Ravenna Woods
Forest Management Plan
(Preliminary)

Prepared by:

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Prepared for:

Friends of Ravenna Woods, Inc.

through a grant from
City of Seattle
Department of Neighborhoods
In cooperation with
Seattle Department of Parks and Recreation

Summary

The Ravenna Woods landscape would benefit from a program of forest management that focuses on controlling exotic invasive species and replanting native canopy trees. The site is currently dominated by blackberry in the south end and English ivy in the north end. The tree canopy in the south end is sparse. The tree canopy in the north end is predominantly bigleaf maple. Approximately one quarter of the trees on the site should be removed or severely pruned to minimize hazard potential. This will further necessitate new plantings of trees to provide the next generation of canopy trees.

Introduction

Ravenna Woods is 1.1 acre hillside located between Ravenna Avenue NE and 22nd Avenue NE in the University District. This hillside contains a bigleaf maple forest. Friends of Ravenna Woods hired Paul West, Consulting Arborist to perform an inventory and evaluation of the trees and vegetation for the purposes of developing a forest management plan for the site.

Goals

At a meeting of the Friends of Ravenna Woods board on October 30th, 2002, the board stated the following as goals for the vegetation on the property:

- Habitat and neighborhood buffering are the primary functions of this greenbelt.
- The site shall remain forested over the long term.
- The forest shall consist of species native to the Puget Sound basin.
- The site is not intended for active recreational use, and therefore the ground level will not be heavily impacted by human activity.
- Tree height shall not be compromised for view (or other) purposes.
- Relevant health and safety issues shall be addressed.

History

The site was privately owned, and the subject of development for multi-family housing. The University Neighborhood Plan identified the property for acquisition as open space. It was subsequently acquired through a joint effort of the City of Seattle and Friends of Ravenna Woods. It is currently owned by the Seattle Department of Parks and Recreation.

Site Conditions

The site is an east-facing slope, gently sloping at the eastern half, transitioning to steeply sloping (>40%) along the western boundary. The site is well drained at the north end and along the western boundary. The southeastern third of the site contains saturated soils. This area is fed by groundwater flow that emerges at the toe of the steeper slopes and flows to the southeast corner of the site.

A roadway and a Seattle City Light transmission line runs along the eastern side of the site. Apartment buildings border the western side of the site. A house sits just to the south of the site. An undeveloped right-of-way borders the north end of the site.

Review of City of Seattle landslide databases revealed no known slides on the site. A large, deep-seated slide did occur approximately 100 feet to the north at 4710 22nd Avenue NE in 1961. The trigger mechanism for this slide was a combination of natural factors and fill soils on the site. There are no areas of significant erosion, though there are localized pockets of minor erosion on some of the upper slopes. The consultant did not consider these to be of short-term significance.

Site Inventory

Trees

The consultant inventoried 66 tree on the site. He tagged each tree with an aluminum forestry tag on the east side of the tree at approximately six feet above the ground. He measured the diameter of the tree at approximately 4.5 feet above ground level. He evaluated each tree for species, dominance in the stand, and seven condition factors that relate to the tree's health and hazard potential. He then made a recommendation for action on each tree. The results of that inventory are located in Appendix A.

Fifty of the tree are bigleaf maple. Fourteen are alder. Two are lombardy poplar. The bigleaf maples typically are prone to drop branches from weak branch attachments. They are also subject to *Armillaria* rot and other decay organisms which weaken the wood. More vigorous trees can tolerate this decay for many years, while less vigorous trees often succumb. Trees that are covered with ivy and multi-stem trees typically exhibit more vulnerability to decay.

The alders and poplars on site are reaching the end of their expected lifespan. The two poplars show signs of internal decay. They represent a liability because of their large size and their proximity to parking areas.

The recommended actions below consider the condition of the tree, its habitat value, the potential for failure, and the likely target in the event of failure. For example, twelve trees with moderate structural defects were recommended for snag creation wherever possible. This action would reduce the chance of failure while preserving habitat value. Seven other trees were recommended for removal because their proximity to high-value targets or their extreme structural weakness. **Two trees in particular, numbers 147 and 166, are recommended for IMMEDIATE REMOVAL because of their condition and proximity to buildings.**

Two trees recommended for thinning would benefit from removal of some of the multiple stems that originate from the ground level. Six trees recommended for further evaluation were obscured by vines or debris, or surface evaluations were not conclusive. Some are recommended for inspection by Resistograph or other internal investigation. Six other trees recommended for monitoring do not warrant corrective action at this time, but may

deteriorate in the near future. They should be reinspected on an annual basis. Five trees could not be fully inspected because the amount of wood or debris around the base of the tree, combined with the amount of ivy the canopy prevented an adequate inspection. After debris removal has occurred, they should be evaluated again. Finally, seven trees are recommended for pruning of branches to reduce hazardous branch failure or to correct structural defects.

The summary of recommended actions is as follows:

Table 1: Recommended Actions

Action	Tree ID #
Snag	106, 131, 132 , 133, 135, 136, 138, 145, 152, 157, 162, 163
Remove	113, 116, 123, 124, 146, 147, 166
Thin stems	104, 160
Evaluate further	114, 118, 121, 130, 156, 163
Monitor	127, 128, 137, 139, 154, 156
Remove material at base	114, 119, 120, 121, 155,
prune	117, 145, 148, 150, 158, 161, 165

Ground vegetation

The consultant also surveyed ground layer vegetation on the site. He inventoried both native and non-native plants. The list developed is not comprehensive, but does give typical flora for the site. The list of vegetation observed is as follows:

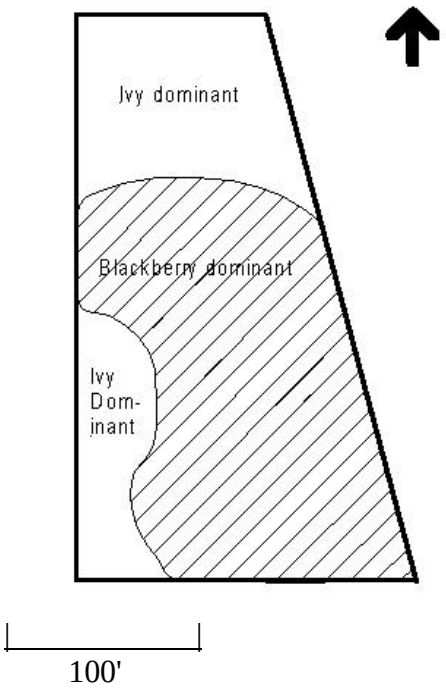
Table 2: Ravenna Woods Plant List

Scientific Name	Common Name	Non-native	Invasive
Acer macrophyllum	Bigleaf maple		
Alnus rubra	Red alder		
Carex spp.	sedge		
Clematis vitalba	Wild clematis	x	X
Convolvulus sepium	Morning glory	x	X
Corylus cornuta var. *californica*	Hazelnut		
Equisetum	Horsetail		X
Geranium robertianum	Herb robert	x	X
Hedera helix	English ivy	x	X
Ilex aquifolium	English holly	x	X
Lystichum americanum	Skunk cabbage		
Oemlaria cerasiformis	Indian plum		
Petasites palmatus	Palmate coltsfoot		

Phalaris arundinacea	Reed canarygrass	x	X
Philadelphus lewisii	Mock orange		
Polystichum munitum	Sword fern		
Populus nigra 'italica'	Lombardy poplar	x	
Prunus laurocerasus	English laurel	x	X
Pteridium aquilinum	Bracken fern		
Ranunculus spp.	Buttercup	x	X
Rubus discolor	Himalayan blackberry	x	X
Rubus spectabilis	Salmonberry		
Rumex crispus	Curly dock		
Sambucus racemosa	Red elderberry		
Solanum dulcamara	Nightshade	x	X
Tolmiea menziesii	Piggyback plant		
Urtica dioica	nettle		X
Vinca minor	Periwinkle	x	

The site contains two distinct vegetation areas. These correspond to the tree canopy and hydrology. The southeast portion of the site lacks tree canopy and contains saturated soils. It is dominated by Himalayan blackberry. Morning glory, reed canarygrass and nightshade are also found in these areas. The north and west portions of the site are dominated by bigleaf maple, while the ground layer is invaded by ivy. Holly, clematis and laurel are also present on this part of the site. See Figure 1 below. A notable native on the site is mock-orange. It occurs abundantly in the southwest corner of the site. This is an attractive medium height shrub that could be considered for restoration of the site.

Figure 1. Ground layer vegetation dominants



Discussion

Ravenna Woods would benefit from a program of active forest management. Currently, the southeastern portion of the site does not have viable canopy. Of the 66 trees inventoried, one quarter (19) are recommended for removal or snagging. This represents further loss of canopy. Adequate canopy regeneration is needed to achieve the long-term goals for this site. Similarly, the loss of native understory to invasive plants has compromised the habitat value of the site. Restoration of canopy and native understory will be primary objectives towards achieving plan goals.

The dominance of non-native invasive plants on the site will make the task of replanting particularly challenging. Invasive plants will smother any restoration plantings if they are not controlled first. The small size of this site makes full eradication of non-native invasive plants a possibility, albeit an expensive one. The expense comes not only with eradication, but also with the cost of maintaining a "clean" site. Invasive plants will continually encroach along the edges, sprout from the seed bank in the soil and reinvade through wind and animal dispersal. A less expensive option is to choose a level of infestation that does not interfere with restoration goals.

Wetland horticulture is significantly different from upland horticulture. Special consideration must be given not only to plant selection, but also planting technique. Traffic from equipment or labor can cause significant damage to soils. Plants must be conditioned to anaerobic soils for best establishment. A qualified expert should oversee such a project.

Recommendations

1) Implement restoration as described below in phases, working discrete areas in succession, rather than the entire site at once.

A shotgun approach to restoration will not achieve real progress. Resources will be spent before any real gains have been made. Begin by taking care of liabilities and "holding the line" against further degradation. Then choose an area of 1000 to 5000 square feet and begin restoration work there. First, control the invasive exotic plants in the area and watch for native plant regenerating from seeds or roots. Second, install tree saplings to provide canopy regeneration and foster any viable native regeneration. Third, install native shrubs where needed. Do not move to a new area until restoration of the first area is stabilized (invasives are no longer resprouting, replacement trees are established). Planning for future areas can proceed at the same time, but should not detract from the focus on the current site. Work on a new area can begin while shrub layer restoration is underway in the original area.

2) Design the wetland habitat and road frontage before attempting restoration there.

If Friends of Ravenna Woods wishes to enhance the wetland habitat on this site, they should first design the restoration project before attempting site work. This avoids piecemeal and redundant efforts. Several resources for this include the Starflower

Foundation (http://www.starflower.org/), the UW's Sustainable Community Landscapes Program (http://www.cfr.washington.edu/research.mulch/), or a wetland scientist listed through the Society for Ecological Restoration (www.ser.org).

Design services should also include eastern edge of the site. This is the side of the site that is visible to the public. Thoughful design of restoration plantings here would help the site work with the neighborhood. Choices around visibility into the site, barrier plantings, shading of invasives and trail access should all be decided before any effort is made toward restoration. The same design services selected for the wetland could make recommendations here.

3) Control invasives thoroughly before installing new plantings.

Avoid the mistake that so many volunteer groups make: planting before weeds are fully controlled. Plan to spend at least the first growing season controlling invasive weeds in an area. This investment will avoid wasted time and money losing small nursery-grown plants to rampant regrowth of invasives.

Control recommendations listed below involve complex choices that should be supported by a mutual agreement between Friends of Ravenna Woods and the Seattle Department of Parks and Recreation. Both entities should monitor the progress of the chosen control methods and be ready to modifying the strategies as site conditions or vegetation responses change. Where herbicide is necessary, the consultant recommends trying a glyphosate product (e.g. Roundup®) first. This chemical has a very low toxicity compared to others and breaks down readily in the soil environment. All chemical applications must be conducted under the supervision of a Washington State Department of Agriculture-licensed pesticide applicator.

Blackberry - Non-chemical control methods are limited to digging out roots of plants and repeated mowing. Cardboard mulching has been successful in controlling blackberry, but is not advised because it can damage tree roots. WSU recommends a combination of cutting back plants in active growth (June) and applying glyphosate (Roundup®) to either the freshly-cut stems or the regrowth one month later. In wetland habitats, Rodeo® or the equivalent formulation should be used, and a wiper applicator employed to minimize overspray. Digging roots in wetland soils should be done by trained personnel only to avoid damaging the soil structure.

Ivy - Effective chemical controls have not developed yet. The first step is to cut vines in the trees. This stops fruit production and buys the trees some time. The second step is to create a 4' clear zone around each tree. These tree "lifesavers" have been used by Portland's No Ivy League for years and are very effective for giving trees the growing space they need. The third step is to "weed" ivy out from between existing native plants. Rescuing natives that are already established is far more cost- and time- effective than buying new plants and planting them. Finally, where ivy forms pure "carpets", ivy can be removed by mowing with a weedeater-type tool called a Red Max, or it can be pulled by hand. Wherever bare ground is exposed during these operations, wood chips or other mulch should be applied to prevent soil erosion. Follow-up by weeding any regrowth for the next two years.

Clematis - Non-chemical control is limited to repeated cutting of the vines until their reserves have been depleted. Cutting new growth three or four times during the growing season should produce total control within two to three years. Cutting could be alternated with glyphosate application to new growth to speed up results.

Laurel and Holly - Non-chemical control includes cutting bushes to the ground and digging out stumps. Weed wrenches can be useful for this. Cutting large trees to a 3' height and repeatedly removing new sprout growth is also effective if a consistent effort is sustained over two years. Chemical control can be achieved by drilling stems with a 1/4 inch drill bit at 1" intervals around the circumference of the base and injecting 1cc of concentrated glyphosate (Roundup®) in the hole. A repipettor is useful for handling the chemical in this situation. Plants are allowed to die in place for minimal site disturbance. Alternately, cut stumps can be painted with the same herbicide, but results are less consistent, and disposal of the brush is added effort.

Reed canarygrass, morning glory, nightshade, and buttercup - these weeds are best controlled by herbicide application because of their tenacious root systems. Spot treatment by wiper-application during active growth is the most conservative method. This will allow targeting the weed while avoiding surrounding vegetation. On reed canarygrass, multiple applications may be necessary.

Herb robert - this weed is easily pulled by hand. It smells bad, though. Repeated effort will be needed, since it deposits long-lived seeds in the surrounding soil. These will continue to sprout for several years.

4) Attempt to work with native regeneration before investing in large-scale plantings.

The soil contains a reservoir of seeds of both native and non-native plants. When an area is disturbed, these seeds sprout. In areas where ivy or blackberry is cleared from the ground, selective control of their regrowth may allow new native plants to appear. This approach should be tried on the site before making large expenditures towards replanting.

There are also small patches of native plants on the site. These patches should be cultivated as restoration islands. The stand of mock-orange in the southwest corner is one example of an area that could be cultivated this way. Groups of sword ferns are another example.

5) Install new plantings of trees and shrubs where needed.

New trees will be needed in many areas of the site. The canopy in the south and eastern portions of the site is very fragmented. Spacing of new trees should be close to assure that enough trees survive. Any crowding of trees can be remedied in ten to fifteen years by thinning. A diversity of species should be utilized. In wet areas, western red cedar,. Sitka spruce, Oregon ash, vine maple and red alder could be used. In drier areas, Douglas fir, western hemlock, cascara, and bitter cherry could be employed. Under dense canopy, only cedar and hemlock will tolerate the low light levels well.

Where native shrub regeneration is missing, new shrub plantings should be installed, once invasive plants have been controlled in the area. In cases where shade-tolerant shrubs are planned, canopy (tree) plantings should be well established to provide the shaded environment the shrubs need. Members of the Washington Native Plant Society could be consulted to make recommendations for specific areas of the site. A program of maintaining such plantings should be developed prior to any planting project. Maintenance of restoration plantings is most critical in the first two years. Maintenance includes watering, weeding, fertilizing, replacement, and monitoring. Cost of maintenance generally runs between 50% and 100% of the value of the planting itself.

6) Educate neighbors about the woods.

The neighbors of Ravenna Woods need to know about this work if they are going to respect it. Signs explaining the project could be posted at two or three places along Ravenna Avenue pointing out project areas. Annual (in the fall) distribution of flyers in the student housing on 22nd Avenue NE could alert student to the restoration project and invite them to participate. This would help reduce potential conflicts that might otherwise develop.

Topics for further attention

The following topics are not vegetation management but impact the goals for Ravenna Woods.

- Encampment - there is currently an inhabited camp on the property.
- Dumping - Yard waste dumping occurs at the northwest and southwest corners of the site.
- Garbage - garbage has accumulated along the western boundary of the site.
- Trail access - stabilizing existing access routes would to support ongoing restoration activities on the site.
- Drainage across Ravenna Avenue - water currently flows over Ravenna Avenue off the southeast corner of the site. This has affected the road surface.
- Unopened Right-of-Way properties - the areas to the east of Ravenna Avenue and the 47th Street ROW to the north of Ravenna Woods would benefit from forest management as well. These were not in the scope of this plan.

ID#	Botanical name	DBH inch	Dom	Lean	Roots	Cracks	Attach	Rot	Deadwd	Target	Recommendation, Comment
101	Acer macrophyllum	35	S	\	OK	\	OK	L	L	Road	Keep, codominant stem
102	Acer macrophyllum	21	S	L	OK	\	OK	L	M	road	keep, unbalanced crown
103	Acer macrophyllum	31, 41	D	M	OK	\	cod	L	M	road	keep, double codom
104	Acer macrophyllum	19,17,10, 10	C	L	L	\	OK	M	M	trees	remove 2 stems on N side
105	Acer macrophyllum	11	S	\	OK	\	OK	L	M	trees	keep
106	Alnus rubra	18	S	H	lift L	L	OK	M	H	road	snag
107	Acer macrophyllum	6	P	L	crowded	\	OK	L	L	Road	release from 106
108	Acer macrophyllum	6	P	L	OK	\	OK	L	L	Road	keep
109	Acer macrophyllum	29	D	M	OK	\	OK	M	L	Road	keep
110	Alnus rubra	18	D	L	OK	L	OK	L	M	trees	keep
111	Acer macrophyllum	16	S	L	OK	\	?	L	?	deck	keep, ivy obscures crown
112	Acer macrophyllum	15	S	L	OK	\	?	L	?	deck	keep, ivy obscures crown
113	Acer macrophyllum	9	P	L	OK	H	?	H	H	trees	remove
114	Acer macrophyllum	15	S	L	? Wood over	\	?	L	?	deck	probably OK, evaluate further
115	Acer macrophyllum	21	C	L	OK	\	?	L	?	trees	keep, ivy obscures crown
116	Acer macrophyllum	12,11	S	M	OK	H	OK	H	H	pkg lot	remove both stems
117	Acer macrophyllum	17,14,10	D	L	OK	\	M	L	M	pkg lot	subord W stem
118	Acer	10	P	L	OK	\	M	L	M	pkg lot	boundary tree, evaluate

	macrophyllum										further
119	Acer macrophyllum	9	C							trees	clear ivy, log, lopsided canopy
120	Acer macrophyllum	19	D							trees	clear ivy, log
121	Acer macrophyllum	9	P	M	OK	\			H	trees	clear ivy, log, evaluate further
122	Acer macrophyllum	10	S	M	?	\	?	L	?	trees	keep
123	Populus nigra "italica"	49	D	L	cut	N	weak	H	L	pkg lot, trees	remove
124	Populus nigra "italica"	58	D	L	cut	\	weak	H	L	pkg lot, trees	remove
125	Acer macrophyllum	19	S	L	OK	\	M	L	M		broken top, keep
126	Acer macrophyllum	16,11	S	L	OK	\	M	L	M		keep
127	Alnus rubra	24	D	M	OK	growth	OK	L	M	bldg	keep, monitor
128	Acer macrophyllum	20	C	L	cut	\	OK	L	L	trees	keep, monitor
129	Acer macrophyllum	19	C	L	OK	\	OK	L	M	trees	keep
130	Acer macrophyllum	23	D	L	OK	\	OK	H	M	Road	resistograph, armillaria
131	Acer macrophyllum	20, 17	P	L	buried	M	OK	H	H	Road	snag
132	Alnus rubra	C	C	M	rot	H	OK	M	L	Road	snag
133	Acer macrophyllum	21,20,19, 18	D	H	rot	\	poor	H	H	Road	snag
134	Acer macrophyllum	12,10	S	L	OK	\	poor	M	L	trees	keep
135	Alnus rubra	27	C	H	OK	M	OK	H	L	trees	snag
136	Acer macrophyllum	26,18	C	L	girdling	\	OK	H	L	bldg? Trees	snag both stems
137	Acer macrophyllum	21	S	H	heave	\	poor	L	L	road?	keep, monitor

138	Acer macrophyllum	18	P	M	OK	\	poor	H	H	trees	keep snag stem as habitat
139	Alnus rubra	27	D	M	rot	L	OK	M	L	trees, road	keep, monitor rot on tension side
140	Alnus rubra	25	D	L	OK	M	poor	M	M	trees	keep
141	Acer macrophyllum	16	S	M	heaved	\	poor	M	L	road?	keep
142	Alnus rubra	23	D	L	OK	L	OK	L	M	trees	keep
143	Acer macrophyllum	22	D	L	OK	\	poor	M	M	trees	keep
144	Alnus rubra	21	P	M	OK	M	poor	H	H	trees	keep, cavity activity
145	Acer macrophyllum	37	D	M	OK	\	poor	H	M	trees, road	snag and balance crown
146	Alnus rubra	11	C	L	cut, heave	\	OK	M	M	trees, house	remove
147	Acer macrophyllum	27	D	L	rot	\	poor	H	H	house	REMOVE, big seam on N side
148	Acer macrophyllum	10,5	S	M	OK	\	poor	L	L	house	prune codominant stem
149	Acer macrophyllum	8	S	M	rot	seam	poor	M	L	blackberries	keep, very asymmetrical
150	Acer macrophyllum	12	S	L	OK	\	cod	L	M	blackberries	keep, prune codominant stem
151	Alnus rubra	18	C	M	OK	M	OK	L	M	bldg? Trees	keep
152	Alnus rubra	18	P	L	OK	H	poor	H	H	\	snag, keep
153	Alnus rubra	31	C	H	OK	L	poor	L	M	trees	keep
154	Acer macrophyllum	33	C	L	buried	L	poor	M	M	trees, bldg	keep, monitor
155	Acer macrophyllum	8	S	L	OK	L	OK	L	L	bldg	move conc. Block
156	Acer macrophyllum	28	C	L	OK	M	poor	H	?	trees, bldg	resistograph, monitor
157	Acer macrophyllum	25	S	H	poor	\	OK	H	M	bldg	snag, big failure on downhill side
158	Acer	26	C	L	OK	L	OK	L	H	bldg	remove deadwood

	macrophyllum											
159	Acer macrophyllum	22,17,30	C	L	OK	M	M	L	M	bldg	keep
160	Acer macrophyllum	19,14,18, 15,18,12	C	L	buried	M	H	M	H	bldg	thin stems
161	Acer macrophyllum	33	C	L	buried	L	M	L	M	bldg	prune
162	Acer macrophyllum	17,14	C	M	buried	L	H	H	H	bldg	snag
163	Acer macrophyllum	40,25	C	L	OK	L	M	H	M	bldg	snag 1 stem, eval 1 stem
164	Alnus rubra	18	S	L	buried	M	M	M	M	trees	keep as snag
165	Acer macrophyllum	9	P	L	OK	L	OK	L	L	none	prune codominant stem
166	Acer macrophyllum	23	S	M	buried	M	L	H	H	bldg	REMOVE

Dominance	**Risk Factors**
D=dominant	L=low
C=codiminant	M=medium
S=subordinate	H=high
P=Suppressed	OK = none observed