park. Consequently, this area has become a transitory space where people do not linger.

The roads around and through the park tend to be used for travel and recreation rather than the forested trails. Pedestrian use of Frink Park is concentrated in other parts of the park where trails form a loop or provide easier and more direct access to the Leschi area and Lake Washington. (Boland 2002).
The majority of use at the cottage site is by local residents who seek out a forested environment to walk, bird watch, jog, or exercise their dogs. Youth use the site for unsupervised parties and gatherings, leaving graffiti on the stone walls and litter on the ground. Those seeking a private place use the site as a camping area or as a venue for other illicit activities. This only adds to the public's perception of the Caretaker's Cottage site as an unsafe place.

From a design perspective, this site offers a rich diversity of experiences through grade changes, differing spatial characteristics, and a variety of vegetation. Most of the site, however, remains underused. Spaces within the site are often too small, undefined, or overgrown and existing circulation paths lead the user straight through and away from the caretaker's cottage.

Light Analysis

The degree of light that penetrates through the mixed forest canopy varies with the degree of human disturbance and aspect. When the caretaker lived at the site his yard was open and sunny. Over the decades the trees have grown and filled in much of the canopy gap. However, the area continues to stand out as a clearing in the forest. The cottage area with its history of high human disturbance and large canopy gaps is in contrast to the denser forest on the steep slope where human use is limited. The site has a northern, eastern, and southern exposure and as is expected, light levels increase as you move from north to east and then to the south.

Removal of the Lombardy poplar and the tall invasive shrubs at the entrance and the cottage site will allow an increased amount of light into the cottage site. All trees and shrubs planted at the entrance and cottage site need to be adapted to the sunnier conditions. The increased light will also increase the growing conditions for English ivy and Himalayan blackberry. Care must be taken to completed remove these species before planting begins.

View Potential

The Caretaker's Cottage site is situated on a hillside overlooking Lake Washington and the surrounding area.

There are a few places in the site that offer exceptional views. At the entrance, passersby can enjoy a wonderful view of the lake and from the old cottage area there are hints of extensive views through the vegetation that can be enhanced. However, there is even greater view potential on the upper level. Here, trees and shrubs frame an impressive view to the east including the lake, sky, and distant land. Just before this area, on top of the second staircase by the fireplace, is yet another more intimate space that provides an interesting view to the surrounding neighborhood, Lake Washington, and colorful woodland. Improving these views will help transform this site from a place of passing interest into one of momentary rest and enjoyment, or even a destination.

DESIGN PROPOSAL

Design Concept

This site in particular stands out from the rest of Frink Park in that it contains the remnants of the structures associated with the old caretaker's cottage. In a park that strives to preserve the native landscape, human influence is visible here where the park's caretaker once lived. These urban ruins provide a source of intrigue and a unique opportunity to explore the integration of human presence in nature through planting and design. The distinctive character of this site makes it more alluring to the public and could become a park attraction if its identity is made more apparent.

Our design proposal attempts to alleviate or mitigate the site and design issues of human use and safety, view potential, forest health, and park identity, while melding remains of a former home site with an ungroomed, naturalistic space. In doing so, we strive to maintain and uphold the Olmsted vision for Frink Park. For much of the site, our proposal recommends forest restoration; however, there are several places where human intervention is evident, specifically the entrance and the old cottage site. We chose to retain the human aspect of the site's history, while elucidating the breaking down of these elements by nature, primarily in the form of vegetation.

Design Proposal by Zones

Refer to the illustrative planting plan (see Figure 9) within this section. The spaces slated for revegetation are numbered and shown in the plan as colored areas; the numbers correspond to the legend, which gives specific plants for those areas. The entrance area has been more finely tuned to address specific design considerations and individual plants are labeled in the planting plan.

Zone A: The entrance to the park at the Caretaker's Cottage site is not obvious as a public access point, nor is it clear that you are looking at one of Seattle's public parks. The entrance can be opened to provide an area for education and welcome. The addition of a typical Seattle public parks rainbow sign would alert passersby to this entrance to Frink Park.

Removal of the English laurel, English ivy, and other invasive species will open up the view into the park. We recommend that the snowberry along the stairs be transplanted in areas like the upper level and the nearby slope that is currently covered in English

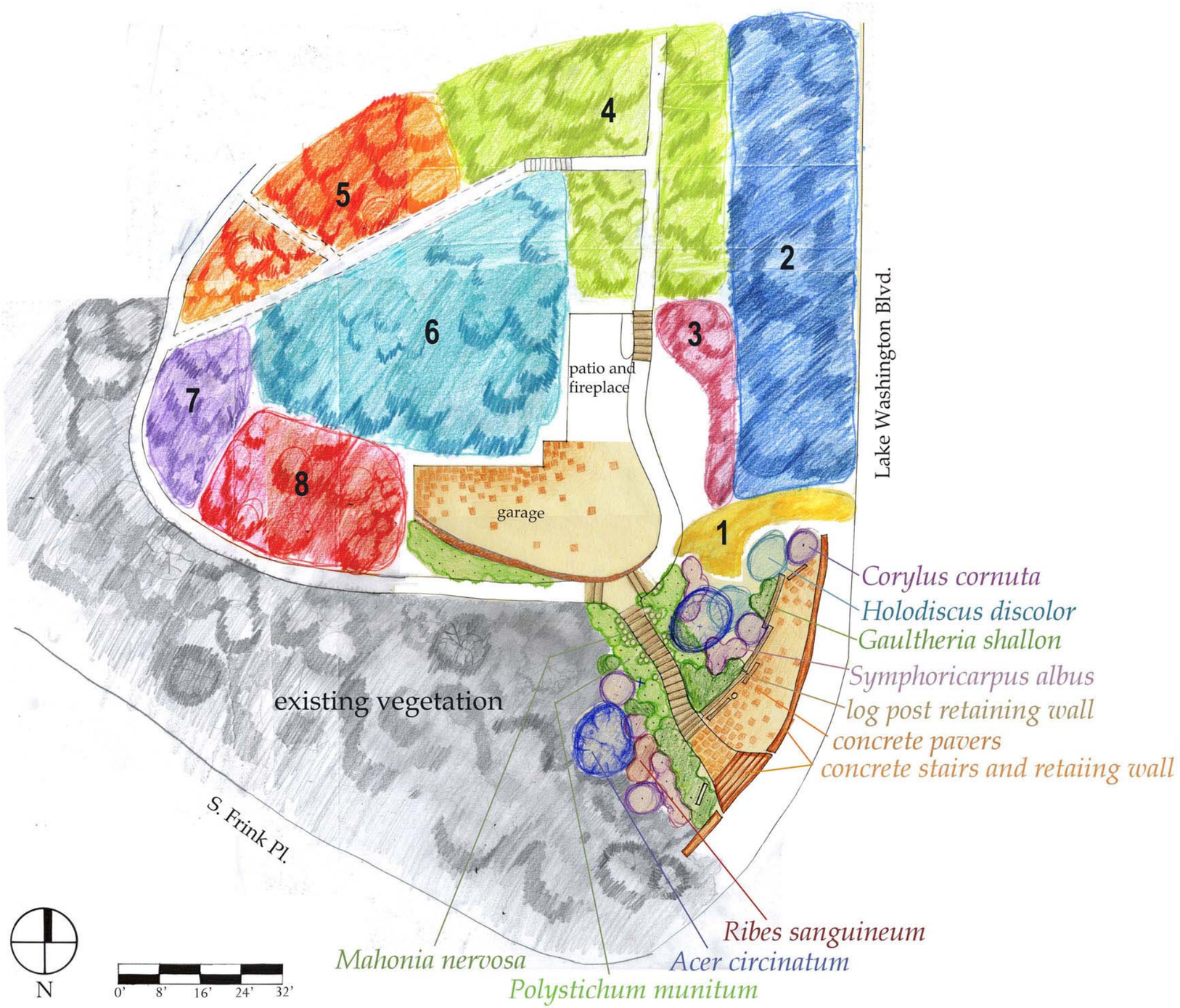

Figure 9. Vegetation restoration and planting plan.

Restoration areas' plant list

Zone A: Entrance

1. trees: *Arbutus menziessi*
   tall shrub: *Holodiscus discolor, Corylus cornuta, Symphoricarpos albus, Acer circinatum*
   medium shrub: *Ribes sanguineum*
   ground cover: *Polystichum munitum, Gaultheria shallon*

Zone B: Steep Slope

2. trees: *Tsuga heterophylla* and *Thuja plicata*
   tall shrub: *Oemleria cerasiformis, Acer circinatum, Corylus cornuta, Sambucus racemosa*
   ground cover: *Mahonia nervosa, Polystichum munitum*

Zone C: Cottage Site

3. trees: *Pseudotsuga menziesii, Abies grandis, Cornus nuttallii*
   tall shrubs: *mock orange, Corylus cornuta, Oemleria cerasiformis and Acer circinatum*
   medium shrubs: *Ribes sanguineum, Rosa spp*
   ground covers: *Polystichum munitum, Mahonia nervosa*

Zone D: Upper Terrace

4. medium shrub: *Symphoricarpos albus*
   ground covers: *Mahonia nervosa, Polystichum munitum*
5. trees: *Arbutus menziesii, Cornus nuttallii*
   tall shrubs: *Corylus cornuta, Oemleria cerasiformis*
   medium shrubs: *Ribes sanguineum, rosa spp.*
   ground covers: *Polystichum munitum, Gaultheria shallon, Mahonia nervosa*
6. trees: *Arbutus menziesii*
   tall shrubs: *Corylus cornuta, Holodiscus discolor*
   medium shrubs*: Ribes sanguineum, Symphoricarpos albus*
   ground covers: *Polystichum munitum, Gaultheria shallon, Mahonia nervosa*
7. tall shrubs: *Corylus cornuta*
   ground covers: *Polystichum munitum, Mahonia nervosa*
8. tall shrubs: *Oemleria cerasiformis, Acer circinatum*
   medium shrub: *Ribes sanguineum*
   ground covers: *Polystichum munitum,Gaultheria shallon, Mahonia nervosa*

laurel. Removal of the snowberry and replanting the entrance with lower-growing vegetation will open up the space.

We designed a small gathering space by terracing adjacent to Lake Washington Blvd. to alleviate the perception of vulnerability caused by exposure and proximity to traffic. Concrete pavers with turf joints form the landing and small gathering space on the terrace and refer to the fusion of humans and nature. The pavers gradually fade as you move away from the stairs, transitioning into a surface of green. The lower terrace wall at the entrance is concrete with a stone cap; these materials blend with what is already there and fit the Olmsted aesthetic, which is of particular importance in an area so visible from Lake Washington Blvd. The second terrace wall is made of timbers and is located where the entrance recedes in the revegetated hillside. Similarly, the bottom stairs are concrete and, beyond the concrete paver landing, become timber box steps. Except for the grass at the landing, we chose a native plan palate in the vein of the *Frink Park Concept Plan* (Sheldon & Associates 2002). This also further emphasizes the power of the environment.

Zone B: The objective in this zone is regeneration of coniferous trees in the overstory and diversification of the understory shrub layers. Invasive species removal and slope stability are key elements in the health of this forest patch. As outlined in the *Frink Park Concept Plan* (Sheldon & Associates 2000), planting shade-tolerant conifers such as western red cedar and *Tsuga heterophylla* (western hemlock) in canopy gaps will nudge along forest succession. This is an important step since there is not a nearby seed source for these trees. Sword fern is the native understory species and should be planted sparingly on this slope. Taller shrubs such as Indian plum, *Acer circinatum* (vine maple), and beaked hazelnut and low-growing Oregon grape are also good choices for stabilization and re-vegetation of the slope. *Sambuscus racemosa* (red elderberry) is not listed as a native species in the park, but is found in other forested lowland parks in Seattle and would be worth planting in a test plot.

Zone C: From the cottage area, there are hints of extensive views to the lake through the vegetation, which will be enhanced with the removal of the non-native plant species. This design proposal suggests ways to open the site up to allow eyes on the street visual access into the site. Not only will this create a safer feeling space, it will allow more solar access and accentuate the breathtaking neighborhood and lake views.

The design identifies opportunities to better define both open and enclosed spaces. A variety of

unified, open spaces take advantage of the different views, structures, vegetation, and grades. Spaces of the old cottage site are subtly subdivided into outdoor rooms that expand outward toward the views, and provide places for relaxation, gathering, picnicking, and exploration of the ruins**.** The garage area is laid in pavers with grass joints that dissolve into the vegetation in the same manner as those at the terrace landing at the entrance. This unifies the 'human' areas in the site and cues recognition of the area as a gathering place. The widened steps adjacent to the fireplace bring users seeking a more intimate space into the upper level where the most rewarding views can be appreciated.

We recommend planting Douglas-fir or *Abies grandis* (grand fir) trees. A variety of shrubs including sword fern, salal, Oregon grape, beaked hazelnut, along with a variety of showier shrubs like *Philadelphus lewisii* (mock orange), *Rosa spp*. (native roses), *Ribes sanguineum* (red-flowering currant), and vine maple are appropriate for this area.

Zone D: Situated in a Pacific madrone grove, this area offers exceptional views surrounding neighborhood. Trees and shrubs frame views of the lake, sky, and distant land.

The high aesthetic value of the Pacific madrone grove is mentioned in management plans dating back to the Olmsted plan. The *Frink Park Concept Plan* (Sheldon & Associates 2000) discusses salvaging the trees from fungal infections, yet it also encourages natural succession to occur. Over time, through natural

succession, the conifer and bigleaf maple will out-compete the Pacific madrone for sunlight. We propose, as the management objective, stressing the uniqueness and aesthetic value of the Pacific madrone, and recommend striving to save the grove.

A challenge of managing for the Pacific madrone is that the open canopy creates a competitive environment for species such as English ivy and Himalayan blackberry. Planting a multi-story shrub layer of drought-tolerant native species will increase shade on the forest floor and decrease the likelihood of the spread of invasive species. Recommended shrubs for this layer include oceanspray, beaked hazelnut, red-flowering currant, snowberry (transplanted from Zone A), sword fern, Oregon grape, native roses, and salal. Additional Pacific madrone should also be planted in the large canopy gap. Pacific dogwood is rarely planted in restoration sites, but it does exist on this site and would be worth planting as a test plot in this area.

IMPLEMENTATION AND INSTALLATION

The forest restoration plan follows the forest plant guidelines and objectives established in the *Frink Park Concept Plan* (Sheldon & Associates 2000). In acknowledgement of the myriad of constraints facing a revitalization project conducted by volunteers such as funding, volunteer availability, and timing tasks with regard to environmental conditions and the growing season, this plan can be implemented by zone as individual segments over the course of four years.

Installation plan

The four-year installation plan (see Appendix A) allows volunteer crews the time to return to a site after planting and carry out weeding and watering tasks before moving on to a new area. The timing of weed removal and bank stabilization varies between zones and is based on the environmental conditions of each site. For example, the window of opportunity to work on the northeastern-facing slope is limited to the dry season when the slope is most stable. In contrast, work on the dry sunny upper level can take place almost year-round. All the planting is planned for fall so that the plants can establish secure and effective root systems before the next growing season and summer drought period.

Site preparation

Invasive species removal

Typically, invasive removal is most effective in spring because invasive woody perennials have depleted their stored starch. The addition of 4–12 in. of coarse mulch, such as woodchips, to areas where invasive plants have been removed is critical to successful invasive removal; the combination of lack of stored starch and no access to sunlight inhibits their ability to grow. To be sure the mulch is effective, the canes of the plants like Himalayan blackberry should be cut down to the soil level. If leaves are left above the mulch, they will be able to produce more starch and will continue to grow.

The likelihood of the re-establishment of unwanted species is high given the reality that the site is surrounded by large reservoirs of invasive species that easily spread vegetatively or by birds through seed dispersal. The trail and the road provide physical barriers to spreading weeds. On the slopes above the roads there are no physical barriers that mark the boundaries of this phase of restoration. Therefore, a visual line will need to be established as a 'no cross zone' for volunteers involved in abating the spread of English ivy. On the slope above Lake Washington Blvd. there is a large remnant patch of sword fern that makes a natural boundary for this project.

Invasive and Non-native Plants at the Caretaker's Cottage Site

Hedera helix (English ivy) is widely planted in landscapes as groundcover and border filler. It is a long-lived, woody, evergreen perennial capable of photosynthesizing for ten months out of the year. Its stems can grow as long as 90 ft. English ivy contains toxins that can cause dermatitis and are harmful for humans and livestock if consumed. Impacts of ivy on forests includes changes in natural succession, water and nutrient deprivation for neighboring plants, shading of mature trees resulting in a

reduction of photosynthesis, addition of weight to trees causing increased tree blow down, and creation of hiding areas for vermin.

· *Noxious weed classification:* Class C

· *Recommended removal techniques:* The most effective physical control for English ivy is to cut the plants with pruners and remove them from the site. Root ball removal is critical to long-term eradication. To do this, wedge the root ball from the soil using a pickaxe or apply herbicide. A follow up plan is recommended for long-term elimination (King County Noxious Weed Control Program 2002).

Cytisus scoparius (Scot's broom, Scotch broom) was introduced to the Pacific Northwest as an ornamental, but aggressively moved into pastures and open lands. The seedpods burst, spreading seeds over several yards. Scot's broom generally grows in large monotypic stands that displace native plants. Many native plants grow best in nutrient-poor soils and, because Scot's broom is a nitrogen fixer, it raises the level of nitrogen in the soil. With this nutrient addition, native plants are no longer suited forthat site and therefore die, leaving a Scot's broom monoculture.

· *Noxious weed classification:* Class B

· *Recommended removal techniques:* Scot's broom is easily removed by pulling out the plants. Because many seeds are dispersed over a large area, a follow-up plan should be implemented for long-term eradication (King County Natural Resources and Parks 2002).

Hypericum calycinum (creeping St. Johnswort, Aaron's beard) is a common, low-growing ornamental groundcover, native to southeastern Europe. It is a hardy, aggressive plant; its stolons spread along the ground by rooting at nodes and tips of the stems.

· *Noxious weed classification:* None

· *Recommended removal techniques:* To mechanically remove creeping St. Johnswort, dig roots from the soil, take them off site, and add a layer of mulch. Long-term follow-up is recommended.

Rubus discolor (Himalayan blackberry)

The King County Noxious Weed Board has five classifications for noxious weeds **(**King County Noxious Weed List (King County Natural Resources and Parks 2002).

CLASS A: Control and eventual eradication of these species is required by law in all of King County and Washington State

CLASS B: Law requires control and slowing the spread of these species.

CLASS C: Law requires control, with containment as the primary goal.

Weeds of concern: Class B and C non-native species on the Washington State Weed List that are not a high priority in King County. The County Weed Board strongly encourages and recommends control and containment of existing populations and discourages new plantings.

Obnoxious weeds: Plants that have escaped from landscapes and now are widespread in King County. Plants on this list are not regulated, but the Board encourages and recommends control and containment of existing populations and discourages new plantings.

was introduced to North America as a cultivated crop. It has hooked prickles on the canes that make working with the plant difficult and can grow into a dense stands with over 418 canes per square yard. This type of blackberry reproduces vegetatively from the canes and adventitious shoots and sexually by seeds that are widely dispersed by birds. Blackberries, with their large root masses and dense vegetation, take nutrients and water away from other species of plants and displace native plants.

· *Noxious weed classification:* Obnoxious weed

· *Recommended removal techniques:* Mechanical removal by mowing the canes and then digging them out is effective, as is controlled burning of plants. Plants can sprout from root balls, thus their removal is critical and long-term follow-up is recommended (King County Natural Resources and Parks 2002).

Ilex aquifolium (English holly) was introduced as an ornamental shrub. Its seeds are spread by birds and holly plants displace natives in the forest understory. In addition, people frequently allow volunteer plants to remain in landscapes for their attractive foliage and red berries.

· *Classification:* Obnoxious weed

· *Recommended removal techniques:* Manual removal of shrubs. Because English holly does not have the same type of adventitious roots as species like English ivy, it is not necessary to take the same care with root removal (King County Natural Resources and Parks 2002).

Prunus laurocerasus (English laurel) is an aggressive, evergreen shrub introduced from Europe that reaches up to 18 ft. in height. English laurel's leaves, stem, and seeds are poisonous so it should not be used where there will be children and pets. It is frequently planted in landscapes to attract birds.

· *Classification:* None

· *Recommended removal technique:* Because of the shrub's height, using a chainsaw for removal is necessary. English laurel spreads by berry dispersal, thus taking away the bush removes the problem (Russell et al. 1997).

Clematis vitalba (traveler's joy) is a deciduous vine that climbs trees and shrubs, smothering them. It grows up to 20 ft. per year and produces a large number of seeds, which are wind dispersed. The large mass of the vine eventually causes trees and shrubs to lose branches or fall. In addition, traveler's joy shades mature trees that require sunlight and creates a monoculture where understory plants cannot grow.

· *Classification:* None

· *Recommended removal techniques:* Removal of traveler's joy is similar to English ivy removal. Cut vines at the ground and again at shoulder height. Remove the cut section of the vines and root ball and continue monitoring and removing new sprouts before they get large. The vines that remain on the tree will eventually die (Gumz 2001).

Populus nigra var. italica (Lombardy poplar) is a tall, columnar, fast-growing tree that sprouts readily

from cuttings. It was introduced from Europe and is widely planted throughout the United States. It uses a great deal of water, taking away resources from native plants.

· *Classification:* None

· *Recommended removal technique:* Removal of the root ball is essential because poplar species sucker profusely (Gilman et al. 1994).

Laburnum anagyroides (golden chain tree) is a small deciduous tree with yellow flowers and long seedpods that was introduced from Europe as a landscape ornamental. The seed dispersal mechanism is similar to that of the Scot's broom, wherein the pods burst spreading seeds over a large area. The plant produces a huge number of seeds, ensuring a seed bank in the ground so care must be taken to pull any new sprouts. The entire plant is highly toxic and may be fatal if eaten.

· *Classification:* None

· *Recommended removal technique:* Plants must be mechanically removed, ensuring that all parts of the plant are taken off site (Russell et al. 1997).

Tree removal

The tree removal plan is based on the recommendations set forth in the *Frink Park Concept Plan* (Sheldon & Associates, 2000) under section 4.6 Prioritized Projects for Improving Specific Forest Zones. For reference in this section, *hazard trees* are defined as having 1) a weak structure or other unhealthy characteristics that indicate potential failure and 2) a potential target, such as people and property.

In Zone C we recommend removal of all Lombardy poplar. They do have some value in relation to the historical significance of the cottage site because they were planted as ornamental in the caretaker's yard. However, due to their shallow roots, weak wood, and habit of suckering they are frequently viewed as hazard trees and are considered detrimental to nearby revegetation efforts. Due to the Lombardy poplar's non-native status and growth habits, we recommend their removal and replacement with native tree and shrub species.

The Douglas-fir growing within several feet of the grove of Lombardy poplar will likely need to be removed along with the Lombardy poplar. Removal of the poplar will damage the Douglas-fir's root system. In addition, the Lombardy poplar trees are out-competing the Douglas-fir tree for light and as a result, the Douglas-fir's crown is asymmetrical. The combination of a lack of crown structure on the same side the tree has severed roots raises the hazard potential of the Douglas-fir tree.

The young red oak at the entrance, planted to replace a tree that fell during the 1992 Inaugural Day storm (Boland 2002), is out of character with the surrounding landscape. Close inspection reveals a severe trunk wound, weak branch attachments with included bark, and a missing dominant leader indicating that it was at one time topped. Considering the tree has been in the ground for ten years and is still a small tree could indicate problems with the root system. We recommend removing this tree .

We agree with the *Frink Park Concept Plan*'s suggestion to remove or trim the bigleaf maples along Lake Washington Blvd (Sheldon & Associates, 2000). This would improve safety at the cottage site by opening

the view into the park from the road. There is also the added benefit of enhanced views to the mountains and lake from within the park.

Slope stabilization

After the invasive and non-native species have been removed, install coir cloth, a degradable netting, on the steepest parts of the slope where English ivy and Himalayan blackberry removal has left the soil bare. To do this, drive large, wooden stakes into the soil to hold the cloth in place and place mulch over the cloth (see Figure 10).

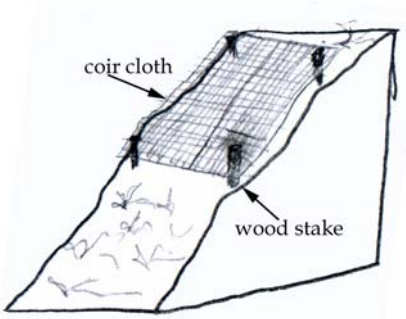

Figure 10. Coir cloth placement.

The use of large woody debris for slope stabilization has been successful in other parts of Frink Park and is recommended as a means of slope stabilization on the small hillside at the site entrance, the hill above the trail leading to the upper level from the cottage site, and the northeast-facing slope. The wood can be placed perpendicular to the fall line in a randomly, but should be at intervals of approximately 6–8 ft apart along the slope (see Figure 11). The large woody debris creates places for forest litter to accumulate. The litter also breaks down and contributes organic matter to the soil, which adds cohesiveness to the soil. The woody debris from the Lombardy poplar trees should not be used for slope stabilization because the branches easily re-sprout and will quickly colonize the slope. If no logs are available on site, the Seattle Parks department may be able to provide logs from other park areas.

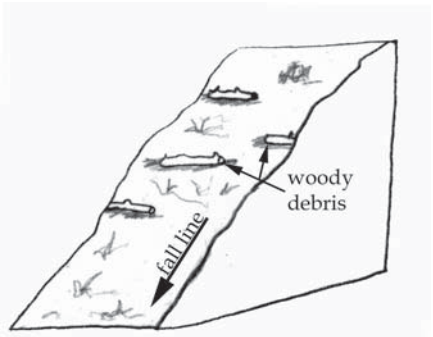

Figure 11. Placement of woody debris.

Upon removal of English ivy, the hillside will be subject to erosion and mass wasting. Due to the steepness of the slope above Lake Washington Blvd. and the potential for uncovering large patches of bare soil during the removal of English ivy, Seattle Parks department personnel should be consulted regarding the slope stability of the steep slope prior to the commencement of work on this area.

Mulching the entire slope after installing the coir cloth and large woody debris protects the soil and allows water to seep into the soil rather than immediately run off. Mulch inhibits invasive plants from taking over the site again and, as the mulch degrades, adds nutrients to the soil increasing plants' chances of survival.

Plants' root systems anchor the soil and intercept rain so immediate replacement of these plants with desirable plants is critical (Myers 1993). Installation of the native vegetation protects the slope by reducing surface soil erosion, strengthening soil, and reducing the risk of mass wasting.

Plant Selection

Plant selection is based on environmental site conditions and design needs, the existing native vegetation, guidelines set forth for plant succession in the concept plan, and the survival rate of individual species in other restoration sites. We recommend containerized and bare root shrubs for planting material. Since bare root

plants must be planted during dormancy, a time when the hillsides are saturated with water, containerized stock must be used for planting on the steep slope. Only trees, shrubs, and ferns are included in this plan because they provide the structure and shade needed to out-compete invasive plant species. In the future when the tree and shrub layers are well established, herbaceous plants can be added as another project.

AFTERCARE AND MANAGEMENT

The plants recommended in this plan have been selected for the specific environmental conditions of each area. They are all native species of the Puget Sound lowland forests and, once established, require little maintenance.

Irrigation

One of the biggest reasons plant restoration projects fail is lack of aftercare, particularly irrigation. It is crucial that plants receive adequate water immediately after planting until the fall rains begin, and again for up to three years during the summer drought period. Expect to provide irrigation to each site approximately every 10–14 days from July through September.

Weeding

Complete removal of tenacious plants such as English ivy and Himalayan blackberry can take several growing seasons. This project spans four years so that volunteer crews can continuously refocus on areas and remove any recurrence of unwanted weedy plants. Since the area is surrounded by other areas infested with species like English laurel and English ivy, it is imperative that volunteers diligently remove any regrowth of these aggressive plant species. For the long-term success of the restoration project and the health of the forest, it is more important to extend the planting schedule, focus on maintaining a weed-free area, and irrigate plants during dry conditions than it is to get the whole area replanted in a shorter time span.

Monitoring

Diseased or dead plant material should be removed and replaced with new plants. It is helpful to take notes throughout the project that can be used as reference material in future projects at Frink Park or other nearby parks.

Mulching

Woodchip mulch should continue to be applied throughout the site on an annual basis until a shrub layer can successfully out-compete invasive weedy species. Mulch is inexpensive and an annual application of 6–8 in. is sufficient to help reduce establishment of weeds. Mulch, as mentioned earlier, will continue to promote increased soil health and structure. Woodchip delivery can be arranged with the Seattle Parks department.

Pruning

Keeping English ivy confined to areas outside the restoration site is the only time pruning by volunteers should be necessary. The Parks and Recreation Department is responsible for the monitoring of forest health and the pruning or removal of trees and shrubs that are diseased or have hazard branches. In addition, pruning of trees and shrubs to enhance safety by opening views into the park should be done by the Seattle Parks department.

Budget

The total cost of the project is flexible and can be implemented by zone in four phases over a four-year period of time. The more expensive phases involve adding hardscape, which can be reduced in cost if Friends of Frink Park and Seattle Parks are able to obtain grants to supplement funding for the implementation. Using bare root and salvaged vegetation instead of containerized plants can also reduce the cost of plants. Logs and stakes used for stabilization can be found on site and if they are not available, Seattle Parks department may be able to find them at neighboring parks. Arrangements can be made for the Seattle Parks department to deliver the woodchips for free. We estimated the total cost of the project to be $9,200.

Materials

Item	Cost
Coir Cloth/ Slope Stabilizer	.20/ square foot * 20'/40' = $160.00
Mulch/ Wood chips	Free from the city
Hardscape (Includes pavers, bench and retaining wall)	$7,417

Plants

Item	Cost
Ground Cover	$ 681.75
Medium Shrubs	$ 240.00
Tall Shrubs	$ 663.75
Trees	$ 61.00
Total cost of project	**$ 9,223.50**

Labor

Volunteers from Friends of Frink Park will provide labor at no additional cost. In addition, work crews such as EarthCorps can be hired and paid for through grant money.

Ground covers

Species/Common name	Plant characteristics	Spacing	Zone	Cost/size	Total needed
Gaultheria shallon Salal	• shade or partial shade • moist to dry soil • co-dominant understory species	18"	A & D	$3.50/gal	175 **Total cost:** $512.50
Mahonia nervosa Oregon grape	• shade • moist to dry soil • co-dominant understory species	2'	B, C, & D	$4.00/gal	75 **Total cost:** $300.00
Polystichum munitum Sword fern	• partial shade to shade • moist to dry soil • dominant understory species • excellent for erosion control	2'	All zones	$3.00/gal	110 **Total cost:** $330.00
Grass seed mix	• use between pavers		A & C	$10.00	1 **Total cost:** $10.00

Medium Shrubs

Species/Common name	Plant characteristics	Spacing	Zone	Cost/size	Total needed
Ribes sanguineum Red flowering currant	• sun to partial shade • dry soil • showy flowers	6'	A, C, & D	$4.00/gal	30 **Total cost**: $120.00
Rosa spp. Nootka rose	• full sun to partial shade • dry soil if shaded, otherwise moist soil • showy flowers	6'	C & D	$3.00/gal	30 **Total cost**: $120.00

Tall Shrubs

Species/Common name	Plant characteristics	Spacing	Zone	Cost/size	Total needed
Acer circinatum Vine maple	• partial shade to deep shade • moist to dry soil • excellent fall color	8'	A, B & C	$3.00/gal	68 **Total cost:** $204.00
Corylus cornuta Beaked hazelnut	• sun to deep shade • moist, well drained to dry soil	6'	All zones	$3.25/gal	102 **Total cost:** $331.50
Holodiscus discolor oceanspray	• full sun to shade • moist to dry soil	5'	A & D	$3.00/gal	18 **Total cost:** $54.00
Oemleria cerasiformis Indian plum	• partial shade to shade • moist to dry soil • blooms in February	6'	B, C& D	$2.75/gal	18 Total cost: $49.50
Philadelphus lewisii Mock orange	• full sun to partial shade • moderately moist to dry soil • fragrant flowers	5'	C	$2.75/gal	9 **Total cost**: $24.75
Symphoricarpos albus Common snowberry	• sun to partial shade • dry soil	3'	A & D	transplant from entrance	Available on site. Total cost: $0.00

Trees

Species/Common name	Plant characteristics	Spacing	Zone	Cost/size	Total needed
Abies grandis Grand fir	• dry to moist soil	12'	C	$3.00/gal	1 **Total cost:** $3.00
Arbutus menziesii Pacific madrone	• sun to partial shade • dry to well drained soil	12'	A & D	$4.00/gal	5 Total cost: $20.00
Pseudotsuga menziesii Douglas-fir	• full sun to light shade • moist to dry soil	15'	C	$3.50/gal	4 **Total cost:** $14.00
Thuja plicata Western red cedar	• partial shade to deep shade • wet to moist soil	15'	B	$3.00	4 **Total cost**: $12.00
Tsuga heterophylla Western hemlock	• partial shade to deep shade • moist soil	15'	B	$3.00	4 **Total cost**: $12.00

Hardscape (prices are pre-tax)

Product	Supplier	Price	Quantity	Total Cost	Notes
Stairs and retaining wall with stone cap	JT Masonry (253) 373-0672	$5,500	1	$5,500	

6"X6" Natural Select lumber #CBA6606	Dunn Lumber 3801 Latona Ave NE Seattle, WA 98105 (206) 632-2129 www.dunnlum.com	$86.42/ 20 feet	800 feet	$345.80	For creation of timber crib steps
Rebar	Dunn Lumber 3801 Latona Ave NE Seattle, WA 98105 (206) 632-2129 www.dunnlum.com	$.35/foot	200 feet	$70.00	For procurement of timber crib steps and slope stabilizing log posts.
Benches	MacKay Precast Products Vancouver B.C. www.mackayprecast.com	$268.80 USD/ bench	3	$806.40 USD	Price does not include shipping
Gravel 5/8" minus crushed gravel	Salmon Bay Sand and Gravel Co. 5228 Shilshole Ave NW Seattle, WA 98107 www.sbsg.com (206) 706-0728	$61.00/ $yard^3$	2 $yards^3$	$122.00	Price includes delivery. For use with timber crib steps.
Builder's sand	Salmon Bay Sand and Gravel Co. 5228 Shilshole Ave NW Seattle, WA 98107 www.sbsg.com (206) 706-0728	$36.00/ $yard^3$	4 $yards^3$	$144.00	Price includes delivery. For use with concrete pavers.
12" square smooth concrete pavers	Mutual Materials 605 119th Ave NE Bellevue, WA 98005 www.mutualmaterials.com (425) 452-2300	$1.34/ square	320 squares	$428.80	Low cost alternative: use the remnant concrete and cobble pieces from demolition of concrete steps and crumbled retaining wall.
Treated log posts 12"– 30" diameter	Possible sources include Seattle City Light (telephone poles) Weyerhauser, etc.	$0	variable	$0	For use in slope stabilization.

Appendix A

Frink Park Caretaker's Cottage Site
Installation Plan

Activity	Year 1												Year 2											
Activity	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Entrance																								
Zone A																								
Invasive plant removal																								
Tree removal																								
Slope stabilization																								
Terrace Construction																								
Move kiosk																								
Mulch																								
Order plants																								
Planting - container																								
Planting - bareroot																								
Irrigation																								
Weeding																								

Frink Park Caretaker's Cottage Site
Installation Plan

Activity	Year 1												Year 2											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Steep NE Slope																								
Zone B																								
Invasive plant removal *																	■	■	■	■				
Tree removal																	■	■	■	■				
Slope stabilization																	■	■	■	■				
Mulch																	■	■	■	■				
Order plants																			■	■	■			
Planting-container **																						■	■	
Planting - bareroot																								■

** Do not begin work on steep slope if ground is still saturated
**Complete planting on steep slope before ground becomes saturated – use only containerized plants

Activity	Year 1												Year 2											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cottage Area																								
Zone C																								
Mulch	■	■								■	■	■	■									■	■	■
Invasive plant removal				■	■	■	■	■								■	■	■	■	■				

Upper Terrace **Zone D**	Do not start work on upper terrace until year three

Frink Park Caretaker's Cottage Site
Installation Plan

Activity	Year 3												Year 4											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Entrance																								
Zone A																								
Weeding			■	■	■	■	■	■							■	■	■	■	■	■				
Mulch	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Irrigation						■	■	■	■	■								■	■	■	■			
						■	■	■	■	■								■	■	■	■			

Activity	Year 3												Year 4											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Steep NE Slope																								
Zone B																								
Mulch					■	■	■	■	■	■							■	■	■	■	■	■		
Planting - bareroot	■																							
Irrigation							■	■	■										■	■	■			
Weeding *					■	■	■	■									■	■	■	■				

* Do not begin work on steep slope if ground is still saturated.

Frink Park Caretaker's Cottage Site
Installation Plan

Activity	Year 3												Year 4											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cottage Area																								
Zone C																								
Tree Removal																								
Terrace Construction																								
Mulch																								
Order plants																								
Planting - container																								
Planting - bareroot																								
Irrigation																								
Weeding																								

Activity	Year 3												Year 4											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Upper Terrace																								
Zone D																								
Invasive plant removal																								
Slope stabilization																								
Mulch																								
Order plants																								
Planting - container																								
Planting - bareroot																								
Irrigation																								
Weeding																								

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