

## Chapter 9 – Trees & Natural Areas



Trees and natural areas provide a multitude of benefits that enhance the quality of our lives. The maintenance and management of these valuable resources is essential for the long term welfare of Bellevue and its citizens. The health of the urban forest is a major indicator of the health of our ecosystem. This chapter identifies and defines the best management practices required to ensure a healthy urban forest.

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### 9.2 Definitions

**Certified Arborist** – An individual who has demonstrated knowledge and competency through obtainment of the current International Society of Arboriculture arborist certification, or who is a member of the American Society of Consulting Arborists.

**Dead Tree** – A tree that is dead or that has been damaged beyond repair or is in an advanced state of decline (where an insufficient amount of live tissue, green leaves, limbs or branches, exists to sustain life) and has been determined to be such by a *certified arborist*. If the tree has been determined to be dead, *removal* is permitted.

**Diameter at Breast Height (DBH)** – The diameter of the tree trunk at four and one-half feet (or 54 inches) above natural grade level. The diameter may be calculated by using the following formula:  $DBH = \text{circumference at 4.5-feet} \times 3.14$ . To determine the DBH of multi-trunk trees or measuring trees on slopes, consult the current *Guide for Plant Appraisal* published by the Council of Tree and Landscape Appraisers.

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**Hazardous Tree** – A tree that possesses a structural defect which poses an imminent risk if the tree or part of the tree could fall on someone or something of value (target).

**Monitor Tree** – A tree that, because of its value, warrants further monitoring to determine an appropriate management strategy.

**Sensitive Area** – An area mapped or defined in the City of Bellevue Sensitive Area Notebook as a sensitive area including areas of special flood hazard, wetlands, riparian corridors and slopes equal to or exceeding 15 percent.

**Significant Tree** – A healthy evergreen, eight inches in diameter or greater, measured four feet above existing grade and a healthy deciduous tree, 12 inches in diameter or greater, measured four feet above existing grade. (BCC 23.76)

**Snag** – Any standing dead tree.

**Soil Fracturing** – The loosening of hard or compacted soil around a tree by means of a pneumatic soil probe (air spade) that delivers sudden bursts of air to crack, loosen or expand the soil to improve the root growing environment.

**Street Tree** – Any tree or large shrub growing within the public right-of-way. In some cases, property lines lie several feet behind the sidewalks. A Right-of-Way Use Permit from the City of Bellevue Transportation Department is required prior to any work on or around these trees. Specific BMPs for Street Trees are covered in Chapter 8 of this manual.

**Target** – A term used to include people, vehicles, structures or something subject to damage by a tree. A tree cannot be a hazard if a target is absent within the falling distance of a tree or its parts. A defective tree in a non-populated area away from pathways may not be considered a hazard.

**Topping** – The reduction of a tree's size using heading cuts that shorten limbs, branches or the main stem to a predetermined crown limit. Topping is not an acceptable pruning practice. (ANSI A300-2001)

**Tree Appraisal** – A method of determining the monetary value of a tree as it relates to the real estate value of the property, neighborhood or community. When required, a *certified arborist* or forester determines the appraisal by adjusting a tree's basic value by its condition, location and species using the most recent edition of the *Guide for Plant Appraisal*, published by the Council of Tree and

Landscape Appraisers.

**Trenching** – Any excavation to provide irrigation, install foundations, utility lines, services, pipe, drainage or other property improvements below grade.

**Vertical Mulching** – Auguring, hydraulic or air excavation of vertical holes within a tree’s root zone to loosen and aerate the soil, typically to mitigate compacted soil. Holes are typically penetrated 4 to 6 feet on center, 2 to 3 feet deep, 2 to 6 inches in diameter and backfilled with either perlite, vermiculite, peat moss or a mixture thereof.

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## 9.3 Background

The Bellevue Parks Department manages over 2,100 acres of undeveloped natural areas consisting of forests, steep slopes, wetlands, riparian corridors, shorelines and meadows. The management and preservation of the City’s natural areas is a long-term investment into the urban environment that must be managed with the same skill and diligence as any other City asset.

Public trees and forests in Bellevue can be classified into three categories:

- 1) Street Trees:** Are part of improvements made within the City of Bellevue Right-of-Way through either Capital Improvement Program projects or private development. A detailed treatment of the Best Management Practices and City Codes associated with this resource is provided in Chapter 8 of this manual.
- 2) Formal Park Areas:** These trees require frequent maintenance and have a high likelihood of tree/people interaction. These trees also have a potential for mechanical injury and demand a high level of care and consideration during design and construction activities.
- 3) Natural Areas and Peripheries of Formal Park Areas:** These trees require the least amount of maintenance because of their often remote and sheltered locations. The trees in these areas are managed not as individual trees, but rather as stands of trees linked to the associated plants and sites on which they reside. These trees can come in conflict with people when they occur along property lines, adjacent to man-made structures or near gathering places.

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## **Design**

### **Selection**

Selecting trees that adapt well to their site and fulfill their landscape function is extremely important to the success and maintenance of a planting. The quality of young plants is also crucial. A plant species should be selected on the basis of its functional uses, its adaptation to the site and the amount of care it will require.

### **Landscape Functions**

There are four main functions to consider when selecting trees to include in the landscape design:

1. Architectural Features: privacy, view enhancement, and space articulation.
2. Engineering: reduce glare, direct traffic, filter air, reduce soil erosion and attenuate noise.
3. Climatic Influences: transpirational cooling; interception of solar radiation, reflection, and re-radiation; and modification of rain, fog and snow deposition.
4. Aesthetic Uses: form, color and texture.

### **Site Adaptation**

It is important to plant the right tree in the right place. The intended landscape use and nature of a site should be considered when selecting for growth habit and ultimate size. Mature size is an important consideration. The tree should not outgrow its allotted space given such constraints as vistas and power-lines. The following table may be used as a guide in selecting the right tree.

Tree Selection Factors	
Feature	Benefit
<b>Rate of Growth</b>	Fast-growing trees tolerate difficult sites, are usually weak-wooded and subject to limb breakage; and generally are shorter lived. The opposite is generally true for slow-growing trees.
<b>Wood Strength</b>	When a tree decays or weakens, it can become a hazard to the surrounding area. Strength is based on the trees ability to withstand wind loads, snow bearing loads, water saturation or drought, and its adaptability to its surroundings.
<b>Rooting</b>	Roots keep the tree anchored in the ground. Through them pass nutrients and water that nourish and support the tree. Stressors such as: drought, flooding, disturbance, disease, or damage can greatly affect tree roots and the health of the tree.
<b>Plant Features</b>	<ul style="list-style-type: none"> <li>• <b>Leaves:</b> Color, size, persistence</li> <li>• <b>Thorns and prickly foliage:</b> Enhanced security vs. maintenance problems</li> <li>• <b>Flowers and fruit:</b> Aesthetic consideration, wildlife habitat. Potentially increased maintenance.</li> </ul>
<b>Climatic Adaptation</b>	<ul style="list-style-type: none"> <li>• Plant hardiness and local minimum temperatures</li> <li>• Moisture – natural or irrigated</li> <li>• Light – reflect or allow for winter heating                             <ul style="list-style-type: none"> <li>• Wind – deflect or channel wind patterns</li> </ul> </li> </ul>
<b>Soils</b>	Poor soils can cause failure of planting. Amendment not desirable or feasible. Match plant to soil condition.
<b>Air pollution</b>	Choose trees with appropriate tolerance level.
<b>Pest Resistance</b>	Resistant plant material will reduce maintenance.
<b>Native Plants</b>	Native or indigenous plants may not perform as well as exotic or non-native species. Most urban landscape sites are no longer "native." Soils, microclimates and water regimes have changed.
<b>Selecting Quality Stock</b>	Selection of quality planting stock is as important to success as selection of proper species, planting and maintenance. Root and shoot quality can determine not only performance but also survival.
<b>Root Defects</b>	Kink roots, girdling (circling roots) can eventually "choke" a tree.
<b>Top &amp; Trunk Characteristics</b>	<ul style="list-style-type: none"> <li>• Height-to-Caliper ratio (see ANSI Z60.1 specs.)</li> <li>• Crown configuration</li> <li>• Branching pattern</li> </ul>



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## 9.4 Best Management Practices

The management and maintenance of trees by the City of Bellevue Parks & Community Services Department consists of a number of practices. The practices are covered in the following section and include: planting, pruning, removal, inventory and routine inspections, irrigation, fertilization and pest management. Activities associated with the protection and management of trees and vegetation before and during construction are covered in the Construction Site Management chapter.

### Formal Park Tree Planting

- All plant material shall be nursery grown under climate conditions similar to or hardier than at the site and meet or exceed The American Standards for Nursery Stock (ANSI Z60.1-1996).
- Ideal planting hole should be 2 to 5 times the diameter of the root spread or root ball.
- Minimum planting hole shall be 12 inches wider in diameter than root spread or root ball.
- The hole shall be no deeper than the ball and the ball shall sit firmly on undisturbed subsoil.
- Native soil shall be used to backfill the planting hole except in situations where the existing soil is contaminated or filled with rubble or pure clay.
- Balled-and-burlapped (B&B) trees shall be placed in the hole and plumbed vertically. All rope shall be removed from around the trunk of the tree and the top 1/2 of the burlap shall be folded back down into the hole. Whenever possible, remove the top 1/2 of burlap by cutting it away with a sharp knife. Trees in wire baskets shall have the top 1/2 of the basket removed, using bolt cutters, to expose the top 12 inches of the ball.
- B&B packaging material shall not be removed until the tree is placed in the hole and securely plumbed into its final position. No false balls shall be used.
- Soil should be backfilled in lifts of 4 to 6 inches at a time with compaction of each layer. Do not compact saturated soil. Water thoroughly after backfilling to settle the soil, eliminate air pockets and re-wet the root system.

- Trees planted in sandy or loamy soils should have a 3-inch-high berm erected just past the perimeter of the planting hole to funnel water to the root ball and wet the hole or sidewall interface. Berms should not be constructed in clay soils or on heavily compacted sites.
- All trees shall be mulched with 3 to 4 inches of shredded mulch or composted brush chips immediately after backfilling. Maintain 3 to 4 inches of mulch annually.
- Mulch shall extend past the diameter of the tree planting pit at least 6 inches.
- Mulch shall be kept away from the tree trunk. Mulch shall taper from the 3-inch depth back to grade right at the trunk to avoid decay of bark tissues.
- Newly planted trees shall be watered weekly through the first three growing seasons.
- Trees shall receive approximately 1 inch of water per week including rainfall.
- Weeds should be suppressed within the mulch ring to eliminate competition and for aesthetics in formal parks and along streets.
- Weeds and/or turf shall not be allowed to grow up to the tree trunk at any time. This increases the likelihood of mechanical trunk injury.
- Ideal months for planting are October through April, as long as the ground is unfrozen.
- Stake only in situations where normal planting procedures do not provide a stable plant. Otherwise, staking is generally not required.
- Stakes and ties shall be removed at the end of the first year.
- Root flare shall be at or slightly above grade to allow for slight settling.
- Tree trunks shall not be wrapped.
- Tree trunk wrapping materials, tags and all ties shall be removed at time of planting.

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## Natural Area Planting

- All plant material shall be nursery grown under climate conditions similar to or harder than at the site and meet or exceed The American Standards for Nursery Stock (ANSI Z60.1-1996).

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- A 5-by-5-foot area should be free of competing vegetation for 3 years.
- Staking of newly planted trees is generally not necessary. If staking is necessary because of size or conditions, trees should be staked according to COB standards as shown in the Design Standards in the Appendix of this Manual.
- New trees shall be watered bi-weekly during summer drought stress periods for the first two to three establishment seasons.

### Container/Bare Root Planting

- All plant material shall be nursery grown under climate conditions similar to or harder than at the site and meet or exceed The American Standards for Nursery Stock (ANSI Z60.1-1996). Container plants shall have the container removed prior to placement in the planting pit.
- Tease pot-bound roots with hands or tools prior to final placement in planting pit.
- Bare root plants shall be protected from root drying prior to and immediately after planting.
- Cleanly prune exceptionally long roots to create a uniform root mass.
- Plant bareroot stock at the same grade as grown in the nursery.

### Tree Removal

Due to the economic, environmental and social benefits of trees, their removal must be well thought out and documented. In general, tree removal in the City of Bellevue is regulated by BCC 23.76. At times, trees may be removed for new park construction, access or other issues not related to tree viability.

#### 1. Hazard Trees

- Tree hazard assessments shall be performed by qualified personnel to the standards established by the International Society of Arboriculture.
- Hazard trees that cannot be made safe or functional by appropriate mitigation shall be candidates for removal.
- Hazard rating shall be the first determining factor in removal decisions.

## 2. Tree Removal Permitting

A clearing and grading permit is required to remove one or more trees if the total canopy area covers 1000 square feet or greater on the ground. In sensitive areas, such as: steep slopes, riparian corridors or along shorelines, all tree removals must be permitted through the Developmental Services Department. In addition, all tree removals occurring in the public Right-of-Way must be accompanied by a Right-of-Way Use Permit, regardless of the amount of canopy area.

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## Transplanting

If trees are smaller than 10 to 12 inches in diameter, it is possible to transplant them with an appropriately-sized tree-spade. The cost of transplanting should be weighed against the cost of replacing the tree with a new smaller caliper tree. Establishment of large trees is often less successful than planting a new one. The value of the tree to be transplanted should also be taken into account when deciding on removal or replacement rather than transplanting. Different methods of appraising value are reviewed in the 9<sup>th</sup> edition of *Guide for Tree Appraisal* produced by the Council of Tree and Landscape Appraisers.

## Irrigation

- In general, established trees do not require supplemental irrigation except during periods of extreme drought.
- Valuable, specimen trees may be irrigated during periods of extreme drought.
- Turf irrigation around established trees needs to be modified to accommodate the water requirements of the trees.
- Water spray on trunks can lead to decay in some species. See Chapter 4, Irrigation and Water Management, for additional information on irrigation practices.

## Pruning

Pruning is sometimes necessary for young trees. Branches that grow into a pedestrian pathway can be dangerous. Usually, branches that grow below 8 feet above a pathway or below 14 feet above a parking lot or driveway entrance shall be cut back. Dead branches should be pruned to restore vigor to a tree. All pruning shall be performed to current ANSI Z133 standards.

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Learning the proper method is important as you can seriously wound or even kill a tree. The best time to prune living branches is late in the dormant season or very early in spring before leaves form. Dead and dying branches can be pruned anytime. Use clean sharp tools and make clean cuts.

**Do Not:**

- Leave living or dead stubs
- Injure or remove the branch collar
- Paint cuts

Topping shall be prohibited.

## Forest and Natural Area Management

### Natural Resource Enhancement Plans

A Natural Resource Enhancement Plan is based on an analysis of the ecosystem and the interrelationships of the different components of natural systems, as well as the human impact on their functions. Natural Resource Enhancement Plans are created based on information gathered about the site both in the field and through available background data. This information is then utilized to reflect the goals of the community and the City of Bellevue. Identified within an Enhancement Plan are the overall intentions for the property.

A Natural Resource Enhancement Plan for a specific site contains the following elements, with maps to illustrate where possible:

- Property description and site history
- Sensitive area classifications
- Soils and topography
- Existing vegetation
- Liability trees and situations
- Wildlife
- Recreation
- Management prescriptions

### Boundary Surveys and Staking

- Upon purchase/transfer of a new property to the City or when a property has not previously been surveyed, a boundary line survey should be conducted so both the City of Bellevue and the adjacent property owners are aware of the location of the property lines.

- Boundary surveys shall be conducted by a professional survey firm or City of Bellevue survey staff.
- Following a boundary survey or property inspection, City boundary stakes shall be installed at all corners and along lines to aid in the future identification of the legally surveyed property lines. When the stakes are installed, care should be taken to ensure that the stakes are placed accurately on the property line and installed securely (See appendix for a detail of the boundary stakes).

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### Site Inventory

- The first task in managing our resources following acquisition and liability mitigation is a thorough inventory of the resource itself. The resources needed to accomplish the site inventory include:
  - Deeds and purchase documents
  - City and county plat maps
  - Registered surveys
  - Topographic maps
  - Aerial photos
- Start with an inventory of the ownership. Locate the original closing papers, recorded easements, deeds of trust or any conveyance documents that describe the property. The goal is to discover the boundaries, legal histories and easement restrictions on the land to be managed. If files on the site are incomplete, the County Property or Records Department may prove helpful. Be sure to provide any parcel numbers, legal descriptions, plat names and even street addresses to assist in the research.
- The next step in a site inventory is to collect site-specific information. Site-specific inventory information will help direct the implementation of operational activities necessary in maximizing open space objectives. The site-specific inventory information shall include:
  - Site history
  - Boundary delineation
  - Site liabilities
  - Vegetation habitat type and successional stage
  - Soils, aspect, topography

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- Fish and Wildlife habitat
- Recreation opportunities
- Sensitive areas

All of the site inventory information should be documented and stored for future reference and the development of Natural Resource Enhancement plans.

### **Routine Site Inspections**

All forest and natural areas shall be inspected on an annual basis. There are, however, two levels of inspection detail that the inspector may use, first and second-priority inspections.

The most detailed and comprehensive inspection is referred to as a first-priority inspection. First-priority inspections are conducted on sites scheduled to receive enhancements for the year or sites that are politically or environmentally sensitive.

As the names imply, first-priority inspections occur ahead of second-priority inspections. This is because first-priority inspections are meant to identify forest management areas of concerns and enhancement tasks, verify the existence of all boundary markers, discover any trespass issues (encroachments, dumping, or illegal tree cutting) and monitor the progress of past enhancement projects. A second-priority inspection, although not as time consuming, is still comprehensive and well documented. Second-priority inspections cover the balance of open space properties and consist of a general site reconnaissance. Second-priority inspections are focused on the discovery of potential liability situations and trespass infractions.

While conducting a site inspection, it is important to respect the adjacent property owners' rights and concerns. The inspector is a representative of the City of Bellevue and should be polite, courteous and professional at all times.

### **Inspection Procedure**

Pre-inspection planning needs to be done to ensure a safe, productive and successful inspection. Spending a few minutes planning and discussing the inspection will help eliminate wasting time over something forgotten.

- Before leaving the office, get a picture of the site characteristics and location.

- Determine whether you need to be carrying out a first or second-priority inspection and get answers to any questions you might have.
- Let someone in the office know your work plans and location, preferably your supervisor.

Property inspections can be a slow and demanding process. Thick vegetation, steep slopes, unmarked property lines and bad weather all conspire to make the going challenging.

- Use aerial photos to identify your location by looking for identifiable structures or rooflines.
- Walk the property line and document all property markers and hazardous trees.
- Look for and document with pictures any encroachments, dumping, vegetation removal and tree cutting. Identify the location on the map.
- If homeless camps or other illegal activities are discovered, notify the proper authorities for removal.

If there are trails on the property, walk the trails and record their general level of upkeep. This brief walkthrough can help the trails crew address maintenance issues.

Record all of the data that was collected. Insert the inspection forms in the site book and report any issues to the supervisor. Clean and store all tools.

### **Liability Tree Monitoring**

Once a tree is designated as a liability tree it shall become the burden of the staff at hand. Although it may be easier and less complicated to simply remove all liabilities, the conservation of trees is something that must be considered until the tree can either be replaced or the tree becomes too great of a liability and must be removed.

### **Trespass Enforcement**

Trespass enforcement consists of remedying any of the following actions on park property: clearing of vegetation, including the topping of trees; dumping of debris; and encroachment by construction or developed structures. In 1993, the Parks & Community Services Department developed a Parks Department Encroachment Policy in response to numerous encroachment issues. In the years that followed, the Parks Department clearly identified many of its property boundaries

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by installing boundary markers. Inasmuch as the installation of these markers greatly reduces the number of trespass situations that arise, they still occur on a regular basis.

The **Parks Department Encroachment Policy**, although developed specifically for encroachment issues, can be applied to all trespass situations. The three steps the policy outlines for the enforcement of encroachment issues are as follows:

1. Voluntary Removal of Encroachment – This would primarily be facilitated by Parks’ staff working directly with the property owner to find a mutually agreeable restoration plan and the implementation of such a plan. The interaction with the property owner is usually a mixture of both on site visits and formal letters.
2. Boundary Line Adjustment – This option will only be considered a possibility in a situation where the property owner is able to “exchange” land of equal size, value and condition for the land that is encroached. All costs associated with a Boundary Line Adjustment would be borne by the property owner. For clearing or dumping situations, this option would not be considered. City Council has final approval of all Boundary Line Adjustment decisions.
3. Legal Action – This option is necessary in the rare case where the property owner refuses to accept the trespass as true or refuses to remedy the situation voluntarily. The City Manager’s approval is required for use of Legal Action for enforcement of a trespass.

### **Natural Resource Enhancement Implementation**

This task should be utilized for all activities related to the implementation of a Natural Resource Enhancement Plan. This includes but is not limited to the following:

- Debris removal & cleanup
- Hazard tree removal
- Preparation and planting of enhancement sites with native plant species
- Silvicultural prescriptions
- Trail construction or upgrades

## Silviculture Prescriptions

Silvicultural prescriptions are also known as forest management practices. These shall be implemented in accordance with the City of Bellevue's land use policies for open space. Sound forest management practices support park functions by maintaining and enhancing a biologically diverse community consisting of a mixture of age classes and plant species, as well as wildlife habitat and recreational opportunities.

The management goals for most parks are as follows:

- Public safety
- Improve forest health
- Protect water quality
- Visual buffering
- Recreational opportunities

## Sensitive/Critical Areas

Sensitive, or critical, areas are defined as those areas that can be adversely affected by any non-natural process, causing degradation to that area, or its biological processes. The City of Bellevue Land Use Code and The Sensitive Areas Notebook define critical areas as:

- Areas of special flood hazard
- Riparian corridors, excluding Type C and D
- Wetlands, excluding Type C
- Areas of colluvial or landslide deposits on slopes of 15% or more
- Slopes of 40% or more
- Areas potentially affected by abandoned coal mines
- Shorelines and aquatic habitats

Bellevue Parks & Community Services Department recognizes the special importance of these areas, as well as others not defined by the Land Use Code, that fall under its stewardship. These sensitive habitats, their plant and animal communities, have a direct link with other habitats and waterways, affecting entire ecosystems. The goal is to preserve these areas to the fullest possible extent, for the preservation of these species, and for the good of the community.

There are many regulations regarding working in these areas, and therefore, many special permits are required by either the City or the State. For further information, contact the Developmental

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Services Department or refer to the COB Land Use Code.

### **Water Quality Monitoring**

Water quality is another important aspect for maintaining a healthy park system and urban environment. In Bellevue, many departments and outside agencies work together and communicate with Parks to ensure that monitoring and regulation of water quality and surrounding habitat persists. These include Bellevue's Developmental Services Department, Utilities Departments and the Washington State Department of Fish and Wildlife.

### **Riparian Corridors**

Riparian corridors are sensitive areas that include an interactive vegetation community integrated with the water course ecosystem which provides food, shelter, breeding and rearing areas for aquatic and terrestrial animals and birds. They encompass the area that runs along both side of the water body, ranging from 10 -50 feet wide, depending on the sensitivity classification. Included are wetlands and meadows.

- Improper clearing can have serious effects on the ecosystem, allowing for increased runoff, toxin accumulation, oxygen reduction to surrounding plants and water systems, and overall habitat destruction.
- Native vegetation is usually preserved or planted in order to mitigate any negative effects.
- If corridor is located within a Native Growth Protection area, it must be registered with the City.

### **Shoreline and Bank Stability**

Reinforcing or protecting a shoreline should consider the least impact necessary to achieve reasonable stability. These practices include, but are not limited to:

- Traditional use of riprap should be used only as a last resort. Softer treatments, such as log placement and bioengineering plantings, are preferred where feasible.

- Treatments should consider seasonal differences, such as the Chittendon Locks operations, and regular seasonal water level changes.

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### Steep Slopes

Steep slopes are defined as any slope over 40% and are considered sensitive or critical areas. An exception are areas of colluvial or landslide deposits, in which case the minimum slope is 15% or greater. The surface slope, soil layers and ground water layers all can impact how stable a slope is. To minimize impacts to a slope and the surrounding area:

- Removing vegetation from the ground layer should be minimized and plantings should be stabilized with appropriate bioengineering techniques (e.g. netting, wattling, hydro-mulching, etc.).
- Revegetation should be evaluated so as not to cause more damage or disturbance to soil layers.
- Slide areas, or areas suspected of being slide-prone, should be evaluated by a geotechnical expert before extensive restoration begins.
- Storm-water runoff must be prevented from saturating or loading steep slopes. The appropriate drainage system should be in place and adequately maintained to intercept runoff flows before reaching the slope.

### Slide Areas

Slide areas, or those suspected of being slide-prone, shall be evaluated by a geotechnical expert before extensive restoration is initiated. Strategies can be developed to help maintain or even improve slope stability. The standard practice of hydro-seeding repaired slide areas is prudent but does not restore stability. To restore stability and prevent further soil erosion, subsurface hydrology must be considered and woody vegetation re-established.

### Wetlands

Wetlands are those sensitive areas that are a transition between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is covered by shallow water.

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The plants that inhabit a wetland are hydrophytic, and adapted to living in hydric soils, sometimes under water. Wetlands serve an important function in that they act as a natural reservoir for storm runoff, offer flood control, recharge ground waters and filter off toxins that would otherwise find their way into the water table. They also provide necessary habitat for various wildlife species unique to any other habitat type.

Most wetlands found within the Bellevue Parks system are treated as sensitive areas and managed with the goal of maintaining the natural environment with the least amount of impact.

- Only invasive and noxious weeds are controlled through mechanical or cultural methods.
- Approved wetland herbicides are used only when necessary and never near standing water. Such applications are made under an approved Aquatic Noxious Weed Control NPDES General Permit.
- Only native species are planted within a wetland area, unless the wetland is part of one of the agricultural areas that are preserved within the parks system.
- Trails are kept to a minimum and specially designed to decrease habitat disturbance.

### Meadows

Meadows serve an important role in natural and sensitive areas. They provide necessary wildlife habitat, reduce flooding potentials downstream or in low lying areas and act as a natural filter as water passes through supplying needed nutrients to the area. The Bellevue Parks & Community Services Department has adopted many restorative and maintenance practices regarding meadows and wetland areas. They include grassland vegetative cover, meadow preservation, meadow restoration, habitat preservation and fire prevention.

### Grassland Vegetative Cover

Healthy vegetative cover is important for erosion control, habitat and noxious weed control.

- Exotic Grasses: Most urban meadow sites are previously disturbed sites resulting in regrowth of primarily exotic grasses. Once established, these exotic species should be accepted

as the primary component of the vegetative cover.

- Native Meadow Plants: Preservation of native plants should be attempted whenever possible.
- Wet Meadows: Many meadow areas in this region remain in a saturated condition for 6 months or more. Avoiding significant maintenance activities during this period is recommended. Preservation and introduction of appropriate native plants into these sites will help ensure a healthy vegetative cover.

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### Preservation

To preserve a grassland, wet meadow, or perennial meadow in the Pacific Northwest requires an ongoing maintenance program.

- Disturbance: Avoid creating holes in the vegetative cover because it will open opportunities for noxious weeds to invade.
- Meadow Succession: The natural evolutionary process of forest/meadow succession will eventually colonize meadow areas with shrubs and trees. The management of this process will have a major impact on the character and longevity of the meadow. The desired character of a meadow area should be defined. The meadow should be managed to prevent establishment of exotic trees and shrubs. Depending on the desired character of the meadow, all, some, or none of the native plants attempting to colonize the site can be retained.
- Exotic Weed and Brush Control: Scotch broom and other noxious weeds colonize many meadow areas, especially if the vegetative cover is weak or not intact. If invasive brush is a minor problem, hand grubbing, use of weed wrenches, or spot spraying with a broadleaf herbicide are options. When invasive brush is a major problem, it may be necessary to mow the meadow on an annual basis. Mowing should be timed to avoid disturbing wildlife. Spring should be avoided to allow protection for ground nesting birds. The site should be monitored for other wildlife activity before mowing occurs. Mowing should also be done before seed set of the targeted species. Mowing heights should be a minimum of 6 inches high to prevent excessive grass clippings and to minimize exposing bare ground.

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### Restoration and Construction of Meadows

The restoration or new construction of a meadow should consider the following:

- Hydrologic Study of the Site: Available moisture is the determining factor in appropriate plant selection.
- Soil Study: Many native plants require specific soil requirements to succeed.
- Existing Vegetation: The site should be assessed for desirable species as well as undesirable species. A small test plot can also help determine the potential weed seed bank in the soil profile. A thorough inventory of existing species can provide valuable information for selection of appropriate species.
- Natural Succession: Whenever possible, attempt to emulate the natural succession process by initially introducing primarily pioneering plant species and gradually expanding into later successional species as cultural conditions allow.
- Wildlife Habitat: The management practices of meadow areas should reflect the goal of preserving and enhancing desirable wildlife species.
- Maintenance Activities: Maintenance activities should be evaluated as to their impact on wildlife and appropriate decisions made.
- Enhancements: Many desirable species can be attracted by enhancements such as nesting boxes, brush piles, rock piles, stumps, snags and specific plants.
- Environmental Education/Interpretation: When resources are available, it is important to address environmental education. Educated park users are much more likely to preserve and protect a site.

### Organic Debris

Organic debris from maintenance practices will remain on site, as long as it does not interfere with other landscape functions. Types of interference include blocking trails, forming unstable cornices, diverting drainages and smothering desirable vegetation. Wherever possible, use the following practices:

- Organic debris should be cut and dispersed to maximize ground contact.

- Chipping woody debris is useful as long as debris is left in a depth of 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.

Notes:

### Fire Prevention

A healthy, diverse plant community is fire resistant, but woody plant debris must be managed in any urban landscape. The following practices encourage fire prevention in natural and sensitive areas:

- Excessive accumulations of dead, woody plant debris should be avoided. Thinly scatter this 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.
- Maintain transitions to developed landscapes to provide interruptions to the normal path that fires usually travel. This practice creates a more defensible landscape.
- Hydrants should be located along the edge of natural areas to provide 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.
- Areas of known homeless encampments should be frequently inspected and cleaned up to minimize the potential for wildfires.

## 9.5 Integrated Pest Management

### Pest Tolerance Thresholds for Natural and Sensitive Areas

- Weeds are generally found in these environments and many will be tolerated.
- Noxious weeds will not be tolerated and will be controlled.
- Invasive plants are generally not tolerated. Invasive plants will be controlled in conjunction with ecosystem restoration efforts in these environments.
- Only insect pests that pose a risk to the public (such as hornets) or to the resource (such as gypsy moth) will be controlled.

Notes:

- Plant diseases will generally be tolerated unless a specific control can be employed that will be effective in ensuring the health of particularly valuable assets.

### Pest Management Control Strategies for Natural Areas

#### Weed Control

An overriding principle of IPM is the 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. Frequent 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 onsite recycled leaf litter are adequate materials. Avoid wood chips from diseased trees. Mulch should be between 2 to 3 inches deep for best results. Care must be given to not incorporate new weed problems with the import and use of lower grade mulch materials, or to allow mulch to runoff into wetland, streams or other water bodies.

#### Woody Brush Control

The control of woody brush like blackberries and English ivy is very important in certain park locations. Often these plants are found in transition areas between developed park areas and natural areas. 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 can be employed when other measures are not possible or have failed. Spot applications are preferred whenever possible although area applications may be employed. Any area applications will be limited to the area of infestation.

#### Stump Re-Sprouting Control

Often there is a need to remove small trees and prevent re-sprouting of

stumps. Methods for controlling the re-sprouting of stumps include the following:

- If the location of the stump will allow access by equipment, then it can be mechanically removed if the location is not within an environmentally critical area.
- Small stumps may be removed manually if they are not on steep slopes or in other environmentally critical areas.
- The re-sprouting of stumps can also be controlled by painting newly cut stump surfaces with specific herbicides. Care will be taken to limit the application of the selected herbicide to the stump surface only.

Notes:

### Invasive Plant Control

Invasive plants have taken over many of the City's natural areas, radically changing pre-existing ecosystems. Attaining long-term control of invasive plants is essential to recovery and preservation of the City's natural ecosystems. Invasive plant control shall follow the guidelines established by the *King County Noxious Weed Board*. Except in the case of Class A weeds, the goal is suppression of weed populations to below threshold (damage causing) levels. Eradication of certain ecological weeds (blackberry or ivy) in all of the City's natural areas is neither feasible nor cost-effective. However, controlling spread of the problem and eradication in certain priority locations is the goal of Bellevue Parks. Control methods include:

- Use *extent of removal* and *type of habitat* to determine the pest control method.
- Large areas that are totally infested can be mowed. Areas that are 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 will 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®, Rodeo® or Garlon 3A®. The use of these products shall conform to those BMPs described below in "Herbicide Use."
- Re-establishing a new native planting regime as quickly as possible.

Notes:

following the removal of invasive plants is critical to successful forest restoration. These new plantings will require care for several years to guarantee establishment.

- Preserve established native plants when possible rather than re-establishing new plants after the clearing of invasives.

### **Herbicide Use**

The use of herbicides in any natural environment can have a serious impact on the surrounding ecosystem, and therefore, must be carefully considered. Herbicides will be used for weed control in natural areas only when other control measures have been tried and have failed or when past practice strongly indicates that control of the weed pest can only be achieved through the use of an herbicide. The following are Bellevue Parks herbicide use practices:

- Cut and stem treatment (daubing or painting) is the preferred choice for natural area management.
- Certain invasive plants are difficult to treat and control in their mature form. If possible, remove existing growth manually or mechanically. Wait for new growth to emerge, and then treat with the appropriate and approved herbicide.
- Only herbicides approved for use in natural areas shall be used.

### **Insect Control**

Insects like the European and Asian gypsy moth and the Asian long-horned beetle can potentially devastate Bellevue's urban forest. The Bellevue Parks Department will cooperate with State and Federal agencies in their monitoring and control programs to prevent the introduction of these pests.

### **Nuisance Wildlife**

Mountain beavers, beavers, opossums, raccoons, waterfowl and other species can be destructive to natural areas when their activities are excessive. If control of wildlife is needed, Bellevue Parks will work with the most appropriate County (Animal Control) or State (Department of Wildlife) agency to gain control.

### **Root Rots**

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

control root 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

Notes:

## Pest Tolerance Thresholds and Management for Sensitive Areas

### Noxious Weeds

- Noxious weeds will not be tolerated in any sensitive area and will be removed. Mechanical or biological methods will be utilized.
- When these methods are not feasible, **emergent weeds** may be controlled with Rodeo and an approved surfactant if needed.
- Herbicides shall not be used within 25 feet of any water source. In some riparian areas, the distance is increased to 50 feet.
- Approved herbicides can be used on wetland sites, as long as no standing water is present.
- All herbicide applications within shoreline, wetland and riparian buffers shall be made under an approved NPDES Aquatic Noxious Weed Permit.

### Weeds

- Most invasive weeds are tolerated in sensitive and natural areas. If the weed species becomes too prolific, mechanical or cultural methods will be used to remove them.
- Weed management in actual water bodies, such as Larsen Lake and Phantom Lake, is handled by the Bellevue Utilities Departments.

### Insects

Generally, insect pests are tolerated in sensitive and natural areas. Only trees in this area that pose a definite risk to the general public will be treated or removed.

### Disease

Disease pathogens that infect trees in sensitive and natural areas are

Notes:

generally tolerated. Spread is monitored and only in extreme cases will any treatment be used.

## 9.5 Training

- Provide training to all construction personnel to make sure they understand all construction site BMPs, including streambed and bank protection, steep slopes and wetland protection.
- The site manager and other designated site managers shall receive the most recent training and education dealing with construction site management. This training includes the most recent advances for protecting trees on construction sites.
- Urban Forestry and site managers should receive training in appraising and evaluating tree and plant damage according to International Society for Arboriculture standards and natural area preservation techniques.
- Tree workers will be ISA certified.
- All contracted or volunteer planting crews shall be trained in proper planting techniques by the site manager.

