

**SDOT BEST MANAGEMENT PRACTICES
(BMP) REFERENCE MANUAL**

Urban Forestry Operations
Tree Crew Operations

December 2008

SDOT BEST MANAGEMENT PRACTICES (BMP) REFERENCE MANUAL

Urban Forestry Operations Tree Crew Operations

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This best management practice (BMP) reference manual was written to assist you, an SDOT field crew member, in preventing pollution from impacting stormwater. Your actions in the field contribute significantly to preventing stormwater pollution and keeping our streams, lakes, and Puget Sound clean. These manuals also help SDOT comply with the City of Seattle's Stormwater Permit.

We would like to receive your feedback on the information this manual contains. Direct feedback; questions regarding any of the BMPs listed; and information about missing work tasks, pollution sources, or missing BMPs should be directed to Maureen Meehan (SDOT's NPDES Stormwater Advisor) at (206) 684-8750.

To report a spill or any illegal dumping issues you observe while in the field, please call the SPU Water Quality Hotline at (206) 684-7587.

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	606 PTR HTR	Street Tree Removal Private Tree Removal Hazard Tree Removal

Description of Work

Removal of street trees with ropes, chainsaws, chippers, dump trucks, and aerial lifts.

Objectives

Reduce stormwater contamination from soil erosion and tree debris.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 1) on any structures located downslope or adjacent to the work area.
 - Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 2).
 - Place the appropriate size filter sock in the catch basin or storm drain inlet.
 - Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
 - Trim and remove filter sock material that extends beyond the grate.



Figure 1. Storm drain cover.



Figure 2. Catch basin filter sock.

BMP Maintenance During Site Work

1. Tree Removal:

- Use selective (rather than wholesale) removal of trees to conserve soil and reduce wood wastes. Avoid indiscriminate removal of trees and other beneficial vegetation.
 - Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable.
2. **Mulching:** Use mulch or other erosion control measures when soils are exposed for more than 1 week during the dry season (May 1 to September 30) or 2 days during the rainy season (October 1 to April 30).
3. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Site Cleanup

1. Waste Disposal:

- Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies, or greenbelt areas (see Figure 3).
 - Salvage and recycle any useful materials (e.g., trees and brush from land-clearing operations can be converted into woodchips through mechanical chippers and then used as mulch in graded areas).
2. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.
3. **Catch Basin Filter Socks:**
- Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
 - Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.
 - Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).
4. *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 3. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.30 - Preserving Natural Vegetation E1.35 - Buffer Zones E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	C101 - Preserving Natural Vegetation C102 - Buffer Zones C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	608	Street Tree Maintenance

Description of Work

Inspection and maintenance of City planted street trees, including mulching tree pits, sucker pruning, spot spraying tree pits, removing articles from trees, and staking trees.

Objectives

Use proper fertilizer application techniques to minimize nutrient pollution of stormwater. Implement proper landscaping and mulching techniques to prevent plant material and excess mulch from entering drainage systems.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Storm Drain Cover and Catch Basin Filter:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 1) on any structures located downslope or adjacent to the work area.
 - Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 2).
 - Place the appropriate size filter sock in the catch basin or storm drain inlet.
 - Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
 - Trim and remove filter sock material that extends beyond the grate.
3. **Landscaping:** Fertilizers should only be applied by properly trained personnel.
4. *Optional BMPs:* Use slow-release fertilizer for turf grass.

BMP Maintenance During Site Work

1. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).



Figure 1. Storm drain cover.



Figure 2. Catch basin filter sock.

2. Landscaping:

- Use mulch or other erosion control measures when soils are exposed for more than 1 week during the dry season (May 1 to September 30) or 2 days during the rainy season (October 1 to April 30).
- *Optional BMPs:*
 - Mulch (see Figure 3) and mow whenever practical.
 - Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and greater drought-tolerance.
 - Select mulch used within the ordinary high-water mark (OHWM) of surface waters to minimize potential flotation of organic matter. Use composted organic materials with higher specific gravities (densities) than straw, wood, or chipped material.

3. Vegetation Management/Fertilizers:

- *Optional BMPs:*
 - Till fertilizers into the soil where practical rather than dumping or broadcasting them on the surface. Determine the proper fertilizer application for the types of soil and vegetation encountered.
 - Use a topsoil layer that is at least 8 inches thick and consists of at least 8 percent organic matter to provide a sufficient growing medium for the vegetation.
 - Time the fertilizer application for periods of maximum plant uptake. Apply fertilizers in amounts appropriate for the target vegetation and at the appropriate time of year to minimize losses to surface water and groundwater.
 - Do not fertilize during a drought or when the soil is dry.

Site Cleanup

1. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.
2. **Catch Basin Filter Socks:**
 - Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
 - Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.
 - Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).
3. **Landscaping:** Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies, or greenbelt areas (see Figure 4).
4. *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 3. Applying mulch.



Figure 4. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Source Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.15 - Mulching and Matting E1.30 - Preserving Natural Vegetation E1.35 - Buffer Zones E1.50 - Topsoiling E3.25 - Storm Drain Inlet Protection	BMP 20 - Landscaping and Lawn and Vegetation Management	C101 - Preserving Natural Vegetation C102 - Buffer Zones C121 - Mulching C125 - Topsoiling C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	609	Street Tree Replacement

Description of Work

Planting new street trees, mulching, and staking.

Objective

Implement proper landscaping techniques to prevent plant material and sediment from entering drainage systems.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Flagging:**
 - Mark all clearing limits, sensitive areas, and their buffers prior to beginning land disturbing activities including clearing and grading (see Figure 1).
 - Flag and provide a rigid (e.g., chain link or similar) fence to protect areas around trees and vegetated areas to be retained (see Figure 2).



Figure 1. Flagged sensitive area.



Figure 2. Protected tree.

3. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 3) on any structures located downslope or adjacent to the work area.
 - Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 4).

- Place the appropriate size filter sock in the catch basin or storm drain inlet.
- Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
- Trim and remove filter sock material that extends beyond the grate.



Figure 3. Storm drain cover.



Figure 4. Catch basin filter sock.

BMP Maintenance During Site Work

1. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
2. **Flagging:**
 - Inspect flagged areas regularly to make sure flagging has not been removed.
 - Repair or replace flagging immediately if it has been damaged or visibility reduced.
3. **Tree Removal:**
 - Use selective (rather than wholesale) removal of trees to conserve soil and reduce wood wastes. Avoid indiscriminate removal of trees and other beneficial vegetation.
 - Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable.
4. **Topsoiling:**
 - Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium.
 - Allow sufficient time in scheduling for topsoil to be spread prior to seeding, sodding, or planting.

- Do not apply to subsoil if the two soils have contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil types.

5. Mulching:

- Use appropriate mulch materials and application rates (see Figure 5).
- *Optional BMPs:*
 - Remulch and/or protect any areas that experience erosion with a net or blanket. Fix and remulch the eroded area if the erosion problem is drainage related.
 - Increase mulch thicknesses for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.
 - Check mulched areas periodically, especially following severe storms. Repair damaged areas of mulch or tie-down material.



Figure 5. Applying mulch.

Site Cleanup

1. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.

2. Catch Basin Filter Socks:

- Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
- Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.
- Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).

3. Waste Disposal:

- Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies or greenbelt areas taking care to avoid contamination or site disturbance (see Figure 6).
- Salvage and recycle any useful materials (e.g., trees and brush from land-clearing operations can be converted into woodchips through mechanical chippers and then used as mulch in graded areas).
- *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 6. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.15 - Mulching and Matting E1.30 - Preserving Natural Vegetation E1.35 - Buffer Zones E1.50 - Topsoiling E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	C101 - Preserving Natural Vegetation C102 - Buffer Zones C121 - Mulching C125 - Topsoiling C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	610 TMR	Tree Pruning Street Tree Root Pruning

Description of Work

RCAT 610 Pruning of street trees as needed to direct growth patterns; to control overcrowding; provide clearance above sidewalks and streets; and to reduce encroachment of trees into power lines, buildings, monorails, business signs, traffic signals, etc.

RCAT TMR Pruning of street tree roots as needed to reduce encroachment of trees into streets and sidewalks.

Objectives

Reduce stormwater contamination from soil erosion and tree debris.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Flagging:** Mark all clearing limits, sensitive areas, and their buffers prior to beginning land disturbing activities including clearing and grading (see Figure 1).



Figure 1. Flagged sensitive area.

3. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 2) on any structures located downslope or adjacent to the work area.

- Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 3).
 - Place the appropriate size filter sock in the catch basin or storm drain inlet.
 - Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
 - Trim and remove filter sock material that extends beyond the grate.



Figure 2. Storm drain cover.



Figure 3. Catch basin filter sock.

BMP Maintenance During Site Work

1. **Flagging:** Inspect flagged areas regularly to make sure flagging has not been removed. Repair or replace flagging immediately if it has been damaged or visibility reduced.
2. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
3. **Landscaping:** Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable.

Site Cleanup

1. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.
2. **Catch Basin Filter Socks:**
 - Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
 - Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.

- Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).

3. Waste Disposal:

- Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies, or greenbelt areas (see Figure 4).
- *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 4. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.30 - Preserving Natural Vegetation E1.35 - Buffer Zones E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	C101 - Preserving Natural Vegetation C102 - Buffer Zones C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	611	Street Tree Watering

Description of Work

Routine watering of street trees during summer (June through September).

Objective

Reduce stormwater contamination from soil erosion and tree debris.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Water Bag:** Install water bag (Figure 1) by zipping the bag around the tree and filling it with water.



Figure 1. Water bag used for tree irrigation.

BMP Maintenance During Site Work

Install inlet protection (e.g., catch basin filter socks) or erosion control BMPs (e.g., filter fences or straw wattles) if there is a potential for soil erosion.

Site Cleanup

Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies, or greenbelt areas taking care to avoid contamination or site disturbance.

References

Source Control Technical Requirements Manual (Seattle 2009)
BMP 20 - Landscaping and Lawn and Vegetation Management

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	612	Volunteer Tree Planting

Description of Work

Provide support to volunteers planting City-owned street trees including mulching and staking.

Objective

Properly manage topsoil and mulch to minimize stormwater pollution.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 1) on any structures located downslope or adjacent to the work area.
 - Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 2).
 - Place the appropriate size filter sock in the catch basin or storm drain inlet.
 - Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
 - Trim and remove filter sock material that extends beyond the grate.



Figure 1. Storm drain cover.



Figure 2. Catch basin filter sock.

BMP Maintenance During Site Work

1. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
2. **Topsoiling:**
 - Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium.
 - Allow sufficient time in scheduling for topsoil to be spread prior to seeding, sodding, or planting.
 - Care must be taken not to apply to subsoil if the two soils have contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil types.
3. **Mulching:**
 - Use appropriate mulch materials and application rates (see Figure 3).
 - Remulch and/or protect any areas that experience erosion with a net or blanket. Fix and remulch the eroded area if the erosion problem is drainage related.
 - Increase mulch thicknesses for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.
 - Check mulched areas periodically, especially following severe storms. Repair damaged areas of mulch or tie-down material.

Site Cleanup

1. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.
2. **Catch Basin Filter Socks:**
 - Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
 - Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.
 - Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).
3. **Vegetation Management:**
 - Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies, or greenbelt areas (see Figure 4).

- *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 3. Applying mulch.



Figure 4. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.15 - Mulching and Matting E1.50 - Topsoiling E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	C121 - Mulching C125 - Topsoiling C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	650	Other Landscape Maintenance

Description of Work

All landscape related maintenance, repair, or construction performed that is not covered by another RCAT such as noxious weed control, grass seeding, mulching, soil replacement, site rehabilitation, and site repair.

Objective

Use proper pesticide and herbicide application techniques to minimize nutrient pollution of stormwater. Implement proper landscaping and mulching techniques to prevent plant material and excess mulch from entering drainage systems.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Flagging:** Mark all clearing limits, sensitive areas, and their buffers prior to beginning land disturbing activities including clearing and grading (see Figure 1).



Figure 1. Flagged sensitive area.

3. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 2) on any structures located downslope or adjacent to the work area.
 - Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 3).

- Place the appropriate size filter sock in the catch basin or storm drain inlet.
- Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
- Trim and remove filter sock material that extends beyond the grate.



Figure 2. Storm drain cover.



Figure 3. Catch basin filter sock.

4. **Pesticides/Noxious Weed Removal:**

- Review the City's integrated pest management plan.
- Choose the least toxic pesticide that is capable of reducing the infestation to acceptable levels.
- *Optional BMPs:*
 - Consider alternatives to the use of pesticides, such as covering or harvesting weeds, substituting other species, and manual weed control and moss removal.
 - Consider the use of soil amendments, such as compost, that are known to control common diseases in plants.

5. **Grass Seeding:** Install temporary surface runoff control measures (e.g., gradient terraces, berms, dikes, level spreaders, waterways, or sediment basins) prior to seeding or planting to protect the surface from erosion until the vegetation is established.

6. **Vegetation Management/Fertilizers:**

- Fertilizers should only be applied by properly trained personnel.
- *Optional BMPs:*
 - Select the appropriate turfgrass mixture for the applicable climate and soil type.
 - Use slow-release fertilizer for turf grass.
 - Use alternatives to chemical fertilizers (e.g., products with seaweed extracts that are beneficial to soil microbes and organisms).

7. **Topsoiling:**

- Maximize the depth of the topsoil wherever possible to provide the maximum possible infiltration capacity and beneficial growth medium.
- Return native topsoil to the site and/or incorporate organic amendments.
- Allow sufficient time in scheduling for topsoil to be spread prior to seeding, sodding, or planting.
- Do not apply to subsoil if the two soils have contrasting textures. Sandy topsoil over clayey subsoil is a particularly poor combination, as water creeps along the junction between the soil types.
- Do not place topsoil while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed sodding or seeding.

BMP Maintenance During Site Work

1. **Flagging:** Inspect flagged areas regularly to make sure flagging has not been removed. Repair or replace flagging immediately if it has been damaged or visibility reduced.
2. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
3. **Pesticides/Noxious Weed Removal:**
 - Conduct spray applications according to specific label directions and the applicable local and state regulations.
 - Do not apply pesticides if it is raining or immediately before expected rain.
 - Ensure that the pesticide application equipment is capable of immediate shutoff in the event of an emergency.
 - Do not apply pesticides within 100 feet of open waters including wetlands, ponds, streams, sloughs, or any drainage ditch or channel that leads to open water, taking care to avoid contamination or site disturbance except as approved by the Washington State Department of Ecology or Seattle Public Utilities (see Figure 4).
 - Never apply pesticides in quantities that exceed the manufacturer's instructions.
 - Mix pesticides and clean the application equipment under cover in an area where accidental spills will not enter surface water or groundwater and will not contaminate soil.
 - Do not hose down the paved areas to a storm drain or conveyance ditch.

- Recycle rinsate from equipment cleaning and/or triple-rinsing of pesticide containers into product.



Figure 4. Example of marked pesticide barrier.

4. Grass Seeding:

- Apply an appropriate mixture to the prepared seedbed at a rate of 120 pounds/acre.
- Cover the seed with topsoil or mulch no deeper than 1/2 inch.
- Work topsoil into the upper soil layer rather than spreading a layer of topsoil directly on top of the native soil.
- Seed during the optimum windows for western Washington (April 1 through June 30 and September 1 through October 1) if possible.
- Irrigate until 75 percent grass cover is established if seeding occurs between July 1 and August 30.
- Mulch or cover seeding with plastic until 75 percent grass cover is established if seeding occurs between October 1 and March 30.
- Confirm that all required surface water control measures have been installed to prevent seed from being washed away.

5. Vegetation Management/Fertilizers:

- *Optional BMPs:*
 - Till fertilizers into the soil where practical rather than dumping or broadcasting them on the surface. Determine the proper fertilizer application for the types of soil and vegetation encountered.

- Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and greater drought-tolerance.
- Use a topsoil layer that is at least 8 inches thick and consists of at least 8 percent organic matter to provide a sufficient growing medium for the vegetation.
- Time the fertilizer application to periods of maximum plant uptake. Fertilizers should be applied in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface water and groundwater.
- Do not fertilize during a drought or when the soil is dry.

6. **Stockpiling of Topsoil:**

- Inspect stockpiles regularly, especially after large storm events. Stabilize any areas that have eroded.
- Do not leave soils exposed and unworked for more than 2 days during the wet season (October 1 to April 30) and for more than 7 days during the dry season (May 1 to September 30).

7. **Mulching:**

- Use mulch or other erosion control measures when soils are exposed for more than 1 week during the dry season (May 1 to September 30) or 2 days during the rainy season (October 1 to April 30).
- Use appropriate mulch materials and application rates (see Figure 5).
- *Optional BMPs:*
 - Remulch and/or protect any areas that experience erosion with a net or blanket. Fix and remulch the eroded area if the erosion problem is drainage related.
 - Increase mulch thicknesses for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.
 - Check mulched areas periodically, especially following severe storms. Repair damaged areas of mulch or tie-down material.

Site Cleanup

1. **Pesticides/Noxious Weed Removal:** Ensure that pesticide-contaminated waste materials are kept in designated containers and disposed of properly.
2. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.
3. **Catch Basin Filter Socks:**
 - Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.

- Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.
- Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).

4. **Vegetation Management:**

- Do not dispose of collected vegetation in stormwater drainage systems, waterways, water bodies, or greenbelt areas taking care to avoid contamination or site disturbance (see Figure 6).
- *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 5. Applying mulch.



Figure 6. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Source Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.30 - Preserving Natural Vegetation E1.35 - Buffer Zones E1.40 - Permanent Seeding and Planting E1.50 - Topsoiling E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	BMP 20 - Landscaping and Lawn and Vegetation Management	C101 - Preserving Natural Vegetation C102 - Buffer Zones C120 - Temporary and Permanent Seeding C121 - Mulching C125 - Topsoiling C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	813	Building and Grounds Maintenance

Description of Work

Mowing, pruning, litter pick up, and miscellaneous maintenance of headquarters, yards, and transfer sites, including offices, shops, and storage yards; sweeping; housekeeping of tools and equipment; recycling; trash disposal; weeding; and spraying herbicide.

Objectives

Implement proper landscaping, tool maintenance, and general housekeeping techniques to minimize stormwater pollution.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.
2. **Flagging:**
 - Mark all clearing limits, sensitive areas, and their buffers prior to beginning land disturbing activities including clearing and grading (see Figure 1).
 - Flag and provide a rigid (e.g., chain link or similar) fence to protect areas around trees and vegetated areas to be retained (see Figure 2).



Figure 1. Flagged sensitive area.



Figure 2. Protected tree.

3. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:

- Install drain covers (see Figure 3) on any structures located downslope or adjacent to the work area.
- Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 4).
 - Place the appropriate size filter sock in the catch basin or storm drain inlet.
 - Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
 - Trim and remove filter sock material that extends beyond the grate.



Figure 3. Storm drain cover.



Figure 4. Catch basin filter sock.

4. Pesticides/Noxious Weed Removal:

- Review the City's integrated pest management plan.
- Choose the least toxic pesticide that is capable of reducing the infestation to acceptable levels.
- *Optional BMPs:*
 - Consider alternatives to the use of pesticides, such as covering or harvesting weeds, substituting other species, and manual weed control and moss removal.
 - Consider the use of soil amendments, such as compost, that are known to control some common diseases in plants.
 - Use manual and/or mechanical methods of vegetation removal rather than applying herbicides, where feasible.

5. Vegetation Management/Fertilizers:

- Fertilizers should only be applied by properly-trained personnel.
- *Optional BMPs:*
 - Select the appropriate turfgrass mixture for the applicable climate and soil type.
 - Use slow-release fertilizer for turf grass.

6. **Sweeping:**

- Do not sweep or vacuum when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose). Washing is not an alternative to sweeping and vacuuming because of the risk of pollutant transport.
- Schedule snow sand removal as part of the snow and ice emergency response.

7. **Cleaning and repair of tools and equipment:**

- Perform vehicle and equipment maintenance, repair, and service at designated repair facilities whenever possible.
- Routinely inspect equipment, tools, and vehicles for leaks or damage.
- Promptly repair or replace leaking connections, pipes, hoses, and valves.

BMP Maintenance During Site Work

1. **Flagging:** Inspect flagged areas regularly to make sure flagging has not been removed. Repair or replace flagging immediately if it has been damaged or visibility reduced.
2. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
3. **Landscaping:**
 - Use mulch or other erosion control measures when soils are exposed for more than 1 week during the dry season (May 1 to September 30) or 2 days during the rainy season (October 1 to April 30).
 - Retain the duff layer, native top soil, and natural vegetation in an undisturbed state to the maximum degree practicable.
 - *Optional BMPs:*
 - Mulch (see Figure 5) and mow whenever practical.
 - Till a topsoil mix or composted organic material into the soil to create a well-mixed transition layer that encourages deeper root systems and greater drought-tolerance.
 - Select mulch used within the ordinary high-water mark (OHWM) of surface waters to minimize potential flotation of organic matter. Use composted organic materials with higher specific gravities (densities) than straw, wood, or chipped material.
 - Remulch and/or protect any areas that experience erosion with a net or blanket. Fix and remulch the eroded area if the erosion problem is drainage related.



Figure 5. Applying mulch.

4. Pesticides/Noxious Weed Removal:

- Conduct spray applications according to specific label directions and the applicable local and state regulations.
- Do not apply pesticides if it is raining or immediately before expected rain.
- Ensure that the pesticide application equipment is capable of immediate shutoff in the event of an emergency.
- Do not apply pesticides within 100 feet of open waters including wetlands, ponds, streams, sloughs, or any drainage ditch or channel that leads to open water, taking care to avoid contamination or site disturbance except as approved by the Washington State Department of Ecology or Seattle Public Utilities (see Figure 6).
- Never apply pesticides in quantities that exceed the manufacturer's instructions.
- Mix pesticides and clean the application equipment under cover in an area where accidental spills will not enter surface water or groundwater and will not contaminate soil.
- Do not hose down the paved areas to a storm drain or conveyance ditch.
- Recycle rinsate from equipment cleaning and/or triple-rinsing of pesticide containers into product.



Figure 6. Example of marked pesticide barrier.

5. Vegetation Management/Fertilizers:

- Till fertilizers into the soil where practical rather than dumping or broadcasting them on the surface. Determine the proper fertilizer application for the types of soil and vegetation encountered.
- *Optional BMPs:*
 - Use a topsoil layer that is at least 8 inches thick and consists of at least 8 percent organic matter to provide a sufficient growing medium for the vegetation.
 - Time the fertilizer application to periods of maximum plant uptake. Fertilizers should be applied in amounts appropriate for the target vegetation and at the time of year that minimizes losses to surface water and groundwater.
 - Do not fertilize during a drought or when the soil is dry.

6. Sweeping:

- Control the number of points where vehicles can leave the site to allow focused sweeping and vacuuming efforts (Figure 7).
- Control speed of sweeper to minimize airborne particulates and remove maximum amount of debris.
- Use water spray system on sweeper to reduce dust.
- Use pickup brooms in sensitive areas.
- Do not sweep up any unknown substance or any object that may be potentially hazardous.

- Inspect potential sediment tracking locations daily after initiating sweeping to ensure that sweeping is being implemented effectively.
- Sweep or vacuum visible sediment tracking on a daily basis.
- Perform equipment and vehicle maintenance in areas that prevent discharges to the storm drain system.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- Do not use kick brooms or sweeper attachments.
- Prevent sediment from entering storm drain system.
- *Optional BMP:* Where feasible, avoid the activity when rain is falling or expected.



Figure 7. Mechanical street sweeping.

7. Mowing:

- Do not mow below the ordinary high water mark (OHWM) of streams or waterways.
- Mow grass to a finished height of 2 to 6 inches to minimize scalping of the soil surface. The finished cut height for other ground cover species is generally 12 inches or greater.

8. Cleaning and repair of tools and equipment:

- Discharge all washwater to a sanitary sewer, process treatment system, or holding tank and not to the stormwater drainage system. If a holding tank is used for the storage of washwater, the contents must be pumped out before the tank is full and then discharged into the sanitary sewer or wastewater treatment system.
- Conduct pressure washing in a designated area (such as a wash pad) that is provided with a sump drain connected to a sanitary sewer or treatment system,

or a blind sump or holding tank. Prevent stormwater run-on using a berm or sump.

- Prohibit discharge of any wastewaters to stormwater drains.
- Do not pour material down drains or hose down work areas.
- Use either dry sweeping or damp mopping.
- Remove buildup of oils and grease on equipment.
- Perform equipment maintenance in areas that prevent discharges to the storm drain system.
- Use drip pans (see Figure 8) under equipment when maintaining, repairing, or servicing in the field.
- Clean maintenance area storm drain grates regularly.
- Clean surfaces following any discharge or spill incident.
- *Optional BMPs:*
 - Use non-toxic solvents whenever possible.
 - Minimize water and detergent use in all washing operations.
 - Use phosphate-free detergents when practical.
 - Consider recycling washwater by installing a closed-loop water recycling system.



Figure 8. Example of drip pan used for equipment maintenance.

9. Waste Disposal:

- Remove and dispose of accumulated solid waste at authorized disposal areas.
- Label waste containers and place them in a covered area. Keep lids closed at all times.

Site Cleanup

1. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.

2. Catch Basin Filter Socks:

- Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
- Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.
- Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).

3. Landscaping:

- Do not dispose of collected vegetation in separate storm drainage systems, waterways, water bodies, or greenbelt areas taking care to avoid contamination or site disturbance (see Figure 9).
- *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 9. Hand sweeping of vegetation waste.

- ## 4. Pesticides/Noxious Weed Removal:
- Ensure that pesticide-contaminated waste materials are kept in designated containers and disposed of properly.

5. Sweeping:

- Clean equipment and tools offsite in an area where pollutants can be contained.
- Properly dispose of sweeper wastes at an approved dump site after sweeping is finished.

6. Cleaning and repair of tools and equipment:

- Collect and properly manage (recycle or dispose of) used materials such as grease, oil, oil filters, antifreeze, cleaning solutions, lead-acid batteries, hydraulic and transmission fluids, and tires.
- Dispose of these wastes at recycling facilities; municipal solid waste disposal facilities; hazardous waste treatment, storage, and disposal (TSD) facilities; or the sanitary sewer as required.
- Obtain prior approval from the local sanitary sewer district to discharge liquid wastes and contaminated stormwater (depending on the pollutants and associated concentrations) to the sanitary sewer system.
- Salvage and recycle any useful materials:
 - Use masonry waste to fill borrow pits.
 - Convert trees and brush from land-clearing operations into woodchips through mechanical chippers and then use them as mulch in graded areas.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Source Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
1.110 - Vegetation (Mowing) 1.111 - Vegetation (Equipment/Tools Cleanup and Maintenance) 2.79 - Inlet Protection	E1.15 - Mulching and Matting E1.30 - Preserving Natural Vegetation E1.35 - Buffer Zones E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	BMP 3 - Dispose of Fluids and Wastes Properly BMP 7 - Cleaning or Washing of Tools, Engines, and Manufacturing Equipment BMP 20 - Landscaping and Lawn and Vegetation Management	C101 - Preserving Natural Vegetation C102 - Buffer Zones C121 - Mulching C220 - Inlet Protection

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	815	Clean and Repair Equipment and Tools

Description of Work

Cleaning and minor maintenance of equipment performed by field personnel including moving maintenance equipment and the repair of small tools.

Objectives

Use proper techniques for equipment maintenance, service, and repair operations to reduce the potential for discharge of pollutants to watercourses or streams.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.

2. **Equipment and Tool Repairs:**
 - Perform vehicle and equipment maintenance, repair, and service at designated repair facilities whenever possible.
 - Routinely inspect equipment, tools, and vehicles for leaks or damage.
 - Promptly repair or replace leaking connections, pipes, hoses, and valves.

BMP Maintenance During Site Work

1. **Washwater:**
 - Discharge all washwater to a sanitary sewer, process treatment system, or holding tank and not to the stormwater drainage system. If a holding tank is used for the storage of washwater, the contents must be pumped out before the tank is full and then discharged into the sanitary sewer or wastewater treatment system.
 - Conduct pressure washing in a designated area (such as a wash pad) that is provided with a sump drain connected to a sanitary sewer or treatment system, or a blind sump or holding tank. Prevent stormwater run-on using a berm or sump.
 - Prohibit discharge of any wastewaters to stormwater drains.

2. Equipment and Tool Repairs:

- Do not pour material down drains or hose down work areas.
- Use either dry sweeping or damp mopping.
- Remove buildup of oils and grease on equipment.
- Perform equipment maintenance in areas that prevent discharges to the storm drain system.
- Use drip pans (see Figure 1) under equipment when maintaining, repairing, or servicing in the field.
- Clean surfaces following any discharge or spill incident.

3. Optional BMPs:

- Use non-toxic solvents whenever possible.
- Minimize water and detergent use in all washing operations.
- Use phosphate-free detergents when practical.
- Consider recycling the washwater by installing a closed-loop water recycling system.



Figure 1. Example of drip pan used for equipment maintenance.

Site Cleanup

1. Waste Disposal:

- Collect and properly manage (recycle or dispose of) used materials such as grease, oil, oil filters, antifreeze, cleaning solutions, lead-acid batteries, hydraulic and transmission fluids, and tires.
- Dispose of these wastes at recycling facilities; municipal solid waste disposal facilities; hazardous waste treatment, storage, and disposal facilities; or the sanitary sewer as required.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Source Control Technical Requirements Manual (Seattle 2009)
1.111 - Vegetation (Equipment/Tools Cleanup and Maintenance)	BMP 3 - Dispose of Fluids and Wastes Properly BMP 7 - Cleaning or Washing of Tools, Engines, and Manufacturing Equipment

SDOT Manual Name	RCAT	RCAT Description
Urban Forestry Operations 1. Tree Crew Operations	TMT	Tree Pit Work

Description of Work

Leveling tree grates by topping off low tree pits with various mulches, typically wood chips or 1/4-inch crushed gravel with an added soil stabilizer including paver maintenance.

Objectives

Implement proper landscaping techniques to prevent soil and plant material from entering drainage systems.

Site Preparation

1. **Spill Kit:** Keep a spill cleanup kit in a nearby vehicle or next to the work site so that it is easily accessible. Make sure the contents of the spill kit are appropriate for the types and quantities of materials used for this work task. Refill spill kit materials before beginning work.

2. **Storm Drain Covers and Catch Basin Filter Socks:** Use the following best management practices (BMPs) if there is a potential for vegetation or sediment to enter any catch basin or storm drain inlets:
 - Install drain covers (see Figure 1) on any structures located downslope or adjacent to the work area.
 - Install catch basin filter socks in any structures that are **greater than 12 inches deep** (see Figure 2).
 - Place the appropriate size filter sock in the catch basin or storm drain inlet.
 - Place the storm drain or catch basin grate on top of the filter sock to hold it in place.
 - Trim and remove filter sock material that extends beyond the grate.



Figure 1. Storm drain cover.



Figure 2. Catch basin filter sock.

BMP Maintenance During Site Work

1. **Catch Basin Filter Socks:** Clean or remove and replace filter sock when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).
2. **Mulching:**
 - Use appropriate mulch materials and application rates (see Figure 3).
 - Increase mulch thicknesses for disturbed areas in or near sensitive areas or other areas highly susceptible to erosion.
 - Check mulched areas periodically, especially following severe storms. Repair damaged areas of mulch or tie-down material.



Figure 3. Applying mulch.

Site Cleanup

1. **Storm Drain Covers:** Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping. Remove drain covers.
2. **Catch Basin Filter Socks:**
 - Remove sediment buildup in front of the catch basin or storm drain inlets by hand sweeping.
 - Remove the filter sock and dispose of the collected sediment in a suitable container to be hauled off site.

- Reuse the filter sock at another site if it remains in good condition (e.g., no rips, tears, or visible staining).

3. Vegetation Management:

- Do not dispose of collected vegetation in separate storm drainage systems, waterways, water bodies, or greenbelt areas taking care to avoid contamination or site disturbance (see Figure 4).
- *Optional BMP:* Dispose of grass clippings, leaves, sticks, and other collected vegetation by composting, if feasible.



Figure 4. Hand sweeping of vegetation waste.

References

Regional Road Maintenance Endangered Species Act Program Guidelines (Regional Road Maintenance Technical Working Group 2002)	Construction Stormwater Control Technical Requirements Manual (Seattle 2009)	Source Control Technical Requirements Manual (Seattle 2009)	Stormwater Management Manual for Western Washington (Ecology 2005)
2.79 - Inlet Protection	E1.15 - Mulching and Matting E3.25 - Storm Drain Inlet Protection C1.45 - Solid Waste Handling and Disposal	BMP 20 - Landscaping and Lawn and Vegetation Management	C121 - Mulching C220 - Inlet Protection

