

**Table 1. Routine Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Ditch Vegetation Management Strategies</b>							
Mowing	Cutting vegetation to a reasonable height to allow for proper water flow and aesthetics	Tall vegetation is impeding flow of water through the ditch or causing line of sight issues	✓ Vegetated	✓ No flow	<ul style="list-style-type: none"> <li>Mower</li> <li>Specialized mower for steep slopes</li> <li>Brooms, scoops, shovels, and/or handheld blowers</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Reflective markers (“fish sticks”)</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Set the mowing height at the highest acceptable level. For standard turf grass, mowing only the top 1/3 of the grass blade height is recommended. Where vegetation growth is excessive, additional mowing may be necessary.</li> <li>Avoid operating in wet areas or rough terrain to minimize scalping and rutting.</li> <li>Strategize mowing direction to minimize spreading of cut material onto adjacent paved surfaces.</li> <li>If vegetation is providing flow control or treatment, too much removal or trimming could reduce these functions.</li> <li>If possible, retain vegetation on the south or west sides of the ditch to provide shading of the ditch and reduce water temperature.</li> <li>If there is an opportunity to re-seed, low growing grass seed mix is recommended to reduce mowing frequency and cost.</li> </ul> <p><b>Steep Slope Considerations</b></p> <ul style="list-style-type: none"> <li>Use a specialized mower when steep slopes (≥ 15 percent) are present.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Turf grass may be mulch mowed and left in place; however, large quantities of turf grass clippings may lead to outlet clogging and nutrient loading in downstream water bodies.</li> </ul>	<p>Refer to <b>Invasive Species and Noxious Weed Removal</b> (<a href="#">Table 1, page 3</a>) for additional recommendations regarding mowing.</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>
Brush Cutting (or Brushing)	Trimming woody vegetation to remove overgrown and/or excessive vegetation to allow for proper water flow and to restore sight distance	<ul style="list-style-type: none"> <li>Overgrown/excessive vegetation impeding flow or storage of water and sediments</li> <li>Safety or structural integrity of the roadway is jeopardized</li> </ul>	✓ Vegetated	✓ No flow	<ul style="list-style-type: none"> <li>Brush cutters</li> <li>Power saws</li> <li>Axes and/or machetes</li> <li>Pruning shears, loppers, and/or clippers</li> <li>Brooms, scoops, shovels, and/or rakes</li> <li>Truck cover (for securing load during transport)</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>If vegetation is providing flow control or treatment, too much removal or trimming could reduce these functions.</li> <li>If possible, retain vegetation on the south or west sides of the ditch to provide shading of the ditch and reduce water temperature.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Remove cut branches/other vegetative debris after brushing to reduce outlet clogging and spreading invasive species.</li> <li>Compost or stockpile vegetative matter in a clean green stockpile at your maintenance facility, if possible.</li> </ul>	<p>Refer to local codes and regulations for additional requirements.</p>

**Table 1 (continued). Routine Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Ditch Vegetation Management Strategies (continued)</b>							
Minor Reseeding/ Replanting	Adding seed and/or plants to stabilize exposed soils. Applies to conditions affecting a small section of a ditch that can be addressed as part of routine maintenance.	<ul style="list-style-type: none"> <li>Sparse vegetation/ eroded patches on ditch bottom</li> <li>Poor grass growth</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> </ul>	<ul style="list-style-type: none"> <li>Seed mix</li> <li>Hydroseeder</li> <li>Post-seeding erosion control BMPs (e.g., straw mulch, biodegradable nets and blankets, coir mats)</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Ensure that erosion control BMPs are installed properly to avoid blockages.</li> <li>Low growing grass seed mix is recommended to reduce mowing frequency and cost.</li> <li>Confirm that there are no weed seeds or invasive plant seeds in the seed mixes.</li> <li>Seed and/or plant during the following optimum windows:                             <ul style="list-style-type: none"> <li>Late spring (April 1 through June 30)</li> <li>Early fall (September 1 through October 1)</li> </ul> </li> <li>Establishment of vegetation may not be feasible in coarse grained or mineral soils.</li> </ul>	<p>When major reseeding/ replanting is necessary to correct poor conditions, refer to <b>Major Replanting/ Reseeding</b> (Table 2, page 9).</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>
Weed Control	Control of weeds through biological, physical, mechanical, chemical, or cultural methods	Weeds present in ditch	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Standing water</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Weeding tools</li> <li>Weed burner</li> <li>Brooms, scoops, shovels, and/or rakes</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Review preferred implementation strategies documented in an Integrated Pest Management (IPM) plan.</li> <li>Ensure that herbicide applications are performed by licensed, qualified staff.</li> <li>Use physical and/or mechanical methods of vegetation removal rather than applying herbicides, where practical.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Compost or stockpile vegetative matter in a clean green stockpile at your maintenance facility, if possible, and only if invasive species and noxious weeds are not present.</li> </ul>	<p>Refer to <b>Invasive Species and Noxious Weed Removal</b> (Table 1, page 3) for disposal considerations when invasive species and noxious weeds are present.</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to your local IPM plan, local codes and regulations for additional requirements.</p>

**Table 1 (continued). Routine Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Ditch Vegetation Management Strategies (continued)</b>							
Invasive Species and Noxious Weed Removal	Control of invasive species and noxious weeds through biological, physical, mechanical, chemical, or cultural methods	<ul style="list-style-type: none"> <li>Invasive species present</li> <li>Noxious weeds present</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Standing water</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Weeding tools</li> <li>Weed wrench</li> <li>Targeted herbicide applicator (woody painter/herbicide wand)</li> <li>Garbage bags (to prevent seed development and dispersal)</li> <li>Protective clothing and eye protection (for toxic, noxious weeds)</li> </ul>	<p><b>Considerations Prior to and During Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Invasive species may need to be removed by hand.</li> <li>Pull plants when soils are moist and before seeds are produced.</li> <li>Identify invasive species that can and should be controlled or reduced by mowing.</li> <li>Ensure that herbicide applications are performed by licensed, qualified staff.</li> <li>Prior to mowing, implement the following for small populations of invasive plants:                             <ul style="list-style-type: none"> <li>Use herbicides early in the summer.</li> <li>Physically remove flower or seed heads (cut and bag).</li> <li>Physically remove rootstock (mechanically excavate).</li> </ul> </li> <li>Implement the following for large, mature invasive plants:                             <ul style="list-style-type: none"> <li>Control large purple loosestrife plant populations with biocontrol beetles (<i>Hylobius</i> sp. or <i>Galruccella</i> sp.) prior to mowing.</li> <li>Mow plants prior to seed maturation, allow the plants to regrow to a height of 2 to 4 feet and then treat with foliar herbicide.</li> </ul> </li> <li>If mowing occurs after seed maturation, hand clean the upper parts of the mowing equipment with a brush or broom prior to moving to a new location.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Ensure proper disposal per the Washington State Noxious Weed Control Board.</li> <li>Bag cut flowers and seed heads.</li> </ul>	<p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to the Washington State Noxious Weed Control Board for weed identification, removal, and disposal considerations: <a href="http://www.nwcb.wa.gov">www.nwcb.wa.gov</a></p> <p>Refer to your local IPM plan, local codes and regulations for additional requirements.</p>
<b>Other Maintenance Strategies</b>							
Inlet/Outlet Cleaning	Clean accumulated sediment from inlets and outlets	Accumulated sediment or blockage impeding flow (≥ 50% blockage) at inlet/outlet pipe	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> <li>✓ Paved</li> <li>✓ Metal</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Standing water</li> </ul>	<ul style="list-style-type: none"> <li>Rake, hoe, or shovel</li> <li>Wheelbarrow or buckets</li> </ul>	<p><b>Steep Slope Considerations</b></p> <ul style="list-style-type: none"> <li>Consider adjusting threshold to ≥ 30% blockage when steep slopes (≥ 15%) are present.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Use or disposal options for the sediment removed from the inlet and/or outlet will depend on the characterization of the waste.</li> </ul>	<p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>

**Table 1 (continued). Routine Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Other Maintenance Strategies (continued)</b>							
Nuisance Animal/ Insect Control	Control of nuisance animals/insects through mechanical, manual, or chemical methods. Examples of nuisance animals and insects include: <ul style="list-style-type: none"> <li>• <b>Beavers:</b> May block ditch capacity with dams</li> <li>• <b>Bees:</b> Could pose a hazard to crews maintaining the ditch</li> <li>• <b>Moles:</b> Contribute to erosion by burrowing holes</li> <li>• <b>Mosquitoes:</b> May result from stagnant flow in ditch; nuisance and public health hazard</li> <li>• <b>Nutria:</b> Contribute to erosion by destroying the banks of ditches</li> </ul>	Nuisance animals/ insects present	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> <li>✓ Paved</li> <li>✓ Metal</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Standing water</li> </ul>	<ul style="list-style-type: none"> <li>• Animal guards (e.g., rods, flap gates, and finger-type flap gates) for outlet pipes</li> <li>• Traps (if allowed)</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <p>Preferred implementation strategies should be documented in an Integrated Pest Management (IPM) plan.</p>	<p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to your local IPM plan, local codes and regulations for additional requirements.</p>

**Table 2. Corrective Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Ditch Cleaning Strategies</b>							
Hand Ditching	Removing sediment and debris manually using a rake, hoe, or shovel	<ul style="list-style-type: none"> <li>Sediment accumulation near inlet and/or outlet</li> <li>Excess sediment impeding flow or causing erosion</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> <li>✓ Paved</li> <li>✓ Metal</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Rake, hoe, or shovel</li> <li>Wheelbarrow or buckets</li> <li>Erosion control BMPs (e.g., wattles, check dams, silt fences)</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Containment dams (e.g., water bladders, sand bags)</li> <li>Vactor truck (for non -fish bearing waters and low -flow scenarios)</li> <li>Fish exclusion nets (9.5 mm stretched mesh)</li> <li>Pump and bypass setup (if ditch flow is significant)</li> <li>Spill kit, including containment for the pump</li> <li>Erosion control BMPs for pump outfall, channel stabilization, etc.</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Cleaning should be performed during low flow or no flow periods if possible.</li> <li>Install erosion control BMPs prior to conducting sediment removal.</li> <li>Consider retaining vegetation near ditch outlet(s), also known as “skip ditching.”</li> <li>Reseed and install erosion control BMPs after sediment has been removed if needed.</li> </ul> <p><b>Steep Slope Considerations</b></p> <ul style="list-style-type: none"> <li>Retain additional vegetation near ditch outlet(s) when steep slopes (≥ 15 percent) are present.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Sweep and collect dirt and debris remaining on the pavement at the completion of work.</li> <li>Separate screenings into soil and vegetative matter (e.g., leaves, grass, needles, branches, etc.) categories: <ul style="list-style-type: none"> <li>Compost or stockpile vegetative matter in a clean green stockpile at your maintenance facility, if possible.</li> <li>Use or disposal options for the soil portion will depend on the characterization of the waste.</li> </ul> </li> </ul>	<p>Refer to <b>Minor Reseeding/ Replanting</b> (<a href="#">Table 1, page 2</a>).</p> <p>Refer to <b>Fact Sheet F2 – Ditch Cleaning Strategies</b> for additional information on ditch cleaning.</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>

**Table 2 (continued). Corrective Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Ditch Cleaning Strategies (continued)</b>							
Bucket Ditching (Mechanical Excavation)	Removing sediment and debris in deep ditches where hand ditching is impractical	<ul style="list-style-type: none"> <li>Sediment accumulation near inlet and/or outlet</li> <li>Excess sediment impeding flow or causing erosion</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Backhoe or excavator with ditching bucket or Ditch Master</li> <li>Erosion control BMPs (e.g., wattles, check dams, silt fences)</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Containment dams (e.g., water bladders, sand bags)</li> <li>Vactor truck (for non -fish bearing waters and low -flow scenarios)</li> <li>Fish exclusion nets (9.5 mm stretched mesh)</li> <li>Pump and bypass setup (if ditch flow is significant)</li> <li>Spill kit, including containment for the pump</li> <li>Erosion control BMPs for pump outfall, channel stabilization, etc.</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Cleaning should be performed during low flow or no flow periods if possible.</li> <li>Cleaning should utilize low-impact equipment if feasible.</li> <li>Install erosion control BMPs prior to conducting sediment removal.</li> <li>Consider retaining vegetation near ditch outlet(s), also known as “skip ditching.”</li> <li>Reseed and install erosion control BMPs after sediment has been removed if needed.</li> <li>Keep excavation equipment on the roadway and off the ditch bank.</li> </ul> <p><b>Steep Slope Considerations</b></p> <ul style="list-style-type: none"> <li>Retain additional vegetation near ditch outlet(s) when steep slopes (<math>\geq 15</math> percent) are present.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Sweep and collect dirt and debris remaining on the pavement at the completion of work.</li> <li>Separate screenings into soil and vegetative matter (e.g., leaves, grass, needles, branches, etc.) categories:                             <ul style="list-style-type: none"> <li>Compost or stockpile vegetative matter in a clean green stockpile at your maintenance facility, if possible.</li> <li>Use or disposal options for the soil portion will depend on the characterization of the waste.</li> </ul> </li> </ul>	<p>Refer to <b>Minor Reseeding/ Replanting</b> (<a href="#">Table 1, page 2</a>).</p> <p>Refer to <b>Fact Sheet F2 – Ditch Cleaning Strategies</b> for additional information on ditch cleaning.</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>

**Table 2 (continued). Corrective Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Ditch Cleaning Strategies (continued)</b>							
Shoulder Ditching (blade ditching or shoulder pulling)	Reshaping and cleaning ditches by removing excess sod from the shoulder	<ul style="list-style-type: none"> <li>Sediment accumulation near inlet and/or outlet</li> <li>Excess sediment impeding flow or causing erosion</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Grader</li> <li>Belt loader</li> <li>Erosion control BMPs during maintenance (e.g., wattles, check dams, silt fences)</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Containment dams (e.g., water bladders, sand bags)</li> <li>Vactor truck (for non -fish bearing waters and low -flow scenarios)</li> <li>Fish exclusion nets (9.5 mm stretched mesh)</li> <li>Pump and bypass setup (if ditch flow is significant)</li> <li>Spill kit, including containment for the pump</li> <li>Erosion control BMPs for pump outfall, channel stabilization, etc.</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Cleaning should be performed during low flow or no flow periods if possible.</li> <li>Cleaning should utilize low-impact equipment if feasible.</li> <li>Install erosion control BMPs prior to conducting sediment removal.</li> <li>Consider retaining vegetation near ditch outlet(s), also known as “skip ditching.”</li> <li>Reseed and install erosion control BMPs after sediment has been removed if needed.</li> <li>Keep excavation equipment on the roadway and off the ditch bank.</li> </ul> <p><b>Steep Slope Considerations</b></p> <ul style="list-style-type: none"> <li>Retain additional vegetation near ditch outlet(s) when steep slopes (<math>\geq 15</math> percent) are present.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Sweep and collect dirt and debris remaining on the pavement at the completion of work.</li> <li>Separate screenings into soil and vegetative matter (e.g., leaves, grass, needles, branches, etc.) categories:                             <ul style="list-style-type: none"> <li>Compost or stockpile vegetative matter in a clean green stockpile at your maintenance facility, if possible.</li> <li>Use or disposal options for the soil portion will depend on the characterization of the waste.</li> </ul> </li> </ul>	<p>Refer to <b>Minor Reseeding/ Replanting</b> (<a href="#">Table 1, page 2</a>).</p> <p>Refer to <b>Fact Sheet F2 – Ditch Cleaning Strategies</b> for additional information on ditch cleaning.</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>



**Table 2 (continued). Corrective Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Other Corrective Ditch Maintenance Strategies</b>							
Ditch Stabilization	Control erosion and scour by installing additional vegetative cover or riprap on steep side slopes or installing check dams to slow water flow and to cover bare soils	<ul style="list-style-type: none"> <li>Erosion damage</li> <li>Ditch bottom eroded or scoured during to flow channelization or high flows</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Riprap</li> <li>Check dams</li> <li>Erosion control BMPs during maintenance (e.g., wattles, check dams, silt fences)</li> <li>Seed mix</li> <li>Post-seeding erosion control BMPs (e.g., straw mulch, biodegradable nets and blankets, coir mats)</li> <li>Geotextile fabric</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Containment dams (e.g., water bladders, sand bags)</li> <li>Vactor truck (for non -fish bearing waters and low -flow scenarios)</li> <li>Fish exclusion nets (9.5 mm stretched mesh)</li> <li>Pump and bypass setup (if ditch flow is significant)</li> <li>Spill kit, including containment for the pump</li> <li>Erosion control BMPs for pump outfall, channel stabilization, etc.</li> </ul>	<p><b>Considerations Prior to and During Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Anchoring straw mulch is difficult in narrow areas.</li> <li>Vegetation may not be feasible in rocky areas or in ditches that experience high flows.</li> <li>Perform ditch stabilization during low flow or no flow periods if possible.</li> <li>Straw mulch is inexpensive, but can easily be washed or blown away.</li> <li>Do not use hay mulch, which is more likely than straw mulch to contain weed seeds. (Note: Some jurisdictions do not allow straw or hay mulch.)</li> </ul> <p><b>Steep Slope Considerations</b></p> <ul style="list-style-type: none"> <li>Anchoring straw mulch is difficult when steep slopes (≥ 15 percent) are present.</li> <li>Vegetation may not be feasible when steep slopes (≥ 15 percent) are present.</li> </ul>	<p>Refer to <b>Minor Reseeding/ Replanting (Table 1, page 2)</b>.</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to <b>Fact Sheet A5 – Ditch Retrofit Strategies</b> for retrofit options.</p> <p>Refer to local codes and regulations for additional requirements.</p>
Minor Ditch Reshaping/ Regrading	Excavating accumulated sediments to restore original ditch slope and/or grade line	<ul style="list-style-type: none"> <li>Ditch storage capacity is limited by accumulated sediments</li> <li>Standing water remains in the ditch during storms and does not drain freely</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Excavator</li> <li>Erosion control BMPs during maintenance (e.g., wattles, check dams, silt fences)</li> <li>Seed mix</li> <li>Post-seeding erosion control BMPs (e.g., straw mulch, biodegradable nets and blankets, coir mats)</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Containment dams (e.g., water bladders, sand bags)</li> <li>Vactor truck (for non -fish bearing waters and low -flow scenarios)</li> <li>Fish exclusion nets (9.5 mm stretched mesh)</li> <li>Pump and bypass setup (if ditch flow is significant)</li> <li>Spill kit, including containment for the pump</li> <li>Erosion control BMPs for pump outfall, channel stabilization, etc.</li> </ul>	<p><b>Considerations Prior to and During Implementation</b></p> <ul style="list-style-type: none"> <li>Deep ditches may require more significant ditch reshaping or flow control.</li> <li>Perform ditch reshaping/regrading during low flow or no flow periods if possible.</li> <li>Failure to reestablish vegetation or protect side slopes could lead to erosion.</li> <li>Keep excavation equipment on the roadway and off the ditch bank.</li> <li>Reseed ditch line after reshaping, unless water is flowing.</li> </ul> <p><b>Steep Slope Considerations</b></p> <p>Ditches with steep side slopes (≥ 15 percent) may require more significant ditch reshaping or flow control.</p>	<p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to <b>Fact Sheet A5 – Ditch Retrofit Strategies</b> for retrofit options.</p> <p>Refer to local codes and regulations for additional requirements.</p>



**Table 2 (continued). Corrective Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Other Corrective Ditch Maintenance Strategies (continued)</b>							
Major Replanting/ Reseeding	Adding seed and/or plants to stabilize exposed soils. Necessary to correct poor conditions. Does not apply to conditions affecting a small section of a ditch that can be addressed as part of routine maintenance.	<ul style="list-style-type: none"> <li>Sparse vegetation/ eroded patches on ditch bottom</li> <li>Poor grass growth</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> </ul>	<ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Seed mix</li> <li>Hydroseeder</li> <li>Post-seeding erosion control BMPs (e.g., straw mulch, biodegradable nets and blankets, coir mats)</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> <li>Consider using different seed mixes for different growing environments (e.g., shady slopes, wetter areas) in the same ditch.</li> <li>Low growing grass seed mix is recommended to reduce mowing frequency and cost.</li> <li>Make sure there are no weed seeds or invasive plant seeds in the seed mixes.</li> <li>Seed and/or plant during the following optimum windows:                             <ul style="list-style-type: none"> <li>Late spring (April 1 through June 30)</li> <li>Early fall (September 1 through October 1)</li> </ul> </li> <li>If necessary, consult an engineer or a landscape architect to develop a planting plan.</li> </ul>	<p>When conditions affect a small section of the ditch and can be addressed as part of routine maintenance, refer to <b>Minor Reseeding/ Replanting</b> (<a href="#">Table 1, page 2</a>).</p> <p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to <b>Fact Sheet A5 – Ditch Retrofit Strategies</b> for retrofit options.</p> <p>Refer to local codes and regulations for additional requirements.</p>
Trees of Concern	Removing dead or dying trees, dead parts of live trees, or unstable live trees that have the potential to cause property damage, personal injury, or fatalities	<ul style="list-style-type: none"> <li>Dead or dying trees present</li> <li>Dead parts of live trees present</li> <li>Unstable live trees present</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> <li>✓ Paved</li> <li>✓ Metal</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Low flow</li> </ul>	<ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Chainsaw</li> <li>Ladder</li> <li>Rope</li> <li>Ax</li> <li>Wedges</li> <li>Wood chipper</li> <li>Pruning shears, loppers, and/or clippers</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Consult with an arborist to verify that the tree should be classified as a tree of concern and to determine an appropriate removal method.</li> <li>Verify that required permits have been obtained prior to beginning work.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Consult with an arborist regarding proper disposal. If the tree is diseased, then it may require special disposal considerations.</li> </ul>	<p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to local codes and regulations for additional requirements.</p>

**Table 2 (continued). Corrective Ditch Maintenance Strategies.**

Strategy	Description	Condition	Ditch Surface Type	Water Flow	Common Equipment and Material Needs	Considerations	References
<b>Other Corrective Ditch Maintenance Strategies (continued)</b>							
Minor Inlet/Outlet Repair	Installing or repairing riprap, aprons, and/or rock plunge pools at inlets and outlets	<ul style="list-style-type: none"> <li>Evidence of scour or undercutting at inlets or outlets</li> </ul>	<ul style="list-style-type: none"> <li>✓ Vegetated</li> <li>✓ Bare Soil</li> <li>✓ Rock</li> <li>✓ Paved</li> <li>✓ Metal</li> </ul>	<ul style="list-style-type: none"> <li>✓ No flow</li> <li>✓ Standing water</li> </ul>	<ul style="list-style-type: none"> <li>Riprap</li> <li>Shovel</li> <li>Erosion control BMPs during maintenance (e.g., wattles, check dams, silt fences)</li> </ul> <p><b>Additional Equipment and Materials for Natural Flow</b></p> <ul style="list-style-type: none"> <li>Required permits (keep documentation on-site during work)</li> <li>Containment dams (e.g., water bladders, sand bags)</li> <li>Vactor truck (for non -fish bearing waters and low -flow scenarios)</li> <li>Fish exclusion nets (9.5 mm stretched mesh)</li> <li>Pump and bypass setup (if ditch flow is significant)</li> <li>Spill kit, including containment for the pump</li> <li>Erosion control BMPs for pump outfall, channel stabilization, etc.</li> </ul>	<p><b>Considerations Prior to Implementation</b></p> <ul style="list-style-type: none"> <li>Verify that required permits have been obtained prior to beginning work.</li> </ul> <p><b>Disposal Considerations</b></p> <ul style="list-style-type: none"> <li>Use or disposal options for the removal of sediment will depend on the characterization of the waste.</li> </ul>	<p>Refer to <b>Fact Sheet F3 – Maintaining Ditches that Convey Natural Flow</b> for natural flow considerations.</p> <p>Refer to <b>Fact Sheet A3 – Permit Requirements for Ditch Maintenance</b> for permitting considerations.</p> <p>Refer to <b>Fact Sheet A5 – Ditch Retrofit Strategies</b> for Major Inlet/Outlet repair strategies</p> <p>Refer to local codes and regulations for additional requirements.</p>