

FOREST LAND STEWARDSHIP PLAN

ROSLYN URBAN FOREST

Adjacent to Roslyn Historic Cemetery's



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INTRODUCTION

The Roslyn Cemetery Urban Forest (RCUF) consists of 24.5 acres adjacent to the Cemetery. For purposes of this LSP there are 7 distinct vegetation types or "stands". The stands are numbered sequentially from east to west; acreages have been rounded to nearest tenth acre:

Stand	Acres	Description – Location
1	2.6	East of C.O.R addn, 1995 and south of Cemetery road
2	4.1	North of Cemetery Road and South of 6 th Street; Suncadia acquisition
3	1.2	West of Memorial Drive; Suncadia acquisition
4	9.8	North of Nelson Dairy Road, west of Cemetery's, Suncadia acquisition
5	1.2	South of Nelson Dairy Road and east of old C.O.R dump. Suncadia acquisition.
6	4.6	Roslyn water reservoir parcel; north of Stand 4
7	1.0	North slope east of water reservoir stand; Suncadia acquisition.
TOTAL	24.5	
Stands with stand numbers are depicted on the 2006 aerial photo and topography map included with this LSP		

The purpose of this LSP is to describe current vegetation conditions and make recommendations for vegetation management alternatives to achieve a desired long term goals and objectives consistent with the conservation easement, the Roslyn Critical Areas Ordinance and the Cemetery Management Plan where applicable.

The LSP is designed to be a useful working plan for the C.O.R to readily implement. Therefore, recommended alternative stand treatments (prescriptions) are included with each stand description. Related, supporting documentation is included in Appendices, including a suggested implementation plan.

GOALS and OBJECTIVES

The **management goals** for the property are driven by the following inter-connected objectives:

- ◆ Create and maintain stands of healthy trees
- ◆ Forest fuels management
- ◆ Maintain and enhance wildlife habitat values
- ◆ Promote bio-complexity for a healthy forest ecosystem

- ◆ Visually attractive forest landscape, with vegetation screening where desirable.
- ◆ Public access trails and safety.

LSP Implementation will achieve a balance of forest health, forest fuel levels, wildlife habitat values and the other objectives. On-the-ground prescriptions can and should be customized overtime to fit site specific changes in vegetation conditions.

The plan should be reviewed and updated periodically to reflect changing conditions and circumstances.

Stewardship Principles

It is important to recognize that forest plant communities are in a continuing state of change. This change, referred to as succession, is imperceptible to occasional observation because it occurs very slowly over time. Forests that have not been "disturbed" in many years may appear to be static or permanent, but this is never the case. Disturbance is the most common agent for change – natural as in a wild fire, insect and diseases or human influenced as in a timber harvest. Planned for "change" can enhance habitat, reduce risk of stand replacement wild fire and lead to vegetation management goals. The idea is to work with nature to achieve a desired future condition or values.

The predominant "disturbance agents" that have resulted in current stand conditions in the Roslyn Cemetery Urban forest are:

- Early day timber harvest
- Natural fire exclusion
- Weather related events and
- Periodic insect and disease occurrences.

These past events should not necessarily be viewed in a negative sense. For example, insects and disease are an integral component of a forest ecosystem and a major component of biodiversity. Insect and disease occurrences are often times the symptom of a stress causing condition such as drought, overstocking or incorrect species for the site. In a healthy forest, there is a balance between insects and pathogens and the forest trees.

Dying trees are a natural part of a healthy forest ecosystem by returning biomass to the forest floor enabling soil improvement and releasing nutrients. Furthermore, the dead tree is a vital source of insect food that will feed bird predators that keep bark beetle populations in check over time.

As dead trees fall the resulting Coarse Woody Debris (CWD) on the forest floor is an important element of a healthy forest ecosystem. The decaying wood process provides microsites for beneficial mychorrizal fungi,

and long term release source of humus, organic matter, phosphates and nitrogen, all desirable for healthy tree growth.

CWD provides habitat for moss, lichens, invertebrates, reptiles, and amphibians that form an integral part of a healthy forest. Nearly all life forms in the forest begin with decaying wood.

Also, decaying wood acts as a reservoir for water storage by slowly releasing moisture throughout the summer.

Forest Health and FireWise

Today, the forest appears in relatively good health, presents a visually attractive landscape and is a pleasing environment for a walk in the woods.

However, as with any forest property there are risks. Common or most likely in the Cemetery Urban Forest are endemic pine bark beetles and root diseases and periodic epidemic pine bark beetle attacks. Fire is a risk on any forested landscape.

Fortunately, through management these risks, including fire, can be minimized or eliminated. The key here is **stocking control**, meaning tree density or spacing. When trees are too close together they compete with each other for available moisture, then in dry years they become weak (stressed), lose vigor, and are more susceptible to insect and disease attacks.

There is still evidence of the widespread epidemic mountain pine beetle (MPB) attack that occurred in 1988-89 in the Roslyn-Cle Elum area.

This event was intensively studied by UW forest scientists David Braun and Robert Gara. The study revealed the relationship between tree stocking and MPB tree mortality with a recommendation of < 100 square feet of basal area per acre as being most resistant to MPB attacks.

The recent, ongoing pine bark mortality, occurring patches, is from western pine beetle (WPB). WPB is a natural part of a ponderosa pine forest ecosystem and can never be 100% eliminated. Pre-disposing agents are moisture stress from inter-tree competition for water, root disease and human caused root disturbance. For a more complete understanding of bark beetles and root diseases, refer to *Appendix B*.

Overstocking is an issue in all stands.

Understanding Tree Stocking Relationships.

Tree stocking (or density) can be expressed in the number of trees per acre (TPA), spacing between trees, and basal area in square feet (SF) per acre (BA/acre). Of these, BA/acre is the most useful because it expresses

the amount of area in SF occupied by trees in the forest. Two separate acres can have the same BA/acre but a different number of TPA. The average tree diameter is the key variable.

STAND DESCRIPTIONS and MANAGEMENT RECOMMENDATIONS

This section is will describe stand by stand current conditions and recommended prescriptions. Refer to the included aerial photo to see Stand locations.

Management recommendations are prescriptions to improve forest health, reduce the risk of stand replacement wildfire and upgrade the forest over time.

Abbreviations used in the Stand description:

DF = Douglas fir

GF= grand fir

PP = ponderosa pin

TPA = trees per acre

BA/acre = basal area per acre measured in SF

LCR = live crown ratio = percent of the tree with green branches.

DBH = diameter breast height

PCT = pre-commercial thinning

Reprod or regen = reproduction; young trees that have naturally regenerated.

WLT's = wildlife trees = dead trees/snags

CWD = coarse woody debris

C.O.R. = City of Roslyn

RPI = growth rings per inch (an indication of tree vigor)

Prescriptions – Overview

Key Points:

- 1) The basic prescription common to all stands (except stand 7) will be referred to as a *"shaded fuel break"*.
- 2) The idea is to create and maintain healthy, firesafe stands of trees together with healthy forest ecosystem features.
- 3) In all stands removal of danger trees for public safety will be a continuing priority. A **danger tree is defined** as any dead, dying or leaning tree that is at risk of falling into a cemetery, across a trail, or across a road.
- 4) The detailed prescriptions across Stands 1-6 are very similar but with some variations to fit specific stand conditions.
- 5) Actual on-the-ground operations will need to be customized during contract preparation and contract supervision.

- 6) The decision will need to be evaluated as to whether or not to remove commercially marketable trees:
- Is there a viable log market for the species and size to be removed ?
 - Will commercial logging be acceptable to the community?
 - An FPA (Forest Practices Application) will be required. Since it is inside the City, the FPA will be a Class IV (general), requiring a SEPA checklist and \$500 application fee.
 - This plan recommends removal of only that commercially marketable timber that can be reached by a loader from an existing road shoulder.
 - It is unlikely that any net revenue will be generated from commercial tree removal. Breakeven after logging slash removal will likely be (but not necessarily) the best case scenario.

Stand 1

Size: 2.6 acres.

Location: south of Cemetery road, east of C.O.R. 1995 addition.

Trails: a north-south pedestrian trail bisects the stand. Does this trail fit or tie into a Suncadia trail system? Contact Art Solbakken.

Other features:

- The north and east boundaries were FireWised in 2000 by DNR.
- Suncadia FireWised adjacent to the south line of Stand 1 in 2006.

Stand 1, 2.6 acres		
	Overstory	Regen
Species	50% PP; 40% DF; 10% GF	Minimal DF/GF
BA/acre	230-240 SF	
TPA	Average 220	
DBH	Range: 4" -30"; Average: 14"	
Canopy Closure	40%-50%	
Comments and Health	No evidence of root disease; endemic WPB will likely continue.	
CWD	Abundant from past beetle killed pine; beetle killed PP still standing.	
Fire Risk: medium to high primarily because of nearby developed area in Roslyn and abundance of ladder fuels.		



Typical view of Stand 1. The shrub layer is dominated by hazelnut, oceanspray, service berry, rose, with some vine maple and willow. The herbaceous layer is pinegrass, elksedge, peavine and a variety of spring wildflowers.

Management Recommendation : Create shaded fuel break:

- 1) Subject to available markets and community acceptance, there will be marketable size trees to remove adjacent to Cemetery Road.
- 2) Remove suppressed understory trees. Favor to leave PP over DF and GF.
- 3) For safety, cut standing beetle killed pine (high stump); limb, buck down to 6"-8" diameter and leave for CWD.
- 4) Ok to leave shorter snags for WLT's.
- 5) Prune ladder fuels on leave trees to a height above projected flame length; roughly 12'-15'. Pruning height can and should vary.
- 6) Dispose of concentrations of cut material together with heavy concentrations of existing forest floor fuels by chipping. Do not create "piles" of chipped material; spread out on forest floor to decompose.
- 7) It is not necessary to dispose of all cut or already down material if it does not create a forest floor fuel concern. Larger diameter segments (>6") can be bucked in manageable lengths and scattered for CWD. Habitat piles are not recommended in this stand.
- 8) Selective mowing of tall shrub layer where it is a ladder fuel concern.
- 9) Maintain trails clear of CWD and chips.



Portion of Stand 1 that was FireWised in 2000. No marketable trees were removed during this entry and the shrub layer has responded. Prescription 1- 8 above applies to this portion of Stand 1 as well, but shrub mowing should be scheduled within the next 3 years.

Stand 2

Size: 4.1 acres.

Location: north of Cemetery road, east of Memorial Drive and south of 6th Street.

Trails:

Other features:

- The north and east perimeter was FireWised in 2000 by DNR.
- The emergent wetland buffer extends into the western portion of the stand.

Stand 2, 4.1 acres		
	Overstory	Regen
Species	95% PP; 5%DF; some GF	DF/PP/GF
BA/acre	Average 365 SF	
TPA	Average 220	
DBH	Range: 8" -30"; Average: 16"	
Canopy Closure	Openings to 50%+ in west portion	
Comments and Health	No evidence of root disease; endemic WPB will likely continue.	
CWD		
Soil Series	8749 -- Varelum Loam	
Timber Volume Estimate:		
Fire Hazard Rating: relatively low because of adjacent to roads and low shrub layer.		



Stand 2, western portion but typical of most of the stand. Ground cover is dominated by low shrubs: snowberry and spirea. Herbaceous layer is pinegrass, elksedge, lupine, and silver crown luina.

Management Recommendation -- Create shaded fuel break:

- 1) Subject to available markets and community acceptance, there will be marketable size trees to remove adjacent to Cemetery Road.

- 2) Remove suppressed understory trees. Select to leave trees with full, well formed crowns. Where there is a choice of species, select PP over DF and GF.
- 3) For safety, cut standing beetle killed pine (high stump); limb, buck down to 6"-8" diameter and leave for CWD.
- 4) Ok to leave shorter snags for WLT's.
- 5) Prune ladder fuels on leave trees to a height above projected flame length; roughly 12'-15'. Pruning height can and should vary
- 6) Dispose of concentrations of cut material together with heavy concentrations of existing forest floor fuels by chipping. Do not create "piles" of chipped material; spread out on forest floor to decompose.
- 7) It is not necessary to dispose of all cut or already down material if it does not create a forest floor fuel concern. Larger diameter segments (>6") can be bucked in manageable lengths and scattered for CWD. Habitat piles can be created in firesafe openings – approximately 4-6.
- 8) Selective mowing of tall shrub layer where it is a ladder fuel concern. Do not create "piles" of chipped material; spread out on forest floor to decompose.
- 9) Do not enter the critical area on the west end of the stand.
- 10) You may want to consider leaving closer spacing of trees adjacent to Cemetery Road for a visual screen.
- 11) Maintain trail clear of CWD and chips.
- 12) Adhere to Roslyn CAO wetland buffer constraints. If necessary flag wetland buffer outer limits before beginning operations.



Portion of Stand 2 next to Roslyn residential area that was FireWised in 2000. No marketable trees were removed during this entry and the shrub layer is low. Good example of a Shaded fuel break.

Stand 3

Size: 1.2 acres .

Location: west of Memorial Drive and south of 6th Street.

Trails: An existing trail traverses the stand from southeast to northwest.

Other features:

- The north perimeter was FireWised in 2000 by DNR.
- There is an emergent wetland on the eastern edge of the stand; west side of Memorial Drive.

Stand 3, 1.2 acres		
	Overstory	Regen
Species	60% PP; 20% DF; 20% GF	DF/PP/GF
BA/acre	Up to 440 SF	
TPA	Up to 260	
DBH	Range: 4" -30"; Average: 18"	
Canopy Closure	80%-90%	
Comments and Health	Root rot pockets occur in the north ½ of the stand as evidenced by GF mortality.	
CWD	Abundant due to root rot and older pine beetle mortality.	
Soil Series	8757 -- Varelum variant sandy loam	
Fire Risk : high because of overstocking, ground fuels, ladder fuels.		



Example of Stand 3 in the heaviest overstocked portion. The nearly closed canopy precludes development of an herbaceous layer. The shrubs here are serviceberry and vine maple.

Stand 3 – Mature GF with fading crown is evidence of root disease common in the north ½ of this stand.

Management Recommendations – Create Shaded Fuel Break

- 1) Subject to available markets, there will be some marketable size trees to remove adjacent to Memorial Drive.
- 2) For safety, cut standing root diseased trees. The root disease fungus will continue to remain active in the soil and will likely spread to other GF and DF; pine is more resistant. The shrub layer (primarily vine maple, hazelnut, oceanspray and service berry) will occupy the site and will provide habitat diversity. Limb and buck cut trees and leave for CWD down to 6" – 8" diameter; chip smaller diameter concentrations of limbs and tops.
- 3) Cut danger trees adjacent to the cemetery along the southwest portion of the stand boundary.



- 4) Remove suppressed understory trees. Select to leave trees with full, well formed crowns. Where there is a choice of species, select PP over DF and GF.
- 5) Prune ladder fuels on leave trees to a height above projected flame length; roughly 12'-15'.
- 6) Chip concentrations of cut material together with concentrations existing forest floor fuels. Do not create "piles" of chipped material; spread out on forest floor to decompose.
- 7) It is not necessary to chip all cut or already down material if it does not create a forest floor fuel concern. Larger diameter segments (>6") can be bucked in manageable lengths and scattered for CWD.
- 8) Habitat piles are not recommended in this stand.
- 9) Vine Maple has formed a dense medium to tall understory in the north perimeter that was FireWised in 2000. At this is time the vine maple is not a ladder fuel problem, but it could develop as such. Therefore, it is recommended that the taller specimens be removed and chipped.
- 10) Adhere to emergent wetland and buffer rules in Roslyn CAO.



Stand 3 – portion FireWised by DNR in 2000. Consider spacing out the heavy vine maple clumps to reduce ladder fuel development

Stand 4

Size: 9.8 acres.

Location: North of Nelson Dairy road and west of Cemetery's. East of Suncadia Stream "C" Corridor open space.

Trails: a pedestrian – mountain bike trail bisects the stand.

Other features:

- The cemetery road system extends through the stand and ties into the Nelson Dairy road. This road will be closed and converted to a trail.

Stand 4, 9.8 acres		
	Overstory	Regen
Species	50% PP; 50% DF F	Minimal DF/GF
BA/acre	130 to 350 SF	
TPA	Average 150; up to 420	
DBH	Range: 6" -28"; Average: 15"	
Canopy Closure	Range: 20%-40%; up to 70%	
Comments and Health	Pine bark beetles are active in parts of the stand and there are pockets of root rot. Overall fair health considering the high density.	
CWD	Widely scattered remnants of pine bark beetle mortality and some DF root rot mortality.	
Soil Series	6840 -- Roslyn-Racker complex	
Fire Risk: medium, shrub layer ladder fuels are not a serious concern.		



Stand 4- heavy to pine in this portion of the stand. Shrub layer is low snowberry and spirea; there is a well established herb layer of pinegrass, lupine, balsam root, peavine and a variety of spring wildflowers.



Stand 4 – about 50-50 PP and DF. Taller shrubs are service berry and hazelnut. Snowberry forms a good ground cover together with spirea, peavine and pinegrass.



Stand 4 – heavily overstocked portion upslope (north) of Nelson Dairy Road.

Management Recommendation -- Create shaded fuel break:

- 1) Subject to available markets and community acceptance, there will be marketable size trees to remove adjacent to Nelson Dairy Road, the Water Reservoir road and the interior road.

- 2) Remove suppressed understory trees. Select to leave trees with the best looking, full, well formed crowns. Where there is a choice of species, select PP over DF and GF.
- 3) For safety, cut standing beetle killed pine (high stump) and root rot mortality where they are a danger tree next to a road, trail or cemetery. Limb, buck down to 6"-8" diameter and leave for CWD.
- 4) Ok to leave shorter snags for WLT's.
- 5) Prune ladder fuels on leave trees to a height above projected flame length; roughly 12'-15'. Pruning height can and should vary.
- 6) Dispose of concentrations of cut material together with heavy concentrations of existing forest floor fuels by chipping. Do not create "piles" of chipped material; spread out on forest floor to decompose.
- 7) It is not necessary to dispose of all cut or already down material if it does not create a forest floor fuel concern. Larger diameter segments (>6") can be bucked in manageable lengths and scattered for CWD.
- 8) Habitat piles can be created in firesafe openings.
- 9) There are only a few areas where selective mowing of the tall shrub layer will be a ladder fuel concern.
- 10) Eliminate Scotch Broom (Class B noxious weed)
- 11) Following the logging and FireWise treatment, the western fork of the interior road can be eliminated and restored to native vegetation by ripping, out sloping, grass seeding and planting to native shrubs.

Stand 5

Size: 1.2 acres.

Location: South of Nelson Dairy road and east of old C.O.R. dump.

Location: South of Nelson Dairy Road and east of old growth dump.		
Trails: None. Stand 5, 1.2 acres		
	Overstory	Regen
Species	100% PP	Dense PP/DF along road.
BA/acre	70	
TPA	Average 60	
DBH	Average: 14" with older pine up to 34"	
Canopy Closure	0-20%	
Comments and Health	Good vigor with no indication of insects or disease.	
CWD	sparse	
Soil Series	6840 -- Roslyn-Racker complex	
Fire Risk: low		



Stand 5 – this is a small stand of well spaced larger pine with good diversity of species in the shrub and herb layers.

Management recommendations – Create Shaded Fuel Break

- 1) PCT overstocked thickets-
 - a) Select to leave tallest trees regardless of spacing
 - b) Select to leave PP over DF
 - c) As a guide space to leave 1' to 2' between crowns but leave tallest, best formed crowns regardless of spacing.
 - d) Do not create green pine slash >3" from Dec thru July without disposing of as cut to avoid pine engraver beetle attacks.
- 2) Prune ladder fuels. On small trees always leave at least ½ green crown.
- 3) Larger Cut material (>than 4") can be used to create 1 or 2 habitat piles in firesafe openings
- 4) Chip remainder of concentrations of cut material.
- 5) Control noxious weeds adjacent to road.

Stand 6

Size: 4.6 acres.

Location: Roslyn reservoir parcel north of Stand 4.

Trails: none

Other features:

- The C.O.R water reservoir is located in this stand.
- The old water reservoir overflow channel runs down thru the stand.
- A shrub/scrub wetland buffer extends into this stand.

Stand 6, 4.6 acres		
	Overstory	Regen
Species	60% PP; 40% DF	
BA/acre	240-250 SF	
TPA	Average 260	
DBH	Range: 6" -20"; Average: 13"	
Canopy Closure	20%-90%	
Comments and Health	Recent pine bark beetle mortality. DF with fading crowns indicates pockets of root disease	
CWD	Abundant from pine bark beetle mortality	
Soil Series	6840 -- Roslyn-Racker complex	
Fire Risk: high		



Stand 6 – illustrates heavily overstocked patch of predominantly DF.



Stand 6 –predominantly PP with low to medium shrub layer.

Management Recommendation – Create Shaded Fuel Break:

This stand is essentially the same as Stand 4 and can be treated at the same time.

- 1) Subject to available markets and community acceptance, there will be marketable size trees to remove adjacent to the Water Reservoir road.
- 2) Remove suppressed understory trees. Select to leave trees with full, well formed crowns. Where there is a choice of species, select PP over DF and GF.
- 3) For safety, cut standing beetle killed pine (high stump) and root rot mortality where they are a danger tree next to a road, limb, buck down to 6"-8" diameter and leave for CWD.
- 4) Ok to leave shorter snags for WLT's.
- 5) Prune ladder fuels on leave trees to a height above projected flame length; roughly 12'-15'. Pruning height can and should vary.
- 6) Dispose of concentrations of cut material together with heavy concentrations of existing forest floor fuels by chipping. Do not create "piles" of chipped material; spread out on forest floor to decompose.
- 7) It is not necessary to dispose of all cut or already down material if it does not create a forest floor fuel concern. Larger diameter segments (>6") can be bucked in manageable lengths and scattered for CWD.
- 8) Habitat piles can be created in firesafe openings.
- 9) There are only a few areas where selective mowing of the tall shrub layer will be a ladder fuel concern.
- 10) Follow Roslyn CAO rules for a wetland buffer.

Stand 7

Size: 1.0 acres.

Location: North slope east of Stand 6 .

Trails: There is a trail extending southward from the end of 8th street on the eastern perimeter of this stand.

Other features: There is a portion of a shrub/scrub wetland buffer in the northwest portion of the stand.

Stand 7, 1.0 acres		
	Overstory	Regen
Species	13% PP; 75% DF; 12% GF	DF/GF
BA/acre	340 SF	
TPA	Average 160	
DBH	Range: 6" -20"; Average: 20"	
Canopy Closure	50%	
Comments and Health	Good vigor; no evidence of insect or disease.	
CWD		
Soil Series	8749 – Varelum Loam	
Fire Risk: Low		



Stand 7 – A mature stand of DF on the north slope east of the water reservoir. The shrub layer is dominated by vine maple and oceanspray.

Management Recommendation: Leave as is for the near term. With no major disturbance events, the stand will develop into a nice area of old growth DF.

Appendix "A" Soils

The soil survey map classifies three forest soil series as illustrated on the attached soils map.

Varelum Loam - (8749)

Varelum is under Stands 1 and 2 and a portion of 7. It is a deep (60"+), well drained soil formed from highly weathered Roslyn sandstone with a mixture of volcanic ash and loess in the top soil. There are no restrictive layers and available water capacity is high. The top soil is a loam over a clay loam. Site index rated at 90 for Douglas fir (DF), and 85 for ponderosa pine. This means that these species will grow to heights of 90 feet and 85 feet respectively in 100 years. Erosion potential is rated *medium* so it is important to maintain a well established herbaceous ground cover. Compaction potential is also rated *high* and heavy equipment should not be operated during wet conditions to avoid soil compaction which in turn, will adversely affect tree health and growth.

Varelum Variant Sandy Loam – (8757)

This soil is under Stand 3 and portions of 4 and 7. It is also a deep (60"+), well drained soil formed from basalt with a mixture of volcanic ash in the top soil. There is a restrictive layer of weathered sandstone bedrock at about 30". Water holding capacity is moderately low. Site index rated at 90 for Douglas fir (DF), and 83 for ponderosa pine. This means that these species will grow to heights of 90 feet and 83 feet respectively in 100 years. Erosion potential is rated *medium* so it is important to maintain a well established herbaceous ground cover. Compaction potential is rated *medium*, but heavy equipment should not be operated during wet conditions to avoid soil compaction which in turn, will adversely affect tree health and growth.

Roslyn-Racker Complex – (6840)

This soil is under Stand 5 and a portion of 4. It is also a deep (60"+), well drained soil formed from glacial drift and volcanic ash in the top soil. On the Racker portion there is a restrictive layer of very cobbly loamy sand below about 11". Water holding capacity is moderately high on the Roslyn portion and low on the Racker portion. PP site index rated at 98 on the Roslyn and 70 on the Racker. Erosion potential is rated *low* but it is still important to maintain a well established herbaceous ground cover. Compaction potential is rated *medium*, but heavy equipment should not be operated during wet conditions to avoid soil compaction which in turn, will adversely affect tree health and growth.

Existing ground cover is sufficient to protect the soil from erosion. Any fresh soil disturbances should be promptly seeded to a grass mix to protect the surface from puddling and erosion, and help prevent the invasion of noxious weeds. The recommended seed mix is:

- 10% Chewings Fescue
- 30% Canada Bluegrass
- 30% Creeping Red Fescue
- 30% Sheep Fescue

Late fall is the best time to prepare a good seed bed and broadcast seed mixes and A straw mulch is advisable, especially around construction sites. Seeding too early in the fall may result in fall germination which will increase the risk of winter kill. Spring germination is preferred. Seed to rate of at least 25 lbs. per acre.

End of Appendix "A:"

APPENDIX "B" --- Forest Health

As with any forest property there are risks. Common or likely in the Lauderdale area are bark beetles, defoliators, root diseases, and mistletoes.

It is important to recognize that insect and diseases are a natural part of a healthy forest ecosystem. In a healthy forest there is a balance between insects and pathogens and the forest trees.

Fortunately, through management these risks can be minimized or eliminated. The key here is **stocking control**, meaning tree density or spacing. When trees are too close together they compete with each other for available moisture, then in dry years they become weak (stressed), lose vigor, and are more susceptible to endemic insect and disease attacks. Proper spacing is important at all ages.

Following descriptions of common tree health problems occurring or likely to occur on the RUF property. .

Understanding Pine Bark Beetles

Recent pine bark beetle mortality is evident on the parcel. Bark beetle populations fluctuate year-to-year depending on stress causing conditions in a stand of forest trees. The most common stress problem is available moisture. During normal precipitation years, beetle populations tend to decline because vigorous trees are better able to resist beetle attacks. During drought years, such as we have recently experienced, beetle populations tend to increase, especially in over-stocked stands. Bark beetle outbreaks can last for several years depending on weather and forest conditions. The last major outbreak was in the late 1980's and early 1990's.



Pine Bark Beetle Facts:

- 1) Bark beetles only infest living trees or damaged and down trees that are still green.

- 2) Beetles will seek out moisture stressed trees because these trees produce less resin.
- 3) A vigorous tree can repel beetles with an abundance of resin flooding the entrance holes and galleries.
- 4) Once beetles find a suitable host tree, they release a chemical (called pheromones) to attract other beetles.
- 5) Bark beetles develop through 4 life stages: egg, larva, pupa, and adult. There is usually only one live cycle (or generation) per year.
- 6) Beetles spend almost their entire life beneath tree bark. The female will excavate an egg gallery.
- 7) The eggs hatch within a few weeks and the larvae feed on the inner bark of the tree, pupate and then emerge as an adult.
- 8) The adult beetle spends only a few days outside the bark and then will fly to locate a new host tree.
- 9) Bark beetle attacks often leave plainly visible evidence outside the bark such as pitch tubes, resin streams, and a reddish brown boring dust in bark crevices. Under the bark, distinctive egg galleries are specific to each kind of beetle.
- 10) Normal populations of bark beetles are kept in check by woodpeckers and other insect eating birds.
- 11) The green needles will begin to fade in the fall and sometimes not turn brown until the following year.
- 12) It is a good thing to create and maintain good bird habitat in your forest.

There are four major groups of beetles common to Central Washington pine forests. They are native and a natural part of a forest ecosystem. They all have characteristic gallery patterns and preferred host tree types.

- 1) Mountain Pine Beetle (MPB) is generally associated with stands of ponderosa pine larger than 8" DBH in older, overstocked stands. They make long J-shaped egg galleries under the bark of trees. This is the most damaging beetle in our area. It can begin in weakened trees and even spread to healthy trees.
- 2) Western Pine Beetle (WPB) will most likely attack large, old ponderosa pine with low vigor, usually in clumps. They make winding, criss-crossing egg galleries under the bark of trees.
- 3) Pine Engraver Beetle (*Ips*) attack pine 5" to 8" DBH, logging slash, pre-commercial thinning slash, wind throw, or top portions of larger trees which have been weakened by drought. Out breaks are usually associated with spring and early summer drought.

Their egg galleries radiate out from a central chamber under the bark of trees. Branches 2 to 6 inches long extend from the central chamber.

Avoid creating green PP slash from early winter through mid-summer.

- 4) Red Turpentine Beetles attack the lower trunk of weakened or stressed pole-sized and larger pine. Look for conspicuous globular reddish pitch masses about 1 inch across on the lower trunk. The egg galleries are irregular shaped; can be up to 1" wide and about 12" long. These beetles are rarely lethal by themselves but they will weaken the tree and make it more susceptible to MPB or WPB attacks.

Douglas fir Bark Beetles

Key Points—

- 1) DF bark beetles, like pine beetles, attack trees that are under stress. This can mean lack of moisture, root disease, or defoliators.
- 2) Foliage will turn yellow and then fade to a reddish brown by late summer or fall.
- 3) There will be red or yellow boring dust in bark crevices. No pitch tube, but you may see resin streamers on upper stem attacks. This is where pitch has seeped out through the beetle entry hole.
- 4) Egg galleries are straight, similar to Mountain Pine Beetle.

Although not specifically observed on the RUFI, DF bark beetles may be present now and in the future.

Western Spruce Budworm (SBW will affect Douglas fir and grand fir)

This defoliating caterpillar like insect has been present in Kittitas County forests since the early 1980's, and no doubt even before then. Population build-up runs in cycles, usually during periods of low precipitation.

It is currently active in large populations on the east side of the Cascades including the Teanaway, Liberty area, and Green Canyon. 2007 SBW sample traps indicate an increasing population in the lower North Fork Teanaway and could be a concern in the Roslyn area in 2008.

SBW Key Points –

- 1) It is a defoliating insect (eats the needles) and does not necessarily always kill the trees.
- 2) It will weaken trees and make them more vulnerable to bark beetles.
- 3) Needles will appear blighted or scorched on the tips. Needles will be bound together with webbing at branch tips.
- 4) The caterpillars are about 1" with green markings and white spots on the sides. Appear in the spring or early summer.

Dwarf Mistletoe

Has not been observed on Cemetery RUF but it is common to the area and is something to be aware of.

Basic Mistletoe Facts:

- 1) It is a parasitic plant depending on a tree host for water and nutrients.
- 2) It is specific to each species of tree. It only survives on living trees. When the tree or branch dies, so does the mistletoe.
- 3) The spread is relatively slow in single layer stands. The spread is usually downward.
- 4) Mistletoe survives by stealing water and nutrients from the tree. By itself, it is rarely a tree killer but it does weaken the tree and it will be more susceptible to bark beetle attacks in overstocked stands.
- 5) Mistletoe "brooms" provide nesting and hiding cover for birds and small mammals. The "fruiting body" is a food source.

Complete eradication is impossible. The best approach is to control by cutting heavily infected trees during thinning, or pruning the mistletoe branches in the overstory and any young trees that become infected.

DF mistletoe is the cause of this branching deformity.



Understanding Root Diseases

Root diseases were evident during the site examination on May 19-20, 2008.

Fading crowns in DF are an indication of root disease occurrence.

Research has confirmed that these organisms are native and a natural part of a healthy forest ecosystem. In a healthy forest there is a balance between the fungus and trees. The trees and the fungus have evolved with each other and pre-settlement periodic low intensity fires they lived in balance with each other.



There are 3 primary root rot fungi in the area: *Armellaria*, Laminated and Annosus, with the first two being most common. Root rot pockets are easy to identify in the forest. There will be patches of dead trees, some broken off or fallen with the root wad exposed. Often there will be a heavy patch of vine maple, oceanspray, hazelnut or alder which have responded to more sunlight reaching the forest floor.

Selective harvest will aggravate the spread of root rots because fresh stumps are quickly colonized by the fungus. The roots of these stumps in contact of roots of adjacent green trees allows the fungus to spread to these green trees and they will be dead within a year or two. In other words a "flush" of infection and mortality usually follows colonization of stumps created by selective harvesting infected trees. In any event, it is safe to say the fungus once present on a site will always be present. Normally, the fungus spreads very slowly from infected trees to adjacent trees. This may take years.

In areas that have been clear-cut and planted it is common to see pockets of dead young trees or just an individual dead tree. This is an indication the fungus is surviving in old stumps.

Host species vary in their susceptibility but all coniferous species are moderately too highly susceptible until they are 12 to 15 years old. After this age, some species become less susceptible to mortality, especially pines and western larch. Choosing to manage for pine is logical management option. If you notice infected trees, keep in mind the pocket could be ¼ acre and up to 2 acres in size. Cutting what appear to be infected trees will only

aggravate the spread of the fungus to adjacent healthy trees, *unless* you cut all the susceptible trees in the pocket (GF and DF) and leave the pine. In this case, it will be ok to leave any dominant DF that have well formed full crowns. If there are no pine in the pocket then create an opening and plant to pine and western larch.

If you observe Douglas fir trees with weak or fading crowns, then it is likely because of root disease. If you are unsure of the extent of pocket contact your forester.

End of Appendix "B"

LSP IMPLEMENTATION PLAN – Roslyn Cemetery Urban Forest

Note: this portion of the LSP is intended to be a "How To" guide to getting the job done on the ground. This is a suggested approach – modify to fit your circumstances.

To facilitate planning, funding and operations it makes sense to separate the subject area into *Management Units*, for example two are suggested:

East – Stands 1, 2, and 3

West – Stands, 4, 5 and 6

Following is a discussion of recommended sequence of activities that will lead to community approval, funding sources and contractor selection:

- 1) Clearly flag the boundaries of the stands to be treated including exclusion of any critical/sensitive areas (wetlands and buffers)
- 2) Clearly flag trails that are to be kept open and free of debris.
- 3) Sample mark commercially marketable trees (flag or paint mark) adjacent to existing roads.
- 4) Mark danger trees for removal adjacent to roads, trails and cemeteries.
- 5) Prepare a sample contract and bid prospectus to eventually show prospective contractors. The contract will include the prescriptions in as much detail as possible – see recommended prescriptions by stand in the LSP.
- 6) At this point it is advisable make sure City government, advisory committees, neighbors and the community at large are on board with the project in general and stand prescriptions.

Cost and funding:

The best way to arrive at costs is to show the project to prospective contractors and solicit bids.

However, you may want/need to have your funding sources firmed up before hand. If this is the case, I'm sure we can come up with some approximate per acre costs; Contact the plan preparer for ideas on how to do this.

Contractor Selection:

- 1) Ideally, you should select a single contractor to carry out the entire Shaded Fuel Break prescription, including removal of commercially marketable trees adjacent to existing roads.
- 2) Contractor selection is critical to a successful operation.
- 3) They should have a proven track record for this type of work.
- 4) They should have:
 - a) A tractor mounted PTO chipper or a self powered chipper that can be pulled through the woods with a skid steer or wheeled tractor. The portability through the woods will allow for the chips to be scattered.
 - b) Optional: A brush mower mounted on a skid steer or a walk behind DR type – or both. This is an optional piece because the brush can be hand cut and fed to the chipper.
 - c) Pole saw – for ladder fuel pruning.
 - d) Chain saws and experienced cutters.
 - e) Access to a truck mounted log loader for removal of marketable trees designated for cutting adjacent to the roads.

This plan does not anticipate any log skidding equipment in the woods. Therefore, trees to be removed must be reachable with a truck mounted loader from the road shoulder. This can be a loader with a winch or the operator can use a choker and cable attached to the grapple to drag the logs within reach of the grapple, or some similar rigging. For example, a rubber tired cable skidder at road side could be acceptable. A lot depends on how far off the road marketable trees are marked for cutting.

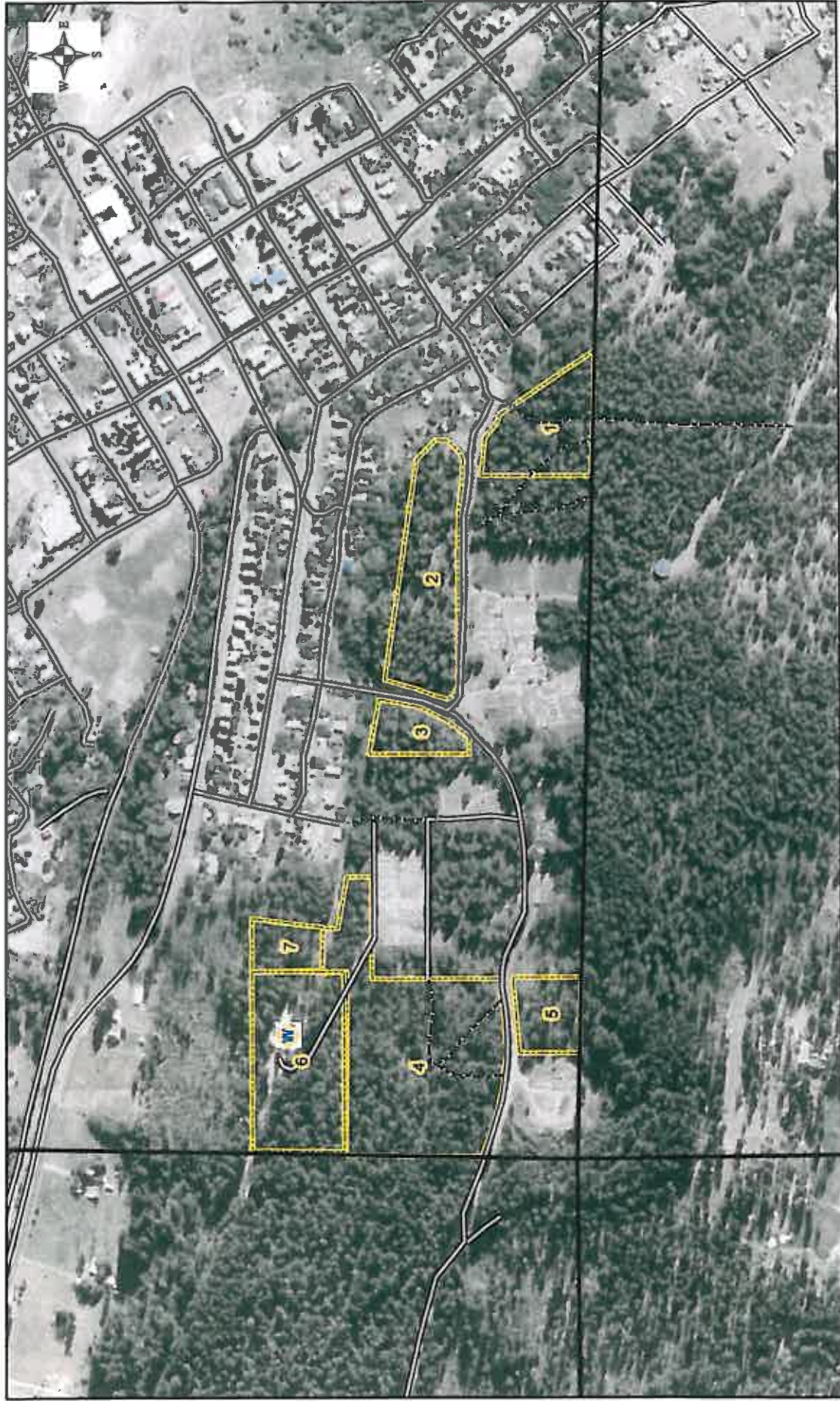
Contract Supervision:

- 1) For a smooth operation, this should be just one person with shaded fuel break experience.
- 2) This person is essential because there will be decisions to be made continually – it is not possible to spell out every last detail in the contract.
- 3) I recommend the person be a City employee with sufficient authority to make immediate on-the-ground decisions.
- 4) For example: One of this persons many responsibilities will to make tree cutting decisions (or leave tree decisions) in cases where the contractor has a question.

Prepared by:
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8-13-08

Roslyn Urban Forest Land Stewardship Plan

T20N R15E Sec 17



Map Legend

	Section Line
	Road
	Trail
	Forest Stand
	Water Reservoir

2006 Aerial Photography

Forest Stand Map

0 250 500 Feet

Map Scale: 1:6,000

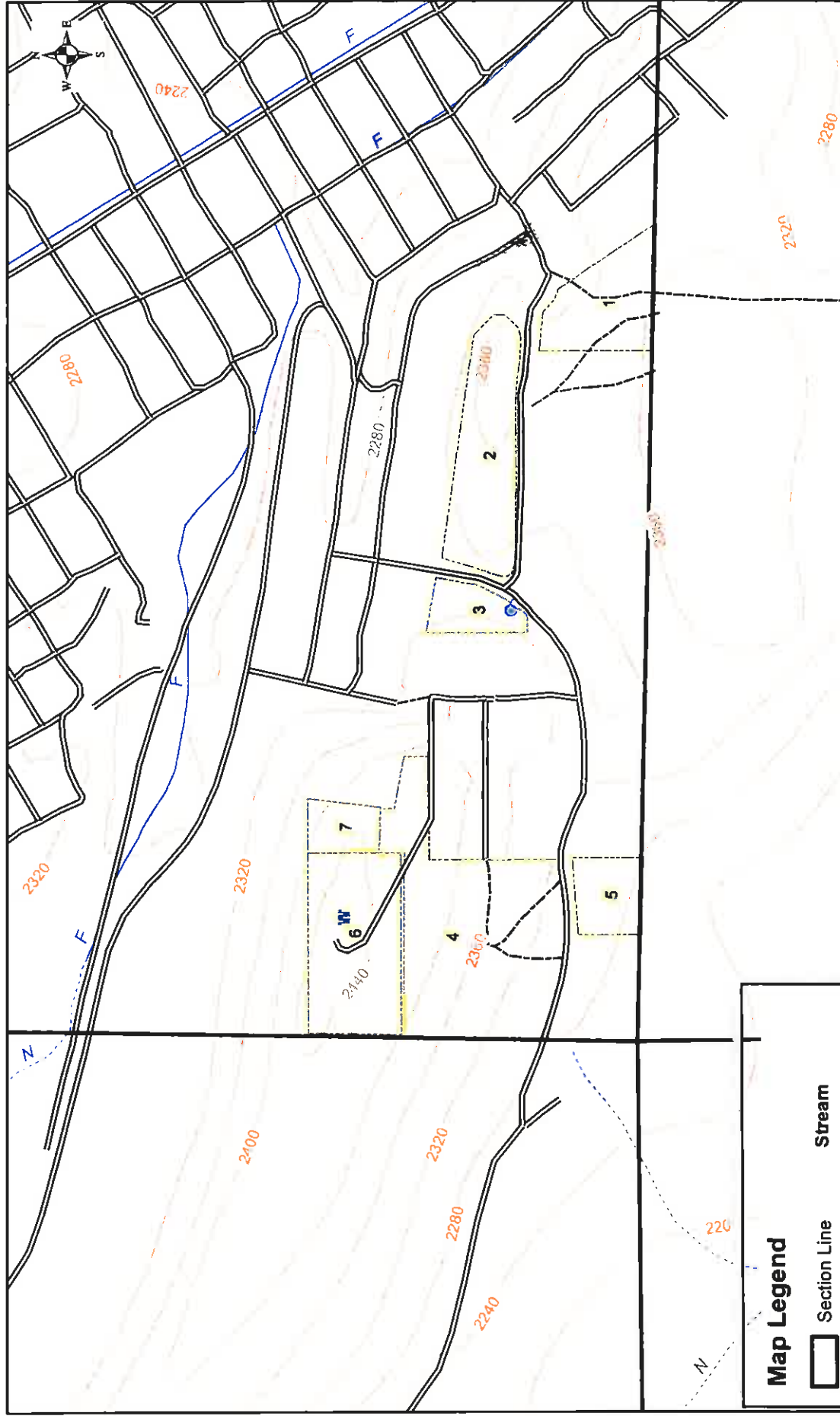
PH F&LS 2008

T20N R15E Sec 17



Roslyn Urban Forest Land Stewardship Plan

T20N R15E Sec 17



Map Legend

	Section Line		Stream
	Forest Stand		Shoreline
	Road		Fish
	Trail		Non-Fish
	Contour Line (40')		Unknown
	Water Reservoir		Wetland

0 250 500 Feet



Map Scale: 1:6,000

Topographic Map

PHF&LS 2008

