

# Vegetation Management Plan

*Prepared for*

**King County Parks & Recreation**

Luther Burbank Park  
2040 84th Avenue SE  
Mercer Island, Washington 98040

*Prepared by*

**Parametrix, Inc.**

5808 Lake Washington Blvd. NE, Suite 200  
Kirkland, Washington 98033-7350  
(425) 822-8880  
[www.parametrix.com](http://www.parametrix.com)

---

June 2002

Project No. 553-1521-044/15 (01)



## TABLE OF CONTENTS

<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1-1</b>
<b>2.</b>	<b>HAZARD TREES .....</b>	<b>2-1</b>
2.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	2-1
2.2	SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS .....	2-1
2.2.1	Avoidance .....	2-2
2.2.2	Stabilize the Tree .....	2-2
2.2.3	Remove Limbs (Partial Removal) .....	2-2
2.2.4	Create Wildlife Trees or Snags .....	2-2
2.2.5	Logging .....	2-2
2.2.6	Total Removal .....	2-2
2.2.7	Removal on Steep Slope .....	2-3
2.2.8	Vegetation Replacement .....	2-3
2.3	NOTIFICATIONS .....	2-3
<b>3.</b>	<b>SIGHT-DISTANCE HAZARDS AND TRAIL MAINTENANCE .....</b>	<b>3-1</b>
3.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	3-1
3.2	SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS .....	3-1
3.2.1	Sight Distance .....	3-2
3.2.2	Sequence of Vegetation Management Options .....	3-3
3.2.3	Trim Minimum Vegetation .....	3-3
3.2.4	Drastic Pruning .....	3-3
3.2.5	Clearing Around Fence .....	3-3
3.2.6	Removal in Steep Slope Areas .....	3-3
3.2.7	Relocation, Removal and Vegetation Replacement .....	3-4
3.2.8	Monitoring .....	3-4
3.3	NOTIFICATIONS .....	3-4
<b>4.</b>	<b>NOXIOUS WEED MANAGEMENT .....</b>	<b>4-1</b>
4.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	4-1
4.2	SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS .....	4-2
4.3	NOTIFICATIONS .....	4-2
<b>5.</b>	<b>DRAINAGE MAINTENANCE .....</b>	<b>5-1</b>
5.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	5-1
5.2	SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS .....	5-2
5.2.1	Permit Conditions .....	5-2
5.2.2	Timing .....	5-3
5.2.3	Impact Minimization .....	5-3
5.2.4	Ditch Reseeding .....	5-3
5.2.5	Stabilization .....	5-3
5.3	NOTIFICATION .....	5-3

## TABLE OF CONTENTS (Continued)

<b>6.</b>	<b>MAINTENANCE ACCESS .....</b>	<b>6-1</b>
6.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	6-1
6.2	SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS .....	6-1
6.2.1	Vegetation Replacement .....	6-2
<b>7.</b>	<b>VEGETATION REPLACEMENT .....</b>	<b>7-1</b>
7.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	7-1
7.2	SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS .....	7-1
7.2.1	Choose Native Plants .....	7-1
7.2.2	Choose Species Appropriate to Site .....	7-1
7.3	NOTIFICATION .....	7-2
<b>8.</b>	<b>MONITORING.....</b>	<b>8-1</b>
8.1	KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES .....	8-1
8.2	SITE SPECIFIC CONDITIONS AND CONSIDERATIONS .....	8-1
8.3	NOTIFICATION .....	8-2
<b>9.</b>	<b>REFERENCES .....</b>	<b>9-1</b>

### APPENDICES

A	Best Management Practices For Hazard Trees
B	Best Management Practices For Safe Sight Distances
C	Best Management Practices For Noxious Weed Management
D	Best Management Practices For Drainage Maintenance
E	Best Management Practices For Maintenance Access
F	Best Management Practices For Vegetation Replacement
G	Best Management Practices For Monitoring
H	Relevant Permit Conditions

## ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
BMP	Best Management Practice
DDES	[King County] Department of Development and Environmental Services
ECOLOGY	Washington State Department of Ecology
ELST	East Lake Sammamish Trail
HPA	Hydraulic Project Approval
IPM	Integrated Pest Management
ISA	International Society of Arboriculture
NPDES	National Pollutant Discharge Elimination System
PAUE	Public Agency Utility Exception
RCW	Revised Code of Washington
TESC	Temporary Erosion and Sediment Control
WDFW	Washington State Department of Fish & Wildlife
WSDOT	Washington State Department of Transportation



## 1. INTRODUCTION

This document is intended to be a guide for King County Park personnel who are responsible for vegetation maintenance in the East Lake Sammamish Trail (ELST) corridor. The goals of this Plan are as follows:

- To provide a safe trail environment
- To maintain and monitor native plant communities in the corridor
- To control invasive species

This document is part of a package. It complements existing documents that, together, form a comprehensive reference for maintenance personnel. The entire package consists of the following documents:

- This Plan
- 2002 Permitting Map Set
- *Regional Road Maintenance Endangered Species Act Program Guidelines* (Tri-County Regional Road Maintenance Technical Working Group 2000)

This Plan describes maintenance tasks for hazard trees, other conditions, maintenance of safe sight distance, control of noxious weeds, drainage maintenance, vegetation replacement, access, and monitoring along the trail. Under each task heading there is a brief description of the task, reference to relevant existing guidance, which appears in appendices, and identification of special considerations to be addressed along the ELST corridor. Permit conditions that apply to ongoing trail maintenance are also provided in appendices.

This document provides guidance for maintenance work done along any part of the trail using common practice. The trail corridor contains sensitive areas such as steep slopes, landslide hazards, wetlands, streams, and other conditions. The guidance generally does not distinguish sensitive areas and their buffers from non-sensitive areas, except in some specific instances. Where practical, the intent is to avoid differentiating practices in different parts of the trail corridor. However, King County Park personnel should keep copies of maps and figures identifying sensitive areas with them. Maintenance personnel should be cognizant of these sensitive areas along the corridor. In addition, maintenance personnel should keep a copy of the *Regional Road Maintenance Endangered Species Act Program Guidelines* (Tri-County Regional Road Maintenance Technical Working Group 2000) with them.

This document should be updated each time best management practices (BMPs) and permit conditions are changed. Maintenance staff members should consult with the King County Park System permit coordinator to be assured that they have the most current copy of the Plan. Permitting agencies include U.S. Army Corps of Engineers, Washington State Department of Ecology (Ecology), Washington State Department of Fish and Wildlife (WDFW), King County Department of Development and Environmental Services (DDES), City of Issaquah, City of Redmond, and City of Sammamish.



## 2. HAZARD TREES

A hazard tree (as determined by a person with 5 years of field experience with the assessment of such hazards or the equivalent training and professional experience) is defined as any tree that has a structural defect, combination of defects or disease resulting in structural defect that under the normal range of environmental conditions at the site would result in the loss of a major structural component of that tree in a manner that will: (a) damage a residential structure, place of employment or public assembly, or approved parking spaces for such structures; (b) damage an approved road or utility facility; or (c) prevent emergency access in the case of medical hardship. A derelict tree is any tree in such poor condition that no reasonable restoration is possible. A habitat tree is any tree that has declined in a manner to be derelict but has habitat value and is allowed to remain. Hazardous trees should be evaluated for habitat potential and converted to snag, log or other habitat features. Leave debris on site to decompose. (source: *King County Park System Best Management Practices Manual*[*King County Park System 2001a*]).

Hazard trees should be managed using standard King County BMPs. Standard practices are listed below in section 2.1. In addition, maintenance staff should follow the site-specific guidance described in Section 2.2 below.

### 2.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

King County BMPs, as well as guidance from additional sources, are provided in Appendix A. BMPs and maintenance policies and procedures pertaining to the management of hazard trees include the following:

- *King County Park System Best Management Practices Manual* (King County Park System 2001a), Ch. 6, Trees, Tree Removal
- International Society of Arboriculture hazard tree evaluation form

### 2.2 SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS

In addition to standard practices, maintenance staff should follow site-specific considerations for the Interim Use Trail. Given the presence of a variety of sensitive areas and resources and their buffers within the trail right-of-way, the preferred sequence for managing hazard trees is as follows:

1. Avoid disturbing the tree at all unless it truly represents a hazard as determined by a certified arborist.
2. Stabilize the tree, if possible, using approved arboricultural methods.
3. Remove limbs from the tree, if this will eliminate the problem.
4. Create a wildlife tree or snag, or cut the tree down to a safe condition, without disturbing the roots.
5. Remove tree roots only when warranted by disease or other considerations. The Park Maintenance Supervisor or Horticulturalist should make this determination.
6. Removals of roots on steep slopes require geotechnical oversight.

Special conditions and considerations for some of the above actions are described in the sections that follow.

### **2.2.1 Avoidance**

Do not disturb the tree unless it truly represents a hazard. Use the International Society of Arboriculture (ISA) hazard rating form to determine whether a tree is a hazard tree (Appendix A).

### **2.2.2 Stabilize the Tree**

Do not cable and brace unless (1) the tree is highly valuable, or (2) the tree needs it for extraordinary reasons.

### **2.2.3 Remove Limbs (Partial Removal)**

Reduce the risk of the hazard by removing dead and broken branches, or by reducing branch end weights. Remove branches from the canopy and main trunk in small pieces.

When feasible, leave limbs, trunk and chips on site in such a way that it does not create a fire hazard, become an attractive nuisance and/or create other liability.

### **2.2.4 Create Wildlife Trees or Snags**

Where possible, leave the main trunk standing as a wildlife tree or snag. Procedures for creating wildlife trees or snags are as follows. For conifers, remove all branches from the canopy in small pieces. Leave the main trunk standing as a wildlife tree or snag in such a way that it does not create a fire hazard, become an attractive nuisance and/or create other liability. For deciduous trees, remove all branches from the canopy in small pieces and girdle the main stem of the tree.

### **2.2.5 Logging**

No logging is permitted in the ELST corridor.

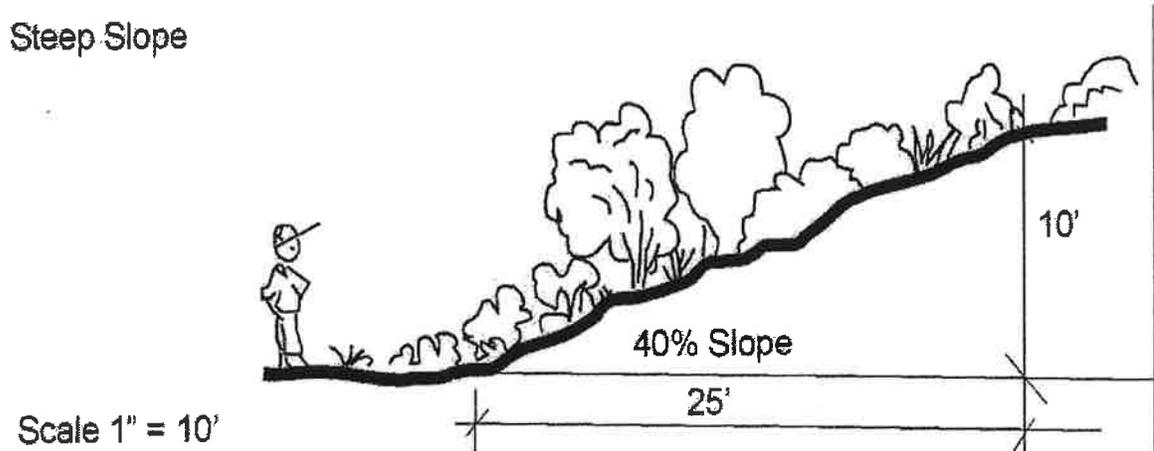
### **2.2.6 Total Removal**

Total removal may be warranted due to disease or cases in which the tree poses a "trip hazard." Where total removal is necessary it should be performed in a manner that will minimize impacts and disturbance to soil, underlying shrubs, groundcover and other trees. If the tree is diseased, remove it from the project site and burn it at an approved location. Whole tree removal is allowed under the following conditions:

- Check with local regulations and obtain necessary permits.
- Remove all branches from the canopy in small pieces.
- Remove main trunk so as to minimize impacts.
- For the safety of trail users, cut stumps flush with ground surface if they are located within five feet of trail surface.
- Refer to the *Regional Road Maintenance Endangered Species Act Program Guidelines* for temporary erosion and sediment control methods (Tri-County Regional Road Maintenance Technical Workgroup 2000).
- Disperse parts of tree on the site if the tree is not diseased. When feasible, limbs, trunk and chips should remain on site to a maximum depth of 3 inches in such a way that it does not create a fire hazard, become an attractive nuisance and/or create other liability.

- Stabilize logs on-site to prevent sliding or rolling. Or use uncut logs and branches to restrict traffic and socialized trails in natural areas. Follow established park safety standards during removal and clean up.

### 2.2.7 Removal on Steep Slope



If removal must occur on a steep slope or potential slide area, prior to removal a geotechnical expert should evaluate removal methods and vegetation restoration after removal (see Appendix A). A steep slope is any ground that rises by a 40 percent grade (rises 10 feet over 25 feet of horizontal distance), at an angle equal to or greater than shown above.

### 2.2.8 Vegetation Replacement

Bare ground should be covered with mulch or organic debris from the tree immediately after removal. Where vegetation replacement is warranted, planting should take place within 3 months or the next planting season, whichever occurs first. See Chapter 7 below, Vegetation Replacement.

## 2.3 NOTIFICATIONS

Notify the local jurisdiction and obtain the necessary permits prior to removing hazard trees. Locations where trees are proposed for removal should be documented in a pre-notification log book. This information should be provided to the local jurisdiction on a regular basis.



### 3. SIGHT-DISTANCE HAZARDS AND TRAIL MAINTENANCE

Sight distance is the physical distance required for a pedestrian, bicyclist, equestrian or driver to see an obstruction and come to a complete stop. Safe sight distance varies, depending on the mode of transportation and speed of travel. It is important that sight lines are unobstructed along both roads of an intersection and across their corners for distances sufficient to allow travelers approaching the intersection simultaneously to see each other in time to prevent collision.

For the purposes of this Plan, trail maintenance includes vegetation control and brush removal. It consists of clearing brush, branches, natural growth; cutting and removing tree limbs and clearing fallen trees; as well as maintaining safe sight distance.

Standard practices for maintaining trails and safe sight distances are listed below in Section 3.1. Conditions along the Interim Use Trail require additional procedures, and these are described in Section 3.2.

#### 3.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

Vegetation management for safe sight distance along the Interim Use Trail should follow King County standard BMPs, which are listed below. Applicable excerpts from these documents are provided in Appendix B. BMPs and standard practices for managing trails and sight-distance hazards include the following:

- *2001 East Sammamish Trail Maintenance Plan* (King County Park System 2001b)
  - Vegetation Control and Brush Removal (maintenance task description)
  - Natural Areas Trail Maintenance (maintenance task description)
- *King County Park System, Best Management Practices Manual* (King County Park System 2001a)
  - Ch. 6, Trees, 6.5 Maintenance Practices, Tree Pruning, Coniferous Trees, Specialized Pruning and Tree Work
  - Ch. 6, Trees, 6.6 Cultural Care
  - Ch. 9, Natural Areas, 9.6 Maintenance Practices, 9.8 Forests

#### 3.2 SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS

The interim trail surface will be 8 to 12 feet wide. Park standards call for clearing all vegetation from the trail surface up to 12 feet above the trail surface to allow adequate space for maintenance vehicles. Optimum stopping distance for bicyclists using the trail is 120 feet to see ahead to road crossings.

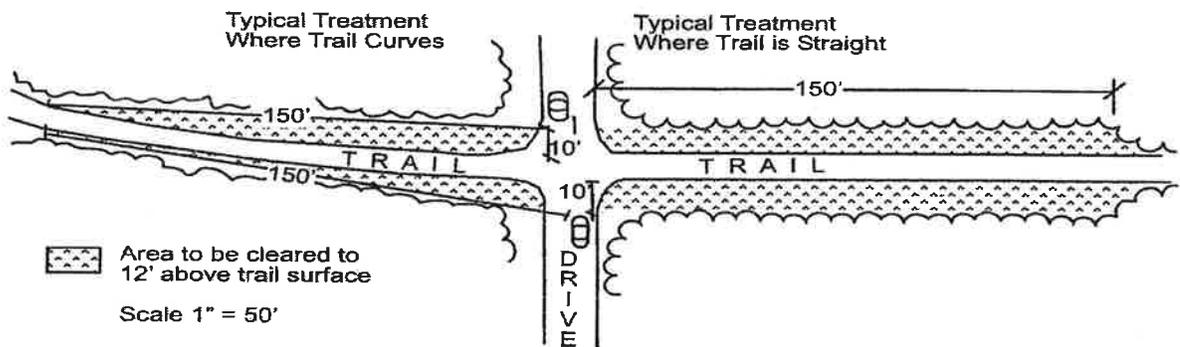
Topographic conditions along ELST corridor are often steep, with frequent crossings by driveways and arterial streets. There are seven trail intersections with local access or arterial streets and 52 trail intersections with driveways, of which at least 20 currently have limited sight distance. In order to provide trail users with safe conditions, vegetation management is necessary at trail-street/driveway intersections.

### 3.2.1 Sight Distance

At least 150 feet of clear entering sight distance for vehicles approaching a stop or yield sign is necessary at trail approaches in order for vehicles to safely cross, assuming that vehicles are traveling 25 miles per hour (WSDOT 2001). This distance is the optimum but speeds typically will be lower across the trail corridor. Often, only 60 feet or less is present between the turnoff from East Lake Sammamish Parkway and the trail crossing intersection. Topography further precludes providing 150 feet of sight distance.

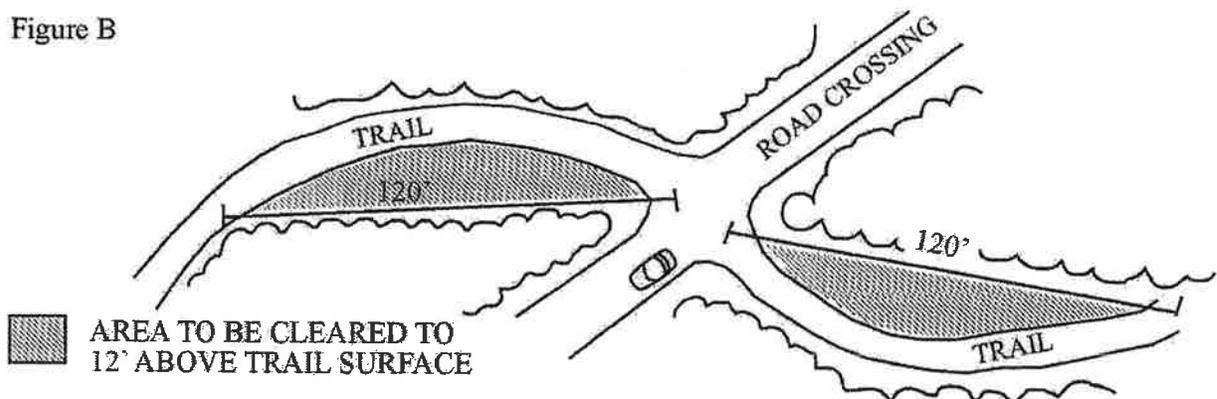
Therefore, maintenance personnel should use good judgement when clearing to maintain adequate sight distance. At trail-street/driveway intersections where trail users have right-of-way, vegetation should be removed to provide a clear view as shown in Figure A. Planting under 3 feet in height are acceptable within the trail corridor. In such cases, the stop or yield sign should be clearly visible to cars.

**Figure A**



Stopping sight distance requirements for bicyclists using the trail will also have to be met. American Association of State Highway and Transportation Officials (AASHTO) standards (AASHTO 1999) require 120 feet of clear stopping sight distance for a bicyclist traveling 20 miles per hour (design speed). Therefore, in cases where bicycles or vehicles have the right-of-way, sight distance on the trail should be clear at least 120 feet ahead in order to allow time for a bicyclist to stop if a vehicle is in its path. Vegetation should be cleared as shown in Figure B. Intersections with local access or arterial streets occur at NE 70<sup>th</sup> Street, NE 65<sup>th</sup> Street, SE 26<sup>th</sup> Street, 206<sup>th</sup> Avenue SE, SE 51<sup>st</sup> Street, SE 56<sup>th</sup> Street, and SE 62<sup>nd</sup> Street.

**Figure B**



### **3.2.2 Sequence of Vegetation Management Options**

Given the presence of sensitive areas and their buffers within the trail right-of-way, the preferred sequence for managing vegetation that represents a site-distance hazard is as follows:

1. Do not disturb the vegetation at all unless it truly represents a hazard as described above.
2. Remove the minimum amount of vegetation necessary to eliminate the sight-distance hazard.
3. If the vegetation represents an ongoing sight-distance hazard and requires frequent pruning, the options are as follows, in order of preference:
  - a. If the vegetation is located on a relatively steep (40 percent slope) embankment or in an area of loose soil, then cut the plant down to its base without removing the roots.
  - b. Depending on the value and maturity of the species, relocate the plant.
  - c. Remove the plant.
  - d. Replace the plant with lower growing species when conditions merit replacement.
4. Where a split-rail fence or other fence is present, trim vegetation so that it does not extend beyond the fence.
5. Removal on steep slopes requires a geotechnical report.

### **3.2.3 Trim Minimum Vegetation**

When pruning is necessary to maintain safe sight distances, it should be done in a manner to minimize impacts to soil, shrubs, groundcover, and trees.

Prune large branches and trunks in small pieces. When feasible, trunks, limbs and/or chips should remain on site, to a maximum depth of 3 inches in such a way that it does not pose a fire hazard, become an attractive nuisance and/or create other liability. Stabilize logs on site to prevent sliding or rolling, or use uncut logs and branches to restrict traffic and socialized trails in natural areas.

### **3.2.4 Drastic Pruning**

If more than 25 percent of the plant must be removed, it may jeopardize plant viability. In such a case, the plant should be pruned back, left in place, and replaced with a more appropriate species during the next planting season. Prune branches and main trunk in small pieces.

Sound pruning practices shall take into consideration safety first, arboriculturally correct pruning methods, and natural appearance. Pruning methods may include crown reduction and crown thinning to reduce sail area.

### **3.2.5 Clearing Around Fence**

When vegetation must be cleared along a fence, it should be trimmed so that it does not extend beyond (trail-ward of) the fence (“faced”). See Chapter 5, Drainage Maintenance, for vegetation management behind a fence.

### **3.2.6 Removal in Steep Slope Areas**

If plant removal must occur on a steep slope or potential slide area, prior to removal a geotechnical expert should evaluate removal methods and vegetation restoration after removal.

### **3.2.7 Relocation, Removal and Vegetation Replacement**

If it is not in a drainage channel, any bare ground that has been exposed as a result of vegetation removal should be covered with mulch or organic debris. The area should be replanted, using hydroseed or planted species or both, within 3 months or the next planting season, whichever occurs sooner (see Chapter 7, Vegetation Replacement). If bare ground is in a drainage channel, the specified seed mix should be applied along with sediment and erosion controls (see Chapter 6, Drainage Maintenance).

### **3.2.8 Monitoring**

Sight distance hazards should be monitored twice a year to assure safety (see Chapter 8, Monitoring).

## **3.3 NOTIFICATIONS**

Vegetation management at field-observed steep slope areas and their buffers should be documented on the pre-notification log book and conveyed to DDES on a regular basis. This information should also be provided to the local jurisdiction on a regular basis.

## 4. NOXIOUS WEED MANAGEMENT

Noxious weeds are defined as “non-native plants that are highly destructive, competitive or difficult to control” (Revised Code of Washington [RCW] 17.10). By contrast, “invasive species” or “invasive non-native species” may or may not be listed as “noxious weeds.” There are three classes of noxious weeds recognized by Washington State, Class A, B, and C. Control of all classes is mandatory in King County. Class A weeds have a limited distribution in Washington. Control and eventual eradication of these species is the highest priority and is required in all of Washington State, including King County. Class B weeds are presently limited to portions of Washington. Class B weed lists will differ from county to county based on the weeds’ distribution and each county’s weed board policy. Control of these weeds is required in King County. Class C weeds are common throughout most of Washington. These weeds have been selected as priority weeds in King County and control is mandatory. See Appendix C for the King County noxious weed list.

King County Park System defines integrated pest management (IPM) as (King County Park System 2001a):

"Integrated Pest Management (IPM) is a coordinated decision-making process and set of actions for pest control and vegetation management. IPM determines if, when, where, and how pest control is needed and employed. The IPM process encourages design and implementation or retention of landscapes that meet their intended purposes while promoting healthy plants and minimizing pest problems. IPM requires careful monitoring to determine if and what form of pest control is necessary."

Park maintenance personnel should follow the standard practices with respect to noxious and invasive weeds. These are listed below in Section 4.1. In addition, special conditions along the Interim Use Trail require additional procedures, which are described below in Section 4.2.

### 4.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

King County Park System has a policy of zero tolerance for noxious weeds. Noxious weeds should be managed using King County BMPs and following Tri-County IPM guidelines (see Appendix C for relevant text). BMPs and maintenance policies and procedures pertaining to noxious weed management include the following.

- *King County Park System Best Management Practices Manual* (King County Park System 2001a)
  - Ch. 9, Natural Areas, IPM 9.9
  - Ch 3, IPM
- *Tri-County Integrated Pest and Vegetation Management Model Policy* (Tri-County Committee (1999))
  - Specific Guidelines, 3 F, Noxious Weeds
- *2001 East Sammamish Trail Maintenance Plan* (King County Park System 2001a)
  - Invasive Non-Native Plant Removal (maintenance task description)

## 4.2 SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS

In addition to following standard practices for weed control, maintenance personnel should be guided by site-specific considerations on the Interim Use Trail. For example, King County Parks will not use herbicides and pesticides within the trail corridor without consulting with permitting agencies. Given the presence of sensitive areas and their buffers within the trail right-of-way, the preferred hierarchy of actions for controlling noxious weeds and invasive and non-native species is as follows:

**Follow King County Weed Control Board prescriptions.** Follow King County Weed Control Board prescriptions for each weed species with respect to timing, removal of roots, and cultural practices. If manual means are not effective, use mechanical methods. If all steps fail to control the target weed species, King County Parks should consult with permitting agencies to discuss use of herbicides.

**Wetlands, streams or stream buffers.** Attempting to control or eradicate invasive species or noxious weeds in wetlands, streams or stream buffers is often disruptive of habitat. In those areas, invasive species and noxious weeds should be removed by the least disruptive method possible, e.g. hand pulling, applying mulch, or applying weed cloth. After removal of weeds, native species should be replanted immediately.

**Steep slopes.** If removal must occur on a steep slope or potential slide area, prior to removal a geotechnical expert should evaluate removal methods and vegetation restoration after removal. Steep slopes can be field identified as slopes over 40 percent (10 feet of rise over 25 horizontal feet) (See Section 2.2.7 for illustration).

**Vegetation replacement.** Where weed removal results in areas of bare soil, replace weeds with appropriate native species (see Chapter 7, Vegetation Replacement).

## 4.3 NOTIFICATIONS

Notify the local jurisdiction 48 hours in advance of removal of noxious weeds. When contemplating weed removal in or adjacent to streams, notify WDFW in advance of removal, describe removal method and plant restoration plan, including plant species, spacing, and installation methods.

## 5. DRAINAGE MAINTENANCE

Scheduled drainage maintenance consists of slope mowing, dry ditch cleaning, and wet ditch cleaning, and repairing or replacing damaged culverts. In addition, unscheduled emergency drainage maintenance may include clearing clogged culverts or ditches.

Park maintenance personnel should follow standard practices for drainage maintenance, which are listed in Section 5.1. In addition, maintenance should follow the special conditions that apply to the Interim Use Trail. These conditions are identified in Section 5.2.

### 5.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

Drainage maintenance in the trail corridor should follow standard King County practices and BMPs. Relevant excerpts from these documents are found in Appendix D. Maintenance personnel should also carry with them and use *Regional Road Maintenance, Endangered Species Act Program Guidelines, Final Draft* (Tri-County Regional Road Maintenance Technology Working Group 2000). Standard practices and procedures include the following:

- *East Lake Sammamish Trail 2001 Ground Support Maintenance Plan* (King County Park System 2001c)
  - Slope mowing
  - Dry Ditch Cleaning
  - Wet Ditch Cleaning
  - Clearing of Clogged Culverts
  - Repair or Replacement of ditches or culverts that are dry
  - Repair or Replacement of blown out culverts and ditches that are in water
- *2001 East Sammamish Trail Maintenance Plan*
  - Drainage Maintenance & Repair
- *Regional Road Maintenance, Endangered Species Act Program Guidelines, Final Draft* (Tri-County Regional Road Maintenance Technical Working Group 2000) (This manual should be kept with maintenance vehicle at all times.)
  - BMP 2.37 Coir Log
  - BMP 2.57 Dewatering
  - BMP 2.74 Grass Lined Channel
  - BMP 2.81 Hand Seeding
  - BMP 2.83 Hydroseeding
  - BMP 2.103 Mulching
  - BMP 2.120 Silt Fence
  - BMP 2.123 Silt Mat
  - BMP 2.148 Stream Bypass
  - BMP 2.168 Turbidity Curtain

- BMP 2.172 Vactoring
- Outcome Category: Open Drainage Systems (1.35)
- Outcome Category: Stream Crossing (1.44)
- Outcome Category: Keep Water from Work Area (2.17)
- Outcome Category: Filter/Perimeter Protection (2.19)
- Outcome Category: Reduce Water Velocity/Erosive Forces (2.21)
- Outcome Category: Habitat Protection Maintenance (2.23)
- Fish Exclusion Protocol

## **5.2 SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS**

ELST is located in an area with steep and erodible slopes and numerous drainages and wetlands uphill of residential development and a shoreline of the state. Re-establishment and maintenance of functional drainage systems and minimization of sediment mobilization during maintenance activities are important aspects of managing this project. In addition to standard practices, drainage maintenance along the Interim Use Trail should follow site-specific guidance described below. The preferred sequence of actions for maintaining the drainage systems is as follows:

1. Check/be aware of existing permit conditions.
2. Verify that the ditch is not a stream.
3. Conduct routine maintenance during summer months.
4. Where it is clear that material in drainage system is litter, such as yard waste and clippings dumped by others, remove this material and dispose of at an approved site.
5. Minimize impacts to the extent possible by implementing BMPs. Remove only the amount vegetation necessary for maintenance activity.
6. Reseed ditches using specified seed mix, provided in Chapter 7, Vegetation Replacement.

### **5.2.1 Permit Conditions**

Be aware of existing permit conditions. Ongoing drainage maintenance is subject to U.S. Army Corps of Engineers regulations and to the following permits:

- Hydraulic Project Approval (HPA) from WDFW
- National Pollutant Discharge Elimination System (NPDES) from Ecology
- Public Agency and Utility Exception (PAUE) from King County DDES

Ecology requires monitoring for storm events greater than 0.5 inch in 24 hours (King County Division of Capital Planning and Development 2001). Copies of the HPA permit conditions and the U.S. Army Corps of Engineers stipulations are provided in Appendix H.

## **5.2.2 Timing**

Dry ditches should be cleaned between April and October as weather allows. Wet ditches can only be cleaned between June 16 and October 15, per condition of the HPA.

## **5.2.3 Impact Minimization**

Avoid entering drainage ditches with heavy equipment. Install proper BMPs prior to earthwork, continue to implement and inspect BMPs during the work, and stabilize the site once work is complete. Unless otherwise instructed, ditches should be excavated only to their original dimensions. Completely remove mucked out material from the project site and dispose of in an approved location.

## **5.2.4 Ditch Reseeding**

Use the specified seed mix to reseed areas where vegetation has been removed. Do not place mulch on slopes where it can be carried to storm drains or clog culverts. See Chapter 7, Vegetation Replacement, and Chapter 8, Monitoring.

## **5.2.5 Stabilization**

Where flow is present in a ditch and seeding is impractical because seed will be washed away, use coir cloth to stabilize slopes.

## **5.3 NOTIFICATION**

King County Park System Program Manager, District Managers, and the Resource Coordinator should be informed prior to the start of work. Notify Ecology on a weekly basis describing work completed the previous week and work planned for the week ahead. Notify the local jurisdiction 48 hours in advance of removal of vegetation to maintain drainage structures.



## 6. MAINTENANCE ACCESS

Maintenance access consists of a suitable, stable path of entry to and exit from the area requiring maintenance. The objective of this guidance is to sustain the function and value of vegetation assets and to reduce or avoid soil compaction. Gaining access to perform maintenance tasks along the Interim Use Trail should follow standard practices, which are identified below in Section 6.1. In addition, Park personnel should follow site-specific requirements for the Interim Use Trail described in Section 6.2.

### 6.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

Park maintenance personnel should follow standard practices, policies and procedures for accessing the Interim Use Trail. BMPs for maintenance access are described in the following documents and relevant excerpts describing these practices are provided in Appendix E.

- *King County Park System, Best Management Practices Manual* (King County Park System 2001a)
  - Construction Site Practices
- *2001 East Sammamish Trail Maintenance Plan* (King County Park System 2001b)
  - Natural Areas Trail Maintenance (maintenance task description)

### 6.2 SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS

The Interim Use Trail consists of flat compacted railroad ballast 8 to 12 feet wide and it should be used to access maintenance sites. Topographic conditions adjacent to ELST are often steep, and some areas have limited sight distance. Use of large equipment on steep slopes should be minimized. In order to allow adequate space for maintenance vehicles to access the trail, branches should be cleared up to 12 feet high and as wide as the trail surface. Sensitive areas on both sides of the trail grade may require equipment to back out along the trail rather than turning around on the trail. If material, such as fill or plant material, will be removed, vehicles should be loaded with care. If contractors will be used, Park personnel should identify acceptable access points and vehicle loads for them in advance.

Access to maintenance sites should be guided by the following:

1. If maintenance access can be deferred until soils are dry, defer maintenance task until that time.
2. Set up temporary erosion and sediment control measures using BMPs.
3. Establish the limit of impact using appropriate tape or flagging or other marking. Use orange construction fencing to establish entry and exit routes and to protect vegetation.
4. For each maintenance task, use the smallest and least impacting equipment. If motorized vehicles are necessary, use those that will have the least impact on soils and vegetation.
5. If work can be done efficiently with hand tools, use them first.
6. If large equipment must be used, keep it on the trail and use equipment that can reach to desired maintenance location. Do not use heavy equipment in areas off the trail.
7. If equipment must go off the trail, prior approval is required from the King County Maintenance Lead and the King County Lead for temporary sediment and erosion control (TESC Lead). Temporary wood mats must be placed under the vehicle path to spread the vehicle load.
8. Any disturbance, whether authorized or not, should be repaired and replanted.

## **6.2.1 Vegetation Replacement**

If bare ground is exposed, it should be covered with mulch or organic debris immediately after maintenance procedures unless it is in a drainage ditch. Where vegetation replacement is warranted, planting should take place within 3 months or the next planting season, whichever occurs first (see Chapter 7, Vegetation Replacement).

## 7. VEGETATION REPLACEMENT

Vegetation should be replaced whenever bare soil results from maintenance activities, erosion, or vegetation removal. Vegetation removal may occur in any number of ways, both intentional and unintentional, such as the result of removing noxious weeds, after drainage maintenance, as the result of removals due to hazardous sight lines, vandalism, erosion, etc. Section 7.1 lists standard King County vegetation replacement BMPs and practices that should be followed. Specific guidelines for the Interim Use Trail are described in Section 7.2.

### 7.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

King County Parks maintenance staff should follow standard practices for vegetation replacement that are found in the documents listed below. These documents, or relevant excerpts from these documents, are provided in Appendix F

- *2001 East Sammamish Trail Maintenance Plan* (King County Park System 2001b)
  - Natural Area Restoration and Vegetation Management (maintenance task description)
  - Plant Installation and Maintenance (maintenance task description)
  - Plant Salvage and Propagation (maintenance task description)
- *King County Park System Best Management Practices Manual* (King County Park System 2001a)
  - Ch. 6, Trees, Design
  - Ch. 6, Trees, Maintenance Practices
  - Ch. 9, Natural Areas, 9.5 Design, Plant Selection

### 7.2 SITE-SPECIFIC CONDITIONS AND CONSIDERATIONS

In addition to standard practices, maintenance personnel should follow site-specific procedures that apply to the Interim Use Trail outlined in the following sections. Guidance for replacement of vegetation is described below.

#### 7.2.1 Choose Native Plants

Choose plants that are native to the Pacific Northwest, sustainable, disease resistant, pest resistant, and drought tolerant.

#### 7.2.2 Choose Species Appropriate to Site

Choose species based on their appropriateness for site conditions, such as sun, shade, long-term growth patterns, urban versus rural setting, and surrounding environment. Be aware of the following site conditions:

**Locations where sightlines must be preserved.** Choose groundcovers that do not obscure the line of sight above 2 to 3 feet in height. Examples of choices include: kinnickinick (*Arctostaphylos uva-ursi*), woodland strawberry (*Fragaria vesca*), salal (*Gaultheria shallon*), low Oregon grape (*Berberis nervosa*), sword fern (*Polystichum munitum*). Mature trees may be retained if trunks are bare of lower branches up to 12 feet above the ground surface. If existing trees must be removed, replace them with low growth species such as the groundcovers listed above.

**Locations where barriers to pedestrians are appropriate.** Plant shrubs, preferably species with thorns, at dense spacings (3 to 4 feet on center). Examples of choices include: salmonberry (*Rubus spectabilis*), native roses (*Rosa nutkana*, *Rosa gymnocarpa*, *Rosa pisocarpa*), snowberry (*Symphoricarpos alba*), red osier dogwood (*Cornus sericea*), tall Oregon grape (*Berberis aquifolium*), red flowering currant (*Ribes sanguineum*).

**Steep slopes and landslide areas.** Choose plants with robust root structures to control erosion and stabilize soil. Examples of choices include: salmonberry, willows (*Salix* spp.), and red-osier dogwood in wet areas. Plant densely to eliminate bare soil.

**Drainage channels.** Avoid using cattails (*Typha latifolia*), which require frequent removal. Do not place mulch in areas where water levels could mobilize mulch and clog a channel and/or pipe. Use Paul's Special Mixture seed mix as specified by King County Park System. It can be purchased from United Horticultural Supplies, and comes in a 55 lb. bag. It contains 44.27 percent red fescue (*Festuca rubra*) (creeping type), 29.43 percent chewings fescue (*Festuca rubra* chewings), 14.92 percent award Kentucky bluegrass (*Poa pratensis*), 9.96 percent highland colonial bentgrass (*Agrostis capillaris*), 00.002 percent other crops, and 1.20 percent inert matter. It contains no noxious weeds.

**Wetlands, streams, and their buffers.** Choose native species that are typically found in these areas, for example, salmonberry, willows, red-osier dogwood, twinberry (*Lonicera involucrata*), and western red cedar (*Thuja plicata*).

Plantings should be implemented according to terms of issued permit conditions. Vegetative cuttings shall be planted at a maximum interval of 3 feet on center. If sources are nearby and abundant, live stakes of native willows and/or dogwood can be collected from the site and installed immediately. Monitor plantings on a regular basis to be sure they are surviving (see Chapter 8, Monitoring).

### 7.3 NOTIFICATION

Notify local jurisdiction of proposed work 48 hours in advance.

## 8. MONITORING

Monitoring is defined as conducting surveys within natural areas to determine the health and function of various plant and wildlife species (and fish, upon request). Changes in habitat conditions and public impacts are to be noted (King County Park System 2001a). Monitoring also includes observing the effectiveness of vegetation management efforts and recording results.

King County Parks staff monitor parks based on established practices and procedures. Monitoring along the Interim Use Trail should follow existing practices, listed below in Section 8.1. Staff should also follow site-specific procedures for the Interim Use Trail, described in Section 8.2.

### 8.1 KING COUNTY STANDARD PRACTICES, POLICIES, AND PROCEDURES

Monitoring efforts in King County parks are guided by the BMPs and practices listed below. Full text or relevant excerpts of these documents appear in Appendix G.

- *2001 East Sammamish Trail Maintenance Plan* (King County Park System 2001b)
  - Monitoring Natural Areas
  - Site Inventory
  - Park Inspection
- *King County Park System, Best Management Practices Manual* (King County Park System 2001a)
  - Ch. 1, Construction Site Management, 1.6 Post-Construction Care

### 8.2 SITE SPECIFIC CONDITIONS AND CONSIDERATIONS

King County Parks Department has a standard policy to monitor and maintain healthy vegetation and wildlife in the trail corridor. Since many sensitive areas are present at this location, the obligation to closely monitor the site is doubly important. The presence of many road and driveway crossings along the trail will require monitoring to maintain safe sight distances. Following is a list of vegetation management activities and the associated monitoring requirements.

1. Hazard tree sites should be monitored annually to determine success of treatment. In addition, the trail should be monitored after storms to identify potential hazard trees.
2. Sight distance hazards should be monitored twice yearly to determine when safety is compromised.
3. Sites of noxious weed infestations should be monitored on a monthly basis immediately after control efforts, to evaluate control methods and prevent further infestations. This monitoring should continue for 3 years or until noxious weeds are eradicated.
4. Drainage ditches and culverts should be monitored at least every 3 months and especially in fall before the rainy season to be sure pathways are clear.
5. Plantings in wetlands, streams, and their buffers shall be monitored and maintained for 3 years to ensure 80 percent or greater survival (WDFW 2001). Other areas that have been replanted should be monitored for survival rates, weed control, and general condition for one full growing season or the plant establishment period as specified by King County Park System, whichever is longer.

### **8.3 NOTIFICATION**

Field visits to conduct monitoring efforts do not require notification. Results of monitoring shall be recorded with King County Park System and reported to permitting agencies, where required by permits. Results of monitoring noxious weed control efforts shall be reported as required to the King County Noxious Weed Control Board.

## 9. REFERENCES

- AASHTO (American Association of State Highway and Transportation Officials). 1999. Design Manual. <http://www.aashto.org>
- King County. 1998. King County, Washington, Surface Water Design Manual. King County Department of Natural Resources, King County, Washington.
- King County Division of Capital Planning and Development, Department of Construction and Facility Management. 2001. Interim East Lake Sammamish Trail, Draft Construction Stormwater Pollution Prevention Plan. Prepared by Parametrix, Kirkland, Washington.
- King County Park System. 2001a. King County Park System Best Management Practices Manual. King County Park System, Mercer Island, Washington.
- King County Park System. 2001b. 2001 East Sammamish Trail Maintenance Plan (TMP). Prepared by King County Park System, Mercer Island, Washington.
- King County Park System. 2001c. East Lake Sammamish Trail 2001 grounds support maintenance plan. Prepared by King County Parks, Renton, Washington.
- Parametrix, Inc. 2001. Temporary sediment and erosion control and construction monitoring plan. Prepared for King County Department of Construction and Facility Management. Kirkland, Washington.
- Tri-County Committee. 1999. Tri-county integrated pest and vegetation management model policy and guidelines. <http://www.metrokc.gov/hazwaste/ipm>.
- Tri-County Regional Road Maintenance Technical Working Group. 2000. Regional Road Maintenance Endangered Species Act Program Guidelines, Final Draft. <http://www.salmoninfo.org/tricounty/tcdocuments.htm>.
- WDFW (Washington Department of Fish and Wildlife). 2001. Hydraulic project approval, issued to King County Park System. September 18, 2001.
- Washington State Department of Transportation. 2001. Roadside manual. Engineering Publications, WSDOT, Olympia, Washington.



**APPENDIX A**

**Best Management Practices - Hazard Trees**



## **Tree Removal**

- Derelict trees that cannot be made safe or functional by corrective pruning must be removed.
- A tree must be defective and have a target to be considered a hazard.
- Hazard must be the first determining factor in removal consideration.
- Trees may present a risk because of old age, storm damage, poor structure, disease, decay or death.
- Trees that constitute a high hazard must be removed.
- Tree decline or failure is caused by several factors. These include poor tree structure, summer branch drop, increased exposure, root loss, unstable rooting, girdling roots, leaning trees, unfavorable soil conditions, cracks, conks, seams, decay, cavities, root rot and butt diseases.
- Trees may occasionally be removed for new park construction, access or other issues not related to tree viability.
- If trees are smaller than 12 inches in diameter, they can be transplanted—if cost-effective.

Tree removal is a sensitive issue. It is important to alert park management and if necessary participate in a public process to allow for comment.

Source: *King County Park System Best Management Practices Manual* (King County Park System 2001)



A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas  
**TREE HAZARD EVALUATION FORM** 2nd Edition

Site/Address: \_\_\_\_\_  
 Map/Location: \_\_\_\_\_  
 Owner: public \_\_\_\_\_ private \_\_\_\_\_ unknown \_\_\_\_\_ other \_\_\_\_\_  
 Date: \_\_\_\_\_ Inspector: \_\_\_\_\_  
 Date of last inspection: \_\_\_\_\_

HAZARD RATING:						
Failure Potential	+	Size of part	+	Target Rating	=	Hazard Rating
_____ Immediate action needed						
_____ Needs further inspection						
_____ Dead tree						

**TREE CHARACTERISTICS**

Tree #: \_\_\_\_\_ Species: \_\_\_\_\_  
 DBH: \_\_\_\_\_ # of trunks: \_\_\_\_\_ Height: \_\_\_\_\_ Spread: \_\_\_\_\_  
 Form:  generally symmetric  minor asymmetry  major asymmetry  stump sprout  stag-headed  
 Crown class:  dominant  co-dominant  intermediate  suppressed  
 Live crown ratio: \_\_\_\_\_ % Age class:  young  semi-mature  mature  over-mature/senescent  
 Pruning history:  crown cleaned  excessively thinned  topped  crown raised  pollarded  crown reduced  flush cuts  cabled/braced  
 none  multiple pruning events Approx. dates: \_\_\_\_\_  
 Special Value:  specimen  heritage/historic  wildlife  unusual  street tree  screen  shade  indigenous  protected by gov. agency

**TREE HEALTH**

Foliage color:  normal  chlorotic  necrotic Epiphytism? Y N Growth obstructors: \_\_\_\_\_  
 Foliage density:  normal  sparse Leaf size:  normal  small  stakes  wire/ties  signs  cables  
 Annual shoot growth:  excellent  average  poor Twig Dieback? Y N  curb/pavement  guards  
 Woundwood development:  excellent  average  poor  none  other \_\_\_\_\_  
 Vigor class:  excellent  average  fair  poor  
 Major pests/diseases: \_\_\_\_\_

**SITE CONDITIONS**

Site Character:  residence  commercial  industrial  park  open space  natural  woodland/forest  
 Landscape type:  parkway  raised bed  container  mound  lawn  shrub border  wind break  
 Irrigation:  none  adequate  inadequate  excessive  trunk wetted  
 Recent site disturbance? Y N  construction  soil disturbance  grade change  line clearing  site clearing  
 % driplines paved: 0% 10-25% 25-50% 50-75% 75-100% Pavement filled? Y N  
 % driplines w/ fill soil: 0% 10-25% 25-50% 50-75% 75-100%  
 % driplines grade lowered: 0% 10-25% 25-50% 50-75% 75-100%  
 Soil problems:  drainage  shallow  compacted  droughty  saline  alkaline  acidic  small volume  disease center  history of fall  
 clay  expansive  slope \_\_\_\_\_° aspect: \_\_\_\_\_  
 Obstructions:  lights  signage  line-of-sight  view  overhead lines  underground utilities  traffic  adjacent veg.  \_\_\_\_\_  
 Exposure to wind:  single tree  below canopy  above canopy  recently exposed  windward, canopy edge  area prone to windthrow  
 Prevailing wind direction: \_\_\_\_\_ Occurrence of snow/ice storms  never  seldom  regularly

**TARGET**

Use Under Tree:  building  parking  traffic  pedestrian  recreation  landscape  hardscape  small features  utility lines  
 Can target be moved? Y N Can use be restricted? Y N  
 Occupancy:  occasional use  intermittent use  frequent use  constant use

The International Society of Arboriculture assumes no responsibility for conclusions or recommendations derived from use of this form.

**TREE DEFECTS**

**ROOT DEFECTS:**

Suspect root rot: Y N Mushroom/conk/bracket present: Y N ID: \_\_\_\_\_

Exposed roots:  severe  moderate  low Undermined:  severe  moderate  low

Root pruned: \_\_\_\_\_ distance from trunk Root area affected: \_\_\_\_\_ % Buttress wounded: Y N When: \_\_\_\_\_

Restricted root area:  severe  moderate  low Potential for root failure:  severe  moderate  low

LEAN: \_\_\_\_\_ deg. from vertical  natural  unnatural  self-corrected Soil heaving: Y N

Decay in plane of lean: Y N Roots broken Y N Soil cracking: Y N

Compounding factors: \_\_\_\_\_ Lean severity:  severe  moderate  low

**CROWN DEFECTS:** Indicate presence of individual defects and rate their severity (s = severe, m = moderate, l = low)

DEFECT	ROOT CROWN	TRUNK	SCAFFOLDS	BRANCHES
Poor taper				
Bow, sweep				
Codominants/forks				
Multiple attachments				
Included bark				
Excessive end weight				
Cracks/splits				
Hangers				
Girdling				
Wounds/seam				
Decay				
Cavity				
Conks/mushrooms/bracket				
Bleeding/sap flow				
Loose/cracked bark				
Nesting hole/bee hive				
Deadwood/stubs				
Borers/termites/ants				
Cankers/galls/burrs				
Previous failure				

**HAZARD RATING:**

Tree part most likely to fail: \_\_\_\_\_

Inspection period: \_\_\_\_\_ annual \_\_\_\_\_ biannual \_\_\_\_\_ other \_\_\_\_\_

Failure Potential + Size of Part + Target Rating = Hazard Rating

\_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

Failure potential: 1 - low; 2 - medium; 3 - high; 4 - severe

Size of part: 1 - <6" (15 cm); 2 - 6-18" (15-45 cm);

3 - 18-30" (45-75 cm); 4 - >30" (75 cm)

Target rating: 1 - occasional use; 2 intermittent use;

3 - frequent use; 4 - constant use

**HAZARD ABATEMENT**

Prune:  remove defective part  reduce end weight  crown clean  thin  raise canopy  crown reduce  restructure  shape

Cable/brace: \_\_\_\_\_ Inspect further:  root crown  decay  aerial  monitor

Remove tree: Y N Replace? Y N Move target: Y N Other: \_\_\_\_\_

Effect on adjacent trees:  none  evaluate

Notification:  owner  manager  governing agency Date: \_\_\_\_\_

**COMMENTS**



**APPENDIX B**

**Best Management Practices – Sight Distance**



## **Appendix B - Safe Sight Distance**

Some portions of material pertaining to maintaining safe sight distance do not apply along the ELST Interim Use Trail. They are marked with an asterisk in the text and described below.

### **Natural Areas Trail Maintenance**

It is not necessary to haul out and remove unwanted plant materials unless they are diseased, consist of noxious weeds or non-native invasive weeds, or pose a hazard if left on the site.

Do not pressure wash along the Interim Use Trail.

Do not construct any new trail alignments along the Interim Use Trail corridor.

### **Tree Pruning**

Only 12 feet (as opposed to 14 feet) of clearance is required above the Interim Use Trail.



Time Standard varies with topography and size of planting.

## VEGETATION CONTROL AND BRUSH REMOVAL

### DEFINITION:

The clearing of brush, branches, natural growth [undergrowth, suckers, blackberries, thistles, etc.], felling hazardous trees, cutting and removing tree limbs, and clearing fallen trees. Cutting back vegetation at viewpoints and natural areas for both view and safe sight lines and access along trails. Task includes travel to and from site locations, task preparation, post-task cleanup and storage of equipment, tools and materials.

### DESIRED RESULT:

Parks should be relatively free of undesired undergrowth, undesired overgrown brush and tree debris that would jeopardize the safety of visitors and to reduce fire hazards and improve habitats. Viewpoints, vehicular corridors and high density access areas should have a clear line of sight and be free of hazardous plant/tree material that could fall and injure public or property in high traffic areas.

### GENERAL TASK PROCEDURE:

- Assess area to determine the most efficient brush removal procedure.
- Assess safety needs of job site. Determine escape routes, set up flagging cones, barriers to regulate public access to site. Provide staff to control flagging of work area.
- Put on appropriate safety gear.
- Clear brush, fall trees (when appropriate.), cut and remove tree limbs (when appropriate), leave or create habitat tree trunks for cavity nesters and bird brush piles when possible).
- Adjust, lubricate, and sharpen tools and equipment as needed.
- Fall tree using proper and safe falling techniques.
- Cut, gather, shred, chip and dispose of debris (when necessary) if on site need for wood chips exists use them to mulch areas.
- If job is not completed at end of workday, secure site.
- Remove and noxious weeds, replant area with natives and mulch.
- Clean and return equipment and safety gear to storage.

### GENERAL FREQUENCY:

As needed or planned - Storm and weather dependent.

### TIME STANDARD:

Calendar is January through December.  
Time Standard is variable, site dependent.



## NATURAL AREAS TRAIL MAINTENANCE

### DEFINITION:

The maintenance and restoration of paved, gravel, wood-chip and natural surface trails. This includes regular vegetation management, brush removal, drainage activities, and may include tread or surface repairs and improvements.

### DESIRED RESULT:

Trail surfaces and adjacent areas will be maintained to provide a safe and pleasant experience consistent with the surroundings for the recreational user. Drainage impacts of trail use will be maintained to avoid silt transfer in system.

### GENERAL TASK PROCEDURE:

- Establish parameters of current project; use Washington Trails Association standards when appropriate.
- Review safety plan.
- Obtain necessary permits for maintenance or construction work.
- Train staff and volunteers on the safe use of tools and maintenance techniques.
- Load and unload equipment, hike or haul into work site. (partner with other agencies to share needed equipment)
- Cut and remove obstructing trees, limbs and brush.
- Haul out or dispose of unwanted plant materials on site (when not contributing to habitat, such as nurse log potential and cavity nesting tree trunks).
- Remove roots, rocks and other trip hazards.
- Fill depressions, grade and compact soil for a solid well-drained surface.
- Clear existing swales, ditches, water-bars and culverts.
- Haul in and compact new surfacing materials. This may require extensive hand or wheelbarrow work in areas not accessible to vehicles. Use power carts when possible.
- Clean surface of trail by blowing, sweeping, raking or pressure washing.
- Inspect, clean and report on condition of signs and structures.
- Re-route or construct new trail alignments to avoid standing water and areas that are unsafe, unstable or too steep. Avoid working during rain to reduce silt transfer.
- Close off and re-vegetate social and non-designated trails (including woody debris).
- Close and sign trails if floods or other unsafe conditions exist.

### GENERAL FREQUENCY:

- -Daily to weekly in heavily used areas.
  - -Monthly or every second week in natural and wildlife areas.
  - -Once per quarter for informal trails in undeveloped open-space areas.
  - -After major storm or earthquake events.

## Department of Parks and Recreation - Maintenance Task Descriptions

- Blowing paved trails may take as little as a half an hour per week, while major re-routes in road-less areas can take several weeks.

### NATURAL AREAS TRAIL MAINTENANCE (cont.)

#### TIME STANDARD:

Calendar is January through December.

Time Standard      -Regular scheduled maintenance - 1 hour per 1,000 lineal feet.  
                             -New trail construction - 250 hours per 1,000 lineal feet of re-routing.

## 6.5 Maintenance Practices

The following are BMPs for routine maintenance of trees.

### Tree Pruning

#### Deciduous Trees

- Pruning for health: All broken, dead and diseased limbs and branches must be removed back to healthy viable wood.
- Crossing and misshapen limbs and branches must also be removed as soon as possible.
- Narrow crotches must be eliminated by removing or drop pruning one of the competing scaffold limb when as small as possible, to reduce splitting later.
- Trees located in lawn areas or in areas where people may walk must be pruned to establish the crown at least 8 feet above the ground. This eliminates eye hazards to park users and mower operators. Along roadways and trails a 14 foot clearance is required.
- Tree topping is to be avoided unless it is for removal of dead wood.
- Pruning cuts must be made cleanly with sharp sterilized tools. Use rubbing alcohol, or 3 to 1.
- Cut side branches  $\frac{1}{4}$  inch away from trunk for every 1 inch in diameter of removed branch. Cuts should be almost parallel to trunk and to branch cambium roll indicators (concentric rings in the branch collar). Support the portion being removed or take the leader off in stages to avoid tearing bark.
- If the main leader must be removed, prune back to a major side scaffold branch. Pruning cut should be  $\frac{1}{4}$  inch per 1 inch of diameter of trunk removed above the side scaffold branch. The cut must parallel to the angle of side scaffold. Do not apply wound dressings except as pest protection from borers.
- Dispose of any diseased wood. Do not use for composting.

#### Coniferous Trees

- Needled evergreens usually do not require pruning except for health.
- Remove any dead, broken or diseased branches. Use the guidelines above for making pruning cuts.
- Allow the tree to remain dressed to the ground, unless it may cause sight line or safety concerns.
- It is especially important to cut back to a viable branch or the trunk because evergreens usually do not resprout without green foliage remaining.
- Taking out the leader or cutting it back is usually bad practice. In conifers this causes weak scaffold connections that later fail.

#### Specialized Pruning and Tree Work

- Stylized pruning, shaping and pollarding is not done unless a tree is in a special or historical setting that requires it.
- Cabling and bracing is not done unless the tree is highly valuable or needs it for extraordinary reasons.
- Cavity filling is not done.
- Root pruning is not to be done unless it is for safety concerns. If pruning is necessary, assess tree stability.

## 6.6 Cultural Care

The following are BMPs for growing, healthy long-lived trees.

- Do not give supplemental watering to established trees except during extreme drought.
- Modify turf irrigation around established trees to accommodate water requirements of the trees.
- Keep spray from large sprinklers away from trees to avoid water-caused abrasion and constant moisture on trunk, which can lead to decay in some species.
- Avoid fertilizing ornamental and native trees, unless symptoms indicate a need for fertilizer.

## **9.6 Maintenance Practices**

The goal of routine maintenance in natural areas is to protect, conserve and enhance native plants, water quality, soil, sensitive areas, and wildlife (and fish).

### **Inspection**

Natural and sensitive areas require routine monitoring of the following:

- Public use, such as high-impact or illegal activity.
- Public safety, such as hazard trees, and police and fire access.
- Natural processes such as landslides, erosion and drainage.
- Fuel loading (accumulations of woody debris that can fuel fires).
- Silt loading of water bodies.
- Presence of noxious weeds.
- Water quality.
- Wildlife activity.
- Boundary encroachments.

### **Drainage**

Drainage features should be inspected each November or early December, to ensure proper function throughout the rainy season. Organic debris and excess sediment should be removed as needed to allow unrestricted flow and optimum storage volume.

### **Litter Control/Dumping**

To keep natural areas free of litter and dumping, BMPs include:

- Inspect trailheads and streets/street-ends frequently
- Respond quickly to clean up dumped materials. Partner with other agencies or volunteer groups.
- Investigate dumped materials to identify the perpetrator. Follow up with sufficient evidence to seek prosecution or remedial action by the perpetrator
- Involve Hazardous Materials Specialists when unknown chemicals are detected

- Promote pack-in and pack-out through education and signage and recycling litter.

## Mowing

The goal is to suppress vegetation as a means of fire control or to retain meadow grasses. The following are BMPs for mowing in natural areas:

- Mowing heights should be no lower than 4 inches. Staging heights to increase edge buffers that are longer than 4 inches increases cover and habitat for wildlife.
- Mowing should be infrequent and only when necessary to reduce the potential for fires.
- One mowing every 2 to 3 years may be sufficient for woody vegetation control. Firebreaks require more frequent mowing.
- Timing should minimize impacts on wildlife nesting and habitation. Mow after July.

## Hazard Tree Conversion

Trees in natural areas are identified as hazards only if they have targets. Hazardous trees should be evaluated for habitat potential and converted to snag, log or other habitat feature. Leave debris on site to decompose.

## Pruning

Pruning debris generated from vegetation management operations should be left on site and placed where it will add habitat value. Do not place pruning debris along stream and riverbanks because high water can float debris downstream.

## Trails

Trail maintenance hinges on the construction and maintenance of proper drainage systems along trails. Trail surfaces can be composed of pavement, bare soil, wood chips, or crushed rock/gravel. Maintain the existing surface by adding like-kind material to current trail surface. Do not mix surface treatments. Use the Washington Trails Association's guide to maintenance.



## Trail Structures and Signs

Inspect trail structures and signs regularly. Replace any missing or damaged signs as needed. Structural inspection is important to ensure public safety on bridges, guardrails and other structures. During repairs of these features, make sure that precautions are

taken to protect the public. More detail on maintenance and construction of these features is covered in section 12.10.

If wooden structures contain treated wood, ensure sawdust does not get into water. Sediment barriers and other protective devices should be used as warranted.

## 9.8 Forests

The following BMPs guide how we manage forests in natural areas. They include practices for forest cover, canopy regeneration, erosion control, steep slopes, organic debris and fire prevention.

### Vegetative Cover

Healthy vegetation cover is important for erosion control, habitat, and invasive weed control.

- Except in features that cannot function with vegetative cover, vegetation is preserved and enhanced to maximize its functional value.
- When possible, enhance conditions favorable to native plants and inhibiting to exotic plants.
- Limit disturbance and changes to site conditions to prevent loss of plant biomass.

### Canopy Regeneration

Except for grassland/meadow habitats, tree canopy is an integral part of natural ecosystems. Use the following BMPs to encourage canopy growth.

- Where canopy is fragmented or absent, new plantings should anticipate natural succession in native conditions. Pacific Northwest forests proceed from pioneer deciduous forest to a predominantly coniferous forest.
- For practical reasons, successional stages may be accelerated, retarded or staggered. An example may be to create canopy openings to stimulate growth in an understory where shading would preclude tree growth.

### Erosion Control

- Bare parkland should be carefully evaluated and appropriate vegetation established. At a minimum, a layer of organic mulch should be applied to the soil until the appropriate vegetation can be established.
- Management decisions should reflect the principles of plant succession leading to a multi-layered canopy, which ultimately provides erosion protection.
- Natural accumulations of leaf litter and other organic materials should be left undisturbed on erosion-prone sites whenever possible.
- Excessive runoff should be buffered and erosion controlled through a comprehensive watershed study followed by appropriate corrective action and maintenance.

## Shoreline and Bank Stability

When protecting a shoreline from erosion, choose a method with the least impacts while achieving reasonable stability. Generally, projects involving banks stabilization and securing will be done as major DNR design projects. BMPs include:

- Traditional use of rip rap is not the preferred method any longer. Softer treatments, such as log placement and bio-engineered plantings are preferred.
- Shoreline improvements and signage should be used to direct usage. Seasonal variations in water level require additional engineering.

## Structures

Structures are constructed features—check dams, water bars, sediment pools, boardwalks, bridges or stairs—built to mitigate impacts on sensitive areas.

- Planning should ensure construction impacts are minimized.
- Structures should neither interfere with nor dominate natural processes.
- Structures should be designed and constructed to endure extreme exposure, including unstable ground and constant wetness.

## Beaches

The unstable nature of shorelines requires that beaches be carefully engineered to prevent loss of the beach areas through erosion or adverse environmental impacts such as those from park users. Beach engineering includes importing sand and cobble, armoring, and installing geo-textile. Jetties, groins, seawalls and other retention structures are not desirable shoreline management strategies.

## Buffers

The transition between natural areas and developed landscapes needs special attention in parks. Edges are also some of the most diverse and productive habitats in urban environments. The following BMPs maintain the transition between a developed landscape and natural areas:

- Less frequent mowing.
- Restricted access.
- Landscape design that blends the two resources and provides interpretation.
- Dense plantings and extra weed control.
- Limited maintenance activity.

- Bio-filtration of hard surface runoff should be attempted whenever possible. Managing for healthy plant communities is a major element in erosion prevention. The grass in a forest can provide adequate erosion buffering if it is healthy and vital.

### **Steep Slopes**

- Removing vegetation from the ground layer should be minimized. Plantings should be stabilized with appropriate bioengineering techniques.
- A geo-technical expert should evaluate slide-prone areas before extensive restoration.
- Stormwater runoff must be prevented from saturating or loading slopes. The appropriate drainage system should be in place and adequately maintained to intercept run-off.

### **Slide Areas**

A geotechnical expert evaluates slide areas, or those suspected of being slide prone, before extensive restoration. Strategies can be developed to help maintain or even improve slope stability. While the standard practice of hydro-seeding slide areas is prudent, it does not restore structural stability to the slope. To restore stability and prevent further soil erosion, woody vegetation must be reestablished.

### **Organic Debris**

Organic debris from maintenance practices remains on site if it does not interfere with other landscape functions. Types of interference include blocking trails, forming unstable cornices, diverting drainage and smothering desirable vegetation. Whenever possible, use the following BMPs:

- Organic debris should be cut and dispersed to maximize ground contact:
- Chipped woody debris is useful as long as the debris is left on site in depths to 3 inches or less.
- Leave uncut branches and logs in place to restrict traffic into natural areas.
- Stabilize logs to prevent sliding or rolling.
- Remove invasive species from the site through the appropriate IPM method.

### **Fire Prevention**

A healthy, diverse plant community is fire resistant, but woody plant debris must be managed in the landscapes. The following BMPs encourage fire prevention in natural areas:

- Excessive accumulations of dead, woody plant debris should be avoided. Thinly scatter debris away from park use areas.
- If tree pruning or removal debris remains in a native woodland site, the material should be diced well enough to directly contact the ground and start the decay process.
- Maintain transitions to developed landscapes to provide interruptions to the normal path that fire may travel.
- Water hydrants should be located along the edge of natural areas to grant immediate access for firefighting.
- Service roads into large woodland tracts should be maintained to allow access to Fire Department tanker trucks.
- Large woodland tracts with high fire potential should be studied for possible development of service roads.
- Known areas of encampments and overnight use should be frequently inspected. These areas should be cleaned up to sanitize the site and to minimize potential for wildfires.



**APPENDIX C**

**Noxious Weeds**



## **Appendix C – Noxious Weeds**

Some portions of material pertaining to control of noxious weeds do not apply along the ELST Interim Use Trail. They are marked with an asterisk in the text and described below.

### **9.9 IPM**

#### **Woody Brush Control**

Herbicide application in the ELST corridor will only occur after consultation with, and approval by, permitting agencies.

#### **Stump Re-Sprouting Control**

Herbicide application in the ELST corridor will only occur after consultation with, and approval by, permitting agencies.

#### **Herbicide Use**

Herbicide application in the ELST corridor will only occur after consultation with, and approval by, permitting agencies.



## 9.9 IPM

### Thresholds

- Weeds are generally found and tolerated in grasslands.
- Noxious weeds are not tolerated and are controlled when found as prescribed by recommendation of the King County Noxious Weed Control staff

- Invasive plants are generally not tolerated. Invasive plants are controlled in conjunction with ecosystem restoration efforts in grasslands.
- Only insect pests that pose a risk to the public (such as hornets) or the resource (such as gypsy moth) will be controlled.
- Plants diseases are generally tolerated unless a specific control can be employed that will be effective in protecting the health of particularly valuable assets, while not jeopardizing the environment.

### Control Strategies

Control strategies for meadows must consider weeds, woody brush, stump re-sprouting, invasive plants, herbicide use, exotic insects, nuisance wildlife, and root rots.

### Weed Control

An over-riding principle of IPM is maintenance of healthy plant communities. That means weed control of the following types:

- **Timed mowing.** Carefully timed mowing before seed set can effectively reduce weed seed sources. Frequently mowing can eliminate blackberry and other woody species.
- **Mulching.** Mulching around the base of plantings is widely accepted as a horticultural practice for soil fertility and weed control. In most instances, composted wood chips, or on-site leaf litter are adequate materials. Avoid wood chips from diseased trees. Mulch should be between 2 to 3 inches deep.
- **Weed watch during mulching.** Care must be given to not incorporate new weed problems with the import and use of mulch materials.

### Woody Brush Control

The control of woody brush like blackberries and poison oak is very important in certain park locations. Often these plants are found in transition areas between developed areas and natural areas. Most of King County's natural areas contain some blackberries. If not controlled, woody brush can easily overtake forest-edge environments, eliminating vital habitat opportunities. Control measures for woody brush include the following:

- Manual or mechanical removal using hand tools or gas-powered equipment.
- Chemical control with Roundup Pro™ or Garlon™ can be employed when other measures are not possible or have failed. Spot treatments are preferred. The use of some herbicides may require an exemption from the County's IPM committee. \*
- Current King County policy eliminates the use of Tier 1 Chemicals unless exemptions are given.

## Stump Re-Sprouting Control

Often there is a need to remove small trees and prevent re-sprouting of a stump. Methods for controlling the re-sprouting of stumps include the following:

- If the location of a stump allows access by equipment, then it can be mechanically removed if the spot does not lie within an environmentally critical area.
- Small stumps can be removed manually if not located on steep slopes or other environmentally critical areas.
- Painting newly cut stump surfaces with Roundup Pro™ or Garlon 3A™ can control re-sprouted stumps. Limit herbicide application to stump surface only. \*

## Invasive Plant Control

Invasive plants have taken over many King County forested areas, radically changing pre-existing ecosystems. Our goal is to attain long-term control of invasive plants, which is essential to recovery and preservation of natural ecosystems. Invasive plant control must follow the guidelines



established by the King County Noxious Weed Control Board. Except in the case of Class A weeds, the objective is suppression of weed populations to below damage-causing thresholds. Eradication of certain ecological weeds (blackberry or ivy) in all of the County's natural areas is neither feasible nor cost-effective. Control methods include:

- Use extent of removal and type of habitat to determine pest control method.
- Large, totally infested areas can be mowed. Areas interspersed with invasive pests require more selective procedures such as manual removal.
- Heavy equipment or manual removal can be used on firm soils. But on either steep or saturated soil, use techniques that minimize site and slope disturbance.

- Where mechanical or manual removal is neither possible nor practical but control is essential, careful and selective use of an approved herbicide is permitted. The list of approved herbicides is limited to Roundup Pro™ or Garlon3A™. The use of these products must conform to the BMPs listed below under “Herbicide Use.”
- Establishing a native planting regime as quickly as possible following the removal of invasive plants is critical to successful forest restoration. These new plantings require care for several years to guarantee establishment.
- Preserve native plants when possible rather than reestablishing new plants after clearing invasive plants

### Herbicide Use \*

The use of herbicides in any natural environment must be carefully considered. Herbicides will be used for weed control in natural areas **only when other control measures have failed**, or when past practice strongly indicates that control of the weed can only be achieved through herbicide use. The following are King County Park System herbicide use practices:

- Cut and stem treatment (daubing or painting) is preferred for natural areas. \*
- Certain mature invasive plants are difficult to treat. If possible, remove existing growth manually or mechanically. Wait for new growth to establish, then treat with the appropriate herbicide. \*
- Herbicides approved for use in natural areas are limited to Roundup Pro™, \* Rodeo™ (near aquatic habitat), or Garlon3A™. \*

### Exotic Insects

Insects like European and Asian Gypsy moth and Asian long-horned beetle can potentially devastate an urban forest. Parks cooperates with state and federal agencies in monitoring and control programs to prevent introduction of these pests.

### Nuisance Wildlife

Mountain beavers, opossums, raccoons, waterfowl and other species can be destructive to natural areas when their activities are excessive. If control of wildlife is needed, we work with the most appropriate agency to gain control, usually the Washington State Department of Fish and Wildlife.

### Root Rots

Even native forests can have serious disease problems. Root rots are the most serious, often killing significant trees. Several strategies help control rot in forests:

- Inoculate with mycorrhizae.

- Remove infected wood.
- Plant resistant varieties.
- Treat hemlock stumps with borax.
- Do not change site conditions on mature trees.



### 3.1 Goals and Philosophy of IPM

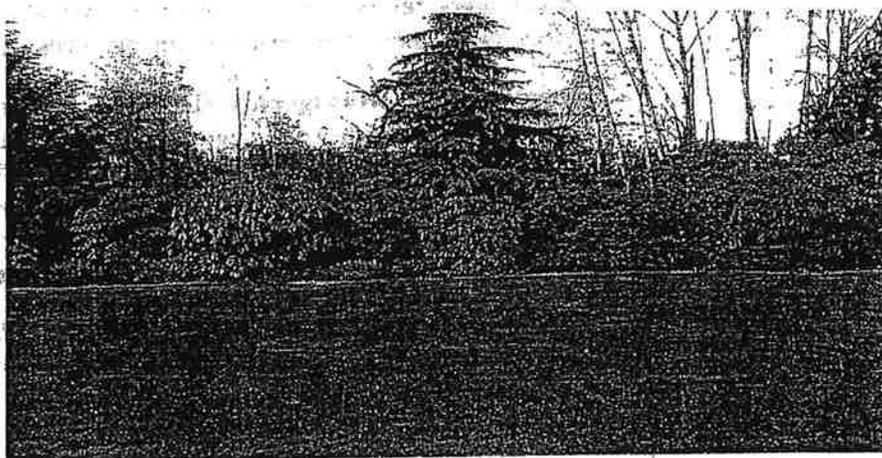
King County has adopted Integrated Pest Management (IPM) as its approach to pests that affect its facilities, landscapes, parks, public lands and roadways. The IPM approach is a process of:

- Evaluating and determining which pest is of concern.
- Exploring if the effects are tolerable.
- Considering what actions are appropriate to reduce intolerable effects to tolerable levels if effects are not acceptable.

Chemical controls through the use of pesticides are only one of the possible controls that should be considered. The King County Park System uses pesticides only when absolutely necessary. When pesticides are used, we select the product least toxic (acute and persistent) to people and the environment.

In the forum of a Tri-County Committee on pesticide use, King County has participated with Pierce and Snohomish counties to develop policies that guide activities that impact salmon listed under the ESA. This BMPs manual conforms to these policies and guidelines. IPM is the cornerstone of the approach taken by the tri-county plan. A copy of those policies and guidelines are presented in *Appendix A*.

The nearly 20,000 acres of parks and public lands managed by the King County Park System are very important to the mental and physical health of our region. All landscapes, however, are susceptible to threats from a variety of pests. Because some pests pose a threat not only to the landscape but also to park users, King County must manage pests in its parks and public lands.



Our goals in doing that include the following:

## 3.2 Definitions

---

- Address the safety of our park users.
- Protect the health and value of the landscape assets.
- Preserve and enhance King County's environmental and natural ecosystems.
- Ensure an intact, public legacy in our designed and developed parks.
- Provide attractive landscapes for public enjoyment.
- Provide functional and well-maintained active-use facilities.

In meeting these goals, IPM is used to control those pests that could damage or injure our environments, landscapes or park users. Budget realities will in some cases dictate the approach used, but Parks must seek sufficient funding to allow budgetary constraints to be a secondary, not primary, consideration.

### 3.2 Definitions

**Action level:** refers to level at which action must be taken to prevent a pest population at a specific site from reaching the **injury level**.

**Prescription:** refers to pest control activities utilize principles of IPM specific to types of sites or specific locations. We call this strategy an IPM "prescription." An IPM prescription addresses needs and uses of parklands while promoting the health and vigor of desirable vegetation. A BMP prescription ensures that natural predators of undesirable vegetation or of other pests are not eliminated.

**Injury level:** refers to point at which growth of a pest causes some unacceptable level of safety, public health, recreational impact, ecosystem, aesthetic or economic injury.

**Integrated Pest Management (IPM):** coordinated decision-making process and set of actions for pest control and vegetation management. IPM determines if, when, where and how pest control is needed and employed. The IPM process encourages design and implementation or retention of landscapes that meet their intended purposes while promoting healthy plants and minimizing pest problems. IPM requires careful monitoring to determine if and what form of pest control is necessary.

**Pest:** any weed, insect, rodent, nematode, snail, fungus or other plant or animal that adversely interferes with the aesthetics, health, safety, environmental or economic goal of the County. Pests (vectors) do not include viruses or microorganisms on or in a living person or animal, but do include plant diseases.

**Pesticides:** any substance registered by the Washington State Department of Agriculture (WSDA) as a pesticide.

### 3.3 Integrated Pest Management Program

The IPM process follows a continuum from design to maintenance. It begins with design and construction decisions or habitat analysis in natural areas and is followed by appropriate management actions by staff with up-to-date training. IPM uses cultural, physical, mechanical, biological and, where needed, chemical controls to keep pest populations or vegetation problems low enough to prevent intolerable damage, annoyance or public safety hazards. An IPM program must consider all these factors while remaining economically and environmentally feasible.

IPM encompasses use of chemical controls (pesticides), specifically in situations where pesticides may be the most environmentally responsible or safest way to deal with a problem. When pesticides are necessary, decisions on their use must consider any possible effects on aquatic life and any tendencies for the chemical to move in the environment. Decisions on chemical use are also weighed against other effective and practical control methods. An IPM program has nine major components:

- 1. Design.** A landscape, facility, or natural area should be designed to maximize intended uses of the land and minimize pest problems. Design considers such factors as types of use, soils, grading and slope, water table, drainage, proximity to sensitive areas, existing vegetation and control of potential pests.
- 2. Maintenance for Maximum Landscape Health.** A well-selected and maintained landscape dramatically reduces the need for pest control. Appropriate selection of plants, irrigation, application of mulch or fertilizer, mowing and other practices all help landscapes withstand pest pressures and support natural predators.
- 3. Knowing the Pest.** Identification of pests and their lifecycle are crucial to proper management. To focus IPM strategies, potential pests should be documented and then carefully identified. Field staff needs the opportunity to train in pest identification and time to conduct regular assessments.
- 4. Determining Tolerance, Injury and Action Levels.** IPM must establish tolerance thresholds. Thresholds may vary by pest, specific location or land use. Weed thresholds will differ among natural areas, developed parks and trails. Insect or plant disease tolerances likewise depend on use or location. There are some situations in which threshold levels must be set at or near zero. Laws and regulations set the population level at zero for most noxious weed species given their potential for economic injury or public health or environmental impact. Safety and infrastructure protection also factor into very low or zero thresholds for weeds. Examples include warning tracks or paved areas.
- 5. Monitoring for Pests.** Regular monitoring is important to assess pest levels, extent of infestation, locations and lifecycle. Assessments of established tolerance are necessary.
- 6. IPM Prescription.** The following elements should be considered when selecting appropriate IPM prescriptions:

### 3.3 Integrated Pest Management Program

---

- Preservation of natural systems and long-term health of the area.
- Damage to natural environment.
- Disruption to those natural controls that are present.
- Hazards to human health.
- Toxicity to aquatic life, including all aspects of salmon lifecycle and salmon food and amphibian lifecycles food.
- Mobility and persistence in the environment.
- Impact to non-target organisms.
- Timing relative to most vulnerable period in pest's lifecycle with least impact on natural enemies.
- Ability to produce long-term reduction in pest.
- Ability to be carried out effectively.
- Cost-effectiveness in short- and long-term.
- Ability to be measured.

**7. Implementation of IPM Prescription.** Well-trained staff should fully implement the prescription and record steps and control methods used.

**8. Monitoring and Evaluation.** Effectiveness of an IPM prescription should be measured, careful records kept and an evaluation process conducted to assess how well it brings about the desired results.

**9. Learning and Revision.** The results of applying IPM prescriptions and programs should be reviewed regularly and revised based on experience.

#### **Control Methods**

The control methods used in an IPM approach include the following:

- **Cultural.** Management activities that prevent pests from developing by enhancing desirable vegetation that out-competes or otherwise resists the pests. Cultural controls include seeding, fertilizing, mulching, pruning and trimming, and companion planting.
- **Physical.** Management activities that use hand removal, burning, barriers, baits, traps or other physical means to control pests.

- **Mechanical.** Management activities that use mechanical equipment to control pests. This equipment includes mowers, brush cutters, blades, hoes or weed-eaters.
- **Biological.** Management activities that use insects, animals, birds, diseases or competing vegetation to control pests.
- **Chemical.** Management activities that use chemical agents registered as pesticides by the Washington State Department of Agriculture (WSDA). Pesticides include herbicides, insecticides, fungicides and other chemicals. These chemicals repel, change the regular growth rate of, eradicate or otherwise reduce levels of targeted pests.

### **Record Keeping**

Good record keeping is essential for any successful IPM program. The following records must be maintained:

**IPM Program and Prescription:** Written IPM program and IPM prescriptions. These are kept in accessible locations and at the central records location at the Renton Shops.

**Pest Identification and Assessment:** Records of each documented pest. Records include date, specific location, name, reference used for identification, corroborating expert (as needed) stage of lifecycle, extent of pest presence and other pertinent information.

**Control Methods Implemented:** Control methods employed according to the IPM prescription. These include dates, location and other pertinent information.

**Pesticide Applications:** If chemical methods are employed, pesticide application records as required by WSDA, include, but are not limited to, the following:

- Licensed applicator's name.
- Application target or site, chemical name.
- Area of application, concentrations used.
- Amount and rate of application.
- Coverage rate.
- Equipment used.
- Weather conditions including temperature and wind, and date and time intervals of application.

replanting with appropriate species, and in some cases herbicide applications. It is usually necessary to constantly check the site for newly emerging seedlings and plants missed in previous control efforts.

Additional guidelines regarding noxious weeds include:

- a) Learn to recognize and eliminate noxious and invasive weeds before they establish.
- b) Choose non-invasive species for landscapes and gardens.
- c) Prevent noxious weed infestations by checking vehicles, clothing and equipment for weeds and seeds.
- d) Remove or control weeds safely and appropriately. The most important step is to control seed production by cutting down and bagging noxious plants.
- e) Protect yourself when working with noxious weeds; some, such as hogweed and leafy spurge, contain toxins that can damage skin on contact.
- f) Replant with appropriate species to prevent weeds from returning.
- g) Dispose of noxious weeds and weed seeds properly. Consult with the county program (contacts above) for specific recommendations. Do not compost any noxious weed debris that may contain seeds or plant parts that might take root.
- h) In cases where noxious weeds may impact habitat (aquatic or terrestrial), control measures may need to be taken to restore the habitat functions.

Some of the more common noxious weeds found in this region are:

- a) Giant hogweed - predominantly an urban weed and an escaped garden ornamental, its sap can cause skin blistering and scarring. Washington State law requires that giant hogweed be eradicated.
- b) Tansy ragwort - likely to infest pastures and roadsides, it has toxins that can be fatal to cows and horses and can be found in milk and honey.
- c) Spotted and diffuse knapweeds - threaten wildlife habitat, pastures, and grasslands by displacing beneficial species.
- d) Purple loosestrife - grows in wetlands and along lakes, rivers and streams; it chokes out wildlife habitat and clogs drainage ditches and irrigation canals. Purple loosestrife now invades wetlands in numerous states at an estimated cost of \$45 million a year for control and loss of forage crops, crowding out native plants and endangering the wildlife that depend on the native plants.
- e) Hydrilla - the most problematic aquatic plant in the U.S., it forms extensive surface mats that destroy freshwater fish habitat and recreation areas. Washington State law requires that hydrilla be eradicated.
- f) Parrotfeather - chokes out prime salmon habitat and reduces availability of refuge, exposing salmon to predators.

## INVASIVE NON-NATIVE PLANT REMOVAL

### DEFINITION:

The monitoring and control of non-native, invasive, and noxious weeds, from natural areas and developed park sites. Task includes travel to and from the site location, task preparation, post-task cleanup and storage of equipment, tools and materials.

### DESIRED RESULT:

The control of noxious and invasive weeds on lands in the custodianship of the King County Park System or contracted sites, to comply with King County Noxious Weed Board guidelines.

### GENERAL TASK PROCEDURE:

- Inventory property to determine if noxious weeds or invasive weeds are present.
- Define weed tolerance level for the site.
- Assess area to determine the most efficient control procedure (note weed's seed stage and act prior to seed dispersal).
- Remove noxious weeds as recommended by the King County Noxious Weed Board.
- Use IPM strategies to control weeds.
- Assess safety needs of the job site. Determine escape routes, set up flagging, cones, or barriers to regulate access to site. Provide staff to control flagging of the work area.
- Put on appropriate safety gear.
- Adjust, lubricate and sharpen tools and equipment as needed.
- If necessary apply herbicide label an (in accordance with State regulations), log information as required. \*
- Apply mulch (wood chips) to suppress weed growth, post removal.
- Clean and return equipment.
- Monitor to catch early return of weed.

### GENERAL FREQUENCY:

As needed or planned.

### TIME STANDARD:

Calendar is January through December.  
Time Standard is variable.



Noxious weeds are non-native plants that are highly destructive, competitive and difficult to control or eliminate. These invasive species are introduced intentionally or accidentally through human actions. They may have appeared in the Northwest as ornamental garden plants, in wildflower seed mixes, agricultural crops, contaminated hay or seed, aquariums and water gardens. These exotic species can reduce crop yields, destroy native plant and animal habitat, damage recreational opportunities, clog waterways, lower land values and poison humans and livestock. Noxious weeds should be controlled wherever they occur and should not be introduced to new sites.

**2001 KING COUNTY NOXIOUS WEED LIST**

The King County Noxious Weed Control Board has adopted the 2001 County Weed List to include all Class A weeds, B designates, plus County-selected priority species. Additional species designated by the WAC 16-750-005 for control in King County which have yet to be found growing locally shall be subject to on-going surveys and will be controlled if found.

Suspected or known sources of introduction are indicated in the columns following each species' name.



Information here is available in alternate formats upon request. Call: 206-296-0290. TTY: 1-800-833-6388

- Prevent weed infestations:**
- ☼ Use weed-free seed and forage.
  - ☼ Obey noxious weed laws and quarantines.
  - ☼ Choose non-invasive species for your gardens and landscapes.
  - ☼ Check vehicles, clothing, boats, boat trailers and camping equipment for weeds and seeds.
  - ☼ Never dump aquarium plants into a pond or stream.
  - ☼ Cover compost, topsoil and mulch piles with a tarp.

- Control weed infestations:**
- ☼ Remove or control weeds safely and appropriately.
  - ☼ Re-plant with appropriate species to prevent weeds from returning.
  - ☼ Prevent seed production and the spread of weeds at a minimum.
  - ☼ Properly dispose of noxious weeds and weed seeds.
  - ☼ Follow best management practices for pastures and open spaces.

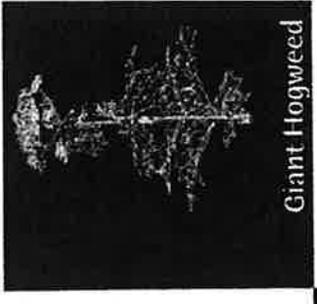
To find out more about identifying, removing and controlling noxious weeds, please call:

**206-296-0290**  
<http://dnr.metrokc.gov/weeds>  
**King County Noxious Weed Control Program**  
 King County Department of Natural Resources  
 Resource Lands & Open Space Section  
 201 South Jackson Street, Suite 600  
 Seattle, WA 98104-3855

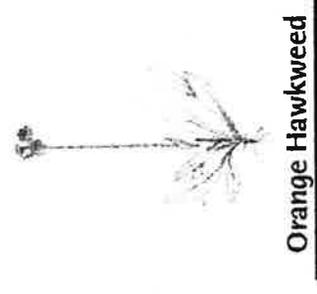
Brochure produced by the King County DNR GIS & Visual Communications Unit 0012noxiousWEEDbroch WGC

2001

King County Noxious Weed List



Giant Hogweed



Orange Hawkweed



Tansy Ragwort



Purple Loosestrife



**CLASS A WEEDS** have a limited distribution in Washington. Control and eventual eradication of these species is required in all of Washington State including King County.

Common Name	Scientific Name				
bean-caper, Syrian	<i>Zygophyllum fabago</i>	X			
blueweed, Texas	<i>Helianthus ciliaris</i>	X	X		
broom, Spanish	<i>Spartium junceum</i>	X	X		
buffalobur	<i>Solanum rostratum</i>	X	X		
clary, meadow	<i>Salvia pratensis</i>	X	X		
cordgrass, salt meadow	<i>Spartina patens</i>	X	X		
crupina, common	<i>Crupina vulgaris</i>	X	X		
flax, spurge	<i>Thymelaea passerina</i>	X	X		
four o'clock, wild	<i>Mirabilis nyctaginea</i>	X	X		
garlic mustard	<i>Alliaria petiolata</i>	X	X		
goatsrue	<i>Galega officinalis</i>	X	X		
hawkweed, yellow devil	<i>Hieracium floribundum</i>	X	X		
hogweed, giant	<i>Hieracium mantegazzianum</i>	X	X		
hydrilla	<i>Hydrilla verticillata</i>	X	X		
johnsongrass	<i>Sorghum halapense</i>	X	X		
knawweed, bighead	<i>Centaurea macrocephala</i>	X	X		
knawweed, Yochin	<i>Centaurea nigrescens</i>	X	X		
lawnweed	<i>Soliva sessilis</i>	X	X		
nightsshade, silverleaf	<i>Solanum elaeagnifolium</i>	X	X		
peganum	<i>Peganum harmala</i>	X	X		
sage, clary	<i>Salvia sclarea</i>	X	X		
sage, Mediterranean	<i>Salvia aethiopsis</i>	X	X		
saltcedar	<i>Tamarix ramosissima</i>	X	X		
spurge, eggleaf	<i>Euphorbia oblongata</i>	X	X		
starthistle, purple	<i>Centaurea calcitrapa</i>	X	X		
thistle, Italian	<i>Carduus pycnocephalus</i>	X	X		
thistle, milk	<i>Silybum marianum</i>	X	X		
thistle, slenderflower	<i>Carduus tenuiflorus</i>	X	X		
velvetleaf	<i>Abutilon theophrasti</i>	X	X		
woad, dyers	<i>Isatis tinctoria</i>	X	X		

**CLASS B WEEDS** are presently limited to portions of Washington. Control of these weeds is required in King County.

Common Name	Scientific Name				
blueweed	<i>Echium vulgare</i>	X	X		
broom, Scot's	<i>Cytisus scoparius</i>	X	X		

**CLASS B WEEDS** continued

Common Name	Scientific Name				
bugloss, annual	<i>Anchusa arvensis</i>	X	X		
bugloss, common	<i>Anchusa officinalis</i>	X	X		
chervil, wild	<i>Anthriscus sylvestris</i>	X	X		
cinquefoil, sulfur	<i>Potentilla recta</i>	X	X		
cordgrass, common	<i>Spartina anglica</i>	X	X		
cordgrass, smooth	<i>Spartina alterniflora</i>	X	X		
fanwort	<i>Cabomba caroliniana</i>	X	X		
gorse	<i>Ulex europaeus</i>	X	X		
hawkweed, mouseear	<i>Hieracium pilosella</i>	X	X		
hawkweed, orange	<i>Hieracium aurantiacum</i>	X	X		
hawkweed, polar	<i>Hieracium atriatum</i>	X	X		
hawkweed, smooth	<i>Hieracium laevigatum</i>	X	X		
hawkweed, yellow	<i>Hieracium caespitosum</i>	X	X		
hedgearsley	<i>Torilis arvensis</i>	X	X		
knawweed, black	<i>Centaurea nigra</i>	X	X		
knawweed, brown	<i>Centaurea jacea</i>	X	X		
knawweed, diffuse	<i>Centaurea diffusa</i>	X	X		
knawweed, meadow	<i>Centaurea jacea x nigra</i>	X	X		
knawweed, Russian	<i>Acroptilon repens</i>	X	X		
knawweed, spotted	<i>Centaurea biebersteinii</i>	X	X		
kochia	<i>Kochia scoparia</i>	X	X		
loosestrife, garden	<i>Lysimachia vulgaris</i>	X	X		
loosestrife, purple	<i>Lythrum salicaria</i>	X	X		
loosestrife, wand	<i>Lythrum virgatum</i>	X	X		
nutsedge, yellow	<i>Cyperus esculentus</i>	X	X		
parrotfeather	<i>Myriophyllum aquaticum</i>	X	X		
pepperweed, perennial	<i>Lepidium latifolium</i>	X	X		
policeman's helmet	<i>Impatiens glandulifera</i>	X	X		
ragwort, tansy	<i>Senecio jacobaea</i>	X	X		
sowthistle, perennial	<i>Sonchus arvensis</i>	X	X		
skeletonweed, rush	<i>Choridilla juncea</i>	X	X		
snapdragon, dwarf	<i>Cheanorhinum minus</i>	X	X		
spurge, leafy	<i>Euphorbia esula</i>	X	X		
thistle, musk	<i>Carduus nutans</i>	X	X		
thistle, plumelless	<i>Carduus acanthoides</i>	X	X		
thistle, Scotch	<i>Onopordum acanthium</i>	X	X		
toadflax, Dalmatian	<i>Linaria dalmatica</i>	X	X		
water primrose	<i>Ludwigia hexapetala</i>	X	X		
yellow floating heart	<i>Nymphoides peltata</i>	X	X		

Note: Weeds shown in **bold typeface** are new to the 2001 list.

**CLASS C WEEDS** are common throughout most of Washington. These weeds have been selected as priority weeds in King County and control is mandatory.

Common Name	Scientific Name				
St. Johnswort, common	<i>Hypericum perforatum</i>	X	X		
toadflax, yellow	<i>Linaria vulgaris</i>	X	X		
wormwood, absinth	<i>Artemisia absinthium</i>	X	X		

**WEEDS OF CONCERN**

Control and containment of existing populations of these noxious and other weeds is strongly encouraged in King County.

Common Name	Scientific Name				
bindweed, field	<i>Convolvulus arvensis</i>	X	X		
<b>blackberry, evergreen</b>	<b><i>Rubus laciniatus</i></b>	X	X		
<b>blackberry, Himalayan</b>	<b><i>Rubus discolor</i></b>	X	X		
canarygrass, reed	<i>Phalaris arundinacea</i>	X	X		
carrot, wild	<i>Daucus carota</i>	X	X		
daisy, oxeye	<i>Leucanthemum vulgare</i>	X	X		
elodea, Brazilian	<i>Egeria densa</i>	X	X		
herb Robert	<i>Geranium robertianum</i>	X	X		
<b>ivy, English</b>	<b><i>Hedera helix</i></b>	X	X		
knawweed, giant	<i>Polygonum sachalinense</i>	X	X		
knawweed, Japanese	<i>Polygonum cuspidatum</i>	X	X		
nightsshade, bitter	<i>Solanum dulcamara</i>	X	X		
old man's beard	<i>Clematis vitalba</i>	X	X		
poison hemlock	<i>Conium maculatum</i>	X	X		
<b>reed, common</b>	<b><i>Phragmites australis</i></b>	X	X		
tansy, common	<i>Tanacetum vulgare</i>	X	X		
thistle, bull	<i>Cirsium vulgare</i>	X	X		
thistle, Canada	<i>Cirsium arvense</i>	X	X		
watermilfoil, Eurasian	<i>Myriophyllum spicatum</i>	X	X		

**KEY TO SOURCES OF INTRODUCTION CODES**

- Agricultural (Crops, seed, feed, pastures, etc.)
- Garden (Ornamentals, landscaping, seed mixes, herbal or medicinal, etc.)
- Fresh or saltwater aquatic (Water gardens, ponds, aquariums, etc.)
- Other (Ships' ballast, gravel, unknown)

**X** Known Introduction Source-type  
 Suspected Introduction Source-type

**APPENDIX D**

**Drainage Maintenance**



# DRAFT FOR DISCUSSION PURPOSES

November 14, 2001

## East Lake Sammamish Trail

### Grounds Support Storm Drainage Maintenance Plan

#### Article I. Scheduled Work

##### *Section 1.01 Dry Ditch Cleaning*

- (a) Dry Ditches (can be done any time) task timing will take place April to October as weather allows.
- (b) All disturbed soil less than @10,000 square feet, (sf), will be seeded by hand, (BMP 2.81). Areas larger than @10,000 sf will be hydro seeded, (BMP 2.83) as the ditches are cleaned. Silt mat will be installed over all seeded areas, (BMP 2.123). Coir Log, (BMP 2.37) will be placed down stream until secondary roots of seeding. This will re-establish grass lined channel, (BMP 2.74).
- (c) Previously placed silt fencing will be removed as a part of the cleaning process where the ongoing need for the fences is not necessary.

##### *Section 1.02 Wet Ditch Cleaning*

- (a) Wet ditches can only be cleaned from June 16 to October 15<sup>th</sup> when cleaning dry is not a practical option.
- (b) Wet ditches will follow the provision identified in the HPA permit.
- (c) Fish Exclusion Protocol, (Appendix B), will be implemented when required. Current crews with training and equipment are; Department of Transportation, Roads Maintenance, ecological unit and Department of Natural Resources, Water and Land Resources Division.
- (d) Stream Bypass, (BMP 2.148) will be used for areas of flowing water. Dewatering, (BMP 2.57) shall be used for areas of standing water.
- (e) All disturbed soil less than @10,000 sf will be seeded by hand, (BMP 2.81). Areas larger than @10,000 sf will be hydro seeded, (BMP 2.83) re- as the ditches are

# DRAFT FOR DISCUSSION PURPOSES

November 14, 2001

cleaned. Silt mat will be installed over all seeded areas, (BMP 2.123). Coir Log, (BMP 2.37) will be placed down stream until secondary roots of seeding. This will re-establish grass lined channel, (BMP 2.74).

- (f) Previously placed silt fencing will be removed as a part of the cleaning process where the ongoing need for the fences is not necessary.

## ***Section 1.03 Culvert Inspection and Replacement***

- (a) Beaver Lake District Office will maintain a drainage log, comprised of completed checklists for culverts and ditches throughout the trail corridor where problems have been identified through observation of District or Support Maintenance staff or citizen complaint.
- (b) Annually, and prior to the formation of the annual budget, the District Manager, Maintenance /CIP Liaison, and Resource Coordinator will visit each of the sites where outstanding or potential drainage problems have been documented with completed checklists.
- (c) Each of the sites will be reviewed and prioritized, considering (1) current condition and function, (2) fish use, (3) proximity to upstream barriers, (4) existing habitat and potential to extend habitat. A site's jurisdiction will not be considered in the reviewing and prioritizing process.
- (d) A plan for repair or replacement in the next budget year will be prepared that includes replacement of 1-3 culverts with associated fish passage improvements as appropriate.
- (e) Should the scope of culvert replacement necessary exceed \$50,000 or the ability of Parks Maintenance staff to complete, a capital budget request will be submitted.

# DRAFT FOR DISCUSSION PURPOSES

November 14, 2001

## Article II. **Unscheduled Work**

### ***Section 2.01 Clearing of clogged culverts***

- (a) As needed the crews will clear clogged culverts that may pose integrity concerns for the trail or endanger adjacent properties.
- (b) For culvert in flowing water, Fish Exclusion Protocol, (Appendix B), will be implemented when required. Current crews with training and equipment are; Department of Transportation, Roads Maintenance, ecological unit and Department of Natural Resources, Water and Land Resources Division. Stream Bypass, (BMP 2.148) will be used. Vactor, (BMP 2.172) will be used.
- (c) For Culvert in standing water, Dewatering, (BMP 2.57). Vactor (BMP 2.172) will be used.
- (d) For culverts that are dry, Vactor (BMP 2.17) will be used.

### ***Section 2.02 Repair or replacement of ditches or culverts that are dry***

- (a) On an as needed basis, repairs or replacements will be done to culverts. Silt Fence, (BMP 2.120), Mulching, (BMP 2.103). All disturbed soil less than @10,000 sf will be seeded by hand (BMP 2.81). Areas larger than @10,000 sf will be hydro seeded , (BMP 2.83) Silt mat will be installed over all seeded areas, (BMP 2.123). Coir Log, (BMP 2.37) will be placed down stream until secondary roots of seeding.
- (b) As needed repairs will also be made to ditches that have collapsed or are blown out due to erosion or obstructions. All disturbed soil less than @10,000 sf will be seeded by hand, (BMP 2.81). Areas larger than @10,000 sf will be hydro seeded , (BMP 2.83). Silt mat will be installed over all seeded areas, (BMP 2.123). Coir Log, (BMP 2.37) will be placed down stream until secondary roots of seeding. This will re-establish grass lined channel, (BMP 2.74).

### ***Section 2.03 Repair or replacement of blown out culverts and ditches that in are water***

- (a) On an as needed basis, repairs or replacements will be done to culverts. Fish Exclusion Protocol, (Appendix B), will be implemented when required. Current crews with training and equipment are; Department of Transportation, Roads Maintenance, ecological unit and Department of Natural Resources, Water and Land Resources Division. Stream Bypass, (BMP 2.148) will be used for areas of

# DRAFT FOR DISCUSSION PURPOSES

November 14, 2001

flowing water. Dewatering, (BMP 2.57) shall be used for areas of standing water. Silt Fence, (BMP 2.120), Mulching, (BMP 2.103). All disturbed soil less than @ 10,000 sf will be seeded by hand (BMP 2.81). Areas larger than @ 10,000 sf will be hydro seeded, (BMP 2.83) Silt mat will be installed over all seeded areas, (BMP 2.123). Coir Log, (BMP 2.37) will be placed down stream until secondary roots of seeding.

- (b) On an as needed basis, repairs or replacements will be done to open ditches. Fish Exclusion Protocol, (Appendix B), will be implemented when required. Current crews with training and equipment are; Department of Transportation, Roads Maintenance, ecological unit and Department of Natural Resources, Water and Land Resources Division. Stream Bypass, (BMP 2.148) will be used for areas of flowing water. Dewatering, (BMP 2.57) shall be used for areas of standing water. Silt Fence, (BMP 2.120), Mulching, (BMP 2.103) will be used. All disturbed soil less than @ 10,000 sf will be seeded by hand (BMP 2.81). Areas larger than @ 10,000 sf will be hydro seeded, (BMP 2.83) Silt mat, (BMP 2.123), will be installed over all seeded areas. Coir Log, (BMP 2.37) will be placed down stream until secondary roots of seeding.

## **Article III. Sequencing of Work and Requirements**

### ***Section 3.01 Sequencing***

- (a) In all foreseeable cases scheduled work will be done starting at the north end of the trail and progress to the south.
- (b) Unscheduled work will be done at the site of the need.

### ***Section 3.02 Requirements***

- (a) District Managers and the Resource Coordinator will be informed prior to the start of work along with notification to the Project Administrator.
- (b) All applicable BMP protections, notifications and necessary permits will be in place prior to the start of work.

## **DRAINAGE MAINTENANCE & REPAIR**

### **DEFINITION:**

Maintenance and repair of drainage systems within properties under the custodianship of King County Parks or contract sites, including retention ponds, bio-swales, culverts, gutters, catch basins, natural drainage systems, trail drainage elements, and oil separators.

### **DESIRED RESULT:**

All drains, catch basins, culverts, gutters and other drainage features should be kept clear, clean and functional, and in a state of good repair. No contaminants or silt shall be allowed to enter the stormwater system and cause contamination of any stream, river or other waterway. Habitat existing in ditch structures or natural structures is not to be damaged in maintenance process.

### **GENERAL TASK PROCEDURE:**

- Apply and receive proper permits prior to maintenance actions if required (HPA, NPDES, DDES and others).
- An environmental review list is to be used to inspect work site to determine those environmental measures/tasks/materials that are necessary.
- Time to do task is when system is dry or minimum moisture possible. Do not do this task prior to storms, check predicted weather patterns.
- Travel to and from site.
- Unload equipment and tools from vehicle or pickup on-site.
- Use all Best Management Practices including SWM for individual parts of systems (see in appendix), install silt barriers prior to any actions disturbing soils.
- Inspect, clean and remove vegetation from catch basins, gutters and other structures at least once every three months.
- Check and clean debris and vegetation from drainage swales and culverts, at least once every three months. Be careful not to expose bare soil that can erode into the storm drainage.
- Clear grates, filters and other openings of debris and vegetation.
- Perform routine inspections of oil separators and maintain as mandated by Water and Land Resources standards and regulations, DOE, NPDES and DDES.
- Repair, replace or report missing or damaged grates, traps and doors.
- Construct water bars, etc., on natural trails, and outlets using approved technology.
- Remove all invasive weeds (purple loosestrife).
- Work with other agencies and contractors on drainage matters such as contracting vector services from KC road.
- Secure areas due to flooding, and in heavy rainfall.

**DRAINAGE MAINTENANCE & REPAIR (cont.)**

**GENERAL FREQUENCY:**

Inspections - Minimum of quarterly, and corrective maintenance as required.

**TIME STANDARD:**

Calendar is January through December.  
Time Standard is variable.



## BMP: COIR LOG

### DESCRIPTION

A coir log is a manufactured coconut fiber log used as a structural and rooting mechanism for bioengineered systems. These logs can be used to provide filter/perimeter protection, settling, reduction in water velocity/erosive forces and habitat protection/maintenance. They may be cut or folded, to the appropriate length, to fit the desired location.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Intercepting sheet flow.
- Intercepting and detaining small amounts of water from disturbed areas during construction operations in order to promote settling of soil particles.
- Filtering soil particles, debris and snow sand.
- Trapping topsoil and retaining moisture from rainfall, which aids in growth of seedlings planted along the upslope side of the rolls.

### APPLICATIONS

This BMP may be used for temporary check dams in ditches of any dimension, temporary soil stockpile protection, drop inlet protection, temporary interceptor dike and swale, check dam in ditches and/or bank stabilization. Coir logs may also be used for habitat protection at the toe of a bank and can be incorporated with vegetative planting. This BMP may be used for perimeter sediment control. This BMP is particularly useful in areas where the effects of soil disturbance need to be minimized. It may be used in combination with other BMPs.

### LIMITATIONS

This BMP should not be used:

- Where flow volume or velocity inhibit BMP function.
- When maintenance activities conducted in locations could reduce actual or potential high flow salmonid refuge functions, this BMP will be used if required by permit conditions.

### **CONSTRUCTION GUIDELINES**

- Coir log installation must be done in accordance with applicable design and/or permit conditions.
- Install to prevent water from going around or under BMP.
- BMP must be staked (wood only) to insure soil particle containment.
- When using as a check dam, prior to installation, cut or fold to proper length.

### **BMP MAINTENANCE**

- During construction, inspect BMPs daily during the workweek. Schedule additional inspections during storm events. Make any required repairs.
- Sediment should be removed when deposits reach one-half the height of the BMP.

### **BMP REMOVAL**

- Evaluate site to determine BMP is no longer needed (the area has stabilized- potential of sediment laden water exiting the area has passed).
- Remove sediment buildup in front of BMP.
- Removal of BMP may not always be necessary.
- Depending upon BMP placement, re-vegetation of site may be necessary.



## BMP: DEWATERING

### DESCRIPTION

Dewatering can be used to keep water from a work area by using any or all of the following: pump, barrier, vector, or bypass culvert.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Allowing work to be performed in dry conditions.
- Reducing the transport of soil particles by flowing water.
- Reducing the liquefaction of soils.

### APPLICATIONS

This BMP may be used in, but not limited to, ditches, watercourses or streams, channels, swales and excavations. It will generally be used in combination with other BMPs.

### LIMITATIONS

This BMP should not be used:

- Where flows are greater than pump capacity.

### CONSTRUCTION GUIDELINES

- Determine if the project will require continuous dewatering.
- Schedule pumping, monitoring and maintenance activities accordingly.
- Dewatering must be used in accordance with applicable design and/or permit conditions.
- Refer to Appendix B for Fish Exclusion Protocols.
- Install a "Keep Water from Work Area" BMP.
- Install dewatering devices.
- Install site specific barrier, prior to dewatering, to prevent exterior water from entering construction area.
- Ensure water discharged from the site is not allowed to cause erosion.
- Dewatered water will be discharged to:
  - A containment device.
  - A sanitary sewage system.
  - Other BMPs to remove water borne soil particles prior to the water being reintroduced to a storm drainage system, water course or stream.

BMP: DEWATERING (continued)

### **BMP MAINTENANCE**

- Schedule pumping, monitoring and maintenance activities in accordance with dewatering needs.
- During construction, inspect BMPs daily during the workweek. Schedule additional inspections during storm events. Make any required repairs immediately.
- Inspect bypass, pump, and barrier periodically. Make necessary repairs.
- Check for erosion at discharge. Repair or move as necessary.
- Have adequate fuel supply and backup pumps in the event of mechanical failure.

### **BMP REMOVAL**

- Remove BMP (recycle and/or re-use if applicable).
- Reintroduce water gradually.
- Re-vegetate area disturbed by BMP removal (if applicable).



## **BMP: GRASS LINED CHANNEL**

### **DESCRIPTION**

A grass lined channel is the vegetative lining of a ditch, watercourse, stream, or swale to protect it from erosion and to provide filter/perimeter protection.

### **PURPOSE**

The purpose of this BMP includes, but is not limited:

- Reducing erosion by providing ground cover, binding soil particles with roots, and lowering water velocity.
- Providing filter/perimeter protection.
- Providing habitat for primary production.
- Providing habitat for prey base organisms such as macro-invertebrates.

### **APPLICATIONS**

This BMP may be used where a vegetative lining can provide sufficient stability for the channel grade by decreasing velocity; where site conditions require establishment of vegetation (climate, soil and topography are present). This BMP may be used in combination with other bank stabilizing methods.

### **LIMITATIONS**

This BMP should not be used:

- When maintenance activities are conducted in locations which could reduce actual or potential high flow salmonid refuge functions.
- In locations where there is frequent turbulence with flows likely to rip out grass lining, creating erosion and downstream plugging of system.

### **CONSTRUCTION GUIDELINES**

- This BMP must be used in accordance with applicable permit requirements.

### **BMP MAINTENANCE**

- During initial vegetation establishment, inspection should occur and any necessary repairs made.
- After vegetation establishment, the channel should be inspected periodically to determine if the channel is withstanding flow velocities without damage.

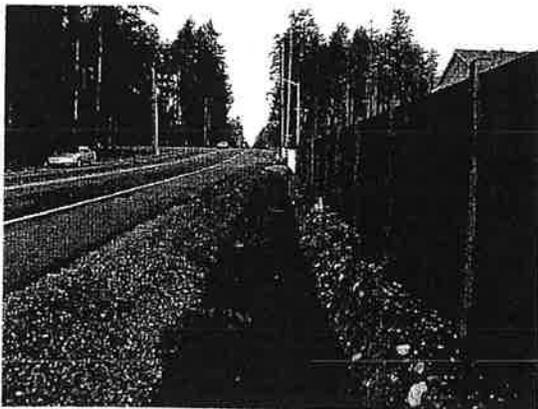
- Check the channel for debris, scour, or erosion and make repairs.
- Remove all significant sediment accumulations to maintain the designed carrying capacity. Debris such as litter, car parts, appliances and items that pose a risk to public safety should be removed. Any LWD that falls into the channel and does not pose a threat to public safety should be left in place.
- Check channel outlet and all road crossings for bank stability, evidence of piping or scour holes and make repairs.

### **BMP REMOVAL**

- BMP removal is not necessary.



*Grass lined channel; reducing erosion by providing ground cover*



*Grass lined channel: providing a filter*



## BMP: HAND SEEDING

### DESCRIPTION

Hand seeding is broadcasting grass seed on disturbed areas by hand or a hand seeding device. This BMP is used to reduce potential for soil becoming water or air borne, to reduce water velocity/erosive forces after vegetation establishment and to aid in habitat protection/maintenance.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Establishing vegetation in sparse, bare and/or exposed soil areas.
- Decreasing soil erosion.

### APPLICATIONS

This BMP may be used after soil disturbance is completed at construction sites. This BMP may be used in areas that need to be permanently or temporarily vegetated. It may be used in conjunction with other BMPs.

### LIMITATIONS

This BMP should not be used:

- In months when seed germination will not occur. (In winter months, see "Mulching" and/or "Plastic Covering" BMPs).

### CONSTRUCTION GUIDELINES

- Seed mixes vary. Seed selection should be based on the intended use of the area it is applied to, for example, low growing grass versus ditch bank grass.
- Spread seed uniformly and according to manufacturers recommendations.
- Cover with other methods as needed to protect surface (for example, light application of mulch, jute matting).

### BMP MAINTENANCE

- Inspect during seed establishment period. Re-seed, due to mortality, as necessary.

BMP: HAND SEEDING (continued)

- Schedule additional inspections during storm events and/or heavy rainfall. Check for scour and sloughing; any required repairs shall be made.

**BMP REMOVAL**

- BMP removal is not necessary.



## BMP: HYDROSEEDING

### DESCRIPTION

Hydroseeding is broadcasting grass seed, tackifier, wood fiber mulch and water on disturbed areas by using a hydroseeding machine. This BMP is used to reduce potential for soil becoming water or air borne, to reduce water velocity/erosive forces after vegetation establishment and to aid in habitat protection/maintenance.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Establishing vegetation in sparse, bare and/or exposed soil areas over a large site.
- Decreasing soil erosion.

### APPLICATIONS

This BMP may be used after soil disturbance is completed at construction sites. This BMP may be used in areas that need to be permanently or temporarily vegetated. It may be used in conjunction with other BMPs.

### LIMITATIONS

This BMP should not be used:

- In months when seed germination will not occur. (In winter months, see "Mulching" and/or "Plastic Covering" BMPs).
- During strong winds or freezing weather.

### CONSTRUCTION GUIDELINES

- Seed mixes vary. Seed selection should be based on the intended use of the area it is applied to. i.e. low growing grass versus ditch bank grass.
- Spread seed uniformly and according to manufacturer's recommendations.
- Cover hydroseeded area with other methods as needed.
- Hydroseeding should be applied after finish grading and/or surface roughening. Application may depend on slope, soil, exposure and time of year.
- Tackifier and/or moisture retention agent may need to be added, per state standard.

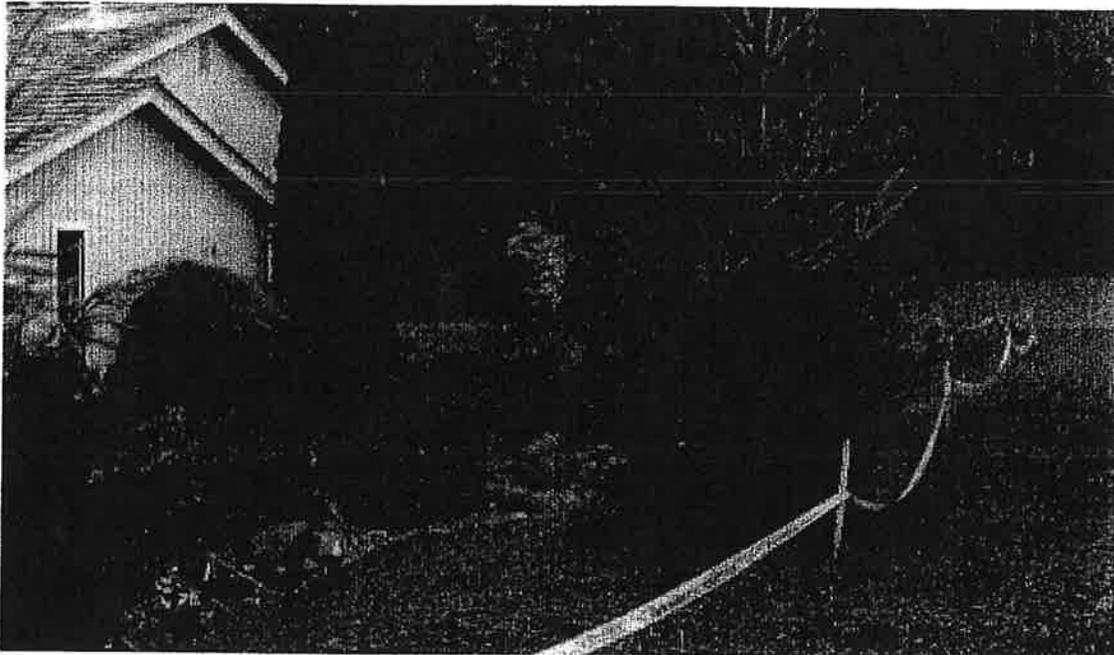
BMP: HYDROSEEDING (continued)

### **BMP MAINTENANCE**

- Inspect during seed establishment period. Re-seed, due to mortality, as necessary.
- Schedule additional inspections during storm events and/or heavy rainfall. Check for scour and sloughing; any required repairs shall be made.

### **BMP REMOVAL**

- BMP removal is not necessary.



*Erosion protection and vegetation establishment after maintenance work*



## BMP: MULCHING

### DESCRIPTION

Mulching is the application of straw, wood chips, or other suitable materials on the soil surface applied manually or by machine. This BMP is used to reduce potential for soil becoming water or air borne and to reduce water velocity/erosive forces after vegetation establishment.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Reducing erosion by protecting the soil surface from raindrop impact or wind.
- Decreasing surface water or wind velocity impacts.
- Fostering the growth of vegetation by increasing available moisture and providing insulation against extreme heat and cold.

### APPLICATIONS

This BMP can be used in areas to provide protection to the soil surface. Areas that have been seeded can be mulched to provide additional protection. This BMP may be used in combination with plantings of trees, shrubs, certain ground covers or in conjunction with seeding.

### LIMITATIONS

This BMP should not be used:

- On slopes steeper than 2 horizontal to 1 vertical.
- In watercourse and streams.
- In ditches where water flow is continuous.

### CONSTRUCTION GUIDELINES

- When used near watercourses or streams, this BMP must be used in accordance with permit requirements.
- Mulch should be applied so that the soil is covered sufficiently enough to allow seeds to germinate, but also protects the soil from erosion.
- Nets and matting may be used in combination with mulch.
- Various types and sizes of mulch are available.
- If used to stabilize soil from wind forces, the mulch needs to be tilled or incorporated into the soil.

BMP: MULCHING (continued)

### **BMP MAINTENANCE**

- During construction, inspect BMPs daily during the workweek. Schedule additional inspections during storm events. Make any required repairs.
- Additional mulch should be applied where erosion or scouring occurs.
- If a tear occurs in the cover netting or matting, repair as necessary.

### **BMP REMOVAL**

- BMP removal is not necessary under normal circumstances.



*Using straw to reduce erosion in a slide area prior to a major stabilizing project*



## BMP: SILT FENCE

### DESCRIPTION

A silt fence is a temporary sediment barrier consisting of fabric stretched across and attached to supporting posts and entrenched into the soil. It is generally installed perpendicular to the flow direction to slow or stop water and to allow filter/perimeter protection, settling of soil particles, and/or reduce water velocity/erosive forces.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Intercepting sheet flow.
- Intercepting and detaining small amounts of water from disturbed areas during construction operations in order to allow for filtering or settling of soil particles.
- Decreasing down slope sheet flow velocity.
- Retain soil particles on site.

### APPLICATIONS

This BMP may be used for perimeter protection. It may be used in combination with other BMPs.

This BMP may be used below disturbed areas subject to sheet and rill erosion where drainage area is no greater than .25 acre per 100 lineal feet of barrier and the slope behind the barrier should be no steeper than 2 horizontal feet to 1 vertical foot. On relatively flat slopes the maximum disturbed slope distance should not exceed 100 feet. The allowable disturbed slope distance decreases as the slope gets steeper.

### LIMITATIONS

This BMP should not be used:

- Where rock or hard surfaces prevent the full and uniform anchoring of the barrier.
- Directly in perennial streams or water courses.
- Around drop inlets.
- In front of storm drain inlets.
- As a diversion dam.

## CONSTRUCTION GUIDELINES

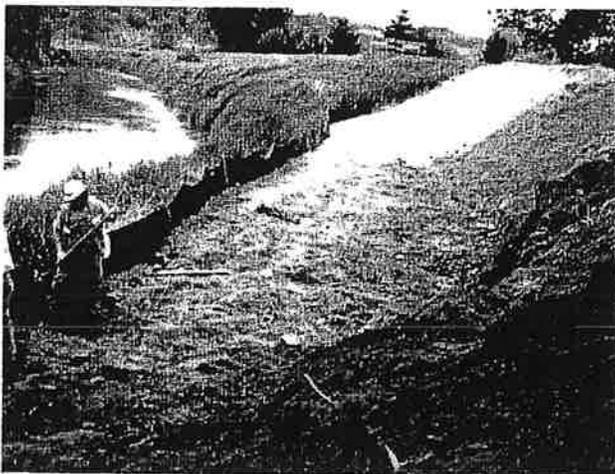
- The BMP should be placed along contours.
- The bottom of the fabric must be continuously and securely anchored for its entire length to prevent undermining.
- The height of the fence shall be adequate to reduce the potential of silt from leaving the job site.
- There must be at least a three-foot overlap at vertical seams to avoid leakage. Both ends of the overlap must be securely attached to posts.
- Increase the elevation at the ends of the BMP installation to prevent "end runs."

## BMP MAINTENANCE

- During construction, inspect BMPs daily during the workweek. Schedule additional inspections during storm events. Make any required repairs.
- Replace damaged sections of fabric.
- Repair damaged BMPs due to end runs or undercutting.
- Sediment should be removed when deposits reach one-half the height of the BMP.

## BMP REMOVAL

- Evaluate site to determine BMP is no longer needed (the area has stabilized- potential of sediment laden water exiting the area has passed).
- Remove sediment buildup in front of BMP.
- Remove BMP (recycle and/or re-use if applicable).
- Re-vegetate area disturbed by BMP removal.



*Silt fence being installed on a temporary access road; used as perimeter protection*



## BMP: SILT MAT

### DESCRIPTION

A silt mat is a flat pre-manufactured pad made in three layers: jute mesh, excelsior, and burlap. The pads are 4 feet by 10 feet and are biodegradable. Sediment passes through the mat layers and is held by the burlap layer. Silt mats can be used to provide filter/perimeter protection, settling and reduction in water velocity/erosive forces.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Intercepting and detaining small amounts of soil particles.
- Preventing erosion at discharge points.

### APPLICATIONS

It may be used at pump discharges, pipe outlets, and/or downstream of work sites to retain soil particles and provide stabilization. It may also be used in ditch lines. It may be used in combination with other BMPs.

### LIMITATIONS

This BMP should not be used:

- As the only BMP when excessive soil particles are present.
- In high flow rates.
- As the only BMP when excessive fines are present.

### CONSTRUCTION GUIDELINES

- This BMP may be used singly or in a group on the streambed immediately downstream of a work site.
- Silt mats should be installed with either staples or stakes.
- There is no need for disposal; place on adjacent slope or leave in place after use and add seed and mulch to stabilize the slope.
- Joints need to be overlapped according to flow.

### BMP MAINTENANCE

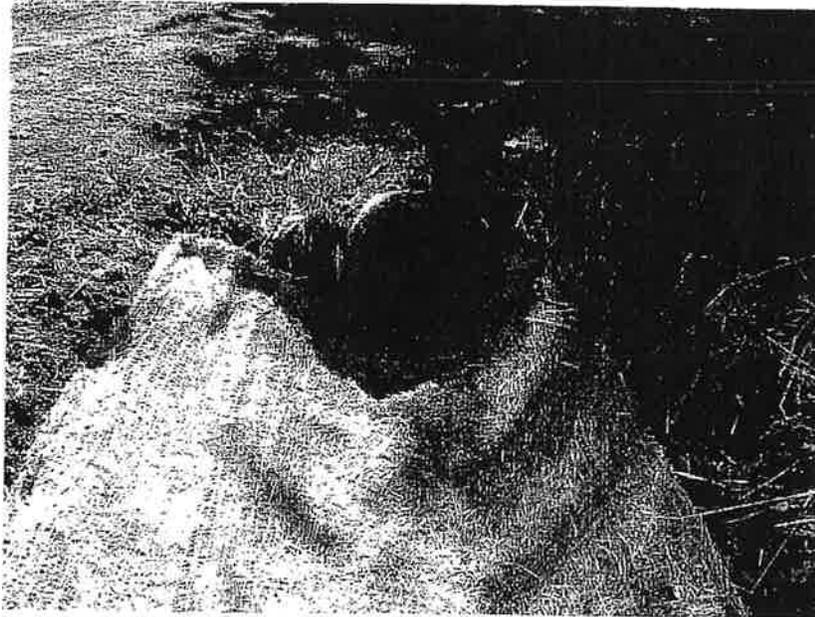
- During construction, inspect BMP's daily during the workweek. Schedule additional inspections during storm events. Make any required repairs.

BMP: SILT MAT (continued)

- Sediment loads should be monitored frequently to ensure the silt mat's capacity load is not exceeded. Replace silt mats before capacity is reached.
- Check periodically for gaps.

**BMP REMOVAL**

- Evaluate site to determine BMP is no longer needed (the area has stabilized- potential of sediment laden water exiting the area has passed).
- Remove BMP (recycle and/or re-use if applicable).
- Silt mat may be incorporated into permanent stabilization/re-vegetation process.
- Re-vegetate area disturbed by BMP removal (if applicable).



*Silt mat installed in ditch to decrease erosion  
and allow settlement of suspended solids*



## BMP: STREAM BYPASS

### DESCRIPTION

A stream bypass is a method of diverting the main flow of a stream to a temporary alternate route during construction. It is used in conjunction with a cofferdam and pumps. A stream bypass may be constructed by various methods or combination of methods such as earthen berms, sand bags, ecology blocks and aqua barriers.

### PURPOSE

The purpose of this BMP includes, but is not limited to:

- Diverting flowing water away from or around a construction site.
- Minimizing sedimentation.
- In limited cases, it may provide for fish passage.

### APPLICATIONS

This BMP may be used at stream crossings during culvert replacement, at bridge repair sites, and other sites where the stream flow cannot be interrupted. It may be used in combination with other barriers.

### CONSTRUCTION GUIDELINES

- Stream bypass BMPs must be installed according to applicable permit requirements.
- Refer to Appendix B for Fish Exclusion Protocols.
- Determine best method for specific site.
- Discuss strategy with crew.
- Work quickly to avoid water contamination by sediment.
- Ensure pipe outlet is stabilized to prevent scour and erosion.
- Pump and bypass should be designed or reviewed by an engineer to ensure capacity can handle peak flows.

### BMP MAINTENANCE

- Inspect bypass, pump, and dam periodically. Repair any leaks.
- Check for scour at bypass outfall. Repair or move as necessary.
- Have adequate fuel supply and backup pumps in the event of mechanical failure.
- Inspect fish isolation nets to ensure complete exclusion. Remove any accumulated debris from isolation net.

## BMP MAINTENANCE

- Follow manufacturer's operation and service guidelines.

## BMP REMOVAL

- BMP removal is not applicable.



*Vactor truck removing sediment from catch basin*



## APPENDIX B: FISH EXCLUSION PROTOCOL

Prepared by

King County Road Services Division  
Road Maintenance Section/Environmental Unit  
Department of Transportation  
155 Monroe Avenue Northeast  
Renton, WA 98056-4199

December 2000

Road Maintenance activities may require work within streams that contain salmonids. Some of these activities, such as culvert replacements within salmonid bearing streams, require the site to be temporarily dewatered. BMPs are used to minimize or reduce deleterious impacts to aquatic resources. Fish exclusion from the work site prior to dewatering must be done in accordance with the protocols set forth in this appendix and in accordance with The Memorandum of Agreement between Washington State Department of Fish and Wildlife, National Marine Fisheries Service and United States Fish and Wildlife Service. A copy of this Agreement is included at the end of this appendix.

The sequence for fish exclusion is as follows:

- Isolate the area (block nets).
- Remove as many fish as possible using seine or dip nets.
- Gradually dewater work area.
- Remove as many remaining fish as possible using dip nets.
- Electroshock, if required by permit, to avoid any stranding. Any permit specifying electroshocking will be reviewed by NMFS/USFWS in accordance with the Memorandum of Agreement contained in this appendix.
- Keep records of fish exclusion activities.

### **ROAD MAINTENANCE ACTIVITIES THAT MAY REQUIRE FISH EXCLUSION ARE:**

#### **Open Drainage Systems**

Repair, replacement, installation and maintenance tasks performed on open drainage systems include: facilities, retention/detention facilities, swales, pollution control devices, manholes, catch basins, vaults, pipes, culverts, inlets and outlets, weirs, and fish ladders.

#### **Watercourses and Streams**

Repair, replacement, installation and maintenance tasks performed on

watercourses or streams may include: structural repair/replacement, slope stabilization, sediment removal, vegetation management, debris removal, or, habitat maintenance/improvements.

### **Stream Crossings**

Repair, maintenance, cleaning, installation or replacement/upgrade of stream crossing facilities such as pipes, arch pipes, box culverts, fish ladders, weirs, sediment pools and bridges.

### **Bridge Maintenance**

Bridge maintenance activities include repairing, replacing, maintaining, components of the bridge, such as; the superstructure, footings, piers, supports, abutments and ramps.

### **Emergency Slide/Washout Repair**

Slide and washout repair activities include: removal of slide/washout material from the ROW; back-filling or stabilizing slope, reestablishment of damaged roadway features, repairing and cleaning drainage system and re-vegetating and or armoring with rock.

Prior to dewatering the site, aquatic life (vertebrate species) are temporarily removed and relocated out of the work area. Fish exclusion is done under the supervision of environmental support staff.

Fish and other wildlife removal from the work area is allowable under a special collection permit required by the Washington State Department of Fish and Wildlife (WDFW). The permit conditions must be followed. A copy of the permit must be in the possession of any persons authorized to collect wildlife, food fish, and/or shellfish.

## **SITE PROCEDURES**

In order to reduce any impacts to the affected species that are handled during this process, several techniques are used. Permit conditions require that fish and other vertebrates be removed a certain way. The basic steps for fish exclusion are:

### **Training**

A training program will occur before any inexperienced crew begins any fish exclusion techniques, including electrofishing, and will occur in waters that do not contain ESA-listed fish. Training program will be conducted by the qualified biologist trained by WDFW and USFWS staff.

The training program will include the following elements:

1. Fish handling techniques and fish identification.
2. How to monitor and install block nets.
3. A demonstration of the proper use of seines and electrofishing equipment, the role each crew member performs, and basic gear maintenance.
4. An explanation of how electrofishing attracts fish.
5. An explanation of how gear can injure fish and how to recognize signs of injury.
6. Definitions of basic terminology: e.g. galvanotaxis, and tetany.
7. A review of these guidelines and the manufacturer's recommendations.
8. A field session where new individuals actually perform each role on the netting and electrofishing crew.
9. Field supervision by ecologist during the first few days of electrofishing.
10. Electrofishing using a back-pack electrofisher will only be used.

### **Isolate the Area**

Install block nets at up and downstream locations to isolate the entire affected stream reach. This is done to prevent fish and other aquatic wildlife from moving into the work area. Block net mesh size, length, type of material, and depth will vary based on site conditions, but will be installed to block fish movement into the work area. Generally, block net mesh size is the same as the seine material (9.5 millimeters stretched). These block nets are then left in place throughout the activity and are checked regularly during work to make sure they are functioning properly. These nets may be checked by crew supervisors, leads, and/or crew members following initial oversight by Environmental staff. The amount of leaves and other debris collected on the net will determine how often the nets need to be checked. Block net locations require leaf and debris removal to ensure proper function. An individual must be designated to monitor and maintain the nets. Block nets are installed securely along both banks and in channel to prevent failure during unforeseen rain events or debris accumulation. Some locations may require additional block net support such as galvanized hardware cloth or additional stakes or metal fence posts.

### **Fish Exclusion**

Once the stream reach has been isolated, all attempts to remove fish and other aquatic life are made in a manner that involves the least amount of handling. Aquatic life is captured by hand or with dip nets and immediately put in dark colored five gallon buckets filled with clean stream water.

### **Information Logs**

Appendix B: FISH EXCLUSION PROTOCOL (continued)

Each species and yearclass are recorded in bound field note books. Year class designations will be used to allow a rapid estimate of length to minimize fish handling time. Salmonids with fork lengths approximately 60 millimeters or less will be classed as 0+ age fish; and fish over 60 millimeters will be classed as 1+ age fish. In addition to the species information, field notes will also include other information such as date, personnel, time, general site conditions, weather, stream temperature, conductivity, length of stream reach, methods used, and any other general comments. Data collected is used for research purposes and clear/concise documentation is important. Any injuries or mortalities will be documented and reported if it involves and ESA listed species.

**Fish Release**

All collected specimens are to be released unharmed upstream of the isolated stream reach.

**SPECIFIC ELECTROFISHING GUIDELINES**

The following guidelines are recommended for all electrofishing sessions.

1. No electrofishing in anadromous waters from October 15th to March 1st. No electrofishing in resident waters from November 1st to May 15th. In order to avoid contact with spawning adults or active redds, environmental staff must conduct a careful visual survey of the area to be sampled before beginning electrofishing. Electrofishing will only be conducted at other times of the year in response to emergency activities. Electrofishing at other times of the year may require mitigation. Specific mitigation requirements recommended by the NMFS, USFWS, and WDFW will be followed.
2. Equipment must be in good working condition and operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a logbook.
3. Measure conductivity and set voltage as follows:

<b>Conductivity (umhos/cm)</b>	<b>Voltage</b>
Less than 100	900 to 1100
100-300	500 to 800
Greater than 300	to 400

4. Only Direct Current (DC) or Pulsed Direct Current (PDC) should be used.

## Appendix B: FISH EXCLUSION PROTOCOL (continued)

5. Each session should begin with pulse width and rate set to the minimum needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured. Start with pulse width of 500us and do not exceed 5 milliseconds. Pulse rate should start at 30 Hz and work carefully upwards. In general, exceeding 40 Hz will injure more fish.
6. Fish should not come in contact with the anode. The zone of potential fish injury is 0.5m from the anode. Care should be taken in shallow waters, undercut banks, near structures such as wood, or where fish can be concentrated in high numbers because in such areas the fish are more likely to come into close contact with the anode.
7. Electrofishing should be performed in a manner that minimizes harm to fish. The stream segment should be worked systematically, moving the anode continuously in a herringbone pattern through the water. Do not electrofish one area for an extended period of time. Remove fish from the electrical field immediately; do not hold fish in net while continuing to net additional fish.
8. Crew members should carefully observe the condition of the excluded fish. Dark bands on the body and longer recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit may need adjusting. Each fish should be completely revived before releasing upstream of the block nets. ESA specimens will be released as soon as possible upstream of the block nets in an area that provides refuge.
9. Fish should be handled properly. A healthy environment for the stressed fish must be provided, with no overcrowding in the buckets, and the holding time minimized. Large fish should be kept separated from smaller prey-sized fish to avoid predation during containment. Water to water transfers, the use of shaded, dark containers and supplemental oxygen shall be considered in designing fish handling operations.

### **FISH EXCLUSION BEST MANAGEMENT PRACTICES**

General techniques for fish exclusion out of the work area in order of preference by federal, state, and local agencies are:

1. Net drags or seining through the isolated stream reach. Depending on the site, various lengths of 9.5 mm stretched nylon mesh minnow seines are used throughout the isolated stream reach. Seining follows modified protocol of Parametrix (1980) and Muckleshoot Fisheries Department and is summarized as follows. The seine is approximately three feet wide

Appendix B: FISH EXCLUSION PROTOCOL (continued)

and of various lengths with approximately fifteen feet of rope attached to either end. Sets are conducted with one person on shore and one to two people working the other end of the net through the isolated stream reach area. Once the net is out and the lead line dropped to the bottom, the other end of the 15 foot line is brought to shore and both ends of the net are pulled in quickly in tandem.

2. Collecting aquatic life by hand or with dip nets as the site is slowly dewatered.
3. Electrofishing in stream channels where other means of fish exclusion are not feasible as determined by the qualified biologist.
4. Trapping using minnow traps. Traps will be left in place between each pass as an additional non-lethal BMP.

When removing fish out of the isolated stream reach, all attempts to remove fish out of the existing stream crossing structure shall be made. Connecting rod snakes may be used to help get the fish to move out of the structure. The connecting rod snake is inserted and wiggled through the pipe or other structure to get the fish to move out so they can be captured and removed out of the stream reach. The connecting rod snake is made of wood sections with metal couplers with sections approximately three feet in length. As the snake is wiggled slowly through the pipe, noise and turbulence will help to get the fish to move out without harming them.

Trash pumps, which are used to temporarily bypass water around work sites, should be fitted with smaller mesh screens to prevent aquatic life from entering the trash pump hose. The screens shall be installed as a precautionary measure to prevent any fish and other wildlife which may have been missed in the fish exclusion process. The screens will also prevent fish and other wildlife from entering the trash pump if a block net should fail. Screens will be placed approximately 2-4 feet from the inlet of the trash pump hose to avoid the suction of the trash pump.

If the isolated stream reach is large and many fish are expected to be caught, many buckets should be available with clean stream water to hold the fish until counting and measuring can be done. Frequent monitoring of bucket temperature and well being of the specimens will be done to assure that all specimens will be released un-harmed. Perforated buckets may also be used and placed upstream of the block nets until the fish are counted.

Captured aquatic life will be released upstream of the isolated stream reach (following species identification and length estimates) in a pool or area which provides some cover and flow refuge.

Follow mitigation requirements which may be recommended by the USFWS, NMFS, and WDFW.



## OUTCOME CATEGORY: KEEP WATER FROM WORK AREA

**Definition:** The BMPs in this category are used to keep water from reaching the work area or disturbed soils generally through a by-pass/diversion or interception process.

**Desired Outcome:** The desired outcome of these BMPs is to by-pass/divert sheet flow, stormwater or stream flow around the work area. The intercepted water will be discharged to an acceptable storm drainage system or stream.

**Applications:** These BMPs work well:

- In streams or ditches where the normal flow can be piped around the work area by temporarily damming and conveying the flow by pumping or gravity.
- Covering stock piles or disturbed soils with impermeable fabric to intercept rainfall.
- Diverting sheet flow around work area or disturbed soils by constructing upslope berms or channels.

**Limitations:** These BMPs are often used in combination with other BMPs (i.e.: dewatering work area, grass lined swales). Refer to individual BMP limitations.

**Permit Conditions:** Follow acceptable procedures, if required, to exclude fish from work area. Reintroduce water flow into the work area to reduce sediment transport. Comply with permit requirements. Inspect and maintain BMPs according to the guidelines established in the Regional Road Maintenance ESA Program Manual.

**BMP Options (Include but not limited to):**

- Aqua Barrier.
- Cofferd Dam.
- Dewatering.
- Diversion Berm.
- Diversion Channel.
- Plastic Covering.
- Sandbag.
- Stream Bypass.
- Vactoring.





## MAINTENANCE CATEGORY: OPEN DRAINAGE SYSTEMS

### ACTIVITIES

Open drainage systems include stormwater conveyance systems that were created entirely by artificial means, such as roadside ditches and storm or surface water run-off facilities. These structures are not watercourses, streams and/or wetlands.

Repair, replacement, installation and maintenance tasks performed on open drainage systems, include: facilities, retention/detention facilities, swales, pollution control devices, manholes, catch basins, vaults, pipes, culverts, and inlets/outlets.

Open drainage systems can be located within the road ROW, on easements, tracts, public property and/or on private property.

### PURPOSE

- Maintenance tasks performed on open drainage systems include but are not limited to activities such as:
  - Cleaning.
  - Reshaping/Regrading.
  - Erosion Control/Bank Stabilization.
  - Vegetation Management.
  - Removing Debris, Trash, Yard Waste, Sediment.
  - Repairing structures.
- Open drainage systems are part of the ROW structure that routes water and sediment from roadways or surface structures to outlet areas. The system allows sediments to separate and settle from the water flow which cleans and removes large quantities of sediments out of the storm water systems.
- Maintaining open drainage systems includes activities to preserve line and grade, depth and cross section, inflow and outflow of culverts. Open systems should be kept free of trash, debris, sediment and vegetation that restricts or constricts the open drainage system (in compliance with federal and state regulations).
- Roadside ditches generally consist of inslopes, the ditch, and back slopes (see typical road cross section in the Preface). The inslopes can be vegetated with grass and/or small forbs. Small trees and brush may be allowed on back slope. (In compliance with Federal and State Regulations).
- Roadside ditch maintenance operations are performed when sediment, debris, or vegetation in a ditch impedes flows or storage of water and

Maintenance Category: OPEN DRAINAGE SYSTEMS (continued)

sediments to a point where safety or structural integrity of the roadway system is jeopardized. Roadside ditches, which are not properly functioning, can cause:

- Sheet flow of surface waters across the roadway, which creates slope erosion.
- Hazardous driving conditions, particularly during cold weather.
- Roadway washouts during storm events.
- Flooding of adjacent property.
- Saturation of the road sub-base.
- Large quantities of sediment transported to watercourses and/or streams.

### **BMP OUTCOMES**

- Maintain and restore water quality by cleaning ditches or structures.
- Maintain or restore structure.
- Minimize sediment or debris from leaving construction/repair area.
- Maintain or restore surface water drainage and storage.
- Maintain or restore sediment storage capacity.
- Reduce flooding from plugging of system/reduced storage area.
- Keep structure clear of debris, trash, and yard waste.
- Reduce sediments and/or debris from entering watercourses and/or streams.
- Reduce sediment conveyance through drainage system by trapping and removal.
- Leave vegetated sections in ditch where sediment buildup has not impeded flow or infiltration.

### **BMPs**

- Maintain drainage systems.
- Maintenance activities within waters of the State will be covered under "Watercourses and Streams".
- Plan and schedule work in dry conditions, except in emergency situations.
- Use "Filter/Perimeter Protection", "Keep Water from Work Area", "Reduce Potential for Soil Becoming Water or Air Borne" and "Reduce Water Velocity/Erosive Forces" BMPs at/around the work site to reduce work site pollutants, turbidity and sediments from entering watercourses, streams, wetlands, lakes, or other water bodies. Refer to "Part 2-BMPs" for selection and/or installation guidelines.

Maintenance Category: OPEN DRAINAGE SYSTEMS (continued)

- Exposed and unworked soils shall be stabilized by application of effective BMPs, which protect the soil from the erosive forces of raindrop impact and flowing water.
  - During the winter season, October through June, no soils shall remain exposed and unworked for more than 2 days.
  - During the summer season, July through September, no soils shall remain exposed and unworked for more than 7 days.
  - These conditions apply to all soils on site, whether or not at final grade.
- Leave vegetative buffer outside of work zone to provide bio-filtration and shading on back slope of ditch.
- Leave vegetative buffer of grasses and small forbs between the shoulder and ditch if the area is wide enough.
- Leave vegetated sections in ditchline, where sediment buildup does not impede flow or infiltration.
- After removal of sediments from drainage system reseed with grass and small forbs.
- After repairs are completed, remove construction/maintenance waste materials from work site and dispose of and/or recycle.
- Vehicle and equipment maintenance, repair and/or service will be performed at designated repair facilities whenever possible. To reduce the potential for discharge of pollutants to watercourses or streams from vehicle and equipment maintenance, service and repair operations, follow the practices listed below:
  - Prohibit discharge of any wastewaters to the stormwater drains. Do not pour material down drains or hose down work areas, use dry sweeping or damp mopping.
  - Remove build up of oils and grease on equipment.
  - Perform equipment and vehicle maintenance in areas to prevent discharges to the storm drain system.
  - Use drip pans under equipment when maintaining, repairing, or servicing in the field.
  - Use non-toxic solvents whenever possible.
  - Clean maintenance area storm drain grates regularly.
  - Collect and properly manage (recycle or dispose of) used materials such as: grease, oil, oil filters, antifreeze, cleaning solutions, lead-acid batteries, hydraulic and transmission fluids, and tires.
  - Surfaces shall be cleaned immediately following any discharge or spill incident.
- Carry Spill Kit used for small spills related to equipment failure. Desired outcome is to control, absorb, or contain spill for clean up and disposal.

Maintenance Category: OPEN DRAINAGE SYSTEMS (continued)

Minimum requirements:

- Absorbent.
- Pads.
- Shovel.

## POTENTIAL CONSERVATION OUTCOMES

Habitat Goals:

- Protect downgrade habitat.
- Protect Water Quality.
- Reduce work site runoff to watercourses, streams and/or water bodies.
- Maintain or restore the storage, delivery, and routing of surface and ground water, to control volumes and velocities of discharge by removing sediment loading from drainage system.
- Maintain or restore the storage area of sediments and other pollutants.
- Remove sediment from system.

Conservation Objectives of Maintaining Open Drainage Systems include one or more of the following:

- Open drainage system maintenance activities reduce the potential for sediment and debris from reaching watercourses or streams.
- Maintain or restore water quality by removal of sediments and other pollutants.
- Revegetation provides biofiltration, shading and bank stabilization.
- Maintain or restore sediment collection process by removal of excess sediment. This maintenance activity reduces the potential for sediment to reach downgrade fish habitat.
- Control flow volumes and velocities by removing sediments and repairing structures.

Conservation Objectives Achieved by one or more of the following:

- Performing maintenance, repair, and upkeep of system.
- Preventing drainage system failure.
- Reducing risk of sediments from roadway/shoulder failure from entering aquatic habitat.
- Reducing erosion in unlined ditches by seeding ditch line.
- Increasing or improving biofiltration by seeding ditchline and disturbed soil.
- Maintaining or restoring velocities and peak flows by creating storage areas by cleaning ditches to prevent blockages.
- Providing erosion/sediment controls during maintenance work to protect water quality and reduce sediments.



## MAINTENANCE CATEGORY: STREAM CROSSINGS

### ACTIVITIES

Repair, clean, maintenance, installation or replacement/upgrade of stream crossing facilities, such as pipes, arch pipes, box culverts, fish ladders, weirs, sediment pools, and bridges. Maintenance within waters of the State will be reviewed with the WSDFW HPA as negotiated with NMFS/USFWS.

### PURPOSE

This work is done to prevent flooding or catastrophic road failure as a result of facilities, which have filled to capacity or blocked with sediment or debris or are undersized, poorly designed, damaged, or deteriorated. Timely replacement or upgrade of these facilities is critical in terms of roadway safety, habitat protection, fish passage, and/or infrastructure preservation.

### BMP OUTCOMES

- Maintain, repair and/or replace structure.
- Improve or maintain fish passage (HPA).
- Improve or maintain riparian habitat (HPA).
- Improve or maintain streambed habitat within pipe, culvert or area within work zone (HPA).
- Minimize construction/repair worksite area sediments and/or debris from entering watercourses, streams or water bodies.
- Maintain or restore surface water drainage by performing repairs.
- Reduce streambed/stream bank erosion by revegetation or stabilization of disturbed soils.
- Reduce flooding and erosion from blockages of system by removing obstructions such as debris, trash, yard waste, sediment.

### BMPs

- All stream crossing repair, replacement or maintenance work within the waters of the State will be reviewed with the WSDFW, HPA as negotiated with NMFS/USFWS and permitted prior to work.
- If seasonal watercourse or stream, schedule work during dry conditions.
- Plan and schedule work in dry or low flow conditions, except in emergency situations (HPA).
- Use "Filter/Perimeter Protection", "Keep Water from Work Area", "Habitat Protection/Maintenance" and "Reduce Water Velocity/Erosive Forces" BMPs at/around the work site to prevent sediment from entering watercourses, streams and/or wetlands and other water bodies. Refer to

- “Part 2-BMPs” for selection and/or installation guidelines.
- All exposed and unworked soils shall be stabilized by application of effective BMPs, which protect the soil from the erosive forces of raindrop impact and flowing water.
    - During the winter season, October through June, no soils shall remain exposed and unworked for more than 2 days.
    - During the summer season, July through September, no soils shall remain exposed and unworked for more than 7 days.
    - These conditions apply to all soils on site, whether or not at final grade.
  - Minimize disturbance to riparian vegetation.
    - Mark jobsite.
    - Flag work area.
    - Position equipment to protect riparian habitat.
  - “Fish Exclusion Protocol” (Appendix B) and permit conditions will be followed during maintenance activities.
  - Fish will be excluded from construction area using appropriate methods such as the use of nets, dewatering at a controlled rate, and removal of stranded fish according to HPA permit conditions as negotiated with NMFS/USFWS.
  - Monitor water quality.
  - Restore vegetation appropriate for site conditions within riparian areas.
  - Protect outflows by bio-vegetation techniques or armoring to reduce erosion.
  - Habitat restoration to be designed and constructed in accordance with applicable local, state and federal guidelines.
  - After repairs are completed, remove construction/maintenance waste materials from site and dispose of and/or recycle.
  - Monitor vegetation and stream habitat in accordance with permitting requirements.
  - Vehicle and equipment maintenance, repair and/or service will be performed at designated repair facilities whenever possible. To reduce the potential for discharge of pollutants to watercourses or streams from vehicle and equipment maintenance, service and repair operations, follow the practices listed below:
    - Prohibit discharge of any waste waters to the stormwater drains. Do not pour material down drains or hose down work areas, use dry sweeping or damp mopping.
    - Remove build up of oils and grease on equipment.
    - Perform equipment and vehicle maintenance in areas that prevent discharges to the storm drain system.

Maintenance Category: STREAM CROSSINGS (continued)

- Use drip pans under equipment when maintaining, repairing, or servicing in the field.
- Use non-toxic solvents whenever possible.
- Clean maintenance area storm drain grates regularly.
- Collect and properly manage (recycle or dispose of) used materials such as: grease, oil, oil filters, antifreeze, cleaning solutions, lead-acid batteries, hydraulic and transmission fluids, and tires.
- Surfaces shall be cleaned immediately following any discharge or spill incident.
- Carry Spill Kit used for small spills related to equipment failure. Desired outcome is to control, absorb, or contain spill for clean up and disposal. Minimum requirements:
  - Absorbent.
  - Pads.
  - Shovel.

## POTENTIAL CONSERVATION OUTCOMES

### Habitat Goals:

- Repair, replace or maintain structure.
- Protect habitat and watercourse or stream by performing maintenance.
- Reduce work site pollutant runoff .
- Restore or maintain fish passage through structure.
- Maintain or restore the storage, delivery, and routing of surface and ground water to control volumes and velocities of discharge by maintaining structure.
- Reduce flooding.

Conservation Objectives of Performing Stream Crossing Maintenance include one or more of the following:

- Maintain structures.
- Improve fish passage.
- Reduce damage to shoulders, roadways and riparian habitat which may be caused by flooding from blockages.
- Maintain or restore water quality by repairing, replacing or maintaining structure.
- Maintain or restore nutrient process by re-vegetating after land disturbance to hold sediments and to remove nutrients.
- Maintain or restore natural flow volumes and stream velocities in the vicinity of the stream-crossing project.

Maintenance Category: STREAM CROSSINGS (continued)

Conservation Objectives Achieved by one or more of the following:

- Performing maintenance.
- Preventing flooding and drainage system failure.
- Reducing the risk of sediment from roadway/shoulder failure from entering aquatic habitat and watercourse or stream.
- Reducing adverse habitat impacts stemming from catastrophic culvert/pipe failures.
- Reducing stream bank erosion by repair work and re-vegetating.
- Providing stream shading by planting riparian area (HPA).
- Reducing habitat-detrimental flooding caused by a plugged system or reduced storage capacity. Flooding within the ROW can be detrimental to salmonids or habitat by introducing pollutants (bypassing structures which trap sediment or provide infiltration), stranding fish, destroying vegetation, and/or severely eroding stream channels.
- Providing appropriate erosion/sediment control BMPs during maintenance work.
- Maintaining or restoring flow capacity and stream velocities in the vicinity of stream-crossing projects.

## **POTENTIAL CAPITAL OR MAJOR RESTORATION PROJECTS**

In some cases, habitat restoration work, which is beyond the scope of routine maintenance activities, might be done as capital improvement projects or as major restoration projects. In these cases the following BMPs may apply where ROW is available and to the extent that design/habitat considerations allow:

- Remove artificial bank hardening and/or channel confining structures.
- Enhance or add areas of spawning, migration, feeding, or rearing habitat.
- Create connections to off-channel habitat.

In all cases, capital or major restoration projects must be done in accordance with federal, state, and local regulations and permit requirements. In some cases, these requirements will explicitly prohibit the use of the BMPs listed above.



## OUTCOME CATEGORY: FILTER/PERIMETER PROTECTION

**Definition:** The BMPs in this category reduce soil particles/contaminants as the water passes through a filtering device. This will also apply to perimeter protection around the job site.

**Desired Outcome:** The desired outcome of these BMPs is to reduce soil particles/contaminants before the water discharges from the job site.

**Application:** These BMPs work well:

- When the rate of flow is relatively low and the filter can be inspected and maintained to ensure the BMP continues to function.
- Perimeter protection around job site.

**Limitations:** Not effective in high flows or for removal of high percentage of fine-grained materials. Refer to individual BMP limitations.

**Permit Conditions:** Comply with permit requirements. Inspect and maintain BMPs according to individual guidelines.

### **BMP Options (Include but not limited to):**

- Coir Log.
- Continuous Berm.
- Curb Inlet Sediment Trap.
- Excelsior Filled Log.
- Filter Fabric.
- Grass Lined Channel.
- Gravel Filled Sump.
- Half Round Filter.
- Inlet Protection.
- Kimble Filter Pipe.
- Silt Fence.
- Silt Mat.
- Straw Bale Barrier (1).
- Straw Bale Barrier (2).
- Straw Bale Barrier (3).
- Straw Log.
- Washed Rock.





## OUTCOME CATEGORY: REDUCE WATER VELOCITY/EROSIVE FORCES

**Definition:** The BMPs in this category reduce or diminish the water velocity, thereby dissipating its erosive force.

**Desired Outcome:** The desired outcome of these BMPs is to create energy dissipation and reduce erosion.

**Application:** These BMPs work well:

- On stream and ditch banks.
- In swales.
- In waterbodies.
- On slopes.
- On large disturbed areas.

**Limitations:** These BMPs should not be used when maintenance activities are conducted in locations which could reduce actual or potential high flow salmonid refuge functions, these BMPs may be used if required by permit conditions. Refer to individual BMP limitations.

**Permit Conditions:** Comply with permit requirements. Inspect and maintain BMP's according to individual guidelines.

### **BMP Options (Include but not limited to):**

- Backslope Planting.
- Coir Fabric.
- Coir Log.
- Continuous Berm.
- Ditch Lining.
- Excelsior Filled Log.
- Hand Seeding.
- Hydroseeding.
- Large Woody Debris.
- Live Staking.
- Mulching.
- Rip Rap.
- Rock Check Dam.
- Sandbag.
- Silt Fence.
- Silt Mat.
- Straw Bale Barrier (1).
- Straw Bale Barrier (2).
- Straw Bale Barrier (3).
- Straw Log.
- Stream Bank Bio-Engineering.
- Surface Roughening.
- Triangular Silt Dike.
- Turbidity Curtain.
- Vegetative Buffer.



## OUTCOME CATEGORY: HABITAT PROTECTION/MAINTENANCE

**Definition:** The BMPs in this category maintain or protect habitat.

**Desired Outcome:** The desired outcome of these BMPs is to maintain or protect habitat by providing:

- Bank/slope stabilization.
- Spawning/rearing areas.
- Habitat shading.
- Reducing erosion by providing ground cover, binding soil particles with roots, and lowering water velocity.
- Provides habitat for primary production.
- Provides habitat for prey base organisms such as macro-invertebrates.

**Application:** These BMPs work well in:

- Riparian areas.
- Sensitive areas.
- Watercourses and streams.

**Limitations:** These BMPs should be done in accordance with design. Refer to individual BMP limitations.

**Permit Conditions:** Comply with permit requirements. Inspect and maintain BMPs according to individual guidelines.

**BMP Options (Include but not limited to):**

- Coir Fabric.
- Coir Log.
- Excelsior Filled Log.
- Hand Seeding.
- Hydroseeding.
- Large Woody Debris.
- Live Staking.
- Streambed Gravel.

**APPENDIX E**

**Access**



## **Appendix E- Access**

Some portions of material pertaining to control of access do not apply along the ELST Interim Use Trail. They are marked with an asterisk in the text and described below.

### **Construction Site Practices**

#### **1.4 Pre-Construction**

##### **Planning**

Inventory of vegetation along ELST corridor need not identify every tree and plant on site. Only trees and shrubs greater than 2 inches diameter at breast height (dbh) should be inventoried in affected area.

##### **Irrigation System Design Guidelines and Water Audit Implementation**

Irrigation use along the ESLT corridor is not anticipated, so this guidance is not relevant. However, temporary irrigation may be installed at the wetland mitigation site in order to ensure plant establishment. If irrigation is used, it should conform to these guidelines.

##### **Construction Site Preparation**

##### **Staging and Fencing**

Installation of chain link fence can disturb soils and damage plants. In the ELST corridor, use orange plastic construction fencing to mark entry and exit corridors and to protect vegetation in “vegetation protection zones.”



## **1.1 Purpose**

This chapter identifies the management practices that should be employed at construction sites to protect water quality and the environment. BMPs described here help guarantee a successful project both at completion and across a lifetime of site use and maintenance. These practices apply in cases of in-house improvements and for major capitol improvements projects (CIPs) implemented by the King County Department of Construction and Facilities Management.



The King County Park System manages construction sites to preserve existing vegetation and infrastructure for several reasons:

- To sustain both the function and value of vegetation assets.
- To enhance public safety by carefully maintaining the health of onsite vegetation and to reduce liability from situations such as slumping, siltation, dangerous trees and view blockage. -
- To protect and improve water quality.
- To reduce or avoid soil compaction and degradation.
- To avoid root or other physical injury to existing trees and other valuable vegetation.
- To protect soils and hydrology of the site.
- To protect existing irrigation, underground utilities, drainage and structures.

---

## 1.2 Definitions

**Construction site management:** refers to the proper management of construction activities to preserve living and non-living elements of the ecological, environmental, aesthetic, and social landscape. For landscape maintenance, construction site management consists of BMPs employed during the three phases of site development: pre-construction, construction, and post-development. These controls include BMPs for soils, shrubs, trees, drainage and irrigation. Tree preservation is a special concern during construction because tree roots often extend through the entire site.

**“Dial -Before-You-Dig”:** a statewide system to allow location of underground utilities before construction. This contact is mandatory before earthwork begins. The phone number is 1-800-425-5555.

**Project Administrator:** refers to either the person assigned by Parks or by the Department of Construction and Facilities Management. The project administrator is responsible for managing the overall project.

## 1.3 Background

Successful park maintenance depends on good management of original construction. If construction is not managed carefully, the following can occur:

- Construction equipment improperly strikes or grades over vegetation, damaging plants.
- Site soil can be overly compacted or contaminated, blocking air and water movement essential to good health.
- Hydraulic processes on site can be disrupted, causing permanent drainage problems.

These and other construction-related impacts produce long-term maintenance problems that can be avoided by following the BMPs in this section.

## 1.4 Pre-Construction

### Planning

- Coordinate with Park staff to consider special event and public use schedules.
- Public process and customer input is very important. Contact park “friends of” groups and active users for planning and feedback.

- Before construction begins, the site must be inventoried. Site inventory includes determining size, species, and numbers of trees and plants on site. It also requires locating utilities, such as irrigation and drainage systems, historical elements such as archeological-protected areas and known landfills.
- Before and during removal, the park Horticulturist or Resource Coordinator is responsible for decisions about on-site vegetation.
- Know the development and building regulations concerning trees and vegetation in the area. Either the Department of Development and Environmental Services (DDES) or the adjoining city building department is a good source of information.
- Ensure that permits are secured and acquired before construction. Specific requirements must be followed diligently.
- The project manager or construction supervisor must contact "Dial-Before-You-Dig" (1-800-425-5555) to locate any underground utilities on site.
- Avoid steep grades in turf. For safety and operation performance, no grades steeper than 4 to 1 are allowed in mown turf.
- Avoid installing trees where leaves and roots will damage and increase maintenance time to clean surfaces such as tennis courts and outdoor pools.
- Ensure that irrigation systems comply with *King County Irrigation Specifications and Water Audit Guidelines* and with the *State of California Irrigation Auditor Handbook*, version 5.5, June 1990.
- Drainage systems must be adequately sized, operable, and maintainable.
- Protect natural water flows and drainage patterns.
- Install restrooms near to active play areas. Isolated restrooms create opportunities for loitering, graffiti or other illegal activities.

### **Irrigation System Design Guidelines and Water Audit Implementation**

✱

The purpose of the irrigation and water audit implementation is to:

- Establish a structure for designing water efficient irrigation systems.
- Promote the values and benefits of landscape, while recognizing the need to utilize water and other resources as efficiently as possible

## 1.4 Pre-Construction

---

All new and rehabilitated irrigation systems shall follow the *King County Irrigation Specifications and Water Audit Guidelines*.

All new and rehabilitated irrigation systems at a minimum shall be in accordance with the state of California Landscape Water management Program as described in the *Landscape Irrigation Auditor Handbook*-version 5.5 June 1990.

Park areas should be designed to protect water systems through installation of back-flow protectors. Irrigation systems should have fittings that allow ease of winterization. Water should also be provided near hard surfaces, such as tennis courts, for pressure washing and cleanup.

### Construction Site Preparation

#### Staging and Fencing

- Staging areas for equipment must be established far enough away from plant material to protect plants and roots. This distance is as far as the drip line or farther from plant crown or stem.
- Entry and exit routes must be established and fenced off with chain-link or construction fencing. When planning routes, avoid utility access corridors. \*
- Chain-link fencing or a similar protective barrier must be installed around all valuable vegetation that will remain onsite. The fencing is installed at least as far or farther than the drip-line of existing trees. These fenced and protected areas are known as "vegetation protection areas." \*

#### Mulching

Mulch will help protect against compaction and root injury, as well as reduce muddy conditions. The material must be removed from these areas when construction is complete. Mulch must be disposed of in an appropriate location, such as a composting bin, and the site restored to original or better condition. The following five areas must be mulched with 12 to 18 inches of chips, hog fuel, or other acceptable material.

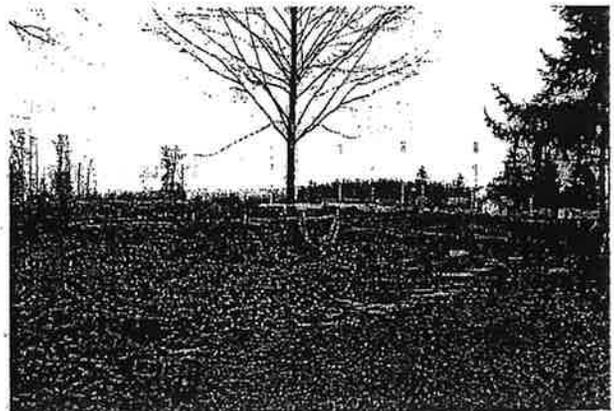
1. Vegetation protection areas.
2. Entry or exit areas.
3. Staging areas.
4. Near existing irrigation systems.
5. High-use equipment areas.

### **Other Protection**

- Protect irrigation, utilities and drainage systems on site.
- Ensure silt fencing is erected by streambeds and as appropriate (buffer zones).
- Prune, clean and remove deadwood from trees and plants as directed
- Fertilize existing plants and trees at the direction of Horticulturist or Resource Coordinator.
- Protect hard surfaces from cracking, chipping and marring. Use plywood under buckets, outriggers and stress points, and heated asphalt. Prevent truck and heavy equipment from rolling on corners and thin surface areas.

## **1.5 Construction**

- Assure all safety equipment, signage, and sirens/backups are in working order or in place.
- Monitor construction frequently enough to ensure compliance with specifications.
- Conduct pre-construction meeting to establish protection areas and work plan.
- Locate cement washout pits and chemical holding areas away from vegetation protection areas and areas that drain to systems and waterways.
- Limit parking and material storage to already damaged areas away from tree roots.
- Allow no site offices, equipment, or material storage in vegetation protection areas.
- Control and minimize grade changes within vegetation protection areas. Generally, no changes in grade are allowed within the drip line of any tree to remain on site. If the grade must be raised around a desired tree, a dry well must be constructed around the tree at the drip line or some point farther away from the tree trunk.





## NATURAL AREAS TRAIL MAINTENANCE

### DEFINITION:

The maintenance and restoration of paved, gravel, wood-chip and natural surface trails. This includes regular vegetation management, brush removal, drainage activities, and may include tread or surface repairs and improvements.

### DESIRED RESULT:

Trail surfaces and adjacent areas will be maintained to provide a safe and pleasant experience consistent with the surroundings for the recreational user. Drainage impacts of trail use will be maintained to avoid silt transfer in system.

### GENERAL TASK PROCEDURE:

- Establish parameters of current project; use Washington Trails Association standards when appropriate.
- Review safety plan.
- Obtain necessary permits for maintenance or construction work.
- Train staff and volunteers on the safe use of tools and maintenance techniques.
- Load and unload equipment, hike or haul into work site. (partner with other agencies to share needed equipment)
- Cut and remove obstructing trees, limbs and brush.
- Haul out or dispose of unwanted plant materials on site (when not contributing to habitat, such as nurse log potential and cavity nesting tree trunks).
- Remove roots, rocks and other trip hazards.
- Fill depressions, grade and compact soil for a solid well-drained surface.
- Clear existing swales, ditches, water-bars and culverts.
- Haul in and compact new surfacing materials. This may require extensive hand or wheelbarrow work in areas not accessible to vehicles. Use power carts when possible.
- Clean surface of trail by blowing, sweeping, raking or pressure washing.
- Inspect, clean and report on condition of signs and structures.
- Re-route or construct new trail alignments to avoid standing water and areas that are unsafe, unstable or too steep. Avoid working during rain to reduce silt transfer. \*
- Close off and re-vegetate social and non-designated trails (including woody debris).
- Close and sign trails if floods or other unsafe conditions exist.

### GENERAL FREQUENCY:

- -Daily to weekly in heavily used areas.
  - -Monthly or every second week in natural and wildlife areas.
  - -Once per quarter for informal trails in undeveloped open-space areas.
  - -After major storm or earthquake events.

## Department of Parks and Recreation - Maintenance Task Descriptions

- Blowing paved trails may take as little as a half an hour per week, while major re-routes in road-less areas can take several weeks.

### NATURAL AREAS TRAIL MAINTENANCE (cont.)

#### TIME STANDARD:

Calendar is January through December.

Time Standard        -Regular scheduled maintenance - 1 hour per 1,000 lineal feet.  
                              -New trail construction - 250 hours per 1,000 lineal feet of re-routing.

**APPENDIX F**

**Vegetation Replacement**



## **Appendix F – Vegetation Replacement**

Some portions of material pertaining to vegetation replacement do not apply along the ELST Interim Use Trail. They are marked with an asterisk in the text and described below.

### **Natural Area Restoration & Vegetation Management**

Herbicide application in the ELST corridor will only occur after consultation with, and approval by, permitting agencies.



## NATURAL AREA RESTORATION & VEGETATION MANAGEMENT

### DEFINITION:

Using adaptive management approach to restore and maintain disturbed areas with native plant communities. Control or remove noxious weeds and invasive plant species.

### DESIRED RESULT:

Reduce cost of land management by maintaining pristine native plant communities and habitats by protecting them from invasive or intrusive damage. Natural areas should be kept in a safe, attractive and ecologically healthy condition. Properties should be free from man-made scars, buildings, vehicles and rubble. Open space and wildland park areas will, to the extent practical, be kept free of noxious weeds and monocultures of invasive or non-native plant species (i.e., Tansy, Loosestrife, Knotweed, Broom, and Blackberry). Desirable native vegetation will be augmented and encouraged to resume natural plant successions typical of the normal environments that should be present given the site soils, exposure, hydrology and other site conditions.

### GENERAL TASK PROCEDURE:

- Obtain required permits prior to any major disturbance of ground soils (Archeological protection permit, HPA, NPDES, Corp. of Eng. DDES, Park Alteration, and/or other required permits).
- Train staff and volunteers in purpose of project, project particulars, plant materials and planting technique guidelines.
- Load and unload tools and equipment from vehicles.
- Salvage desirable plants from areas to be worked or disturbed.
- Prune and/or thin shrubs and trees as needed.
- Cut, uproot or burn noxious weeds and invasive plants and mulch area.
- If necessary use approved herbicide to eradicate noxious weeds (per IPM)\*
- Remove unwanted plant material.
- Re-seed ground covers and transplant or plant shrubs and trees (see guideline in appendix by U of W).
- Mulch newly planted areas (consider use of first layer of biosolids and top cover of horse farm compost material, approved by U of W Professor, Linda Chalker-Scott).
- Irrigate or hand-water as dictated by site and plant needs during establishment periods (for minimum of two years). See irrigation task
- Fence or sign areas to inform public and protect new plantings.

### GENERAL FREQUENCY:

In general, every third year for disturbed areas (Invasive weeds often require three continuous seasons of work for eradication). Large volunteer projects are generally one-time events followed by one-year 'adopt-a-park' commitment.

### TIME STANDARD:

Time Standard is 20 hours per 100 square feet.

## PLANT INSTALLATION AND MAINTENANCE

### DEFINITION:

The successful installation, establishment and maintenance of trees, shrubs, groundcovers, and pristine native plant communities, located in public parks and natural areas.

### DESIRED RESULT:

To maintain pristine native plant communities in order to reduce site maintenance costs. When necessary to plant they are installed according to current appropriate techniques and procedures will ensure plant viability and success.

### GENERAL TASK PROCEDURE:

- Review safety plan.
- Obtain necessary permits for planting (WA. State. DNR, Archeologist review, HPA, Park Alteration, etc.)
- Obtain healthy and vigorous plants.
- Train staff and volunteers on these techniques listed below.
- Load and unload equipment, into work site. (partner with other agencies to share needed equipment)
- Cut and remove unwanted plant material.
- Prepare a hole no deeper than the root mass and twice as wide as the root mass.
- Remove plant from container or burlap.
- Prune off dead or damaged roots and shorten excessively long roots.
- Orient the plant so the shoot-root interface is at or slightly above soil surface.
- Lace the plant atop a soil mound and spread roots out evenly.
- Back fill with native soil (no-amendments).
- Water well to help settle the soil; if holes appear, fill with native soil.
- Build a berm around planting hole to increase water retention.
- Add a well-drained organic mulch atop the root zone, but not with-in 1-2 inches of plant trunks.
- Water new transplants during the first 1 – 2 dry seasons for establishment.
- Maintain a mulch layer 3 to 4 inches thick to aid in water retention. (if possible place a layer of bio-solids first, then horse farm compost as mulch on top).
- Keep the root zone free of turf and weeds to reduce resource competition.
- Sign areas, "Do Not Enter" due to new plantings.

### GENERAL FREQUENCY:

As needed during fall and winter, not during late spring or summer.

### TIME STANDARD:

## PLANT SALVAGE & PROPAGATION

### DEFINITION:

The collection and transplanting of native plants, taking cuttings, and the collection and growing of seeds of native plant species.

### DESIRED RESULT:

To salvage native plants collected from planned development areas; to procure live stake cuttings from native areas; and to collect seeds of native plants for greenhouse and nursery production. All plants are to be used for re-vegetation and habitat restoration projects.

### GENERAL TASK PROCEDURE:

- Conduct site inventories of native vegetation at planned development sites.
- Obtain permission and permits to remove plants.
- Lead and instruct volunteers and staff to carefully dig and remove plants not needed on site and transport to a nursery/holding facility.
- Cut live stakes from appropriate sites. Do not remove more than 1/3 of the plant.
- Collect seeds or cutting material and transport, in good condition, for propagation at greenhouse.
- Contact Greenhouse and Holding Facility Supervisor(s) to receive collected plants.
- Give information about plant material (including preferred habitat, location collected, and location to be used; if decided).

### GENERAL FREQUENCY:

When available

### TIME STANDARD:

Calendar is Winter, Spring and/or Fall, not in summer.  
Time Standard is variable.

## 6.4 Design

The following design considerations enhance both the aesthetic and ecological value of trees in County parks:

### **Selection**

Selecting trees that adapt well to their site and fulfill their landscape function is extremely important to a successful planting. The quality of young plants is also crucial. A plant species should be selected on a basis of its functional uses, its adaptation to the site, its resistance to diseases and other pests and the amount of care it will require. The following table shows landscape classifications and our differing objectives for tree care:

## Selecting Trees for King County Park System

<b>Rate of growth</b>	Fast-growing trees can tolerate difficult sites. If neglected, they become weak wooded, subject to limb breakage, and short lived.
<b>Wood strength</b>	Branch structure and wood strength are closely allied. Conifer branches shed snow easily and partially compensate for weak wood. Black cottonwood trees shed branches with no outward signs of weakness.
<b>Rooting</b>	Roots provide anchorage, nutrients and water. Shallow soils, soil texture interfaces, rainfall and irrigation all cause shallow rooting and drought stress. Trees with invasive roots hurt sewers and drain lines. Surface-rooted trees sucker heavily when injured and raise pavement.
<b>Tree Features</b>	<p><b>Leaves</b> - color, size, shape and persistence. Avoid near pools and tennis courts.</p> <p><b>Thorns and prickly foliage</b> – enhanced security vs. increased maintenance and safety problems</p> <p><b>Flowers and fruit</b> – aesthetic consideration, wildlife habitat, potentially increased maintenance. Can attract rodents.</p>
<b>Climatic Adaptation</b>	<p>Plant hardiness and locale zone</p> <p><b>Moisture</b> – natural or irrigated</p> <p><b>Light</b> – reflected or interrupted</p> <p><b>Wind</b> – deflect or channel wind patterns</p>
<b>Soils</b>	Poor soils can cause failure of plantings. Amendment may not be desirable or feasible. Match plant to poor soil conditions.
<b>Air Pollution</b>	Choose trees with appropriate tolerance levels
<b>Pest resistance</b>	Resistant plant material reduces maintenance
<b>Native Plants</b>	Select native plant material that is hardy, thrives in current climates and provides diverse habitat and low maintenance.
<b>Selecting Quality Stock</b>	Selection of quality stock is as important to success as selection of proper species, planting and maintenance. Root and shoot quality affect performance and survival.
<b>Root Defects</b>	Kinked or girdling roots eventually “choke” a tree.
<b>Top and Trunk Characteristics</b>	<p>Height-to-caliper ratio</p> <p>Crown configuration</p> <p>Branching pattern</p>

King County Park System Tree Classification and Practice	
Classification	Practice
Formal Park areas	<ul style="list-style-type: none"> <li>• Require more frequent maintenance than those in natural areas.</li> <li>• Create risk because of greater likelihood of tree and people interaction.</li> <li>• Suffer greater incidence of mechanical injury</li> <li>• Demand greater restriction on design</li> </ul>
Informal (natural areas)	<ul style="list-style-type: none"> <li>• Get grouped together as part of a forest, rather than as a single tree.</li> <li>• Experience greater impacts from competing invasive, exotic plant species, like English ivy and Himalayan Blackberry.</li> <li>• Include trees deep within the woods, those in natural areas, those in natural or created openings and those on forested edge.</li> </ul> <p>Many trees in natural areas abut private property and therefore have a greater risk potential.</p>
Streets, Boulevards, and Trails	<ul style="list-style-type: none"> <li>• Require greater frequency of maintenance than in parks and natural areas because of proximity to people and property and harsh growing conditions.</li> <li>• More likely to suffer from restricted root space, construction damage, mechanical injury and other related people pressures.</li> <li>• Management directly impacts adjacent property owners and users of the facility.</li> </ul>

## Landscapes Provide These Functions

- Architectural features: privacy, view enhancement, and space articulation
- Engineering: reduce glare, direct traffic, filter air, reduce soil erosion, and reduce noise
- Climatic influences: transpiration effects on cooling; interception of solar radiation, reflection, and re-radiation; and modification of rain, fog and snow deposition
- Aesthetic uses: size, form, color and texture.

## Site Adaptation

**It is highly important to plant the right tree in the right place.** The intended use and nature of a site should be considered when selecting trees. Growth habit and ultimate size are important considerations—a tree should not outgrow its space. Roots should not invade or damage park assets. The following table shows design standards for selecting trees:

## 6.5 Maintenance Practices

The following are BMPs for routine maintenance of trees.

### Planting

- Ideal planting time is October through March.
- Create an ideal planting hole: 3 times diameter of root spread on bare root or root ball.
- Use a minimum planting hole 12 inches wider than root spread or root ball.
- The planting hole must be no deeper than root ball. Root ball must fit firmly on undisturbed subsoil.
- Native soil must be used to backfill planting hole. An exception is a situation in which existing soil is either contaminated or filled with rubble or pure clay.
- Tree must not be fertilized at time of planting.
- Balled and burlapped (B&B) trees must be placed in hole and plumbed vertically. Do not pull tree by the top to position it. All rope must be removed from around trunk. Top half of burlap must be removed by cutting it away. Trees in wire baskets must have the top half of basket removed. Use bolt or wire cutters to expose top 12 to 18 inches of root ball.
- Do not remove any B&B packaging material until tree is placed in hole and securely plumbed into final position.
- Backfill soil in lifts of 4 to 6 inches at a time with compaction of each layer. Do not compact muddy backfill. Water thoroughly after backfilling to settle the soil, eliminate air pockets and re-wet the root system.
- Watering in the soil is preferred over compacting. Backfill half of soil in tree pit. Thoroughly drench with water to settle. Complete back-filling. Thoroughly drench again with water. This method removes air pockets and settles soil.
- Trees planted in sandy or loamy soils should have a 3-inch-high berm erected just past the perimeter of the planting hole. Berms retain water and funnel it to the root ball. Berms should not be constructed in clay or in sites with heavily compacted soils.
- Mulch all trees with 3 to 4 inches of shredded mulch or compost immediately after back-filling.
- Mulch should extend past diameter of tree planting hole, at least 6 inches, or to all sides of tree ring.
- Maintain 3 to 4 inches of mulch annually.

- Keep mulch away from tree trunk. Taper mulch from the 3-inch depth back to grade right at the trunk to avoid decay of bark tissues.
- Water newly planted trees weekly through the first growing season.
- Trees should receive approximately 1 inch of water per week including rainfall.
- Remove or suppress weeds within mulch ring to eliminate competition and for aesthetics in formal plantings.
- Weeds and/or turf should not be allowed to grow up to the tree trunk at any time. This increases the likelihood of mechanical injury.
- Stake only in situations where normal planting procedure does not provide a stable plant. The following are non-normal plant situations that require staking:
  - As a vandal deterrent
  - Tall height-to-root spread
  - High wind areas
  - Areas in which mower or trimmer injury could occur
- **Remove stakes and ties at end of first year.**
- Remove tree trunk wrapping materials and tags.
- Do not wrap tree trunks.

## **Natural Area Planting**

- Determine which tree should be planted where.
- Prepare the site by scalping all vegetation in a 4-by-4-foot area.
- Clear the area to bare soil.
- Plant the tree as described above in the center of the scalped area.
- Maintain the 4-by-4-foot area free of competing vegetation for 3 years.
- Flag each new tree on a branch , not the main trunk, for visibility, so that new trees can be located for watering.
- Depending on tree size and location, stake for stability.
- Water newly planted trees immediately after planting. Water all new trees during summer drought stress periods as needed for first one to two establishment seasons.

- Re-apply mulch to cleared /scalped areas after first year's establishment to encourage water retention and suppress weeds.

## **Container/Bare Root Planting**

- Remove container from plants before placing in planting pit.
- Tease pot-bound roots with hands or small tools before final placement in planting pit.
- Bare root plants must be protected from root drying before and immediately after planting.
- When possible, soak bare roots before planting.
- Exceptionally long roots must be cleanly pruned to create a uniform root mass.
- Take care to plant bare rootstock at the same grade as grown in the nursery.



## 9.5 Design

The following design considerations preserve the aesthetic and environmental values of natural areas.

### Plant Selection

In restoration projects, plant selection should be chosen to mimic pristine (natural) site conditions. Species will typically be predominantly native, and selected based on site ecology. Phased planting that first establishes a canopy works better than comprehensive, one-time restoration plantings. Applying adaptive management techniques assures better success. Using science based information to select appropriate location and plant species and monitoring, then adapting as necessary is essential to ensure project goals.

### Power Lines and Other Utilities

Don't plant big trees under power lines. Select trees and shrubs that will provide required clearances at their mature sizes. Use directional pruning where aesthetic factors justify the additional cost, and to direct growth away from utility lines so that the trees will not become a safety hazard and have to be pruned.

A permit is required to cut any vegetation on Parks' property. If utilities identify the need to clear trees and other vegetation, make sure they have a permit.

Additionally, varying distances are required for electrical line clearances depending on the wattage carried by the lines. Our role in communicating these standards to a utility is to ensure that only vegetation necessary to public safety and continued electrical transmission is removed. We are also concerned with aesthetics and plant health. Qualified park staff will give the utility proper pruning direction for aesthetic and plant health.

### Views

The King County Park System does have viewpoints to manage. At several park locations, such as Cougar Mountain Park and near the Snoqualmie Falls, established viewpoints have been preserved. The goal at these kinds of areas is to convert view-blocking vegetation to low-growing species that will not require long-term pruning. This goal is measured against competing goals for habitat, aesthetics, and erosion control. If a traditional park viewpoint is established, actions to cut back vegetation must only be taken on parklands. Property lines must be confirmed by staff.

### Drainage

Site improvements should work with the existing drainage pattern. Modifications to drainage patterns or features should receive the required review and permits. The project administrator or Resource Coordinator will obtain the necessary permits.

Existing drainage systems should be maintained according to preventive maintenance schedule and specifications developed by the Grounds Crew Supervisor. District crews



**APPENDIX G**

**Monitoring**



## MONITORING NATURAL AREAS

### DEFINITION:

To conduct surveys, within natural areas, to determine the health and function of various plant and wildlife species (and fish upon request). Changes in habitat conditions and public impacts are to be noted.

### DESIRED RESULT:

Documentation of the numbers and distribution of plant and animal species and relative conditions will be done to establish base-line information for future comparison; to plan reforestation, re-vegetation, re-routing watershed damaging trails or other public impacts and other habitat improvements for specific sites; and to determine adaptive management needs associated with previously installed projects.

### GENERAL TASK PROCEDURE:

- Consult existing records and studies to determine probable species and numbers.
- Work in partnership with associated scientists, professionals and stakeholders (tribes).
- Surveys should be done with consistency, example: during the same time of year as prior surveys.
- Amphibian monitoring should be accomplished at three intervals during the spring.
- Habitat conditions such as water depth and quality, plant growth, pollution, amount and health of vegetation should be noted. In addition, animal tracks, scat, nests and dens should be noted. Amphibian deformities are to be noted and this information passed on to the King County biologists.
- Public impacts should be photographed and GIS recorded, hazardous materials reported to appropriate agencies and handled with all mandated safety procedures.
- Where possible, use a camera and GIS to assist in record keeping.
- Information should be centralized with the resource coordinators.

### GENERAL FREQUENCY:

As needed per element monitored, minimum twice yearly for human impacts.

### TIME STANDARD:

Calendar is January through December.

Time Standard is variable. Terrain difficulties must be considered; allow ample time for best results.

## SITE INVENTORY

### DEFINITION:

The comprehensive listing of vegetation, natural history features, wildlife (and fish - assist upon request), stream and wetland habitat and public use patterns under the custodianship of King County Parks or contracted sites.

### DESIRED RESULT:

To provide a recorded inventory of natural history features, hydrologic features, wildlife and flora and fauna along with trails and other public uses within the King County Park facilities.

### GENERAL TASK PROCEDURE:

- This task is performed by Park Personnel, under the general guidance of the Park Resource Coordinator.
- All natural features, man made features and uses, vegetation, habitat features and observed wildlife will be recorded.
- General hydrology and drainage patterns will be noted.
- Soil types will be noted.
- All invasive plant species and noxious weeds will be noted.
- Locations should be noted for recording into G.I.S. maps (trails, illegal dump sites).
- Records of inventory will be submitted to Park Resource Coordinator for records maintenance.

### GENERAL FREQUENCY:

All sites should be inventoried after acquisition, and there after minimum twice yearly.

### TIME STANDARD:

Time Standard is variable, site dependent.

## PARK INSPECTION

### DEFINITION:

The time spent to do regular, and ongoing, park site inspections. Monitor park/site conditions and provide feed back on needed clean up and other site corrections. Ensure consistent, safe usable conditions for site stakeholders. To preserve the integrity of natural open space properties.

### DESIRED RESULT:

Undeveloped natural area parks and open space properties will be kept free from safety hazards, garbage and debris, and monitored to discourage intrusion by vandals, campers, wood and brush cutters, etc. Data base documentation will be tracked, forms filled out correctly to ensure data tracking.

### GENERAL TASK PROCEDURE:

- Inspection for litter, dumping and debris.
- This task is performed by district maintenance and resource personnel on a regular and on-going basis.
- Inspect wetlands, forests, streams, and wildlife habitats for damage and track conditions, evidence of poaching.
- Inspection for hazardous trees, slides and erosion.
- Inspection for and work to discourage trail construction, and other park intrusions.
- Monitor property lines to protect adjacent properties, from park caused/related problems and encroachment on park property.
- Document problems in inspection data base, and secure any additional work through work requests.
- Keep and maintain accurate records and be sure to document follow through actions. See sample in appendix

### GENERAL FREQUENCY:

Once a week.  
Not able to reduce.

### TIME STANDARD:

Time Standard is variable.

## 1.6. Post-Construction Care

---

- Keep refueling and equipment maintenance areas away from trees, native soils, and water. In general, fuel spills are not tolerated on construction sites.
- Control and protect overhead and underground utility corridors. Tunneling under root zones is preferable to trenching in root areas near trees.
- Use tree protection barriers, wraps, and pads when working near trees. Keep these safeguards in good repair.
- Do not install vegetation materials late in spring or summer unless fully automated irrigation is present and working.
- To the extent possible, keep construction equipment away from all on site vegetation, especially those within designated areas. Designated areas are where there are especially sensitive or fragile plants, or that contain historical or special plantings.
- Preserve park users' quality of experience. Create safe corridors. Provide educational and informative signage. Be aware of children and families near site.

## 1.6. Post-Construction Care

Maintaining existing and established new vegetation is the primary horticultural focus after construction. This care requires identifying problems and treatments that may preserve these resources. If warranted, severely damaged vegetation should be removed quickly and replaced with new plantings.

The following cultural practices can preserve trees, plant material and landscape areas:

- Maintenance staff must closely monitor and inspect all new construction throughout the warranty period to ensure plant establishment.
- Weekly water management (critical function). This is generally the contractor's responsibility for the establishment period.
- Ensure contractor compliance with plant establishment warranty period.
- Fertilize with an appropriate product, as needed. Wait one growing season before making minimal Nitrogen applications. Maintain levels for 3 to 5 years. No fertilizer should be applied in buffer zones where it could contaminate nearby water.
- Maintain a depth of 2 to 3 inches of mulch around trees and new plantings. Soil and mulch should be sterile and weed-free. Well-aged compost or wood chips are good products to use. Avoid placement against trunks or bark.

- If the Park Horticulturist believes there to be flaws with the structural integrity of a tree, remove it immediately.
- Watch closely for pests and changes in tree structure. Preventive treatments may be advisable.
- Emphasize weed control during plant establishment period (3 to 5 years). Use well-draining, weed-free sterile soil.
- An “independent” irrigation audit to ensure proper irrigation must be done where there is a significant amount of planting or turf. The Irrigation Specialist or Grounds Supervisor can arrange for an audit as needed.

The non-living portions of a park development should be observed closely to ensure that problems are noted and corrected during the warranty period.

- Note any drainage problems and identify for correction.
- Note pavement conditions.
- Irrigation should be monitored and proper spacing/coverage noted. Independent water audits should be run upon completion of the project.
- Building elements should be observed and deficiencies noted.



**APPENDIX H**

**Relevant Permit Conditions**





REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
SEATTLE DISTRICT, CORPS OF ENGINEERS  
P.O. BOX 3755  
SEATTLE, WASHINGTON 98124-3755

Regulatory Branch

OCT 18 2000

Ms. Bobbi Wallace  
King County Park System  
2040 - 84<sup>th</sup> Avenue Southeast  
Mercer Island, Washington 98040

Reference: 2000-4-01308  
King County Park  
System

Dear Ms. Wallace:

Thank you for your recent letter of inquiry concerning your proposal to perform maintenance work returning existing drainage ditches within the East Lake Sammamish Trail corridor to their original dimension and configuration. All excavated material would be disposed in upland areas. We have assigned the file number 2000-4-01308 to this case, to which you should refer in any future correspondence.

We have determined that the work described in your September 16, 2000, letter does not require a Department of the Army (DA) permit because it is exempt according to our regulations [33 CFR 323.4(a)(3); Discharges not requiring permits] as follows:

Construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance (but not construction) of drainage ditches. Discharges associated with siphons, pumps, headgates, wingwalls, weirs, diversion structures, and such other facilities as are appurtenant and functionally related to irrigation ditches are included in this exemption.

In waters of the U.S., including wetlands, re-alignment of the drainage ditches or placement of fill to provide equipment access would require a DA permit. If you have any questions you may contact Mr. Evan Lewis at the above address or by telephone at (206) 764-6908.

Sincerely,

Ann R. Uhrich  
Chief, Application Review Section





# HYDRAULIC PROJECT APPROVAL

RCW 77.55.100

State of Washington  
Department of Fish and Wildlife  
Region 4 Office  
16018 Mill Creek Boulevard  
Mill Creek, Washington 98012

File: E. Sammamish Trail  
LOG NUMBER: 00-E7738-02

DATE OF ISSUE: September 18, 2001

At the request of Bobbi Wallace on September 10, 2001, this Hydraulic Project Approval (HPA), which now supersedes the previous HPA for this project, is a change of the original HPA issued October 24, 2000. The change is to base the HPA on new plans submitted with the request.

<p align="center"><u>PERMITTEE</u></p> <p>King County Park System ATTENTION: Bobbi Wallace 2040 84<sup>th</sup> Avenue Southeast Mercer Island, Washington 98040 206-296-4248</p>	<p align="center"><u>AUTHORIZED AGENT OR CONTRACTOR</u></p> <p align="center">Not Applicable</p> <p align="center" style="font-size: 2em;"><b>RECEIVED</b></p> <p align="center">SEP 25 2001</p> <p align="center"><b>MAINTENANCE MANAGER</b></p>
---	---

**PROJECT DESCRIPTION:** Remove Sediments, Manage Vegetation, and Revegetate

**PROJECT LOCATION:** Associated Wetlands and Tributaries to Lake Sammamish crossed by the East Lake Sammamish Trail

#	WRIA	WATER BODY	TRIBUTARY TO	1/4 SEC.	SEC.	TOWNSHIP	RANGE	COUNTY
1	08.0143 A-M through 08.0152	Miscellaneous Creeks and associated wetlands	Lake Sammamish	18, 20, 29, 32		25N	06E	King
2	08.0162 through 08.0166	Miscellaneous Creeks and associated wetlands	Lake Sammamish	06, 07, 08, 17, 21		24 North	06 East	King

### PROVISIONS

- TIMING LIMITATIONS:** The project may begin **immediately** and shall be completed by **January 1, 2003**, provided that sediment removal within the ordinary high water line (OHWL) shall occur only **between June 16 and October 15**.
- Work shall be accomplished per plans and specifications submitted to the Washington Department of Fish and Wildlife (WDFW), except as modified by this Hydraulic Project Approval (HPA). This HPA reflects design criteria per Chapter 220-110 WAC. This HPA includes mitigation procedures to significantly reduce or eliminate impacts to fish resources. A copy of the plans shall be available on site during construction.
- Disturbance of the streambed and banks and associated wetlands shall be limited to that necessary to conduct the project. Affected streambed and bank and associated wetland areas shall be restored to pre-project or improved habitat configuration following removal of sediments or management of vegetation. The disturbed areas of streambanks, wetlands associated with streams, and stream and wetland buffers shall be revegetated with native or other woody species approved by WDFW. Vegetative cuttings shall be planted at a maximum interval of three feet (on center). Plantings shall be maintained as necessary for three years to ensure 80 percent or greater survival.



## HYDRAULIC PROJECT APPROVAL

RCW 77.55.100

State of Washington  
Department of Fish and Wildlife  
Region 4 Office  
16018 Mill Creek Boulevard  
Mill Creek, Washington 98012

DATE OF ISSUE: September 18, 2001

LOG NUMBER: 00-E7738-02

4. Sediment removal shall occur in isolation from the stream flow, if the stream is flowing, by diverting or pumping the flow around the work area.
5. Where fish are present, the permittee shall capture and safely move food fish, game fish, and other fish life from the job site. The permittee shall have fish capture and transportation equipment ready and on the job site. Captured fish shall be immediately and safely transferred to free-flowing water downstream of the project site. The permittee may request WDFW assist in capturing and safely moving fish life from the job site to free-flowing water, and assistance may be granted if personnel are available.
6. Any device used for diverting water from a fish-bearing stream shall be equipped with a fish guard to prevent passage of fish into the diversion device pursuant to RCW 77.55.040. The pump intake shall be screened with 1/8-inch mesh to prevent fish from entering the system. The screened intake shall consist of a facility with enough surface area to ensure that the velocity through the screen is less than 0.4 feet per second. Screen maintenance shall be adequate to prevent injury or entrapment to juvenile fish and the screen shall remain in place whenever water is withdrawn from the stream through the pump intake.
7. If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), operations shall cease and WDFW at (360) 534-8233 and Washington Department of Ecology at (425) 649-7000 shall be contacted immediately. Work shall not resume until further approval is given by WDFW.
8. Erosion control methods shall be used to prevent silt-laden water from entering any streams and associated wetlands. These may include, but are not limited to, straw bales, filter fabric, temporary sediment ponds, check dams of pea gravel-filled burlap bags or other material, and/or immediate mulching of exposed areas.
9. Prior to starting work, temporary filter fabric, straw bale, or pea gravel-filled burlap bag check dam(s) shall be installed downstream or downslope. Accumulated sediments shall be removed during the project and prior to removing the check dam(s) after completion of work.
10. Wastewater from project activities and water removed from within the work area shall be routed to an area landward of the OHWL to allow removal of fine sediment and other contaminants prior to being discharged to any stream or associated wetland.
11. All waste material such as construction debris, silt, excess dirt or overburden resulting from this project shall be deposited above the limits of flood water in an approved upland disposal site.
12. If high flow conditions that may cause siltation are encountered during this project, work shall stop until the flow subsides.
13. Extreme care shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into any stream or associated wetland.

**SEPA:** FEIS by King County August 25, 2000

**APPLICATION ACCEPTED:** October 23, 2000

**ENFORCEMENT OFFICER:** Peck 024 [P3]



**HYDRAULIC PROJECT APPROVAL**  
**RCW 77.55.100**

State of Washington  
Department of Fish and Wildlife  
Region 4 Office  
16018 Mill Creek Boulevard  
Mill Creek, Washington 98012

DATE OF ISSUE: September 18, 2001

LOG NUMBER: 00-E7738-02

Larry Fisher (425) 649-7042  
Area Habitat Biologist

for Director  
WDFW

**GENERAL PROVISIONS**

This Hydraulic Project Approval (HPA) pertains only to the provisions of the Fisheries Code (RCW 77.55). Additional authorization from other public agencies may be necessary for this project.

This HPA shall be available on the job site at all times and all its provisions followed by the permittee and operator(s) performing the work.

This HPA does not authorize trespass.

The person(s) to whom this HPA is issued may be held liable for any loss or damage to fish life or fish habitat which results from failure to comply with the provisions of this HPA.

Failure to comply with the provisions of this Hydraulic Project Approval could result in a civil penalty of up to one hundred dollars per day or a gross misdemeanor charge, possibly punishable by fine and/or imprisonment.

All HPAs issued pursuant to RCW 77.55.100 or 77.55.160 are subject to additional restrictions, conditions or revocation if the Department of Fish and Wildlife determines that new biological or physical information indicates the need for such action. The permittee has the right pursuant to Chapter 34.04 RCW to appeal such decisions. All HPAs issued pursuant to RCW 77.55.103 may be modified by the Department of Fish and Wildlife due to changed conditions after consultation with the permittee: PROVIDED HOWEVER, that such modifications shall be subject to appeal to the Hydraulic Appeals Board established in RCW 77.55.130.

**APPEALS - GENERAL INFORMATION**

IF YOU WISH TO APPEAL A DENIAL OF OR CONDITIONS PROVIDED IN A HYDRAULIC PROJECT APPROVAL, THERE ARE INFORMAL AND FORMAL APPEAL PROCESSES AVAILABLE.

A. INFORMAL APPEALS (WAC 220-110-340) OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.100, 77.55.103, 77.55.106, AND 77.55.160:

A person who is aggrieved or adversely affected by the following Department actions may request an informal review of:

- (A) The denial or issuance of a HPA, or the conditions or provisions made part of a HPA; or
- (B) An order imposing civil penalties.

It is recommended that an aggrieved party contact the Area Habitat Biologist and discuss the concerns. Most problems are resolved at this level, but if not, you may elevate your concerns to his/her supervisor. A request for an INFORMAL REVIEW shall be in WRITING to the Department of Fish and Wildlife, 600 Capitol Way North, Olympia, Washington 98501-1091 and shall be RECEIVED by the Department within 30-days of the denial or issuance of a HPA or receipt of an order imposing civil penalties. The 30-day time requirement may be stayed by the Department if negotiations are occurring between the aggrieved party and the Area Habitat Biologist and/or his/her supervisor. The Habitat Protection Services Division Manager or his/her designee shall conduct a review and recommend a decision to the Director or its designee. If you are not satisfied with the result of this informal appeal, a formal appeal may be filed.



# HYDRAULIC PROJECT APPROVAL

## RCW 77.55.100

State of Washington  
Department of Fish and Wildlife  
Region 4 Office  
16018 Mill Creek Boulevard  
Mill Creek, Washington 98012

DATE OF ISSUE: September 18, 2001

LOG NUMBER: 00-E7738-02

B. FORMAL APPEALS (WAC 220-110-350) OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.100 OR 77.55.106:

A person who is aggrieved or adversely affected by the following Department actions may request a formal review of:

- (A) The denial or issuance of a HPA, or the conditions or provisions made part of a HPA;
- (B) An order imposing civil penalties; or
- (C) Any other "agency action" for which an adjudicative proceeding is required under the Administrative Procedure Act, Chapter 34.05 RCW.

A request for a FORMAL APPEAL shall be in WRITING to the Department of Fish and Wildlife, 600 Capitol Way North, Olympia, Washington 98501-1091, shall be plainly labeled as "REQUEST FOR FORMAL APPEAL" and shall be RECEIVED DURING OFFICE HOURS by the Department within 30-days of the Department action that is being challenged. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, the deadline for requesting a formal appeal shall be within 30-days of the date of the Department's written decision in response to the informal appeal.

C. FORMAL APPEALS OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.103 or 77.55.160:

A person who is aggrieved or adversely affected by the denial or issuance of a HPA, or the conditions or provisions made part of a HPA may request a formal appeal. The request for FORMAL APPEAL shall be in WRITING to the Hydraulic Appeals Board per WAC 259-04 at Environmental Hearings Office, 4224 Sixth Avenue SE, Building Two - Rowe Six, Lacey, Washington 98504; telephone 360/459-6327.

D. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS RESULTS IN FORFEITURE OF ALL APPEAL RIGHTS. IF THERE IS NO TIMELY REQUEST FOR AN APPEAL, THE DEPARTMENT ACTION SHALL BE FINAL AND UNAPPEALABLE.