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Riparian Habitat Mitigation Plan

Barry Lutz Project; City of Stevenson, WA

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GRANTEE(S) (Last name, first name, middle initial)
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Riparian Habitat Mitigation Plan

Barry Lutz Project; City of Stevenson, WA

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December 6, 2005

Contents

Riparian Habitat Mitigation Plan
Barry Lutz Project

Project/Applicant: Barry Lutz Project
Location: Terminus of Cascade Ave., Stevenson, WA
Project Type: Residential Development
Zoning: Unknown
Comp Plan: Unknown
Project Area: 0.50-acres
Assessment by: Brian Bieger
Plan Date: December 6, 2005

INTRODUCTION

This report details a riparian habitat mitigation plan prepared by The Resource Company, Inc. (TRC) for the Barry Lutz project located in Stevenson, WA. The 0.5-acre study site is located at the terminus of Cascade Avenue in Stevenson, WA (Fig. 1). The property contains riparian priority habitat areas (streams) that are regulated by the City of Stevenson.

The proposed project consists of replacing an existing single-family home and outbuilding with a new single-family residence and attendant features. In order to comply with the City of Stevenson development code, the applicant must enhance the existing riparian habitat buffers found on the property. The Resource Company, Inc. (TRC) was hired by Barry Lutz to develop a riparian habitat mitigation plan that would protect the sensitive areas on the site and meet the requirements of the City of Stevenson. The details of the mitigation plan are discussed below.

EXISTING CONDITIONS

The 0.50-acre study site currently exists as maintained lawn areas dominated by two single-family homes and un-maintained river banks adjacent to the Columbia River(Fig. 2). In addition, a small private boat dock and gravel access road is located in the southwest corner of the property. The topography of the site consists of a flat terrace in the northern portion of the site that descends down steep slopes to the Columbia River. The Columbia River, a Type I stream and shoreline of the state essentially forms the southern boundary of the study area although property ownership extends beyond the ordinary high water mark of the river. Under the City of Stevenson development code, Type I streams have a base buffer of 200-feet in order to protect riparian priority habitat. The uplands and riparian habitat areas are discussed in detail below.

Uplands

The upland portions of the property exist primarily as maintained lawn areas dominated by a mixture of non-native grasses and forbs. Dominate plant species include: colonial bentgrass *(Agrostis capillaris - FAC)*, tall fescue *(Festuca arundinacea – FAC-)*, common dandelion *(Taraxacum officinale – FACU)*, Canada thistle *(Cirsium arvense – FACU+)*, Cat's-ear *(Hypochaeris radicata – UPL)*, and common plantain *(Plantago major – FACU+)*. In addition

to these grasses and forbs, several western red cedar *(Thuja plicata – FAC),* big-leaf maple (*Acer macrophyllum – FACU),* and black cottonwood *(Populus trichocarpa)* trees are scattered throughout the property.

Riparian Habitat

The only priority habitat feature on the property exists as the Columbia River. The Colombia River is listed as a shoreline of the state and Type I stream. In addition, the Columbia is verified habitat for a variety of Endangered Species Act (ESA) listed fish species. The shoreline of the state buffer extends 200-feet horizontally from the ordinary high water mark of the stream.

Due to the developed nature of the site, the only portion of the property to be regulated as riparian habitat is confined to the steep slopes leading from the shores of the Columbia to the top of the bank. Beyond this point, the area has been maintained as residential lawn areas. The existing vegetation within the habitat buffer is a mixture of native and non-native shrubs and forbs. The western portion of the buffer is currently dominated by Himalayan blackberry *(Rubus discolor – UPL*), Canada thistle, swordfern *(Polystichtum munitum – FACU),* colonial bentgrass, reed canarygrass (*Phalaris arundinacea - FACW*), and scattered red alder *(Alnus rubra - FAC)* seedlings. A photograph of this area is shown in Figure 3. The central portion of the buffer is entirely dominated by Himalayan blackberry (Fig. 3). Lastly, the eastern most portions of the buffer, which also represent the steepest slopes on the property are entirely dominated by English ivy *(Hedera helix – UPL)*(Fig. 3). Both English ivy and Himalayan blackberry are aggressive non-native plants that often out compete native species and serve to substantially reduce the amount of habitat values of riparian buffers.

In general, the existing buffer is in a highly degraded state due to the presence of non-native vegetation and a lack of plant species and form diversity.

REGULATED ACTIVITIES

Under the Washington Shorelines program, repair or replacement of an existing single-family home is exempt for review under the shorelines program. However, the applicant will be required to meet the City of Stevenson Development Code and preserve and protect the riparian habitat areas on the property.

The future single-family residence, for the most part, will be constructed within the footprint of the demolished house. Through discussion with City of Stevenson Planner John Granholm, it was agreed that the applicant would enhance the existing habitat areas in order to ensure that future development of the site would not reduce the functions and values of the buffer area. These enhancement activities are outlined below.

MITIGATION GOAL

The goal of this habitat mitigation plan is to implement a riparian buffer enhancement plan that will result in a net increase in the total amount of habitat functions and values for the property and meet the requirements of the City of Stevenson Development Code.

MITIGATION MEASURES

The following mitigation measures were designed within the context of the existing conditions of the site, limiting factors, and the habitat potential for the riparian zone. Based on these factors, the mitigation measures will be limited to removal of the non-native vegetation within the buffer area and establish a diverse native plant community. These activities are covered in the site preparation and planting plans sections below.

Site Preparation

The site preparation activities that follow have been developed through review of the scientific literature, best available science, and experience in the field. Due to the current level of Himalayan blackberry, reed canarygrass, and English ivy infestation, a substantial amount of effort will be needed to effectively eradicate these plants from the buffer area. The following management subscriptions are species specific and should be applied to only those areas where that particular species has become established. All damage to existing native plants should be avoided to the maximum extent possible!

Reed canarygrass (*Phalaris arundinacea*)

Morphology - Reed canarygrass is a highly variable, rhizomatous perennial grass that can reach up to six feet in height. The grass is easily identified in the winter months as dense stands of robust yellow grass in wetlands, drainage ditches, and riparian areas throughout the region. The sturdy and often hollow stems can grow up to 1/2 inch in diameter and usually display reddish coloration near the top. The leaf blades are flat and hairless, and usually attach to the stems at easily identifiable 90-degree angles. The species flowers in June and July and releases seeds shortly thereafter. In addition to sprouting from seeds, Reed canarygrass propagates from underground rhizomes that are up to 18" deep.

Detrimental Effects- Reed canarygrass quickly forms dense and highly productive single species stands that negatively affect many wetland ecosystems. The species grows so vigorously that it often eliminates competing native species and forms persistent monocultures in wetlands and riparian areas. Unlike native vegetation communities, reed canarygrass monocultures have little wildlife habitat value as few species eat the grass and the stems grow too densely to provide suitable cover for small mammals and waterfowl. Reed canarygrass is extremely difficult to

control once established because it spreads rapidly by rhizomes and seeds can persist for many years.

Control Methods - A combination of both mechanical and chemical methods is the most effective way to eliminate established stands of reed canarygrass.

Mechanical methods-Dense stands of reed canarygrass can be mowed using commercial mowers, blade equipped trimmers, or industrial hedge clippers. Mowing can be a valuable control method since it removes seed heads before seed maturation and exposes the ground to light, which promotes the growth of native species. Studies in Wisconsin indicated that twice-yearly mowing (in early to mid-June and early October) led to increased numbers of native species in comparison to reed canarygrass-infested plots that were not mowed. However, other studies have shown that mowing alone will not remove canarygrass stands. Mowing should take place in the early spring when shoots are actively growing and again in the fall, 3 weeks following chemical treatments.

Chemical methods-A wide variety of chemicals can be used to kill reed canarygrass throughout the growing season. However, because reed is most often found in and around aquatic systems, we only recommend glyphosate herbicides approved by the state of Washington for use in aquatic systems. The two approved brands that are most readily available are Rodeo® Broad Spectrum Aquatic Herbicide and Accord® Concentrated herbicide. Herbicide applications are most effective in late summer. Rodeo should be applied in early spring when most native wetland species are still dormant. The following spring, any surviving canary grass should be sprayed. Care should be taken to avoid contacting non-target plants. Seeding the treated areas with native grasses from the surrounding area as soon as the canary grass has died may also help to reestablish native species.

Perform foliar application of a 5% glyphosate solution designed for use in wetlands in early spring when most native species are dormant to the foliage. Remove the dead leaves from the previous year before applying herbicide. Two herbicidal applications may be necessary to ensure complete coverage. Mow in mid-September then apply herbicide in October .

Table A. Action Plan for Reed Canarygrass Eradication

Timing	Action	Chemical	Result	Special considerations
Early Spring (March)	Cut/Mow Remove new growing shoots and previous years growth.	None	Slows growth of new shoots. Allows access to new shoots for effective herbicide application.	Avoid damage to native vegetation.
3-weeks after mowing	Apply herbicides w/ backpack sprayer	Rodeo® or Accord® (glyphosate)	Stop growth of new shoots.	Follow label directions! Be careful of over spray. [1]
Late Summer – when heads (flowers) have	Apply herbicides w/ backpack sprayer	Rodeo® or Accord®	Transportation of chemical into rhizomes	Plants must not be drought stressed! Apply 1 day after good

formed		(glyphosate)	for long term kill.	rain.
Fall	Cut/ Mow	None	Remove vegetation. Further stress plant rhizomes.	Avoid damage to native vegetation.
Early Spring of second year (March)	Cut/Mow Remove new growing shoots and previous years growth.	None	Slows growth of new shoots. Allows access to new shoots for effective herbicide application.	Avoid damage to native vegetation.
3-weeks after mowing	Apply herbicides w/ backpack sprayer	Rodeo® or Accord® (glyphosate)	Stop growth of new shoots.	Follow label directions! Be careful of over spray. [1]
2-3 weeks after Chemical treatment	Assess removal effectiveness. Seed area with native grass seed.		Out compete future growth of reed canarygrass sprouting from seed bank	Consult biologist on effectiveness of removal and appropriate native grass seed.

[1] *Use low pressure, narrow spray tip setting, and spray downwind to create large droplet size and minimization of herbicide drift.*

Himalayan blackberry *(Rubus discolor)*

Morphology - Rubus discolor is a robust, sprawling, more or less evergreen shrub of the Rose Family. The shrubs appear as dense thickets in uplands and riparian areas with some of the canes standing up to 3 m tall. The stems and leave petioles bear straight or somewhat curved prickles 6-10 mm long. Himalayan blackberry reproduces through seed sprouting, lateral roots and adventitious shoots (suckers), and cane cuttings. Roots can grow as deep as 3 feet. It has been observed that a cane cutting can produce a thicket 15 feet in diameter in less than two years. Timber logging, development activities, and other disturbances can create large open areas that are often invaded by wild blackberries.

Negative Effects- The scrambling habit of Himalayan blackberries smothers existing plant growth. In addition, the tangled mass of thorny stems blocks access of larger wildlife, humans, livestock, and to pastures and waterways. When grazed, the thorny stems can injure nasal passages of livestock. Another undesirable aspect of vining blackberry plants is that they are a good source of food and shelter for rats.

Control Methods– Again, both mechanical and chemical means of control are necessary to eliminate this invasive weed.

Mechanical methods-When feasible, mechanical removal with heavy machinery can effectively eliminate Himalayan blackberry infestations by removing the plant and root systems. At least 24" of topsoil must be removed in order to rid the area of roots and suckers. Due to the proximity of the project area to the Columbia River and the steepness of the slopes, large scale mechanical removal is not recommended. In many instances, excavation is not possible due to variety of constraints. In these cases, repeated cutting, chopping or mowing of blackberry stands

will be necessary for eradication. If only a single cutting can be made, the best time is when the plants begin to flower. At this stage the reserve food supply in the roots has been nearly exhausted, and new seeds have not yet been produced.

Chemical Methods-Application of particular herbicides at certain times of the year can be very effective at eradicating blackberry patches. Extreme caution must be used during herbicide applications as the recommended herbicide is highly volatile and may cause death or stress of neighboring plants even when not directly applied. There are two main application methods

Basal/Cut Stem sprays: Concentrated forms of triclopyr (often mixed with commercially available seed oils or surfactants for better penetration) can be applied to basal regions of wild blackberries by backpack sprayers using a solid cone, flat fan or a straight-stream spray nozzle. Triclopyr is available to licensed applicators for commercial use in either amine (Garlon 3A) or ester (Garlon 4) formulations. Triclopyr ester (0.75 to 1% solution) is the most effective formulation of triclopyr. When air temperatures are above 70°F, it is best to use the amine formulation because the ester form is subject to vaporization. Thoroughly cover a 6- to 12-inch basal section of the stem with spray, but not to the point of runoff. Basal bark applications can be made almost any time of the year. The most common herbicide with triclopyr ester (and 2,4-D ester) is Crossbow®. Extreme care must be exercised when crossbow® is used near desired vegetation due to potential herbicide drift!

Foliar-applied herbicides: Herbicides used to control blackberry during the growing season include glyphosate, dicamba, dicamba/2,4-D combinations, and triclopyr. Glyphosate formulated into a product with 41% active ingredient can provide good to excellent control of wild blackberries when applied in a 0.5 to 1.5% solution (i.e., about 0.6 to 2 oz of product per gallon of water). To effectively control blackberries during the growing season, an herbicide must be transported within the plant to the rhizomes and new growing points. To facilitate this, foliar herbicide applications should coincide with the maximum rate of sugar movement to the root system. This will depend upon whether the plants are primarily first-year canes or a combination of both first- and second-year canes. In a situation where only first-year canes are present (for example when plants have been burned or mowed), the most effective time for optimal herbicide transport to the root system is in late summer. Where the bramble infestation consists primarily of second-year canes or a combination of first- and second-year canes, apply an herbicide in early fall, before plants become dormant. Herbicides applied too early generally result in good kill of the top growth, but very little movement of the chemical to the root system. It is important to note that plants under stress from drought or grazing do not translocate sugars as rapidly as do actively growing plants. Thus, chemical control of wild blackberry plants under stress is difficult and not recommended.

Table B.– Action Plan for Himalayan Blackberry Eradication

Timing	Action	Chemical	Result	Special considerations
Early Spring	Cut/Mow. Remove new growing shoots and previous years	None	Slows growth of new shoots. Allows access to new shoots for effective	Avoid damage to native vegetation. Dispose of debris offsite.

	growth.		herbicide application.	
Late Spring – Early Summer (shoots 3' or longer)	Apply herbicides w/ backpack sprayer to stems	Crossbow®	Stops growth of new shoots. Some degree of root kill.	Follow label directions [1] Be careful of over spray [2] Add surfactant [3]
Early fall (Following full berry formation)	Apply foliar herbicides w/ backpack sprayer	Crossbow® and Accord® mixture	Transportation of chemical into rhizomes for long-term kill.	Plants must not be drought stressed! Be careful of over spray. [1]
Late Fall	Cut/ Mow	None	Further stress plant roots.	Avoid damage to native vegetation.
Winter	Plant native trees/shrubs	None	Assist in out-competing blackberry	Follow herbicide dormancy requirements. Consult biologist on native species.
Early Spring of second year	Cut/Mow. Remove new growing shoots and previous years growth.	None	Slows growth of new shoots. Allows access to new shoots for effective herbicide application.	Avoid damage to native vegetation.
2-weeks after mowing (shoots 3' or longer)	Apply herbicides w/ backpack sprayer	Crossbow®	Stop growth of new shoots. Some root kill.	Follow label directions [1] Be careful of over spray [2] Add surfactant [3]

[1] The high volatility of triclopyr ester requires that temperatures be below 70 degrees F for 2 days following application. Spray during forecasted periods of cloudy and cool weather.

[2] Use low pressure, narrow spray tip setting, and spray downwind to create large droplet size and minimization of herbicide drift.

[3] Surfactant mixing ratio 1 quart per 50 gallons of spray solution. Use a nonionic surfactant labeled for use with pesticides. The surfactant must contain at least 50% active ingredients.

English ivy (Hedera helix – UPL)

Morphology – English ivy is an evergreen climbing vine. Vines attach to the bark of trees, brickwork, and other surfaces by way of numerous, small rootlike structures, which exude a glue-like substance. Older vines are known to reach a foot in diameter. Leaves are dark green, waxy, somewhat leathery, and are arranged alternately along the stem. English ivy has many recognized leaf forms, the most common being a 3-lobed leaf with a heart-shaped base. Leaves in full sun are often unlobed, oval and have wedge-shaped bases. Umbrella-like clusters of small, greenish-white flowers appear in the fall if sufficient sunlight is available. Fruits mature in Spring and are black with a fleshy outer covering enclosing one to a few hard seeds. English Ivy is listed as a Class C invasive plant in Washington.

Negative Effects- English ivy is an aggressive invader that threatens all vegetation levels of forested and open areas, growing along the ground as well as into the forest canopy. The dense growth and abundant leaves, which spring from the stems like small umbrellas, form a thick canopy just above the ground, and prevent sunlight from reaching other plants. Similarly, vines climbing up tree trunks spread out and surround branches and twigs, preventing most of the sunlight from reaching the leaves of the host tree. Loss of host tree vigor, evident within a few years, is typically followed by death of the tree a few years later. The added weight of vines makes infested trees susceptible to blow-over during storms. English ivy also serves as a reservoir for bacterial leaf scorch (*Xylella fastidiosa*), a plant pathogen that is harmful to native trees such as elms, oaks, and maples. Once established at a site, English ivy can be expected to move beyond its intended borders into neighboring yards, parks and other lands, either by vegetative means or by seed.

Control Methods- Again, both mechanical and chemical control methods can be utilized to control or eradicate this plant from an area. The choice between the two methods often depends on the area of infestation, amount of available labor and personal choice. Often times, the most complete method is to utilize both control methods to achieve the best results.

Mechanical Methods- Vines growing as groundcover can be pulled up by hand, with some difficulty, and left on-site or bagged and disposed of as trash. Care must be exercised in order to remove the root system of the plant and not just the shoots growing above ground. Unless the roots are removed, the ivy will return, vigorously. In large areas of infestation, "rolling up" the ivy in a manner similar to rolling up a carpet can be used to remove large amounts of growing shoots and gain access to the root structures.

Vines climbing up into the tree canopy are more difficult to manage. First, vines should be cut at a comfortable height to kill upper portions and relieve the tree canopy. A large screw driver or forked garden tool can be used to pry and snap the vines away from the tree trunks. Vines can be cut using an axe or with more difficulty, using a pruning saw. Rooted portions of vines will remain alive and should be pulled, and repeatedly cut. Because cutting will likely promote further growth from the base, vigilance is required to ensure long term control.

Chemical Methods-The systemic herbicide triclopyr (e.g., Garlon) is absorbed into plant tissues and carried to the roots, effectively killing the entire plant in place. The most common herbicide with triclopyr ester (and 2,4-D ester) is Crossbow®. Extreme care must be exercised when crossbow® is used near desired vegetation due to potential herbicide drift!

Foliar applications: From summer to fall, apply a 2.5% mixture of triclopyr amine (Garlon 3A) in water to the leaves or cut first, allow to regrow, and apply the same mix to new foliage. Herbicide will also be absorbed through the stem bark for additional effect.

Basal bark applications: Because English ivy is an evergreen vine, and remains active during the winter, herbicide applications can be made to it any time of year as long as temperatures are above 55 or 60 degrees Fahrenheit for a few days. Fall and winter applications will avoid or minimize impacts to many native plant species. Repeat herbicidal treatments are likely to be needed and follow-up monitoring should be conducted to evaluate the success of treatments.

Herbicidal contact with desirable plants should always be avoided. In areas where spring wildflowers or other native plants are interspersed, application of herbicides should be conducted prior to their emergence, or delayed until they have died back

Table C– Action Plan for English Ivy Eradication

Timing	Action	Chemical	Result	Special considerations
Anytime as long as Temp. > 50 F.	Cut/Mow/hand pull Remove majority of vegetative structures.	None	Allows access to basal stems for effective herbicide application.	Avoid damage to native vegetation. Dispose of debris offsite.
Immediately following	Apply herbicides w/ backpack sprayer to stems.	Crossbow®	Large amounts of root kill.	Follow label directions [1] Be careful of over spray [2]
Early Spring following above treatments	Herbicide wipe to kill remaining shoots. Seed and replant with native vegetation.	None	Slows growth of new shoots. Allows access to new shoots for effective herbicide application.	Avoid damage to native vegetation.

[1] The high volatility of triclopyr ester requires that temperatures be below 70 degrees F for 2 days following application. Spray during forecasted periods of cloudy and cool weather.

[2] Use low pressure, narrow spray tip setting, and spray downwind to create large droplet size and minimization of herbicide drift.

Enhancement Plantings

The list of plants found below will be installed on the banks of the site detailed in Figure 4. The plantings shall serve to provide: habitat for resident and migratory birds, shelter for local wildlife, alochthonous woody debris, and leaf litter inputs to the Columbia River, and provide a suitable microclimate for amphibian populations. Tree and shrub species are listed in Table D below. General spacing and position guidelines are given within the table but it is expected that specific plant locations will be determined at the time of planting. In addition to the woody plantings, the entire bank will be broadcast seeded with the mix detailed in Table E below. This mix is available from Sunmark Seeds located in Troutdale, OR. Seeding and planting activities should be completed after the invasive plants have been eradicated from the site.

Table D. Planting Plan Specifications – Habitat Enhancement Area (4,662 sq. ft.), 5 trees/ 25 shrubs per 1,000 sq. ft. (Fig 4).

Species	Plant Form	Minimum Size	Minimum Spacing	Required Number	General Location
Trees					
Quaking aspen *(Populus tremloides)*	Container	2 gallon	10'	5	Any
Western Red Cedar *(Thuja plicata)*	Container	2 gallon	10'	10	Any

Oregon ash *(Fraxinus latifolia)*	Bare Root	24-36"	10'	5	Lower on bank
Total Trees				**20**	
Shrubs					
Serviceberry *(Amelanchier alniflora)*	Bare Root	18-24"	4-6'	10	Middle of bank
Snowberry *(Symphoricarpos albus)*	Bare Root	18-24"	4-6'	20	Mid-High on bank
Oceanspray *(Holodiscus discolor)*	Bare Root	18-24"	4-6'	15	Higher on bank
Tall Oregon grape (*Berbaris aquifolium)*	Bare Root	18-24"	4-6'	15	Middle of bank
Indian Plum (*Oemleria cerasiformis*)	Bare Root	2-3'	4-6'	5	Lower on bank
Nootka rose *(Rosa nutkana)*	Bare Root	18-24"	6'	25	Lower on bank
Red Flowering Currant *(Ribes anguineum)*	Bare Root	18-24"	6'	5	Any
Indian Plum (*Oemleria cerasiformis*)	Bare Root	18-24"	3'	5	Higher on bank
Western flowering dogwood (*Cornus nuttali)*	Bare Root	24-36"	4-6'	10	Middle of bank
salal *(Gualtheria shallon)*	Bare Root	18-24"	10-15'	20	Entire bank
red-osier dogwood *(Cornus stolonifera)*	Bare Root	18-24"	10-15'	10	Lower on bank
Total Shrubs				**140**	

Table E. Buffer Enhancement Area (5,275 sq. ft.)
Sunmark Seeds "grasslands" native seed mix (with additional seeds added*)
Rate 2 lbs/ 1,000 sq. ft.

Seed Mix Ingredients:
Blue Wildrye (*Elymus glaucus)* -40%
California Brome (*Bromus carinatus)*- 40%
Native Red fescue (*Festuca rubra)* -15%
Tufted hairgrass *(Deschampsia caespitosa)*- 5%

*** Additional seeds added: 5-lbs of Large Leaf Lupine and 1-lb of White Yarrow.**

Other planting specifications applicable to this plan are as follows:

Source of Plant Materials. All plants will be obtained from nurseries specializing in native Pacific Northwest plant materials.

Planting Time. Bare-root shrubs and trees should be planted between December 1 and March 31, when plants are dormant. If planting is conducted outside this time period, containerized plant stock will be used and extra care and watering may be needed to ensure that plants become

adequately established. Hand seeding will take place in early spring and the seeded area should be covered with straw mulch or kept watered. If seeding occurs during the dry months (June-September), irrigation will be utilized to ensure planting success.

Planting Guidelines. A hole, one foot in diameter and one foot deep, shall be excavated for bare root stock. The holes should be large enough to accommodate the plant roots without restriction. Plants will be held in place with the top of the root mass at ground level. Topsoil will be backfilled around the roots and lightly tamped to remove any air pockets in the soil. Due to the exiting soil conditions, compost should be added to the backfill material at around a 50/50 ratio. This will increase the amount of available nutrients, help retain moisture, and provide better soil texture.
Future maintenance should use scarification to keep the 1-foot diameter area free of herbaceous vegetation until plants are well established. If the soils are not saturated, each plant should be watered at the time of planting. A temporary above ground irrigation system will be installed to ensure plant survival and mitigation success. The entire habitat buffer shall be irrigated at least once a week from June 1st to September 1st. At least one inch of water should be applied to the planting area in order to ensure the survival of the planted stock.

OBJECTIVES AND PERFORMANCE STANDARDS

The following objectives will be used to determine if the mitigation project is successful. The performance standards establish a quantifiable method to determine if the plan objectives were met and ultimately measure the success of the project.

Objective #1 Create a self-sustaining forested plant community within the buffer enhancement area through the installation of native trees and shrubs.

Performance Standard #1 Achieve at least 80% survivorship of all planted native woody vegetation given in and <10% aerial cover of invasive weed species at the end of the 3-year monitoring period. If planted stock do not survive, but are replace by native naturally colonizing wetland plant species, the project will be judged to meet the threshold for successful enhancement with respect to the vegetative component.

MONITORING AND MAINTENANCE PLANS

The enhancement area shall be monitored for a period of three years following initial installation of plant materials. The following actions will be implemented as part of the monitoring and maintenance plan on this site:

1. The initial and any successive years' plantings will be supervised by a qualified professional to ensure that correct planting procedures are followed and that plantings are done according to the planting scheme.

2. Monitoring of all planted areas shall begin once the mitigation site is established and continue in the 1st, 2nd and 3rd years. Monitoring will be conducted during the late spring or summer time period when plants are in full leaf-out. For the first and last year of the monitoring period, a report documenting the monitoring results will be submitted to the City of Stevenson. This report will briefly describe the condition of the enhancements, identify any deficiencies in the enhancement progress, and any contingency measures that will be taken to correct those deficiencies. Photographs of the area shall be included with these reports.

3. The annual goal of this plan is to achieve 80 percent survival of all woody species planted, 80 percent coverage of seeded emergent plants, and less than 10 percent coverage of exotic species within the enhancement area. If the planted/ seeded stock do not survive, but native naturally colonizing plant species replace them, then the project may be judged to meet the threshold criteria for successful plant community establishment.

4. To ensure planting success, the Applicant will be responsible for performing minor maintenance over the monitoring period. Undesirable plant species will be removed utilizing the methods described above or in accordance with the recommendations of the City of Stevenson. An area, 1-foot in diameter surrounding each planted woody species, will be kept free of competing vegetation. This can be accomplished by scarifying the area by hand or using weed-control rings. If animal herbivory is determined to be effecting the survival of the planted stock, individual plant protectors can be installed within the enhancement area. A viable substitute for individual plant protectors would be the installation of a temporary fence around the entire enhancement area. This fence should be comprised of hardware cloth and be secure enough to prevent entry of beaver and nutria into the planting area.

CONTINGENCY PLANS

Contingency plans are designed to identify potential courses of action, and any corrective measures to be taken when monitoring indicates project goals are not being met. Table F summarizes the maintenance and contingency requirements for this project. In general, the contingency measures for this site are as follows:

1. Replacement Plantings—Replacement plantings will also be made throughout the monitoring period if monitoring reveals that unacceptable plant mortality has occurred. Woody species will be re-planted to the original number of plants proposed in the accepted mitigation plan annually throughout the duration of the monitoring and maintenance period. Areas of herbaceous vegetation not meeting the required ground cover requirements will be re-planted or re-seeded with the above listed vegetation to fill in any bare spots in the mitigation area.

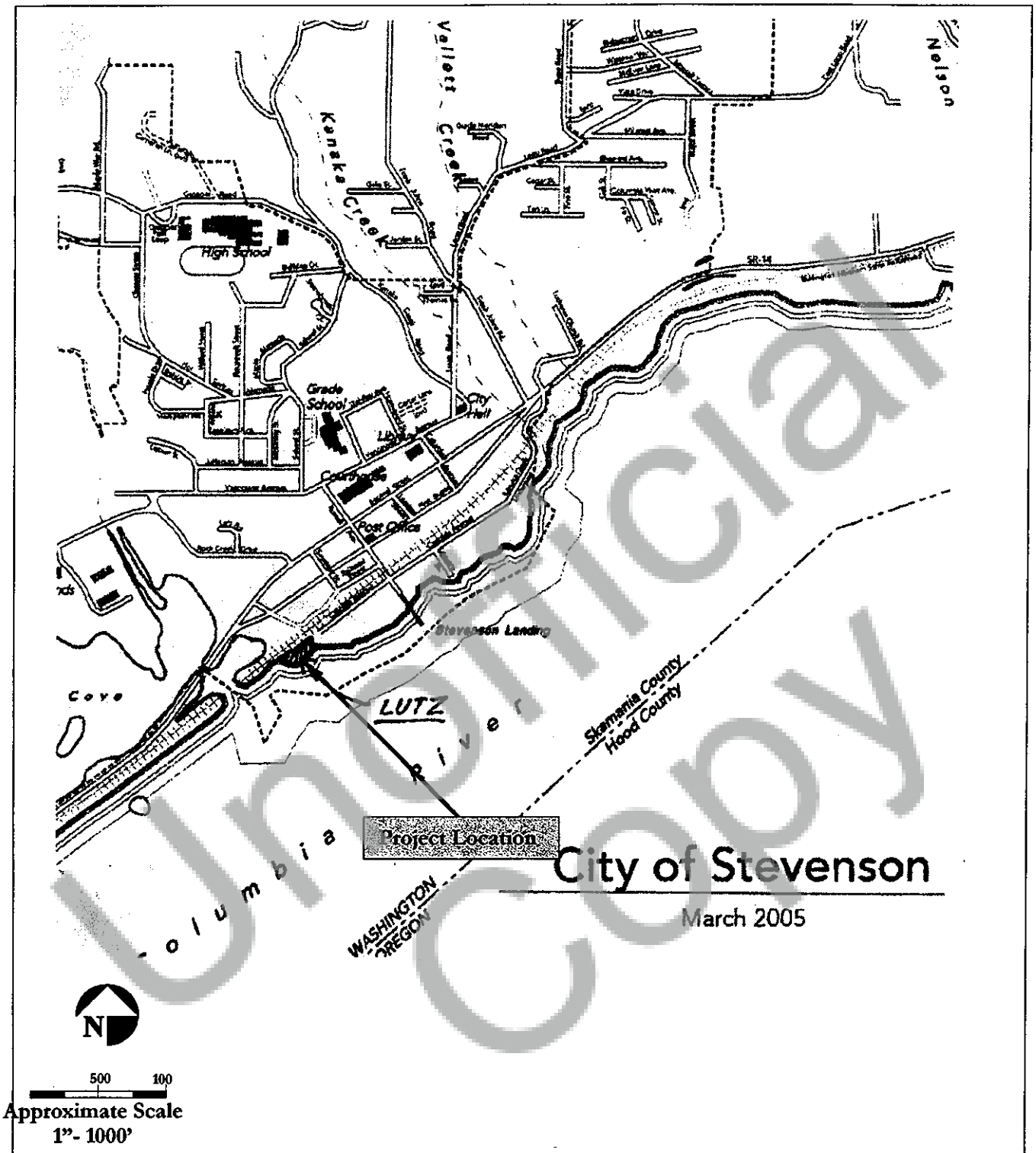
2. Planting Plan Modifications—Modifications to the planting plan (i.e., plant species and densities) will be made if monitoring identifies problems with the original planting

scheme. For example, if annual monitoring identifies that plant mortality is attributed to an inappropriate hydrologic regime, the replacement plantings should be made using a more suitable plant species. Any recommended changes to the planting scheme will be documented in the monitoring report. The addition of any new plant species, not already included in this mitigation plan, shall be listed as a native plant in Plants of the Pacific Northwest.

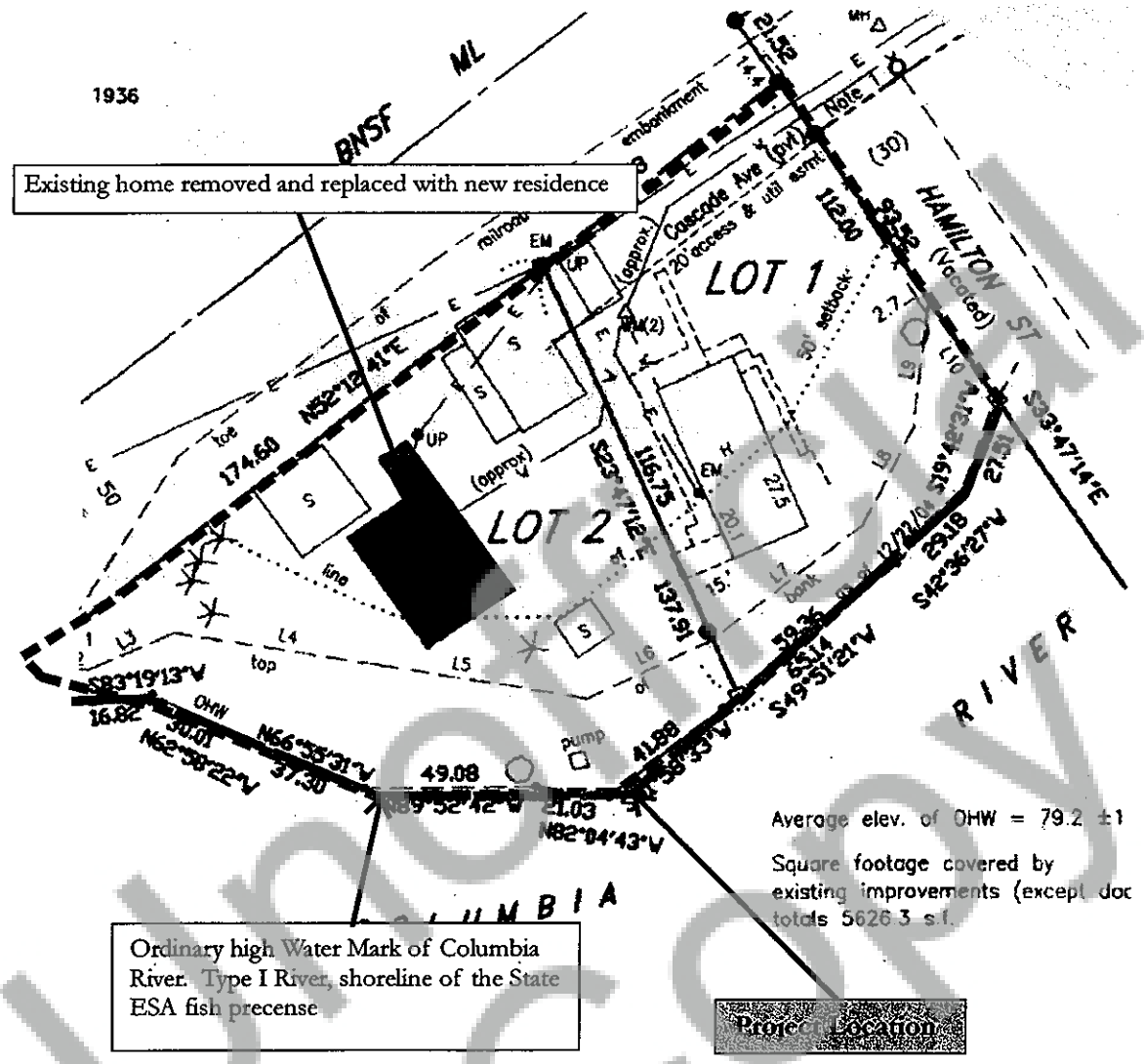
3. Soil Erosion—Any areas demonstrating soil erosion problems will be restored as soon as possible. If there does not appear to be a problem with the original design, the eroded areas will be restored by replacing any lost topsoil and replanted according to the original planting scheme.

Table F. Maintenance and Contingency Requirements

Maintenance Component	Defect	Conditions When Maintenance is Needed	Results Expected When Maintenance is Performed
Buffer Zone Enhancement Areas	Trash and debris	Any trash or debris which exceeds 1 $ft^3/100ft^2$ (equal to the volume of a standard size office garbage can). In general, there should be no evidence of dumping.	Trash and debris cleared from site.
Buffer Zone Enhancement Areas	Erosion	Eroded damage >2 inches deep where cause of damage is still present or where there is potential for continued erosion.	Eroded areas should be stabilized with appropriate erosion control BMP's (e.g., seeding, mulching, riprap).
Buffer Zone Enhancement Areas	Plant mortality	Plant mortality jeopardizes attaining the survival rate and ground cover requirements.	All vegetation will be re-planted each year to the original number of plants approved in the mitigation plan.
Buffer Zone Enhancement Areas	Invasion of undesirable plant species.	Undesirable plant species are hindering the growth and establishment of the favored plant stands.	Undesirable species removed by hand, or in accordance with recommendations of the City of Stevenson.
Buffer Zone Enhancement Areas	Animal herbivory	Animal herbivory jeopardizes attaining the 80% survival rate.	The area may need to temporarily fenced if grazing becomes a problem.



Barry Lutz Project **APPLICANT: Barry Lutz** **538 NE 21st Ave** **Camas, WA 98607** **PURPOSE: Wetland Mitigation Plan**	**Location Map** **Barry Lutz Project** **Stevenson, WA** The Resource Company, Inc. *Environmental Services*	**Figure 1**

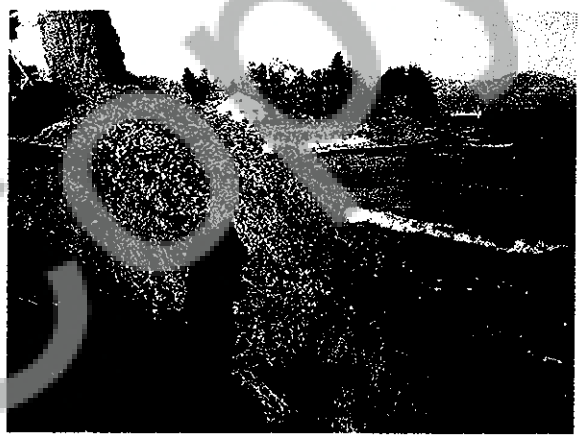


Barry Lutz Project **APPLICANT: Barry Lutz** **538 NE 21st Ave** **Camas, WA 98607** **PURPOSE: Wetland Mitigation Plan**	**Existing Conditions/ Project Plans** **Barry Lutz Project** **Stevenson, WA** The Resource Company, Inc. *Environmental Services*	**Figure 2**

Western buffer area, Facing west

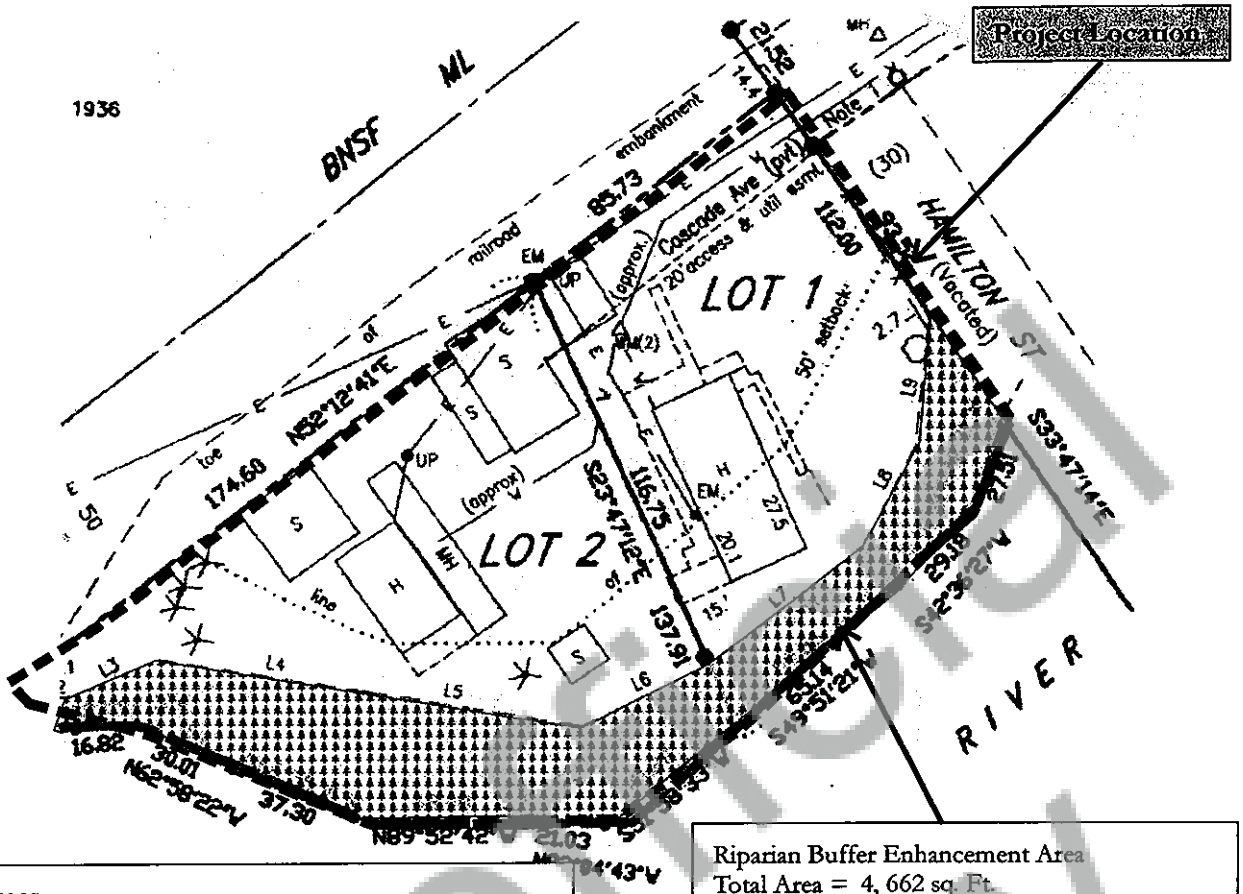
Western buffer area, Facing northwest

Central buffer area, Facing east



Eastern buffer area, Facing east

Barry Lutz Project **APPLICANT: Barry Lutz** **538 NE 21st Ave** **Camas, WA 98607** **PURPOSE: Wetland Mitigation Plan**	**Site Photos** **Barry Lutz Project** **Stevenson, WA** The Resource Company, Inc. *Environmental Services*	**Figure 3**



Trees-
Quaking aspen *(Populus tremloides)*-5
Western Red Cedar*(Thuja plicata)*-10
Oregon ash *(Fraxinus latifolia)*-5
Total Trees-20
Shrubs-
Serviceberry(Amelanchier alniflora)-10
Snowberry (Symphoricarpos albus)-20
Oceanspray *(Holodiscus discolor)*-15
Tall Oregon grape(B*erbaris aquifolium)*-15
Indian Plum (*Oemleria cerasiformis*)-5
Nootka rose *(Rosa nutkana)*-25
Red Flowering Currant*(Ribes anguineum)*-5
Indian Plum (*Oemleria cerasiformis*) -5
Western flowering dogwood(*Cornus nuttali)*-10
salal *(Gualtheria shallon)*-20
red-osier dogwood *(Cornus stolonifera)*-10
Total Shrubs-140

Barry Lutz Project

APPLICANT: Barry Lutz
538 NE 21st Ave
Camas, WA 98607

PURPOSE: Wetland Mitigation Plan

Buffer Enhancement Plan
Barry Lutz Project
Stevenson, WA

The Resource Company, Inc.
Environmental Services

Figure 4