

# **Airport Landscaping Standards**

**Excerpts from PDX, HIO, and TTD Wildlife Hazard Management Plans**

**01/06/2017**



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## **Introduction**

Landscaping at airports can affect tourism, business, and the overall feeling for visitors. With this in mind, landscaping should be aesthetically pleasing. However, it must also coincide with the airport's greater responsibility for aviation safety. The primary goal of airport landscape management is to reduce aviation wildlife species of concern being attracted to the airport environment and to eliminate the vertical intrusion of vegetation into aircraft operating airspace. The plant species found within the Airport Landscaping Standards apply only to management of vegetation in the built environment. Composition of plant species within the context of natural site conversions is not addressed within these standards.

Because landscaping at an airport has the potential to create wildlife attractant issues, the FAA has issued Advisory Circulars that address a variety of landscaping concerns. An FAA Advisory Circular (AC) is guidance that must be adhered to by all FAA Part 139 certificated airports or airports that receive federal funding, of which PDX, HIO, and TTD are included under.

FAA AC 150/5200-33 provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. Section 2-8 of this AC states:

“There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants....are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace....therefore, airport operators and the wildlife damage management biologist must consider the entire surrounding landscape and community....”

Additionally, the *2005 Wildlife Hazard Management at Airports Manual*, written jointly by the FAA and USDA specifically states:

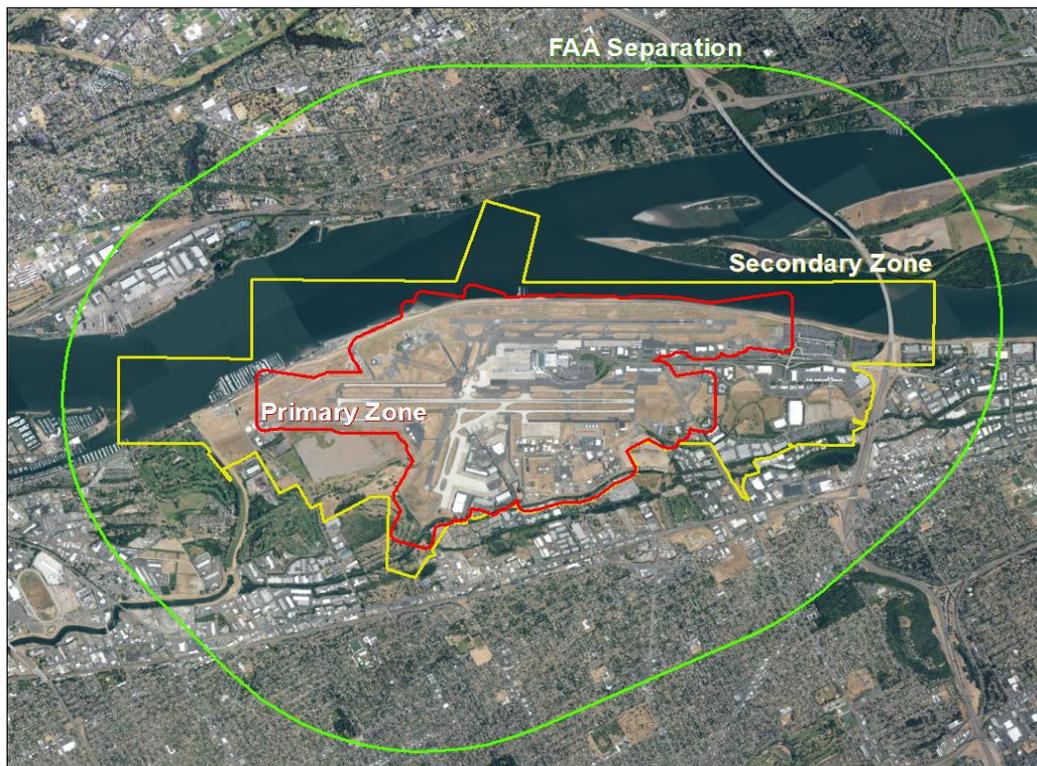
“Do not use trees and other landscaping plants for the street side of airports that produce fruits or seeds attractive to birds. Avoid plants that produce fruits and seeds desired by birds. Also avoid the creation of areas of dense cover for roosting, especially by European starlings and blackbirds. Thinning the canopy of trees, or selectively removing trees to increase their spacing, can help eliminate bird roosts that form in trees on airports.”

In support of this guidance, the Port of Portland has developed a set of landscaping design standards that address plant species and planting standards for spacing of trees and shrubs within the built environment at Port owned aviation facilities (Portland, Hillsboro, and Troutdale Airports). An approved list of trees, shrubs, and groundcover for vegetation is comprised of species screened by Port's Wildlife staff for general wildlife attractant features such as fruit, berries, height, density, branching structure, crown shape, planting density and arrangement, and location relative to the airfield and significant habitat features ([Airport Plant List](#)).

## **Zone Concept**

At airports serving turbine-powered aircraft such as PDX and HIO, the FAA recommends a separation distance of 10,000 feet be maintained between the AOA, for new land uses deemed incompatible with safe airport operations (e.g., municipal solid waste landfills, wastewater treatment facilities, wetland mitigation projects). Existing land uses within this zone (e.g., retail, storm water detention facilities, and golf courses) may be compatible with airport operations if there is no apparent attraction to hazardous wildlife, or if wildlife hazard management efforts effectively eliminate or contain the hazard. For other airports serving piston-powered aircraft such as TTD, this separation distance is recommended to be 5,000 feet. It should be noted that the identification of wildlife species that pose a risk to aviation safety and their attractants is an ongoing process. The AC 150/5200-33 also recommends against placing certain hazardous wildlife attractants within a 5-mile radius of the AOA if they may cause hazardous wildlife movement into, or across, the approach or departure airspace.

For management prioritization the Port has divided the FAA's 10,000-foot distance around the AOA at PDX into 3 zones: the Primary Zone, the Secondary Zone and the FAA Separation Zone (Figure 1). For HIO and TTD the separation distance has been divided into 2 zones: Primary Zone, and Secondary Zone (Figure 2 & 3). This tiered approach to wildlife hazard management is based on the premise that the potential risk posed by a hazard increases with proximity to aircraft operations.



**Figure 1: PDX Zones for Wildlife Management.**

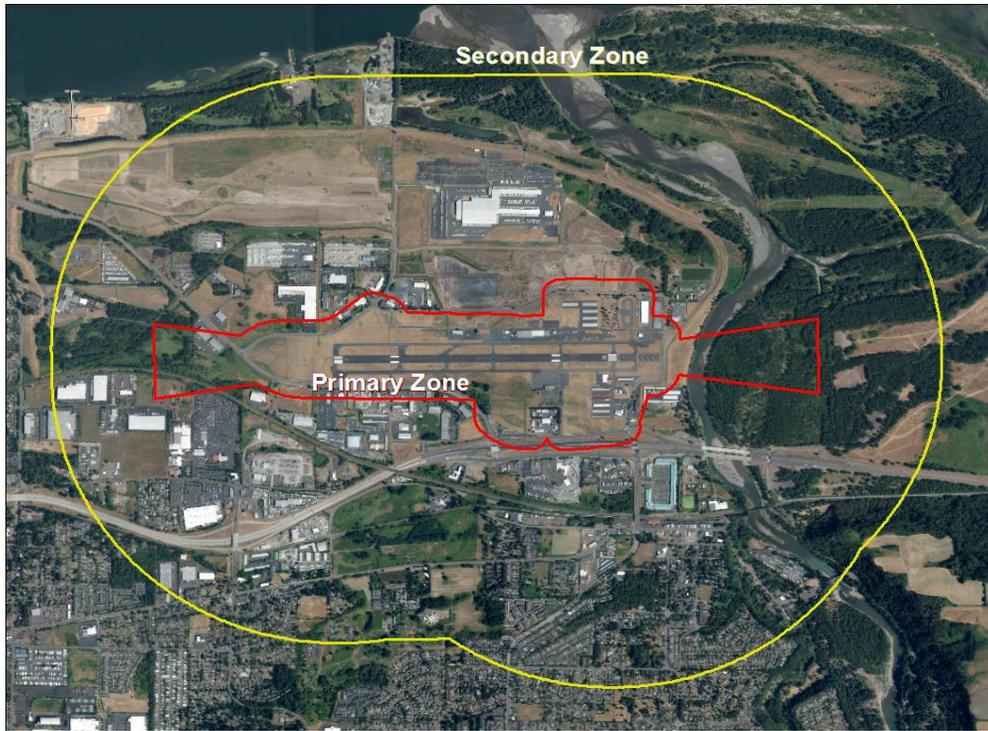


Figure 2: TDD Zones for Wildlife Management.

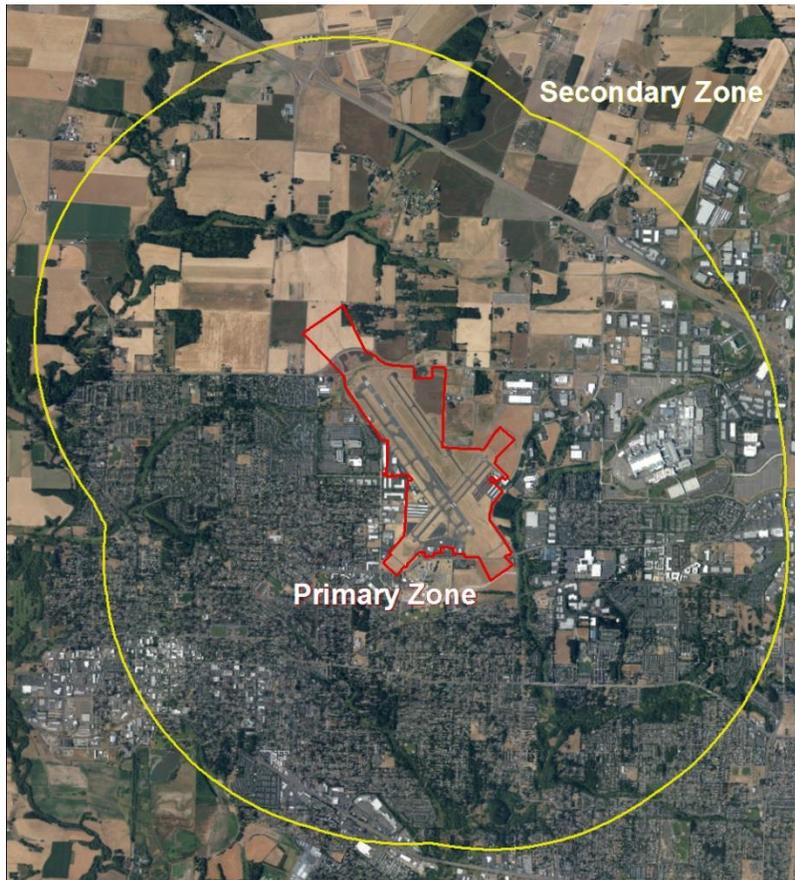


Figure 3: HIO Zones for Wildlife Management.

## **Landscape Management**

For the purpose of these guidelines please reference the following definitions of trees and shrubs taken from the Utah State University Agricultural Extension Office. A plant will be defined as a tree based on having the characteristics of being a woody plant having one erect perennial stem (trunk) at least 3 inches in diameter at a height of 4 ½ feet above the ground, a definitely formed crown of foliage, and a mature height of at least 13 feet. A plant will be considered a shrub if it is a woody plant with several perennial stems that may be erect or may lay close to the ground, usually having a mature height less than 13 feet and stems no more than around 3 inches in diameter.

### **Primary Zone**

The PDX Primary Zone is within the Airport Sub-district ([Title 33, Planning & Zoning, chapter 33.565](#)) of city code, and currently exempt from City of Portland landscaping requirements. No City of Portland environmental zones are located within the Primary Zone.

All landscape management within the all three Primary Zones will be driven by the operational and safety needs. Airport Landscaping Standards for the Primary Zones are as follows:

#### **Existing Landscaping**

- Existing trees, shrubs, and other landscaping will be assessed. Any landscaping that is documented to pose a significant wildlife hazard to safe aircraft operations will be immediately removed.

#### **New Landscaping**

1. Each new landscaping project within the Primary Zone will be reviewed by the Aviation Wildlife Manager and other Port staff before landscaping designs are finalized.
2. Landscaped areas within the Primary Zone, including tenant landscaping, will only include shrubs and groundcover. No new trees will be allowed. Vegetation species must be represented on the Port's Airport Plant List. Design of the landscaping must also comply with the standards outlined in this document.
3. Trees that penetrate 14 CFR Part 77 Transitional Surfaces, and are demonstrated as contributing to hazardous wildlife conditions, will be removed rather than topped. Topping of trees creates an attractive platform for raptor nests, exacerbating bird strike potential.
4. No shrubs will be allowed within ten (10) feet of the airfield perimeter fence. This requirement addresses security concerns as well as vertical structure and wildlife hazards.
5. Shrubs may be planted adjacent to each other in groups of up to five. If there is more than one group of shrubs, there must be at least 10 feet between each group. If shrubs are not planted in groups, there must be at least 10 feet between each shrub.

6. Landscaping will be a combination of evergreen and deciduous species of shrubs, with no greater than 50 percent of evergreen species.

## **Secondary Zone**

Landscaping in the Secondary Zone should not create habitats attractive for wildlife species of concern. Therefore, the goal of landscaping in this zone is to provide a visually pleasing landscape that does not constitute an unacceptable wildlife risk to aircraft operations. All landscape management within the Secondary Zone will consider the operational and safety needs of the Airport. Landscaping Standards for the Secondary Zones are as follows:

### **Existing Landscaping**

- Existing trees, shrubs, and other landscaping will be assessed. If any landscaping is documented to pose a significant wildlife hazard to safe aircraft operations, a proposal for vegetation modification will be presented to the appropriate Port department manager to address the issue.

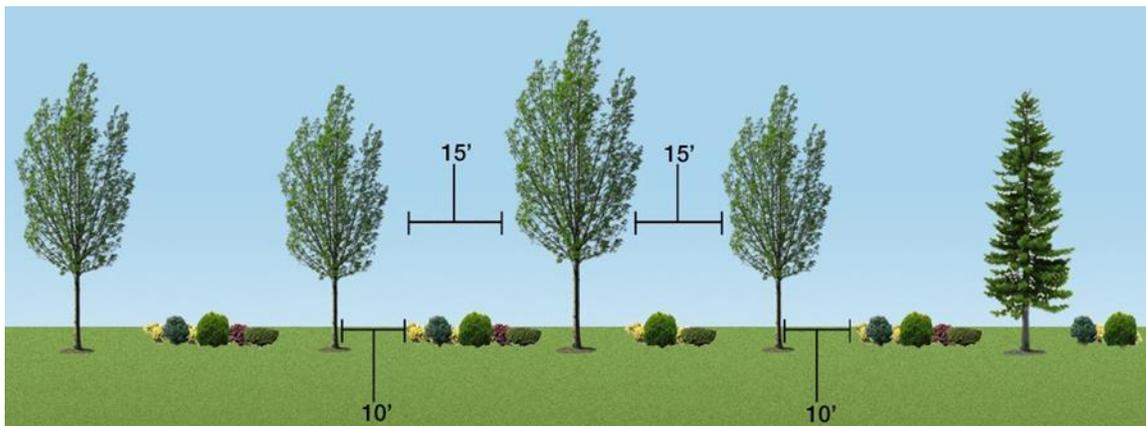
### **New Landscaping**

1. Because of the potential for landscaping to support wildlife species of concern that could pose an unacceptable risk to aircraft operations, aviation wildlife concerns need to be incorporated into landscape project planning.
2. Vegetation species must be represented on the Airport Plant List. Design and installation of landscaping should comply with the spacing and arrangement guidelines outlined below.
3. Tree species should be selected and planted so that, at maturity, overlapping crown structures, that are attractive to European starlings or other wildlife species of concern, will be minimized (Figure 4). In an effort to ensure that there are no areas within the landscaped environment with contiguous canopy cover the Port has developed tree spacing guidelines. These guidelines were developed by looking at the documented maximum spread at maturity of each species on the Airport Plant List. In order to maintain a minimum of 15ft spacing between mature crowns, the tree species on the list were grouped into three categories. The first group includes columnar species with a maximum spread at maturity between 10 and 15ft. To maintain 15ft spacing between the crowns of these species the trees are required to be planted at a distance of 25ft on center. The next group includes species with a maximum spread at maturity between 20 and 30ft. To maintain 15ft spacing between the crowns of the species in this group, these trees are required to be planted at a distance of 40ft on center. The last group includes a few of the largest tree species on the PDX list. The maximum spread at maturity for these trees is between 40 and 75ft. To maintain 15ft spacing between the crowns of these species during their foreseeable life in a landscaped environment, these trees are required to be planted at a distance of 60ft on center. If a contractor wishes to intermix species from the 25 and 40ft categories they may do so at a distance of 35ft on center. Species from the 25 and 60ft categories may be planted at a distance of 45ft on center and species from the 40 and 60ft categories may be planted at a distance of 50ft on center. These situations should be clearly indicated in landscape design plans.



**Figure 4: Overlapping crown structures that allow birds to move safely from tree to tree without exposure to predators or weather.**

4. Trees approved for planting should have varied canopy types and varied heights, both at time of planting and at maturity. This will discourage homogeneity, which attracts starlings (a wildlife species of concern) due to its increased thermal cover and protection from predation. No uniform, even, or continuous canopies will be allowed. In addition, trees will be planted in a manner such that there are no more than 20% evergreen trees per project.
5. Selection of shrubs should be a mix of deciduous and coniferous species with no more than 50% evergreen species planted to avoid continuous blocks of evergreen cover. Selection will be based on species that do not exceed a height of 13 feet at maturity<sup>1</sup>. Shrubs will be planted 10 feet away from all trees<sup>2</sup> (Figure 5).

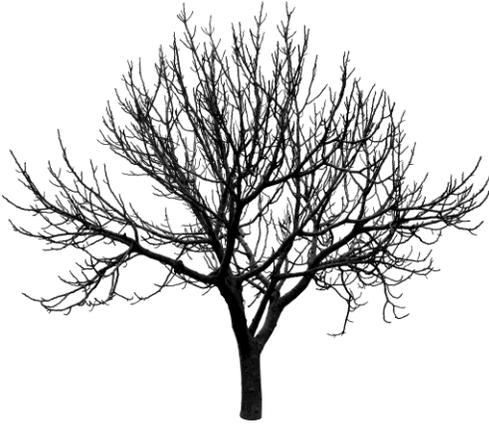


**Figure 5: Conceptual landscaping design for the Secondary Zone.**

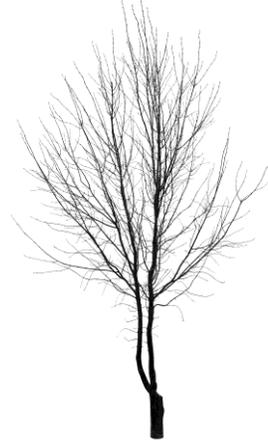
<sup>1</sup> This standard does not include plantings for the Columbia South Shore Marine Drive Standards. The shrubs on this list may not be higher than five (5) feet at maturity.

<sup>2</sup> These on-center planting criteria apply specifically to interior and perimeter landscaping standards for parking lots, and do not necessarily apply universally in the Secondary Zone.

6. Tree species selected should tend toward columnar shapes, which have a vertical branching structure that minimizes perching and nesting opportunities for birds (Figures 6 and 7).



**Figure 6: An example of a tree species that is attractive to birds because of its horizontal branching structure.**



**Figure 7: An example of an ideal tree because it has minimal opportunities for perching and nesting due to its vertical branching structure.**

7. Sterile (non-fruiting) varieties of trees will be maintained and utilized. If, despite following the above guidelines, any landscaped area is documented to be a safety, security or wildlife hazard attractant, it will be managed using appropriate techniques such as pruning, thinning, or selective removal. No planting of new trees will be permitted in areas with documented hazards. Trees removed as documented hazards may be replaced with approved shrub species at densities meeting the Airport Landscaping Standards.

## **Grass Management**

Grass is the primary ground cover currently used in undeveloped infield areas inside the Primary Zone. This ground cover is generally preferable to paving because it visually defines the AOA for approaching aircraft, more economical to maintain over time, and it provides a pervious surface for storm water management. Unfortunately, this maintained short-grass cover also provides suitable habitat for small mammals that are a primary food source for raptors (e.g., red-tailed hawk). If the Port's risk evaluation efforts indicate that grass cover represents an unacceptable risk to safe aircraft operations by providing habitat to wildlife species of concern, other alternate ground cover mixes will be considered. Unnecessary and unwanted weeds and brush (e.g., Himalayan blackberry) are removed from all areas within the Primary Zone. Noxious vegetation found on the Secondary Zone may be sprayed with an herbicide type agent, and/or physically removed.

### ***Grass Type***

The Port's T-901 seed specifications for grass is currently planted and maintained in the Primary Zone, and over much of the Port-owned land in the Secondary Zone. These specifications are a low-maintenance endophyte enhanced tall fescue seed mix. This grass mix grows very well under the normal climatic conditions of the region. Any future changes to this seed mix shall be reviewed for its palatability to wildlife species of concern and/or their prey before being used.

Seed mix shall be a three-way blend of endophyte enhanced dwarf turf type tall fescue:

**Table 1: Aviation Grass Seed Specification.**

<b><u>Seed</u></b>	<b><u>Percent PLS</u></b>	<b><u>Min Seed Purity</u></b>	<b><u>Minimum Germination</u></b>	<b><u>Endophyte Enhanced</u></b>
		<b>(Percent)</b>	<b>(Percent)</b>	<b>(Percent)</b>
Seed type 1	33	98 min	90 min	80 min
Seed type 2	33	98 min	90 min	80 min
Seed type 3	33	98 min	90 min	80 min
Inert Matter	1			

PLS (pure live seed) is the amount of living, viable seed in a larger total amount of seed. The amount of seed to be applied is obtained by using the purity and germination percentages from the label on the actual bag of seed to be used on the project. To calculate the amount of seed to be applied:

- a. Obtain the PLS factor by multiplying the seed label germination percentage with the seed label purity percentage;
- b. Divide the specified PLS rate by the PLS factor;
- c. Round off the result as approved.

Seeding shall be performed during the period between September 1 and October 15, unless otherwise approved or directed by the Port. After October 15<sup>th</sup> an additional 30% of Annual Rye by weight, may be used as an erosion control BMP. Perennial Rye grass is not approved for use at PDX.

## **Storm water Management Systems**

Common hydrophytic vegetation used in storm water management systems creates wildlife attractant concerns for airports. Specifically, swales that contain emergent vegetation are extremely attractive to waterfowl for nesting and shelter. With this in mind, the Airport Plant List consists of five recommended woody shrub-scrub species. The intent is to reduce mobility in the vegetation and sense of safety for waterfowl that may otherwise be content.

In addition to the type of vegetation, many common storm water treatment and management options are highly attractive to wildlife such as detention ponds, infiltration basins, and swales. While managing for aviation wildlife issues, the Port of Portland also needs to stay in compliance with the local storm water management plans. This is achieved by determining the type of storm water facility and location relative to the airport, and determining whether or not it will become a safety concern for aviation wildlife hazard management. There are many storm water management options available that achieve the desired results without attracting wildlife that pose a risk to safe airport operations. To prevent these hazards, land-use developers and airport operators may need to develop management plans in compliance with local and state regulations to ensure a safe airport environment.

### **Existing storm water systems**

Storm water management inside the PDX Airport District should at a minimum comply with the guidance established at the federal and state level and must comply with the [Port's Storm water DSM](#). The intent of the Landscaping Standards and the DSM is to minimize wildlife attractants for storm water treatment systems and ensure existing conveyance systems have adequate capacity to manage flows without creating surcharging or standing water for a 10-year rainfall event, which is the storm system design standard for PDX.

The federal guidance for is found in [FAA Advisory Circular 150/5200-33](#) section 2-3.b, Hazardous Wildlife Attractants on or Near Airports.

This guidance states:

*“Storm water detention ponds should be designed, engineered, constructed, and maintained for a maximum 48-hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, and linearly shaped water detention basins. When it is not possible to place these ponds away from the airport’s AOA, airport operators should use physical barriers, such as bird balls, wire grids, pillows, or netting to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins should be eliminated if it provides food or cover for hazardous wildlife. If soil conditions and other requirements allow, the FAA encourages the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.”*

The state guidance is found in the [State of Oregon Airport Rules \(Oregon Revised Statutes 836.623\)](#). This guidance states: no new water impoundments of one-quarter acre or larger shall be allowed 1) within an approach corridor and within 5,000 feet from the end of the

runway, or 2) on land owned by airport or airport sponsor where the land is necessary for airport operations. Within the Primary Zone and on Port owned aviation property within the Secondary Zone, storm water treatment options are even more limited by the PDX WHMP and the Port of Portland's Storm water DSM.

### **New storm water systems**

New storm water detention ponds are prohibited in Primary Zones. If located on Port owned aviation facilities in a Secondary Zone, detention ponds will be designed in accordance with AC 150/5200-33 and any new holding ponds or detention basins must be completely covered. Installing netting at new open water features is not adequate as a cover to deter hazardous wildlife. The water surface must not be visible as an attractant; requiring the covers to be solid. Other storm water treatment options such as swales, filter strips, and sand filters may be allowed but must be approved by the Port of Portland Wildlife Manager. Wildlife staff will review all project proposals with new storm water treatment in the Primary and Secondary Zones. If proposals are incompatible with the PDX WHMP, Wildlife staff will work with project managers to identify storm water treatment options that will not create a wildlife attractant.

Airport Plant List							
	Scientific Name	Common Name	Type	Max. Height at Maturity (ft)	Max. Spread at Maturity (ft)	On The Web	
Primary Zone	Shrubs	<i>Berberis verruculosa</i>	Warty Barberry	Evergreen	3-5	3-5	<a href="http://oregonstate.edu/dept/ldplants/beve.htm">http://oregonstate.edu/dept/ldplants/beve.htm</a>
		<i>Cornus sericea 'Kelsey'</i>	Kelsey Dogwood †	Deciduous	3	3	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=100">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=100</a>
		<i>Ilex crenata 'Helleri'</i>	Heller Japanese Holly	Evergreen	4	4	<a href="http://oregonstate.edu/dept/ldplants/ilcrh.htm">http://oregonstate.edu/dept/ldplants/ilcrh.htm</a>
		<i>Lavandula angustifolia</i>	English Lavender	Evergreen	2-3	2-4	<a href="http://plants.usda.gov/java/profile?symbol=LAAN81">http://plants.usda.gov/java/profile?symbol=LAAN81</a>
		<i>Rhododendron x 'Girard's Purple'</i>	Girard's Purple Azalea	Evergreen	3-4	2-4	<a href="http://oregonstate.edu/dept/ldplants/rhgpur.htm">http://oregonstate.edu/dept/ldplants/rhgpur.htm</a>
		<i>Rosa meidiland var.</i>	Meidiland Rose Varieties	Evergreen	2.5-3		<a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=c338">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=c338</a>
		<i>Rosa 'Red Flower Carpet'</i>	Red Flower Carpet	Evergreen	2.5		<a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=b852">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=b852</a>
		<i>Rosa 'Radtko'</i>	Double Knock Out Rose	Evergreen	3-4	3-4	<a href="http://nassau.ifas.ufl.edu/horticulture/demogarden/printables/KnockOutDouble.pdf">http://nassau.ifas.ufl.edu/horticulture/demogarden/printables/KnockOutDouble.pdf</a>
		<i>Spiraea betulifolia</i>	Birchleaf Spiraea †	Deciduous	3	3	<a href="http://oregonstate.edu/dept/ldplants/spbet.htm">http://oregonstate.edu/dept/ldplants/spbet.htm</a>
	Groundcovers	<i>Ajuga reptans 'Burgundy Glow'</i>	Carpet Bugle	Evergreen	.5		<a href="http://oregonstate.edu/dept/ldplants/ajre-i.htm">http://oregonstate.edu/dept/ldplants/ajre-i.htm</a>
		<i>Calluna vulgaris</i>	Scotch Heather	Evergreen	.5-2	2+	<a href="http://oregonstate.edu/dept/ldplants/cavu.htm">http://oregonstate.edu/dept/ldplants/cavu.htm</a>
		<i>Ceanothus prostratus</i>	Mahala Mat	Evergreen	.5		<a href="http://plants.usda.gov/java/profile?symbol=CEPR">http://plants.usda.gov/java/profile?symbol=CEPR</a>
		<i>Dicentra formosa</i>	Pacific Bleeding Heart	N/A	2	2	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=42">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=42</a>
		<i>Echinacea purpurea</i>	Purple Coneflower	N/A	5	2	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=162">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=162</a>
		<i>Juniperus horizontalis</i>	Creeping Juniper	Evergreen	1-1.5	10	<a href="http://oregonstate.edu/dept/ldplants/juho.htm">http://oregonstate.edu/dept/ldplants/juho.htm</a>
		<i>Phlox spp.</i>	Native Phlox	N/A	.5-2		<a href="http://plants.usda.gov/java/ClassificationServlet?source=display&amp;classid=PHLOX">http://plants.usda.gov/java/ClassificationServlet?source=display&amp;classid=PHLOX</a>
		<i>Phyllodoce spp.</i>	Mountain Heather	Evergreen	.5-1.5	.5-1.5	<a href="http://plants.usda.gov/java/profile?symbol=PHYLL3">http://plants.usda.gov/java/profile?symbol=PHYLL3</a>
		<i>Polystichum munitum</i>	Sword Fern	Evergreen	4	7	<a href="http://www.pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=337">http://www.pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=337</a>
		<i>Walsteinia fragaroides</i>	Barren Strawberry	Evergreen	.5		<a href="http://oregonstate.edu/dept/ldplants/wafr.htm">http://oregonstate.edu/dept/ldplants/wafr.htm</a>
	Ornamental Grasses	<i>Calamagrostis x acutiflora 'Overdam'</i>	Feather Reed Grass †		2.5-3	1.5-2	<a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=n750">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=n750</a>
		<i>Festuca glauca</i>	Blue Fescue		1	1	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=52">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=52</a>
		<i>Ophiopogon japonicus 'Nana'</i>	Dwarf Mondo Grass				<a href="http://plants.usda.gov/java/profile?symbol=OPJA">http://plants.usda.gov/java/profile?symbol=OPJA</a>
		<i>Ophiopogon planiscapus 'Nigrescens'</i>	Black Mondo Grass		.75-1	.75-1	<a href="http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=E400">http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=E400</a>
		<i>Pennisetum alopecuroides 'Hameln'</i>	Hameln Fountain Grass		1.5-2.5	1.5-2.5	<a href="http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=A680">http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=A680</a>

\* Indicates measurements are not taken from the related website.

† Indicates preferred water quality plant species for swales and mitigation

Airport Plant List							
	Scientific Name	Common Name	Type	Max. Height at Maturity (ft)	Max. Spread at Maturity (ft)	On The Web	
Secondary Zone	Plant at 25 ft on Center	<i>Acer freemanii</i> 'Armstrong'	Armstrong Red Maple	Deciduous	50-70	15	<a href="http://oregonstate.edu/dept/ldplants/acfreea.htm">http://oregonstate.edu/dept/ldplants/acfreea.htm</a>
		<i>Calocedrus decurrens</i>	Incense Cedar	Evergreen	75	15	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=30">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=30</a>
		<i>Cedrus deodara</i> 'Aurea'	Aurea Deodar Cedar	Evergreen	10-25	6-10*	<a href="http://oregonstate.edu/dept/ldplants/cedeur.htm">http://oregonstate.edu/dept/ldplants/cedeur.htm</a>
		<i>Chamaecyparis obtusa</i> 'Gracilis'	Slender Hinoki Falsecypress	Evergreen	20	6*	<a href="http://oregonstate.edu/dept/ldplants/chobg.htm">http://oregonstate.edu/dept/ldplants/chobg.htm</a>
		<i>Cryptomeria japonica</i> 'Elegans'	Japanese Plume Cedar	Evergreen	30	10	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=196">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=196</a>
		<i>Cryptomeria japonica</i> 'Sekkan Sugi'	Golden Japanese Cedar	Evergreen	25	10*	<a href="http://oregonstate.edu/dept/ldplants/crjass.htm">http://oregonstate.edu/dept/ldplants/crjass.htm</a>
		<i>Cupressocyparis leylandii</i> 'Golconda'	Gold Leyland Cypress	Evergreen	20	6	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=115">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=115</a>
		<i>Prunus sargentii</i> 'Columnaris'	Columnar Sargent Cherry	Deciduous	35	15	<a href="http://oregonstate.edu/dept/ldplants/prsac.htm">http://oregonstate.edu/dept/ldplants/prsac.htm</a>
		<i>Zelkova serrata</i> 'Musashino'	Musashino Zelkova	Deciduous	45	15	<a href="http://www.jfschmidt.com/pdfs/musashinozelkova.pdf">http://www.jfschmidt.com/pdfs/musashinozelkova.pdf</a>
	Plant at 40 ft on Center	<i>Acer buergeranum</i>	Trident Maple	Deciduous	25-35	20-30	<a href="https://plants.ces.ncsu.edu/plants/all/acer-buergerianum/">https://plants.ces.ncsu.edu/plants/all/acer-buergerianum/</a>
		<i>Acer circinatum</i>	Vine Maple	Deciduous	10-20	20*	<a href="http://oregonstate.edu/dept/ldplants/acci.htm">http://oregonstate.edu/dept/ldplants/acci.htm</a>
		<i>Acer ginnala</i>	Amur Maple	Deciduous	10-20	20*	<a href="http://oregonstate.edu/dept/ldplants/acgi.htm">http://oregonstate.edu/dept/ldplants/acgi.htm</a>
		<i>Acer griseum</i>	Paperbark Maple	Deciduous	20-30	25*	<a href="http://oregonstate.edu/dept/ldplants/acgr.htm">http://oregonstate.edu/dept/ldplants/acgr.htm</a>
		<i>Acer palmatum</i>	Japanese Maple	Deciduous	15-25	10-25*	<a href="http://oregonstate.edu/dept/ldplants/acpa.htm">http://oregonstate.edu/dept/ldplants/acpa.htm</a>
		<i>Fagus sylvatica</i> 'Tricolor'	Tricolor European Beech	Deciduous	20-30*	10-20*	<a href="http://oregonstate.edu/dept/ldplants/fasytri.htm">http://oregonstate.edu/dept/ldplants/fasytri.htm</a>
		<i>Ginkgo biloba</i>	Ginko (males only)	Deciduous	50+	30	<a href="http://oregonstate.edu/dept/ldplants/gibi.htm">http://oregonstate.edu/dept/ldplants/gibi.htm</a>
		<i>Liquidambar styraciflua</i> 'Rotundiloba'	Rotundiloba Sweetgum	Deciduous	60-70*	20-30*	<a href="http://oregonstate.edu/dept/ldplants/listr.htm">http://oregonstate.edu/dept/ldplants/listr.htm</a>
		<i>Magnolia x soulangiana</i>	Saucer Magnolia	Deciduous	15-20	15-25*	<a href="http://oregonstate.edu/dept/ldplants/maso.htm">http://oregonstate.edu/dept/ldplants/maso.htm</a>
		<i>Malus x 'Spring Snow'</i>	Spring Snow Crabapple	Deciduous	25-30	15-20	<a href="http://hort.ufl.edu/trees/MALXE.pdf">http://hort.ufl.edu/trees/MALXE.pdf</a>
		<i>Metasequoia glyptostroboides</i>	Dawn Redwood (height restricted)	Deciduous	70-100	15-25*	<a href="http://oregonstate.edu/dept/ldplants/meql.htm">http://oregonstate.edu/dept/ldplants/meql.htm</a>
		<i>Oxydendrum arboreum</i>	Sourwood	Deciduous	25-60	10-25	<a href="http://oregonstate.edu/dept/ldplants/oxar.htm">http://oregonstate.edu/dept/ldplants/oxar.htm</a>
		<i>Parrotia persica</i>	Persian Parrotia	Deciduous	40	25	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=326">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=326</a>
	<i>Pinus ponderosa</i>	Ponderosa Pine (height restricted)	Evergreen	60-100	25-30*	<a href="http://oregonstate.edu/dept/ldplants/pipo.htm">http://oregonstate.edu/dept/ldplants/pipo.htm</a>	
	<i>Prunus serrulata</i> 'Shirotae'	Mt Fuji Cherry	Deciduous	12-15	20	<a href="http://oregonstate.edu/dept/ldplants/prsem.htm">http://oregonstate.edu/dept/ldplants/prsem.htm</a>	
	<i>Pyrus calleryana</i> 'Cleveland Select'	Cleveland Select Flowering Pear	Deciduous	30-35*	15-20*	<a href="http://www.advancedtree.com/tree_clevelandpear.htm">http://www.advancedtree.com/tree_clevelandpear.htm</a>	
	Plant at 60 ft on Center	<i>Acer rubrum</i> var.	Red Maple	Deciduous	60-75	30-50*	<a href="http://oregonstate.edu/dept/ldplants/acru.htm">http://oregonstate.edu/dept/ldplants/acru.htm</a>
		<i>Carpinus betulus</i>	European Hornbeam	Deciduous	40-60	30-40*	<a href="http://oregonstate.edu/dept/ldplants/cabe.htm">http://oregonstate.edu/dept/ldplants/cabe.htm</a>
		<i>Fraxinus americana</i> 'Autumn Purple'	Autumn Purple Ash	Deciduous	45-60*	35-50*	<a href="http://oregonstate.edu/dept/ldplants/framap.htm">http://oregonstate.edu/dept/ldplants/framap.htm</a>
		<i>Fraxinus pennsylvanica</i>	Green Ash (seedless varieties only)	Deciduous	50	40	<a href="http://oregonstate.edu/dept/ldplants/frpem.htm">http://oregonstate.edu/dept/ldplants/frpem.htm</a>
		<i>Gleditsia tricanthos</i> var. <i>inermis</i>	Thornless Honeylocust	Deciduous	30-70	30-40*	<a href="http://oregonstate.edu/dept/ldplants/gltri.htm">http://oregonstate.edu/dept/ldplants/gltri.htm</a>
		<i>Platanus x acerifolia</i>	London Planetree (height restricted)	Deciduous	70-100	60-75*	<a href="http://oregonstate.edu/dept/ldplants/plac.htm">http://oregonstate.edu/dept/ldplants/plac.htm</a>
		<i>Quercus coccinea</i>	Scarlet Oak	Deciduous	75	45	<a href="http://oregonstate.edu/dept/ldplants/quco-i.htm">http://oregonstate.edu/dept/ldplants/quco-i.htm</a>
		<i>Tillia americana</i>	American Linden	Deciduous	60-80	30-50*	<a href="http://oregonstate.edu/dept/ldplants/tiamer.htm">http://oregonstate.edu/dept/ldplants/tiamer.htm</a>
		<i>Tillia chordata</i>	Littleleaf Linden	Deciduous	60-70	25-40*	<a href="http://oregonstate.edu/dept/ldplants/tico.htm">http://oregonstate.edu/dept/ldplants/tico.htm</a>
	Shrubs	<i>Abelia x grandiflora</i> 'Prostrata'	Prostrate Glossy Abelia	Evergreen	1.5-2	4-5	<a href="https://plants.ces.ncsu.edu/plants/all/abelia-x-grandiflora-prostrata/">https://plants.ces.ncsu.edu/plants/all/abelia-x-grandiflora-prostrata/</a>
		<i>Berberis thunbergii</i> var. <i>atropurpurea</i> 'Crimson Pygmy'	Crimson Pygmy Japanese Barberry	Deciduous	2	3	<a href="http://oregonstate.edu/dept/ldplants/bethacp.htm">http://oregonstate.edu/dept/ldplants/bethacp.htm</a>
<i>Berberis thunbergii</i> 'Kobold'		Kobold Japanese Barberry	Deciduous	2-2.5*	2-2.5*	<a href="http://oregonstate.edu/dept/ldplants/bethk.htm">http://oregonstate.edu/dept/ldplants/bethk.htm</a>	
<i>Buxus sempervirens</i> 'Suffruticosa'		English Boxwood	Evergreen	4-5	2-4*	<a href="http://oregonstate.edu/dept/ldplants/buses.htm">http://oregonstate.edu/dept/ldplants/buses.htm</a>	
<i>Ceanothus thyrsiflorus</i>		Blue Blossom	Evergreen	4-12	Variable	<a href="http://oregonstate.edu/dept/ldplants/ceth-i.htm">http://oregonstate.edu/dept/ldplants/ceth-i.htm</a>	
<i>Chamaecyparis obtusa</i> 'Nana Lutea'		Nana Lutea Hinoki Falsecypress	Evergreen	6	4	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=164">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=164</a>	
<i>Cistus</i> spp.		Rockrose species	Evergreen	Variable	Variable	<a href="http://oregonstate.edu/dept/ldplants/1plants.htm#ciannp">http://oregonstate.edu/dept/ldplants/1plants.htm#ciannp</a>	
<i>Clematis armandii</i>		Evergreen Clematis	Evergreen	20	Variable	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=261">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=261</a>	
<i>Corylopsis glabrescens</i>		Fragrant Winterhazel	Deciduous	8-15	8-15	<a href="http://oregonstate.edu/dept/ldplants/cospp.htm">http://oregonstate.edu/dept/ldplants/cospp.htm</a>	
<i>Cotinus coggygria</i>		Common Smoketree	Deciduous	10-15	10-15	<a href="http://oregonstate.edu/dept/ldplants/cocog.htm">http://oregonstate.edu/dept/ldplants/cocog.htm</a>	
<i>Daphne</i> spp.		Daphne	Evergreen	3-4	2-3*	<a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderProfileResults.aspx?gen=Daphne">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderProfileResults.aspx?gen=Daphne</a>	
<i>Enkianthus campanulatus</i>		Redvien Enkianthus	Deciduous	6-8	4-6*	<a href="http://oregonstate.edu/dept/ldplants/enca-i.htm">http://oregonstate.edu/dept/ldplants/enca-i.htm</a>	
<i>Erica</i> spp.		Heath	Evergreen	1-2	1-2*	<a href="http://oregonstate.edu/dept/ldplants/1plants.htm#Erica">http://oregonstate.edu/dept/ldplants/1plants.htm#Erica</a>	
<i>Euonymus alatus</i> 'Compactus'		Compact Winged Burning Bush	Deciduous	8-10	9-11*	<a href="http://oregonstate.edu/dept/ldplants/eualc.htm">http://oregonstate.edu/dept/ldplants/eualc.htm</a>	
<i>Euonymus fortunei</i>	Wintercreeper Euonymus	Evergreen	1-3	2-4	<a href="http://oregonstate.edu/dept/ldplants/eufo.htm">http://oregonstate.edu/dept/ldplants/eufo.htm</a>		
<i>Forsythia</i> spp.	Forsythia	Deciduous	8-10	10-12	<a href="http://oregonstate.edu/dept/ldplants/foin.htm">http://oregonstate.edu/dept/ldplants/foin.htm</a>		

## Airport Plant List

		Scientific Name	Common Name	Type	Max. Height at Maturity (ft)	Max. Spread at Maturity (ft)	On The Web
<b>Secondary Zone</b>	<b>Shrubs</b>	<i>Hamamelis x intermedia 'Diane'</i>	Diane Witchhazel	Deciduous	8-12*	10-15*	<a href="http://oregonstate.edu/dept/ldplants/haind.htm">http://oregonstate.edu/dept/ldplants/haind.htm</a>
		<i>Hydrangea macrophylla</i>	Bigleaf Hydrangea var.	Deciduous	4-6	4-6	<a href="http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=K550">http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=K550</a>
		<i>Kerria japonica</i>	Japanese Kerria	Deciduous	4-8	6-9*	<a href="http://oregonstate.edu/dept/ldplants/keja.htm">http://oregonstate.edu/dept/ldplants/keja.htm</a>
		<i>Leucothoe fontanesiana</i>	Drooping leucothoe	Evergreen	3-6	3-6	<a href="http://oregonstate.edu/dept/ldplants/lefo-i.htm">http://oregonstate.edu/dept/ldplants/lefo-i.htm</a>
		<i>Nandina domestica 'Gulf Stream'</i>	Gulf Stream False Bamboo †	Evergreen	2.5-3.5	3*	<a href="https://plants.ces.ncsu.edu/plants/all/nandina-domestica-gulf-stream/">https://plants.ces.ncsu.edu/plants/all/nandina-domestica-gulf-stream/</a>
		<i>Potentilla fruitcosa</i>	Bush Cinquefoil	Deciduous	2-4	2-4	<a href="http://oregonstate.edu/dept/ldplants/pofr-i.htm">http://oregonstate.edu/dept/ldplants/pofr-i.htm</a>
		<i>Rhododendron griffithianum 'Jean Marie'</i>	Honorable Jean Marie Rhododendron	Evergreen	5-6	5-6*	<a href="http://oregonstate.edu/dept/ldplants/rhthei.htm">http://oregonstate.edu/dept/ldplants/rhthei.htm</a>
		<i>Rhododendron macrophyllum</i>	Western Rhododendron	Evergreen	6-12		<a href="http://oregonstate.edu/dept/ldplants/rhmac.htm">http://oregonstate.edu/dept/ldplants/rhmac.htm</a>
		<i>Rhododendron spp. P.J.M.</i>	P.J.M. Rhododendron	Evergreen	3-6	6*	<a href="http://oregonstate.edu/dept/ldplants/rhpjm.htm">http://oregonstate.edu/dept/ldplants/rhpjm.htm</a>
		<i>Rhus typhina 'Laciniata'</i>	Laceleaf Staghorn Sumac	Deciduous	10-20	10-20*	<a href="http://oregonstate.edu/dept/ldplants/rhtyl-i.htm">http://oregonstate.edu/dept/ldplants/rhtyl-i.htm</a>
		<i>Rosa gymnocarpa</i>	Little Wood Rose	Deciduous	6	2-4*	<a href="http://oregonstate.edu/dept/ldplants/rogyrn.htm">http://oregonstate.edu/dept/ldplants/rogyrn.htm</a>
		<i>Rosa nutkana</i>	Nootka Rose	Deciduous	3-6	6*	<a href="http://oregonstate.edu/dept/ldplants/ronut.htm">http://oregonstate.edu/dept/ldplants/ronut.htm</a>
		<i>Salix purpurea 'Nana'</i>	Dwarf Alaskan Blue Willow †	Deciduous	5	3-5*	<a href="http://oregonstate.edu/dept/ldplants/sapun.htm">http://oregonstate.edu/dept/ldplants/sapun.htm</a>
		<i>Spiraea douglasii</i>	Douglas Spiraea	Deciduous	3-7	3-7	<a href="http://oregonstate.edu/dept/ldplants/spdoug.htm">http://oregonstate.edu/dept/ldplants/spdoug.htm</a>
		<i>Taxus baccata 'Repandens'</i>	Spreading English Yew	Evergreen	2-4	12-15	<a href="http://oregonstate.edu/dept/ldplants/tabar.htm">http://oregonstate.edu/dept/ldplants/tabar.htm</a>
<i>Taxus baccata 'Standishii'</i>	Standishii Yew	Evergreen	7*	3*	<a href="http://oregonstate.edu/dept/ldplants/tabas.htm">http://oregonstate.edu/dept/ldplants/tabas.htm</a>		
<b>Groundcovers</b>	<i>Arctostaphylos uva-ursi</i> (cultivars)	Kinnikinnick	Evergreen	.5-1.5	3-6*	<a href="http://oregonstate.edu/dept/ldplants/aruv.htm">http://oregonstate.edu/dept/ldplants/aruv.htm</a>	
	<i>Genista pilosa</i>	Silkyleaf Broom	Deciduous	1-1.5	2-3*	<a href="http://oregonstate.edu/dept/ldplants/gepi.htm">http://oregonstate.edu/dept/ldplants/gepi.htm</a>	
	<i>Hemerocallis hybrida</i>	Day Lily	Deciduous	1-3		<a href="https://plants.ces.ncsu.edu/plants/all/hemerocallis-hybrida/">https://plants.ces.ncsu.edu/plants/all/hemerocallis-hybrida/</a>	
	<i>Iberis sempervirens</i>	Evergreen Candytuft	Evergreen	1-2	3-4*	<a href="http://oregonstate.edu/dept/ldplants/ibse-i.htm">http://oregonstate.edu/dept/ldplants/ibse-i.htm</a>	
	<i>Liriope muscaria</i>	Lily Turf	Evergreen	1-2	.5-1	<a href="https://plants.ces.ncsu.edu/plants/all/liriope-muscaria/">https://plants.ces.ncsu.edu/plants/all/liriope-muscaria/</a>	
	<i>Pachysandra terminalis</i>	Japanese Spurge	Evergreen	1	2	<a href="http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=128">http://pnwplants.wsu.edu/PlantDisplay.aspx?PlantID=128</a>	
	<i>Paxistima canbyi</i>	Canby Paxistima	Evergreen	1-1.5		<a href="http://oregonstate.edu/dept/ldplants/pacan.htm">http://oregonstate.edu/dept/ldplants/pacan.htm</a>	
<i>Sedum spp.</i>	Sedum	Deciduous			<a href="http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Sedum">http://biology.burke.washington.edu/herbarium/imagecollection.php?Genus=Sedum</a>		
<b>Grasses and Sedges</b>	<i>Bromus vulgaris</i>	Columbia Brome				<a href="http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1220">http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=1220</a>	
	<i>Calamagrostis x acutifolia 'Overdam'</i>	Overdam Feather Reed Grass		2.5-3	1.5-2	<a href="http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=N750">http://www.mobot.org/gardeninghelp/plantfinder/plant.asp?code=N750</a>	
	<i>Carex morrowii 'Evergold'</i>	Evergold Japanese Sedge				<a href="http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=s140">http://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=s140</a>	
	<i>Carex tumulicola</i>	Splitawn Sedge				<a href="http://plants.usda.gov/java/profile?symbol=CATU3">http://plants.usda.gov/java/profile?symbol=CATU3</a>	
	<i>Danthonia californica</i>	California Oatgrass		2		<a href="http://plants.usda.gov/java/profile?symbol=DACA3">http://plants.usda.gov/java/profile?symbol=DACA3</a>	

\* Indicates measurements are not taken from the related website.

(height restricted) refers to specific species being limited in usage to areas outside of height restricted zones.

† Indicates preferred stormwater plant species