

**Washington County
Land Use & Transportation
Operations and Maintenance
Integrated Vegetation Management Plan
2014**

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1 Introduction – Integrated Vegetation Management Plan

The Washington County Integrated Vegetation Management Plan (IVMP) establishes a framework to comply with the Integrated Vegetation Management Policy and implement the County’s vegetation maintenance program. The IVM approach combines maintenance and management practices to create a coordinated strategy to achieve long-term roadside maintenance goals in an environmentally and fiscally responsible manner. A suite of practices (mechanical, cultural, chemical, and biological), along with program monitoring and evaluation, are carried out to achieve these goals.

The goal is to develop an approach that promotes the growth of desirable vegetation and discourages unwanted plants in a manner that protects the roadway users and the environment in a fiscally responsible manner....

The guideline is driven by county, state, and federal directives for the vegetation maintenance program, including safety for road and pathway users; road preservation and maintenance; water quality; protection and restoration of sensitive natural resources; and the control of invasive and noxious weeds. Vegetation maintenance is conducted to control the growth of unwanted plants while promoting the establishment of stable, low maintenance native or naturalized plant communities along the unmanaged roadsides. Vegetation management works to establish and promote the growth of aesthetically or environmentally desirable vegetation within landscape, restoration, and mitigation areas. The plan provides a comprehensive approach to vegetation maintenance and management, and can provide guidance on sites with unique vegetation issues.

While the plan is to be followed to the maximum extent practicable, there will be instances where management decisions deviate from the guidance of the plan. Such deviations should be documented and incorporated into an updated version of the plan, if appropriate.

1.1 Goal of the Vegetation Management Plan

The IVMP is based on policies within the Transportation System Plan (TSP); federal, state, and local codes and regulations; and industry best practices. From these standards, the five principles driving the plan include:

- Safety to the traveling public and public infrastructure users
- Good stewardship to the environment
- Maintenance and preservation of public facilities
- Positive relationship with adjacent property owners
- Responsible use of maintenance funds

The plan describes a general approach to maintaining vegetation and managing planted areas within the right-of-way with a focus on reducing the intensity and cost of vegetation maintenance while meeting these requirements.

The goal of the IVM program is to develop a vegetation management approach that discourages or eliminates unwanted vegetation and promotes the growth of desirable

vegetation in a manner that protects the roadway users and natural environment in a fiscally responsible manner.

To obtain this goal the objectives of the IVMP are structured around three main areas of concern – safety for roadway users and maintenance personnel, fiscal efficiency for vegetation management and maintenance activities, and environmental protection.

1. Safety – Develop an approach which considers a variety of vegetation control measures to minimize vegetation encroachment into the roadway or paths while minimizing chemical controls.

Objectives:

- Provide for safe travel on roadways, bike lanes, sidewalks, and paths.
- Reduce encroachment of vegetation on signage, roadways, bike lanes, sidewalks, and paths.
- Maintain visibility at traffic intersections and private access.
- Minimize maintenance workers' exposure to herbicides through the reduction of spraying and incorporation of closed container systems.

2. Financial efficiency – Develop vegetation management strategies that reduce vegetation maintenance intensity and operational costs.

Objectives:

- Utilize the Road Maintenance Prioritization Matrix as a guide for prioritizing efforts.
- Design and implement treatment procedures to minimize the number of chronically problematic vegetation areas.
- Develop and implement a maintenance activity timeline to maximize treatment effectiveness.
- Promote the use of suitable low growth native and naturalized vegetation to repopulate problematic areas.

3. Environmental protection – Develop environmentally sound standards for roadside vegetation management.

Objectives:

- Promote the growth of native and naturalized grass in the ditch line to provide stormwater filtration in compliance with local, state, and federal requirements.
- Preserve healthy, low maintenance, and self-sustaining vegetation to provide erosion control and beneficial wildlife habitat.
- Develop maintenance zones and define the zone-specific maintenance objectives to minimize impacts to the natural environment.
- Reduce the use of herbicides through appropriate application timing.

- Identify, map, and treat invasive weeds on the Oregon Department of Agriculture Target Noxious Weed List and those identified as important to Washington County.

1.2 Integrated Vegetation Management Techniques

Integrated Vegetation Management techniques reduce costs through the reduction of herbicides and increased maintenance efficiency and promote healthy ecosystems. The success of the IVM program can be measured by reviewing annual maintenance activity costs, numbers of vegetation service requests, herbicide application quantities, and the change in native species diversity and mapped invasive species infestations along the road right-of-way. Multiple tools for vegetation management are available to maintenance personnel, and include mechanical, cultural, biological, and chemical techniques. This multi-pronged approach will ensure the right tool is used in the right place at the right time to obtain the most cost-effective use of public dollars in maintaining the roadway system.

2 Right-of-way Maintenance Zones and Management Methods

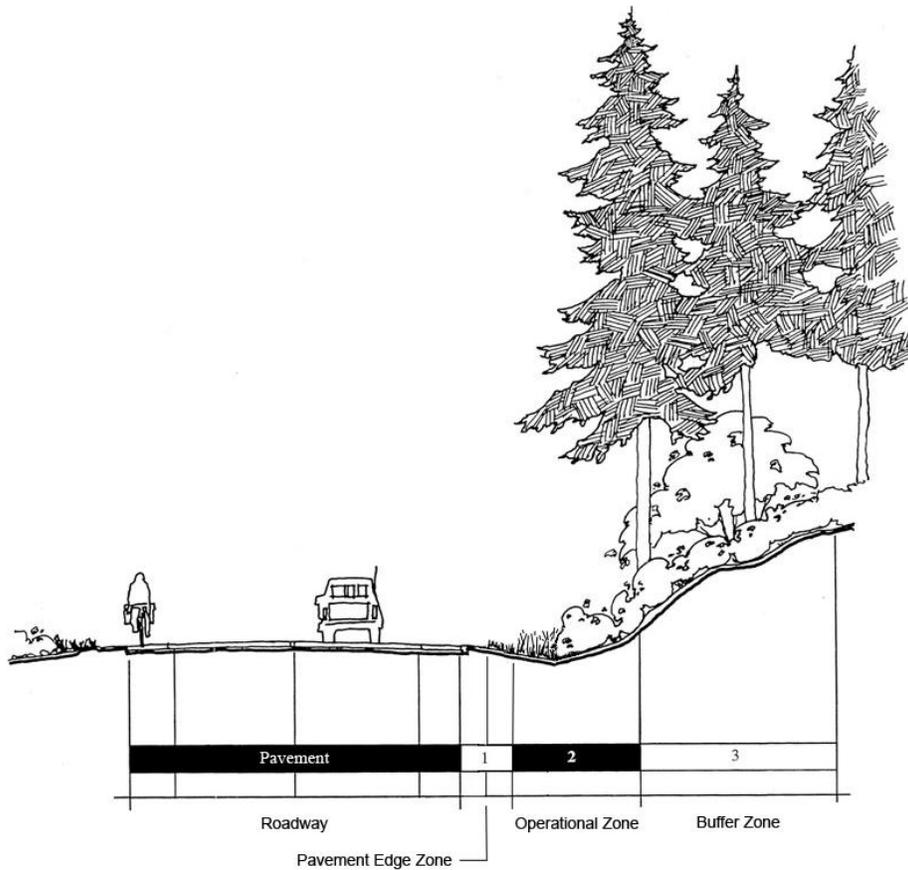
For the purpose of vegetation maintenance, county rights-of-way are divided into three zones. Maintenance objectives and the thresholds for triggering maintenance actions in the three zones are determined based on the road's functional classification. Noxious weeds are controlled throughout all zones. Not all zones are present along every road.

Zone 1 - The Pavement Edge Zone: This zone is directly adjacent to the pavement and extends from the pavement to the break in slope (ditch catch point) or four feet from the edge of pavement, whichever is less. This zone is managed to provide sight distance, stormwater drainage and filtration, pavement preservation, and roadside hardware maintenance (guardrails and delineators).

Zone 2 - The Operational Zone: This zone extends from the edge of Zone 1 to a width necessary to provide safe errant vehicle recovery; sight distance at corners, intersections, and road signs; and stormwater drainage and filtration. Roadside embankments at a slope of 4:1 or shallower are considered recoverable. This zone generally extends from the edge of Zone 1 to 4 feet beyond the bottom of the ditch, or to a maximum of 10 feet from the edge of pavement when no ditch is present.

Landscaped areas, including islands, roundabouts, and roadside planter strips are included in this zone.

Zone 3 - The Buffer Zone: This zone extends from the edge of Zone 2 to the right-of-way boundary. This zone is maintained to encourage desirable, self-sustaining plant communities and acts as a buffer or transitional area between the roadway and adjacent land uses. The vegetation in this zone provides erosion control and wildlife habitat.



Pavement Edge Zone

Low Growing or Routinely Mowed Vegetation and/or Vegetation-Free Strip
 Maintained using mechanical and/or chemical methods for sight distance, stormwater drainage and filtration, noxious weed control, pavement preservation and roadside hardware maintenance.

Operational Zone

No Vegetation with Stem Diameter Greater than 4"
 Maintained using IVM techniques for sign visibility, sight distance, errant vehicle recovery and weed control.

Buffer Zone

Native or Naturally Occurring Vegetation
 Where adequate right of way exists, maintained using IVM techniques to encourage desirable, self-sustaining plant communities.

Typical Roadside Vegetation Management Zones. Source: WSDOT

2.1 Routine Maintenance Activities

Routine maintenance activities are generally associated with the annual work program and are conducted to maintain the safety of the traveling public, protect the public infrastructure, clear roadside vegetation for other scheduled activities, preserve the aesthetic quality of landscaped areas, and provide water quality benefits.

2.1.1 Zone 1 - Shoulder maintenance:

Vegetation in Zone 1 receives a high level of maintenance along Arterials/ Collectors and Rural Resource Roads due to its potential to impact sight distance, traffic safety, pavement condition, and stormwater runoff. The vegetation along the road shoulder is controlled via herbicide application or mowing, depending on the road classification. Vegetation mats along road shoulders are removed during grading, sweeping, or ditching operations, depending on the surface type.

Objectives:

- Provide efficient surface drainage from roadways to protect the integrity of the road subgrade.
- Prevent pavement breakup caused by plant growth.
- Provide for adequate sight distance along the roadway and at intersections.
- Establish year-round visibility and maintenance access of roadside hardware, including signs, guardrails, and utilities through a targeted spray and mowing program.
- Prevent fire fuel buildup due to seasonally dead vegetation.
- Integrate ditching, grading, and sweeping activities into the IVMP to prevent or eliminate buildup of debris and vegetation mats at pavement edge.

Corrective Action Triggers:

- Vegetation height on shoulders exceeds 12 inches.
- Vegetation mat on shoulders is impeding drainage of road surface or roadbed.
- Sprayed, standing dead vegetation persists at the roadside into the dry season.

Maintenance Actions:**Arterials/Collectors:**

Apply herbicide to maintain a vegetation-free zone along the road shoulder, beneath guardrails, and around delineator signs, using a combination of pre and post-emergent herbicides that target both grasses and broadleaf plants. Maintain untreated road shoulders through routine mowing. Remove vegetation mats and debris buildup during ditching or sweeping operations. Mow standing dead vegetation at least two weeks after herbicide applications. Refer to Section 4 and Appendices A and B for further discussion on herbicide use and timing.

Rural Resource Road:

Mow rural resource road shoulders. Apply herbicide beneath guardrails and around delineators and signs to maintain visibility and provide access for maintenance and upkeep. Remove vegetation mats and debris buildup during ditching, sweeping, or grading operations. Mow standing dead vegetation at least two weeks after herbicide applications.

Neighborhood Route

Mow Neighborhood Route shoulders to maintain sight distance at intersections and visibility of signs, delineators, utilities, and guardrails. Remove vegetation mats and debris buildup during ditching, sweeping, or grading operations.

Local Road

Mow Rural and Urban Local Road shoulders to maintain sight distance at intersections. Clear vegetation around guardrails, delineators, utilities, and signs to maintain visibility and provide access for maintenance and upkeep. Remove vegetation mats and debris buildup during ditching, sweeping, or grading operations.

2.1.2 Zone 2 – Operational Zone

Brush cutting, selective herbicide treatment, and hand tools are used in Zone 2 to address safety concerns and invasive and noxious weeds, expose road hardware and utilities, and to prepare roads for scheduled drainage and surface maintenance activities. Zone 2 is typically maintained by mowing beyond signs and utilities, and through selective removal of unwanted trees and brush beyond the mowing strip, including large tree species that may eventually become a safety concern.

Large, native shrubs and small trees (<4" diameter at breast height at maturity) should be allowed to grow and mature in Zone 2 to provide erosion control, stormwater filtration, and slope stability. This vegetation should be side trimmed or limbed if it has the potential to cause safety concerns or interfere with the use of the right-of-way within the next three years. To protect the health of the trimmed tree, a live crown to total tree height ratio of at least two-thirds should be maintained. Cuts should be made close to the stem without damaging the stem tissue or leaving a branch stub and large branches should be pre-cut to avoid splitting or tearing of the bark.

Trees with a diameter at breast height greater than 4 inches can stop a car abruptly, creating a potential hazard in the Operational Zone. As one of the functions of this zone is to provide an area of safe recovery for errant vehicles, it is good practice to remove large trees from this zone when practical. A number of factors should be taken into consideration when deciding whether to remove a mature tree in Zone 2.

- Are large trees in Zone 2 typical for that section of roadway (e.g., forested areas versus agricultural land). Example photos are below.
- Does the large tree protrude closer to the road than is typical for that section of road?
- What is the likelihood of a car to leave the roadway and strike the tree at this location (e.g., outside versus inside of a curve)?
- Are there scars on the tree from previous accidents?
- What is the average speed of vehicles on this section of road?
- What is the tree's proximity to the road in relation to utility poles and other large obstacles?
- Are there any social or environmental concerns associated with the tree?

Objectives:

- Maintain a hazard free vehicle recovery zone.
- Provide year-round sight distance for passing and stopping, and at intersections.
- Preserve healthy, low maintenance, and self-sustaining vegetation to prevent bank erosion.
- Maintain the hydraulic capacity of ditches.
- Eliminate invasive or noxious weeds that are on the ODA targeted noxious weed list or of concern to Washington County.

Corrective Action Triggers:

- Saplings of large tree species (>4 inches dbh at maturity) are growing in an otherwise hazard free vehicle recovery zone.
- Invasive weeds in the right-of-way are bolting or in the flowering stage.
- Vegetation in the ditches begins to impede the drainage capability.
- Vegetation around guardrails, signs, bridges, and culverts inhibits access for maintenance.
- Tree and shrub branches are protruding into the clearance zone over the road shoulder, walkway, or path.

Maintenance Actions:

Mow Zone 2, maintaining a minimum plant height of 6 inches above ground level.

Treat invasive and noxious weeds and problematic vegetation following the treatment protocols and timelines in Section 3 and Appendices C and D.

Remove overhanging branches to maintain the appropriate vertical clearance over roadways and adjacent fixtures, paths, sidewalks, and walkways based on the Vegetation Vertical Clearance Limits in Table 1. Cut overhanging and encroaching branches back a minimum of 2 feet from the road shoulder, or enough to restore necessary road sign, utility, and sight distance visibility.

Remove individual large trees (greater than 4” dbh) to reestablish an otherwise consistent clear zone.

Table 1. Vertical vegetation clearance limits based on road functional class.

Functional Class	Road Surface	Vertical Clearance		
		General Maintenance	Preparation for Drainage and Surface Maintenance	Walkways
Arterial/Collector Rural Resource Road Neighborhood Route	Pavement	16 Feet	18 Feet	9 Feet
	Gravel	18 Feet	18 Feet	9 Feet
Rural Local Road	Pavement	12 Feet	16 Feet	9 Feet
	Gravel	18 Feet	18 Feet	9 Feet
Urban Local Road	Pavement	12 Feet	16 Feet	9 Feet



Photo 1: Trees are a consistent distance from the road, outside of an established clear zone.



Photo 2: Cottonwood tree is growing in an otherwise clear zone. Removing the tree would re-establish a consistent clear zone.

2.1.3 Zone 3 – Buffer Zone

Zone 3 consists of natural vegetation and is managed to encourage self-sustaining beneficial vegetative growth, eliminate invasive and noxious weeds, and minimize the growth of undesirable trees and shrubs. Maintenance in this zone is selective as the vegetation provides environmental and social benefits. This zone is used to conserve and promote native vegetation and habitat for wildlife, control erosion, and acts as a buffer between the roadway and adjacent properties. Hazardous trees and branches are removed from zone 3 to protect the traveling public and transportation infrastructure.

Objectives:

- Promote the growth of vegetation to blend with and/or screen adjacent properties.
- Eliminate invasive or noxious weeds that are on the ODA targeted noxious weed list or of concern to Washington County.
- Reduce shading in areas prone to roadway icing.
- Promote the growth of native and naturalized vegetation to prevent soil erosion.
- Preserve the aesthetic quality of the roadside through selective trimming and limbing, using appropriate tools and techniques.
- Preserve wetlands and wildlife habitat by conserving native vegetation and limiting maintenance activities to addressing safety concerns.
- Design and implement treatment procedures to minimize the number of chronically problematic vegetation areas.

Corrective Action Triggers:

- Tree and shrub branches are protruding into the clearance zone over the road shoulder, walkway, or path.
- Vegetation growth is causing sight distance issues or blocking roadway hardware or utilities.
- An infestation of a noxious weed listed in Appendix A is identified.

Maintenance Actions:

Identify areas of aggressive or nuisance vegetation growth that cause repetitive maintenance or public safety concerns. Treat invasive and noxious weeds and problematic vegetation following the treatment protocols and timelines in Section 3 and Appendices C and D.

Remove overhanging branches to maintain vertical clearance over the roadway and adjacent fixtures. Follow the clearance guidelines based on functional class in Table 1. Cut overhanging and encroaching branches back enough to restore necessary road sign, utility, and sight distance visibility.

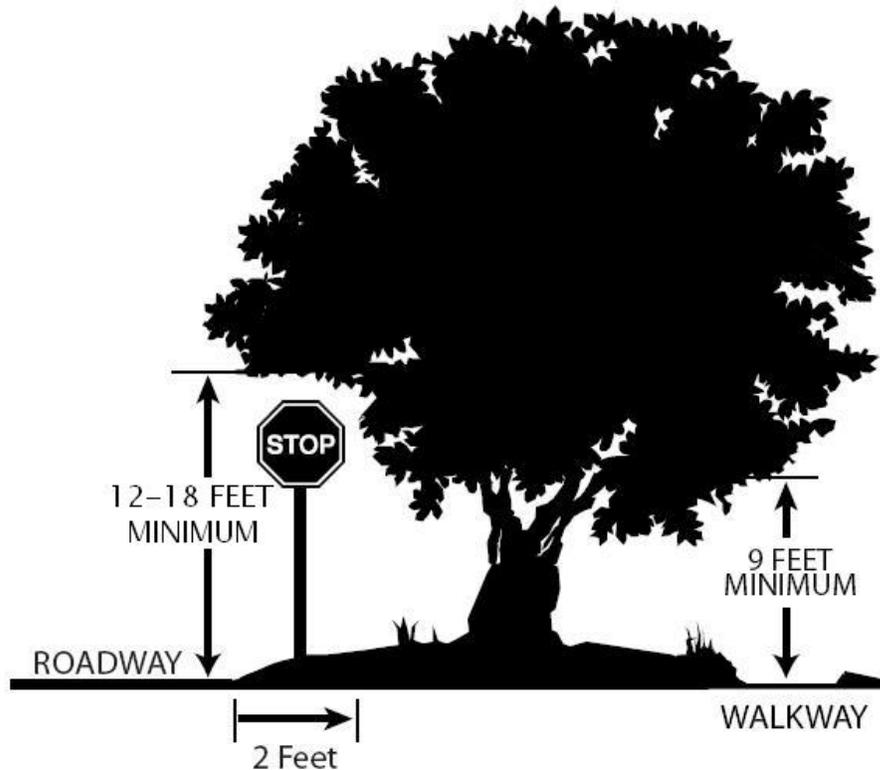


Table 2. Vegetation management strategies for roadside zones.

	Management Method			
	Mechanical	Chemical	Cultural	Biological
Zone 1: Pavement Edge	<p>Mow with a shoulder mower or brush cutter.</p> <p>Remove vegetation mats and debris buildup with a backhoe, excavator, grader, scraper, or sweeper while carrying out associated maintenance activities.</p>	<p>Apply a combination of post- and pre-emergent herbicide in April, May, or June.</p> <p>Apply a second application of pre-emergent herbicide in September or October for year-round growth suppression.</p>	<p>Provide weed-free erosion control products during construction.</p> <p>Do not plant vegetation in this zone.</p>	<p>Not usually considered in this zone.</p>
Zone 2: Operational	<p>Mow a single swath adjacent to Zone 1 with a brush cutter to maintain visibility of signs and utilities.</p> <p>Use a combination of brush cutter and hand tools to selectively remove unwanted trees and shrubs beyond the mowing strip.</p> <p>Hydroseed disturbed ditches with native or naturalized grasses.</p>	<p>Broadcast spray with selective herbicides to target areas of nuisance and noxious weeds and aggressively growing problematic vegetation.</p> <p>Spot treat individual weeds with backpack sprayers and injectors to minimize harm to neighboring vegetation.</p>	<p>Seed and plant disturbed areas with native or naturalized vegetation appropriate for Zone 2.</p> <p>Plant sites in late winter and hydroseed in spring and fall based on temperature and moisture to maximize survival potential.</p> <p>Use weed-free erosion and sediment control products on construction sites.</p>	<p>Work with ODA to initiate the use of biological controls on problematic vegetation in the right-of-way.</p>
Zone 3: Buffer	<p>Use hand tools to remove or trim problematic trees or shrubs.</p>	<p>Use the same Chemical Management Methods as Zone 2.</p>	<p>Use the same Cultural Management Methods as Zone 2.</p>	<p>Use the same Biological Management Methods as Zone 2.</p>

2.2 Special Maintenance Areas

Special Maintenance Areas are locations with unique maintenance requirements or special considerations for roadside management. These areas include landscape areas, adopt-a-landscape areas, culvert and project planting areas, wetland mitigation sites, riparian management areas, stormwater management facilities, stream crossings, stream adjacent roads, and Clean Water Services' vegetated corridors.

2.2.1 Landscaped Areas

Some sections of the right-of-way, including road medians and roadside planting strips, are planted with ornamental trees, shrubs, and ground cover to provide erosion control, environmental mitigation, and traffic calming effects, act as a visual and physical buffer between pedestrians and cars, and increase the aesthetic value of the area. Target service levels are being developed for each landscaped area, based on the functional class of the road. Current maintenance activities within the landscaped areas include general maintenance, herbicide application, landscape mowing, and irrigation maintenance.

Objectives:

- Maintain sight distance requirements for signs and signals.
- Develop and implement target service levels for all landscaped areas.
- Develop and implement a landscape maintenance schedule, identifying treatment timelines that maintain the functional purpose and protect the financial investment.
- Provide sight distance for passing and stopping, and at intersections.
- Provide a vegetation setback from sidewalks, paths, and roadways to maintain safe driving, walking, and biking conditions.
- Eliminate invasive or noxious weeds that are on the ODA targeted noxious weed list or of concern to Washington County.

Corrective Action Triggers:

- Vegetation is encroaching into required sight distance for signs and signals.
- Vegetation is untrimmed, dead, diseased, or damaged.
- Areas are littered with organic debris and trash.
- Weeds are impacting desirable vegetation.
- Excessive growth causes sight distance or other visibility issues.
- Excessive growth is encroaching into roadway, path, or walkway.

Operation Actions:

Develop and implement target service levels for all landscaped areas.

Review planting plans and the street tree list to minimize maintenance needs and impacts to the roadway, sidewalks, and paths. Screen planting lists to ensure long term irrigation will not be necessary for plant survival.

Develop a landscape inspection sheet and screen landscaped areas prior to sign off and acceptance of capital projects. The inspection sheet will ensure the inheritance of healthy plants and landscaped areas that meet warranty requirements.

Develop a landscape maintenance plan that lays out the timing of maintenance activities.

Maintenance Actions:

Landscape Mowing - Mow grass and other herbaceous vegetation adjacent to pedestrian paths and landscaped areas as it is needed.

Landscape Maintenance - Manually trim, cut, and prune desirable shrubs and trees. Prune trees and shrubs to prevent the plant from overgrowing its space, crowding neighboring plants, and encroaching on roadways, pathways, and sidewalks. Conduct severe pruning during the late dormant season, generally late winter and early spring. Weed beds and remove organic debris and litter from landscaped areas. Conduct these activities during early spring and fall, prior to applying pre-emergent herbicides.

Herbicide Application - Apply pre-emergent herbicides to prohibit weed growth. Apply pre-emergent herbicides immediately following weeding activities in early spring and late fall. Selectively apply post-emergent herbicides following the protocols in Section 4 and Appendices A and B.

Irrigation Maintenance - Maintain irrigation systems. Annual maintenance includes backflow testing, spring setup, and winter shutdown. Permanently shut down temporary irrigation installed during capital projects once the vegetation is established and able to survive without irrigation.

Adopt-A-Landscape:

Some neighborhoods, groups, and businesses within Washington County have entered into agreements to adopt and maintain landscaped areas. Although there is no set service level to which the areas are to be maintained, the County has the right to take over the maintenance of the landscaped area if the maintenance level falls to an unacceptable level. Review and approve planting plans and maintenance actions for Adopt-A-Landscape areas.

2.2.2 Project Planting

Transportation related projects that remove large areas of vegetation will be seeded and planted with native vegetation. Planting plans will take into consideration the three zones associated with roadside vegetation management to maintain road safety and transportation facilities while minimizing vegetation maintenance requirements. Planted projects will be actively maintained annually for five years to ensure plant establishment and survival while allowing grass to perform erosion control, slope stabilization, and stormwater filtration functions during the establishment period.

Maintenance Actions:

Mow grass throughout the planted site.

Apply herbicide in a ring around planted trees and shrubs following the protocols in Section 4 and Appendices A and B.

Monitor sites for plant survival during the active maintenance period and interplant sites with less than 60% survival rate

Table 3. Project Planting Maintenance Schedule

Season	Month(s)	Maintenance Activity
Winter	February – March	Plant site
Spring	Late April – May	Circle and spot spray. Circle spray in areas of reed canary grass as early as possible. Monitor plant survival
Summer	May – June	Mow Reed Canary Grass sites
	July	Mow non-Reed Canary Grass sites after July 15. Perform a second circle and spot spray for weed eradication. Mow to eliminate seed set.
Fall	September – October	Spray for blackberry and reed canary grass.

2.2.3 Riparian Management Areas

Vegetation maintenance within Riparian Management Areas is conducted to maintain the safety of the traveling public and preservation of road infrastructure and roadway slopes. Vegetation management within riparian management areas is more selective than for general roadside vegetation maintenance to preserve its ecological function.



Maintenance Actions:

Limit brush clearing to within twenty feet of bridges and ten feet of culverts six-foot diameter or greater. Leave cut brush in place if it does not compromise public safety or drainage systems, create a fire hazard, or impact the proper functioning of roadway structures or systems.

Remove manually cut noxious and invasive weeds that have the ability to regenerate from plant parts.

Limit brush cutting to no more than eight feet from the edge of pavement, unless necessary to maintain the proper functioning of roadway facilities or provide adequate safety. Maintain the mow height of the brush cutter at a minimum of six inches outside of zone 1.

Preserve and protect shade trees unless they are considered hazard trees. Coordinate the removal of hazard trees with ODFW and other agencies. Replace removed trees over six inch dbh at a one-to-one caliper ratio, planting them so as not to create future maintenance issues.

Conduct herbicide applications using aquatic approved herbicides. Apply herbicides by hand or with backpack sprayers to control nuisance, noxious, or invasive weeds, eliminate vegetation under and around guardrails, or to assist in the establishment of trees and shrubs within the project planting areas. Follow the herbicide application protocols in Section 4 and Appendices A and B.

2.2.4 Stream crossings and stream adjacent roads:

Vegetation maintenance adjacent to streams or at stream crossings is conducted to balance traffic safety and infrastructure preservation with ecological value. Significant consideration is given to preserving trees that provide stream shading and bank stabilization. For stream adjacent roads, Zone 2 extends from the edge of Zone 1 to the top of bank, or to 10 feet from edge of pavement, whichever is less. Vegetation maintenance at the border of Zones 2 and 3 on the near bank is conducted to promote bank stability and stream shading while maintaining sight distance, safe errant vehicle recovery, stormwater drainage and filtration, and elimination of invasive and noxious weeds. Vegetation maintenance in Zone 3 on the far stream bank is conducted to promote bank stability and stream shading and the elimination of invasive and noxious weeds.

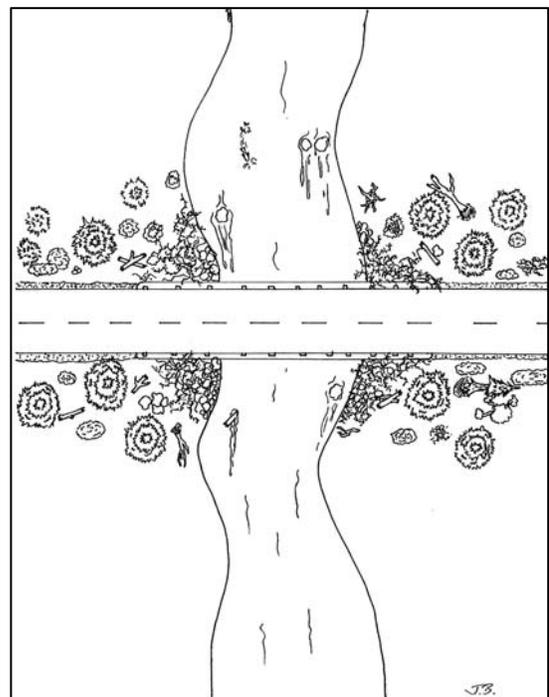


One common issue for stream adjacent roads is slope failure due to the erosive forces of the stream acting on the stream bank. Washington County implements bioengineered slope restoration and stabilization techniques when possible to reestablish the slope and protect the roadway. Vegetation maintenance in these areas is covered under Section 2.2.2.

Maintenance Actions:

Limit brush clearing to within twenty feet of bridges and ten feet of culverts of six-foot diameter or greater. Conduct clearing activities to provide access for maintenance and inspection activities. Minimize impacts to the riparian corridor by restricting vegetation removal to the minimal extents necessary.

Conduct herbicide applications within 250 feet of any active and flowing stream using aquatic approved herbicides. Apply herbicides by hand or with backpack sprayers to control nuisance, noxious, or invasive weeds, eliminate vegetation under and around guardrails, or to



assist in the establishment of trees and shrubs within the project planting areas. Follow the herbicide application protocols in Section 4 and Appendices A and B.

2.2.5 Stormwater Treatment Facilities

Stormwater treatment facilities include bioswales, detention structures, infiltration areas, and other regional treatment facilities. The primary objective for vegetation management within these facilities is to preserve its functionality and maintain any surrounding fence. Vegetation planted in the facility is chosen to maximize the treatment of stormwater. Invasive vegetation has the potential to outcompete the preferred plants, reducing the effectiveness of the treatment facility.

Maintenance Actions:

Map stormwater facilities with the facility type identified to assist in maintenance planning.

Maintain facilities following the maintenance checklist adapted from the Low Impact Development Approaches Handbook from Clean Water Services (Appendix E).

Clear trees and brush along the perimeter fencing for a width of four feet outside of the facility, or as needed, to maintain access.

2.2.6 Clean Water Services Vegetated Corridors

A vegetated corridor is a buffer within Clean Water Services' jurisdiction, created to protect water quality in streams and other natural water bodies. Vegetation maintenance within these corridors is conducted to balance traffic safety and infrastructure preservation with ecological value. Significant consideration is given to preserving trees that provide shading and soil stabilization, and to the removal of nuisance and noxious weeds. For stream adjacent roads, Zone 2 extends from the edge of Zone 1 to the top of bank, or to 10 feet from edge of pavement, whichever is less. Vegetation maintenance at the border of Zones 2 and 3, adjacent to the natural water resource is conducted to promote soil stabilization and shading while maintaining sight distance, safe errant vehicle recovery, stormwater drainage and filtration, and elimination of invasive and noxious weeds. Vegetation maintenance in Zone 3 is conducted to promote the health of the natural habitat and the elimination of invasive and noxious weeds. Herbicide use within the vegetated corridor is limited to the control of non-native, invasive species that threaten the health of the natural ecosystem.

Maintenance Actions:

Limit brush clearing to within twenty feet of bridges and ten feet of culverts of six-foot diameter or greater. Manage vegetation to maintain access for maintenance and inspection activities. Minimize impacts to the vegetated corridor by restricting vegetation removal to the minimal extents necessary.

Apply aquatic approved herbicides within the vegetated corridor using hand-held equipment to control nuisance, noxious, or invasive weeds, eliminate vegetation under and around guardrails, and assist in the establishment of native vegetation within project

planting areas. Follow the herbicide application protocols in Section 4 and Appendices A and B.

3 Managing Vegetation of Concern

While most vegetation within the right-of-way is beneficial to the natural and human environment when properly managed and maintained, vegetation can also threaten maintenance personnel safety or the health of the public, agriculture, recreation, or the natural environment. Problematic vegetation includes nuisance and noxious weeds and hazard trees.

3.1 Noxious Weed Control

A noxious weed is any plant classified by the Oregon State Weed Board that is injurious to public health, agriculture, recreation, wildlife, or any public or private property. The official Oregon list of designated noxious weeds is kept by the Oregon Department of Agriculture at <http://oregon.gov/ODA/PLANT/WEEDS/>. The Oregon Invasive Species Council also maintains a list of the worst invasive species at their website: <http://oregon.gov/OISC/>. Washington County is a partner of the 4-County Cooperative Weed Management Area, a partnership dedicated to combating invasive weeds for the benefit of native habitat.

Transportation rights-of-way can act as a corridor for the spread of noxious weeds as the seeds are carried by vehicles, maintenance equipment and activities, or naturally migrate along unmanaged property boundaries. The control of noxious weeds is important as they can negatively impact human health, agricultural and forest economies, and resources such as fish, wildlife, recreation, and overall watershed health.

When noxious weeds are found in the right-of-way they should be properly controlled, or eradicated if possible. Noxious weeds identified outside of the right-of-way should be reported to Environmental Services, the Tualatin Soil and Water Conservation District, or the Oregon Invasive Species Online Hotline.

Appendix C includes a list of current invasive species located in Washington County or surrounding areas that are on the ODA Targeted Noxious Weeds List or of concern to Washington County and treatment or control options for these plants. Appendix D is an IVM calendar that provides recommendations for proper timing of treatments for maximum effectiveness in the control of invasive species, based on local experience and research.

Invasive species in the right-of-way can be spread as a result of maintenance activities. The following best management practices are to be followed in order to minimize the spread of invasive species.

1. Minimize soil disturbance whenever possible. Invasive plants can quickly colonize areas of disturbed soil, outcompeting native vegetation in the area.

2. Stabilize disturbed soils as soon as possible by seeding and/or using weed free mulch, hay, rip-rap, or gravel. Use native or naturalized grass seed.
3. Use certified weed-free erosion control materials on all projects.
4. Inspect the source site of construction materials such as fill, mulch, hay, rip-rap, and gravel for invasive species prior to obtaining the material. If this is not an option, monitor the disturbed site for two years to check for the emergence of invasive plants.
5. Bring maintenance and construction equipment on site from areas that are not infested by invasive plants. This is especially important when carrying out ditching and shoulder scraping activities.
6. Clean all equipment, machinery, and hand tools of visible soil and plant material before leaving the project site if working in areas with invasive plants. Clean equipment at the infestation site. Cleaning methods include a portable wash station that contains any runoff, an air compressor, or brush, broom or other hand tools used without water.
7. Cut and properly dispose of (see BMP 12) Japanese knotweed, purple loosestrife, or English ivy prior to the start of other maintenance activities. Follow BMPs 13-16 if excavation occurs in these areas.
8. Locate and use staging areas that are free of invasive plants to avoid spreading seeds and other viable plant parts.
9. Japanese knotweed, purple loosestrife, and English ivy have the ability to sprout from stem and root fragments. Avoid mowing these plants whenever possible. Staking roadside populations as “do not mow” is one way to accomplish this. Follow BM 12 when cutting these plants to render the plant material nonviable and avoid spreading plant fragments.
10. Mow the right-of-way prior to seed maturation (approximately August 1st) in areas where invasive plants occur and no plants are present that could sprout from stem or root fragments. Identify specific roads that are either heavily infested with invasive plants or roads that are in sensitive habitat areas, and make those roads a priority in the mowing schedule.
11. Clean mowing equipment daily and prior to transport (see BMP 6). This is particularly important if mowing occurs after seed maturation (approximately August 1st).
12. Avoid the spread of viable plant material when cutting or removing invasive plants by rendering the material nonviable. The following methods can be used to destroy plant material:

- **Drying/Liquefying:** For large amounts of plant material or for plants with rigid stems, place the material on asphalt, tarps, or heavy plastic, and cover with tarps or heavy plastic to prevent the material from blowing away. For smaller amounts of plant material or for plants with pliable stems, bag the material in heavy-duty garbage bags. Keep the plant material covered or bagged for at least one month. Material is nonviable when it is partially decomposed, very slimy, or brittle. Once material is nonviable, dispose of it in a landfill or brush pile. This technique is recommended for Japanese knotweed, purple loosestrife, and English ivy.
 - **Brush Piles:** Pile plant material on site to dry out. When piling purple loosestrife and Japanese knotweed, pile stems so that cut surfaces are not in contact with the soil. This technique is not recommended for any invasive plant with seeds or fruit attached, unless the plants can be piled within the limits of the infestation.
 - **Burying:** Bury plant material a minimum of three feet below grade. This method is best used on a construction site that already has disturbed soils. This technique is not recommended for Japanese knotweed, unless other options are not feasible and knotweed can be buried at least five feet below grade.
 - **Burning:** Burn plant material in a designated burn pile. This technique is recommended for any invasive plant, especially purple loosestrife and Japanese knotweed.
 - **Herbicide:** Herbicide applications must be carried out by a licensed applicator following appropriate herbicide application techniques listed in Section 4 and Appendices A and B.
13. Cover invasive plant material and soils or other material containing invasive plant material during transport.
 14. Reuse excavated material from areas containing invasive plants within the limits of the infestation.
 15. Stockpile any excavated material that contains viable plant material and is not reused within the limits of the infestation on an impervious surface until viable plant material is destroyed or dispose of the material by burying a minimum of three feet below grade. Japanese knotweed must be buried at least five feet below grade.
 16. Avoid excavation in areas containing Japanese knotweed or purple loosestrife whenever possible.

3.2 Nuisance Weed Control

A nuisance weed is a plant that is not considered invasive, but its aggressive growth or other characteristic is problematic for Washington County roadside vegetation management. One example is Poison oak. A list of nuisance weeds and treatment options is provided in Appendices C and D.

3.3 Hazard Tree Monitoring and Removal

Trees in and adjacent to the right-of-way provide a variety of beneficial functions such as soil stability, wildlife habitat, stream shading, and aesthetics. While trees provide benefits to the community and ecosystem, they can also pose a threat to the roadway and bicycle and pedestrian facilities. Trees that are typically greater than 4" dbh can be a fixed object obstruction if a vehicle departs from the travel lane and dead, diseased, or damaged trees can be susceptible to blow down during storms. Roots can damage pavement and sidewalks while fallen leaves can make bicycle and pedestrian facilities slippery. Additionally, leaves and branches can clog storm sewer systems, leading to flooded roads and blocked drain lines.

Washington County does not have an active forestry program or inspection cycle when it comes to trees in or near the right-of-way. Identification of trees that are possible threats to the roadway are typically brought to the County's attention by maintenance crews or citizens who notice a tree that appears to be unhealthy or leaning. After a review of the situation and in accordance with State statute (ORS 368) and local ordinance (R&O 77-76), the County may notify the adjacent property owner that a tree on or adjacent to their property might be compromised or could possibly be a hazard. If the property owner does not comply with the County's request to remove the tree, or the County determines that the tree is an imminent threat to the safety and well-being of the road users, the County will remove the tree and may recoup any costs from the adjacent property owner for work associated with the removal.

If a tree is identified to be removed, but is not considered an imminent threat and the hazard can be mitigated without removing the tree, then removal will be delayed until the active nesting season is over. If the tree needs to be removed during the nesting season, it should be inspected for active nests when feasible. If an active nest is encountered and it is possible to delay the necessary work, removal should be delayed until the young have fledged. If the work must be completed while an active nest is present, Environmental Services should be contacted prior to beginning work.

Trees over 6" dbh that are removed from within RMAs will be replaced at a one-to-one caliper ratio. Permits may be required for tree removal within the vegetated corridor or sensitive areas inside Clean Water Services' jurisdiction.

4 Herbicide Application

The label is the law when using herbicides. Herbicide use is an important tool in the IVMP, used to control the growth of noxious and nuisance weeds and plants growing in undesirable locations such as road shoulders. Due to its cost and the potential to impact human health and the natural environment, its use should be minimized wherever possible. Washington County Operations and Maintenance does not use any EPA restricted-use chemicals to control roadside vegetation in order to protect human health and the ecosystem. Herbicides from the Approved Herbicides list in Appendix A may be used within the road rights-of-way. Herbicides listed as aquatic approved may be used in and around waterways, including RMAs. General best management practices (bmps) for

herbicide application are listed in the “Best Management Practices for Routine Road Maintenance” document and below.

The use of pesticides in Oregon is regulated through the Oregon Pesticide Control Law (ORS 634) and the pesticide administrative rules (OAR 603-57). Herbicide applications conducted by Washington County O&M must follow compliance requirements set by the Oregon Department of Agriculture (ODA) and the Oregon Department of Environmental Quality (DEQ). ODA oversees the general use of pesticides while any herbicide applications in and adjacent to waterways, conducted by the O&M division, fall under the DEQ National Pollutant Discharge Elimination System (NPDES) Pesticide Application General Permit (PAGP) 2300A.

The Operations and Maintenance division conducts three herbicide programs to manage vegetation. These include shoulder spraying, selective herbicide treatment, and landscape maintenance. The following best management practices for herbicide application are implemented to maintain compliance with ODA and DEQ requirements, and protect the division from audit or enforcement actions.

- Always use herbicides in accordance with EPA labels.
- Herbicide applicators will meet Oregon Department of Agriculture (ODA) license requirements.
- Monitor, report, and keep records for three years in accordance with Washington County, ODA and DEQ requirements. See Appendix B for an example form.
- Ensure the herbicide application is part of an IPM strategy that seeks to minimize pesticide use. Give full consideration to alternative management methods before carrying out herbicide applications.
- Time herbicide applications to correspond with the life cycle of the plants to be treated, and monitor the application results.
- Determine the minimum weed population threshold that triggers an herbicide treatment action.
- Follow best technology-based practices in order to reduce leaks or spills, and maintain application equipment in good working order.
- Check and calibrate application equipment for safety and efficiency.
- Check weather conditions before spraying. Unless otherwise indicated on the product label, avoid herbicide use when air temperature is above 80° Fahrenheit, rain is expected within 24 hours, or wind speed is less than one mile per hour or greater than 10 miles per hour.
- Restrict spraying within RMAs and adjacent to streams and wetlands. Use handheld equipment and aquatic approved herbicides near aquatic resources. The RMA maps identify the locations of RMAs where spraying will be restricted.
- Apply pre-emergent herbicides when moderate rainfall is expected in order to transport the materials into the top inch of soil. Avoid application when heavy precipitation or flooding is expected.
- Coordinate the application of pre-emergent herbicides with other maintenance activities to avoid its dispersal during dust-generating activities.
- Use a non-toxic indicator dye in the chemical mix to identify treated vegetation when spot spraying.

- Notify the public of planned herbicide applications by posting the roads and schedule on wc-roads (www.wc-roads.com).
- Store herbicides in a safe and secure location in accordance with local, state, and federal laws.
- Transport herbicides in the bed of the truck or a secured tank to protect workers and the public and minimize the potential for spills.

4.1 Shoulder Spraying

The vegetation in Zone 1 is controlled via herbicide application on many county roads, as discussed in Section 2.1.

Apply a mix of nonselective post-emergent broadleaf and grass herbicides and a pre-emergent herbicide in the spring. Monitor treated roads after application to confirm die-off and check for any signs of herbicide resistance in the shoulder vegetation.

The development of herbicide-resistant weed populations is strongly linked to repeated use of the same herbicide or of herbicides with the same site of action. To prevent or delay herbicide resistance in roadside vegetation, create a shoulder spray program that alternates herbicides annually so herbicides from the same site-of-action group are not used more than once within three years.

Make sure that the weed control spectrums of the different herbicides in a mixture overlap so that weed biotypes resistant to one site of action are controlled by the herbicide with a different site of action. Confirm that the herbicides in the mixture have similar soil residual characteristics.

4.2 Selective Herbicide Treatment

Selective herbicide treatment occurs in zones 2 and 3 as a control against noxious and nuisance weeds, within RMAs, at culvert and bridge crossings, and in planting projects. Selective herbicide treatment is applied by hand, using foliar spray, plant injection, or cut stump treatments. Refer to Appendices A and D for the proper herbicide treatment and timing.

4.3 Landscape Treatment

Spot spraying and applying pre-emergent herbicides are two components of maintaining landscaped areas. Apply pre-emergent herbicides when moderate rainfall is expected in order to transport the materials into the top inch of soil and reduce the exposure potential to pedestrians. In order to minimize the use of post-emergent herbicide, monitor the weeds in the landscaped areas to correctly time the herbicide application to maximize its effectiveness.

4.4 No Spray Zones

County citizens can obtain a “No Spray” permit from Washington County to ensure herbicide is not applied in the right-of-way along the frontage of their property. If a property owner enters into the “No Spray” program, it is their responsibility to maintain the vegetation along their frontage in such a way that drainage, sight distance, and full

width of the traveling roadway are maintained to County standards and expectations. If the property owner fails to ensure proper maintenance of the vegetation, they may be excluded from the “no spray” program and the County will resume normal maintenance activities.

4.5 Closed Containers

Washington County Operations and Maintenance is considering switching to a closed container system whenever possible with commonly applied mixes of herbicide. The closed container system has reusable/refillable containers of premixed herbicide, surfactant, and indicator dye that are automatically diluted to the proper concentration. Closed containers reduce spills, eliminate issues with rinsing equipment, keep herbicide containers out of the landfill, and decrease the amount of herbicide used. The systems are efficient and provide accurate tracking of pesticide use. They are also safer for workers due to the reduced potential for direct exposure to the undiluted chemicals.

4.6 Training

Washington County maintenance personnel who apply or supervise the application of pesticides are licensed by the Oregon Department of Agriculture and follow the rules set out in the Oregon Pesticide Control Law (ORS 634).

Oregon Department of Agriculture Recertification - The Oregon Department of Agriculture has passed legislation that requires 40 hours of Department of Agriculture approved courses every 5 years in order to recertify the Public Pesticide Applicator License. A maximum of 15 credits can be accrued in any given calendar year.

Training Commitment - All persons responsible for supervising or carrying out integrated vegetation management practices, or directing or applying herbicides will attend educational classes, seminars and meetings to supplement and improve their knowledge of vegetation management, alternatives and the selection and safe application of herbicides. An effort will be made to seek out alternative vegetation management courses. Employees in a position to affect Washington County's Integrated Vegetation Management Program will be encouraged to attend the courses in order to enhance the county's vegetation management techniques.

5 Monitoring, Evaluation and Reporting

Monitoring and evaluation of roadside vegetation and the success of the vegetation management practices is an on-going activity. Maintenance crews routinely assess roadsides to identify potential issues caused by vegetation, and opportunities to correct potential hazards from occurring. The public are also encouraged to report road vegetation concerns.

A successful IVMP relies upon the monitoring, evaluation, and adjustment of vegetation management practices. Chronically problematic vegetation sites and representative samples of each zone will be evaluated and documented for maintenance effectiveness during the growing season following treatment. Evaluation results will determine what changes need to be made to the IVMP and practices used. Documentation is important to

ensure efficient use of maintenance dollars and personnel and avoiding the repetition of maintenance failures.

Initial herbicide activity and possible injury to adjacent vegetation can be determined 2 to 4 weeks after application. Total vegetation control treatments can be evaluated after 6 to 8 weeks and observed through the end of the growing season. Adjustments in rates, products, timing of herbicide applications and decisions not to apply herbicide should be made based on the objectives for each zone, and changes recorded in the spray log.

Herbicide use reporting

Records of all herbicide applications are required by Oregon law (ORS 634.146). Herbicide applicators shall prepare and maintain records on County approved forms or equivalent. An example of an approved form is included in Appendix B. Application reports will include:

- Time and date of application
- Road name, limits, and roadside miles sprayed
- Acres of right-of-way treated
- Trade name and quantity of each herbicide applied
- Weather information, including ambient temperature, wind speed, and direction

Herbicide application records will be retained for three years from the date of application.

6 Protected Species

Washington County is home to federally listed threatened and endangered species and has the habitat capable of holding other listed species. The County has worked with National Marine Fisheries Service to approve the “Best Management Practices for Routine Road Maintenance” as a program that minimizes impacts to listed salmon and steelhead and their habitat, and includes vegetation management. In obtaining approval of the program, it was noted that vegetation management is one of the activities carried out by the County that is most likely to cause take for listed salmonids.

In addition to potential impacts to salmon and steelhead, vegetation maintenance activities have a potential to impact protected plants, birds and invertebrates. Appendix F includes a list of protected species and when they are most vulnerable to disturbance from vegetation maintenance activities.

6.1 Migratory Birds

More than 400 species of migratory birds live in Oregon with over 300 nesting in road rights-of-way and on bridges. The Migratory Bird Treaty Act (MBTA) of 1918 implements four bilateral treaties between the US and Canada, Japan, Mexico, and the former Soviet Union, making it illegal to pursue, possess, injure, or kill migratory birds without a permit. Without an incidental take permit option in the act, conflicts between road maintenance activities and the MBTA occur. Best management practices to increase protection of migratory birds and minimize the risk of prosecution for MBTA violations during maintenance and construction activities are included in the IVMP, adopted from ODOT’s MBTA Highway Division Directive. In the unlikely event that state or federal

endangered migratory birds are encountered during vegetation maintenance activities, stop work immediately and contact Environmental Services for advice on how to proceed.

The nesting season can be divided into an early nesting season and a primary nesting season.

Early Nesting Season: February 1 – April 15

Raptors (owls, eagles, falcons and hawks), herons, geese, and hummingbirds are early nesters. Great-horned owls are exceptionally early nesters and may lay eggs in January. Many early nesters have longer breeding cycles and most will not complete breeding until June or July.

Primary Nesting Season: April 15 – July 31

This includes songbirds and the majority of bird species. Willow flycatchers are late nesters, often extending to the end of August.

As they leave the nest, young birds go through the fledgling phase. They are often seen on the ground, flightless, and often take shelter in low vegetation and are highly vulnerable to a variety of human disturbances at this time. June and July are peak months for fledgling activity.

The following are a series of protocols to be followed in order to minimize impacts to migratory birds while carrying out maintenance activities.

Tree Pruning and Tree/Snag Removal

Avoid pruning trees or removing trees/snags containing active nests of migratory birds.

- Do not remove trees/snags along the right-of-way where feasible, unless they pose safety concerns to the road or public and/or removing trees/snags is required to comply with state and local laws.
- Prune or remove trees/snags outside the nesting season (as identified by ODFW), particularly the peak nesting period, if appropriate, unless the tree, limb, or snag is an imminent hazard.
- Develop and implement road corridor plans to minimize the removal of hazard trees/snags during the peak nesting season.
- Inspect trees/snags prior to removal for active nests, when feasible.
- Avoid pruning or removing the tree/snag if an active nest is encountered, until the young have fledged when feasible.

Vegetation Management

Minimize impacts to migratory birds that may be nesting in vegetation along rights-of-way

- When and where feasible, clear vegetation only if it is necessary for the safe operation of the transportation system, in preparation of other maintenance activities, to comply with state and local laws, or to control noxious weeds.

- As appropriate, plant low-growing plants that do not require maintenance during the nesting season of migratory birds. Preference will be given to native plant species.
- When feasible, conduct vegetation maintenance activities outside the nesting season, especially during the peak nesting season, unless safety, fire, weed control, maintenance preparation, or state and local laws dictate otherwise.
- When feasible, adjust the timing and width of required mowing to minimize impacts to nesting birds.
- Limit brush removal to no more than 20 feet from either end and under all maintained bridges, and no more than 10 feet from culverts unless necessary for sight distance and the structural integrity of the bridge or culvert.
- If possible, inspect vegetation for active nests prior to clearing. If an active nest is encountered, if possible, avoid disturbing the nest or surrounding vegetation until the young have fledged.

7 References and Resources

Integrated Pest Management Plan, 2012. Clean Water Services.

Maguire, Chris. "Oregon Strategies for Transportation Compliance with the Migratory Bird Treaty Act". In *Proceedings of the 2007 International Conference on Ecology and Transportation*, edited by C. Leroy Irwin, Debra Nelson, and KP McDermott. Raleigh, NC: Center for Transportation and the Environment, North Carolina State University, 2007. pp. 24-28.

Marion County Vegetation Management Program Policy Document, 2000. Marion County.

Migratory Bird Treaty Act Highway Division Directive, 2006. Oregon Department of Transportation.

Northwest Region, Area 4 Integrated Roadside Vegetation Management Plan, 2012. Washington State Department of Transportation Maintenance Operations Division.

PNW 437 – Herbicide-Resistant Weeds and Their Management, 2008. Oregon State University Extension Service.

Appendices

Appendix A: Washington County Approved Herbicides

Appendix B: Example Herbicide Application Form

Appendix C: Invasive Plant Species Identification and Treatment Options

Washington County Operations and Maintenance may encounter a number of common or high-priority invasive plant species that require treatment while conducting routine roadside vegetation maintenance. The information below is adopted from the Clean Water Services Integrated Pest Management Plan, with original sources coming from the region's extension services such as Oregon State University, University of California, University of Idaho, and Washington State University, as well as regional land management agencies. The list of invasive species may be altered as new invasive plants are identified.

The invasive plant species in Table A1 come from Oregon Department of Agriculture's noxious plants list, as these are plants that may pose threats to native habitats and local economies. Many of the plants are present in the Tualatin Watershed and adjacent areas including Yamhill, Multnomah, Columbia, Tillamook, or Clatsop Counties, and controlling them is a high priority.

A few of the listed plants are not present in the local vicinity, but are considered a serious threat by the 4-County CWMA or the Oregon Invasive Species Council and are on the Early Detection and Rapid Response (EDRR) watch lists.

Table A1: Problematic invasive species potentially found in Washington County

Species	Notes
Garlic mustard <i>Alliaria petiolata</i>	Targeted by District noxious weed control program.
False brome <i>Brachypodium sylvaticum</i>	EDRR species. Control immediately.
Butterfly bush <i>Buddleia davidii</i>	Escaped garden ornamental. Mechanical control possible.
Knapweed <i>Centaurea spp.</i>	EDRR species. Extremely difficult to control.
Canada thistle <i>Cirsium arvense</i>	Common.
Old man's beard <i>Clematis vitalba</i>	EDRR species. Damaging to canopy trees.
Poison hemlock <i>Conium maculatum</i>	Common.
Morning glory <i>Convolvulus sepium</i>	Common.
Scotch broom <i>Cytisus scoparius</i>	Common.
Common teasel <i>Dipsacus fullonum</i>	Common.
English ivy <i>Hedera helix</i>	Extremely common. Some mechanical control possible.

Giant hogweed <i>Heracleum mantegazzianum</i>	EDRR species. Dangerous to human health. Handle with extreme caution.
Policeman's helmet <i>Impatiens glandulifera</i>	EDRR species. Increasingly common.
Yellow flag iris <i>Iris pseudacorus</i>	Targeted by District noxious weed control program.
Yellow archangel <i>Lamiastrum galeobdolon</i>	Uncommon. Extremely problematic to control. EDRR.
Bird's-foot trefoil <i>Lotus corniculatus</i>	Common.
Purple loosestrife <i>Lythrum salicaria</i>	Targeted by District noxious weed control program.
Reed canary grass <i>Phalaris arundinacea</i>	Extremely common but must be controlled for effective restoration.
Woody knotweeds <i>Polygonum cuspidatum</i> or <i>spp.</i>	Targeted by District noxious weed control program. Chemical control only.
Armenian blackberry (Himalayan blackberry) <i>Rubus armenicus</i>	Extremely common. Some mechanical control possible.
Nightshade <i>Solanum dulcamara</i>	Most problematic in wet areas.
Red clover <i>Trifolium pratense</i>	Common escaped agricultural plant. Problematic only in Water Quality Facilities.
Cattail <i>Typha latifolia</i>	Common aggressive native plant. Problematic only in Water Quality Facilities.
Hairy vetch <i>Vicia villosa</i>	Common in wet areas.

Table A2: Treatment options for common invasive and nuisance plants

Plant	Mechanical Control	Chemical Control	Special Considerations
Garlic Mustard <i>Alliaria petiolata</i>	Hand pull in small patches	Rodeo (glyphosate) Habitat (imazapyr)	Treat during active growth and before seeds set (spring). http://ohioline.osu.edu/fact/pdf/0066.pdf
False brome <i>Brachypodium sylvaticum</i>	Excavation not advised	Rodeo (aquatic glyphosate), Roundup Pro (glyphosate)	Treat during active growth and before seeds set (spring). http://appliedeco.org/invasive-species-resources/FBWG
Canada thistle <i>Cirsium arvense</i>	Can hand pull in small patches but rhizomes will persist	Milestone VM (aminopyralid) Vanquish (dichambra)	http://www.ext.colostate.edu/pubs/natures/03108.pdf http://pnwhandbooks.org/weed/other-items/control-problem-weeds/thistle-

		Telar XP or Landmark XP (chlorsulfuron)	canada-cirsium-arvense-nonselective-andor-non-cropland-con
Morning glory <i>Convolvulus sepium</i>	Not advised	2,4-D amine, dichamba, or glyphosate	Roots reproduce quickly. http://pnwhandbooks.org/weed/other-items/control-problem-weeds/bindweed-field-or-perennial-morningglory-convolvulus-arvensis
Scott's broom <i>Cytisus scoparius</i>	Cut or pull with weed wrench	Accord, Rodeo (glyphosate) Garlon 3A (triclopyr) Milestone VM (aminopyralid)	Long-lived seedbank http://extension.oregonstate.edu/catalog/pdf/pnw/pnw103.pdf (biological control: seed weevil)
Common teasel <i>Dipsacus fullonum</i>	Pull in small patches only	CONFRONT 360 SL (triclopyr + clopyralid) Plateau, Cadre or Plateau Eco-Pak (imazapic)	Rhizomatous plants difficult to control. http://pnwhandbooks.org/weed/other-items/control-problem-weeds/teasel-common-dipsacus-fulionum
English ivy <i>Hedera helix</i>	Cut, ground clear, cut at base of trees	Garlon 3A, LM Blackberry, Brush (triclopyr) Accord, Rodeo (glyphosate)	Needs good surfactant (non-ionic near water) due to waxy leaves. Cutting with string trimmer to open leaves and stems just prior to application is quite effective. http://extension.oregonstate.edu/catalog/pdf/ec/ec1595-e.pdf
Giant hogweed <i>Heracleum mantegazzianum</i>	Not advised	Accord, Rodeo (glyphosate) Garlon 3A (triclopyr)	Foliar applications during spring. Extremely dangerous, do not handle without skin and eye protection. http://www.invasiveplantcouncilbc.ca/publications/TIPS/Giant_Hogweed_TIPS.pdf http://pnwhandbooks.org/weed/other-items/control-problem-weeds/hogweed-

			giant-heracleum-mantegazzianum
Yellow Flag Iris <i>Iris pseudacorus</i>	Excavate only if contained in water.	Habitat, Polaris Nufarm (imazapyr)	Foliar application during dry season, rhizome injection only on small scale, removal of plants by mechanical means where feasible. http://www.co.thurston.wa.us/health/ehi/pm/pdf/yellowflagiris.pdf
Reed Canary Grass <i>Phalaris arundinacea</i>	Excavate, mow, shade	Rodeo (glyphosate) Habitat (impazapyr) Sethoxydim	Must be treated multiple years. Use herbicides on fresh growth, once it's at peak height but after it's been cut closer to the ground. ftp://ftp-fc.sc.egov.usda.gov/WA/Tech/RCG_management_0509.0df
Woody knotweeds <i>Polygonum spp.</i>	Not advised	Milestone VM (aminopyralid) Habitat (impazapyr) Rodeo (glyphosate)	Treat with herbicides late-summer to fall only. Use care to keep vegetative material in place. Treat before plant goes to seed http://bit.ly/OSUESem9031
Poison Oak <i>Rhus diversiloba</i> <i>T & G</i>	Grub or hand pull when soil is wet. Not advised for those allergic to Poison Oak	Garlon 3A (triclopyr) Trillion (2,4-D) Rodeo (glyphosate) Arsenal (imazapyr)	Treat with herbicides spring through fall depending on the herbicide used and stage of vegetation. Use extreme caution if removing by hand to eliminate skin contact with the plant or oils. www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7431.html
Armenian Blackberries (Himalayan Blackberries) <i>Rubus armenicus</i>	Cut, Excavate, mow, shade	Garlon 3A (triclopyr) Milestone VM (aminopyralid) Rodeo (glyphosate)	Seed bank lasts for years. Must repeat treatment until shading is sufficient. http://extension.oregonstate.edu/catalog/pdf/em/em8894.pdf
Nightshade <i>Solanum</i>	In small patches, hand pull	Accord, Rodeo (glyphosate)	Dispose carefully, resprouts easily. http://your.kingcounty.gov/dnrp/library/

<i>dulcamara</i>		Garlon 3A (triclopyr) Habitat, Polaris Nufarm (imazapyr)	water-and-land/weeds/Brochures/Bittersweet-Nightshade-factsheet.pdf
Hairy Vetch <i>Vicia villosa</i>	Mow or hand pull small patches	Accord, Rodeo (glyphosate)	Long-lived seedbank; retreat as needed. http://na.fs.fed.us/fhp/invasive_plants/weeds/hairy-vetch.pdf

Appendix D: Invasive Plant Species Treatment Calendar

Appendix E: Stormwater Treatment Facility Maintenance Checklist

Appendix F: Protected Terrestrial Species in Washington County

Threatened and Endangered Species

Invertebrates	
<p><u>Fender's blue butterfly (<i>Icaricia icarioides fenderi</i>)</u>: The life history of the Fender's blue butterfly is closely tied to Kincaid's lupine, laying their eggs on the underside of the leaflets. The egg and larvae are on the plant and most vulnerable to mowing between March and July.</p>	
Plants	
<p><u>White rock larkspur (<i>Delphinium leucophaeum</i>)</u>: White rock larkspur can be found on the edges of oak woodlands, in dry roadside ditches, on basalt cliffs, along river banks and bluffs, on moist rocky slopes, and in moist lowland meadows.</p>	
<p><u>Willamette daisy (<i>Erigeron decumbens</i>)</u>: Willamette daisy inhabits both seasonally flooded bottomland prairies and well-drained upland prairies. Once found throughout the Willamette Valley, it has not been relocated in Washington County.</p>	
<p><u>Kincaid's lupine (<i>Lupinus oregonus</i>)</u>: Kincaid's lupine is found in upland prairie remnants and ecotones between grassland and forest. It usually occurs in heavy, well-drained soils.</p>	

Nelson's checkermallow (*Sidalcea nelsoniana*): Willamette Valley populations of Nelson's checkermallow are typically found in open prairie remnants along the margins of streams, sloughs, ditches, roadsides, fence rows, and drainage swales and in fallow fields.



Birds

Marbled murrelet (*Brachyramphus marmoratus*): The marbled murrelet comes inland up to 50 miles to nest in forest stands with old growth forest characteristics. These dense shady forests are generally characterized by large trees with large branches or deformities for use as nest platforms.



Northern spotted owl (*Strix occidentalis caurina*): Northern spotted owls live in forests characterized by dense canopy closure of mature and old-growth trees, abundant logs, standing snags, and live trees with broken tops. Typically, forests do not attain the preferred characteristics until they are at least 150 to 200 years old.



Streaked horned lark (*Eremophila alpestris strigata*): Horned larks are birds of wide open spaces with no trees and few or no shrubs. The streaked horned lark nests on the ground in sparsely vegetated sites dominated by grasses and forbs. Within Washington County, the streaked horned lark could be found nesting in a broad range of habitats, including native prairies, fallow and active agricultural fields, wetland mudflats, sparsely-vegetated edges of grass fields, recently planted Christmas tree farms with extensive bare ground, moderately- to heavily-grazed pastures, gravel roads or gravel shoulders of lightly-traveled roads, and airports. The common condition for each of these habitat types is the open landscape context.

