

# CHAPTER 9 – EROSION AND SEDIMENT CONTROL DESIGN



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## 9.1 PURPOSE

The objective of this chapter is to provide the steps necessary for developing an effective Erosion and Sediment Control (ESC) plan, which is a required component of the Drainage Submittal. The ESC plan shall provide specific construction Best Management Practices (BMPs) for a given project site in an effort to avoid adverse stormwater impacts to water resources, roads and drainage facilities, and properties and their improvements, due to construction activities.

Erosion controls are designed to prevent soils from moving and sediment controls are designed to contain mobilized soils on the site and prevent them from washing downstream or offsite. Examples of potential impacts due to erosion and sedimentation include:

- Sedimentation of culverts, storm drains, open channels, storage ponds, and swales resulting in decreased capacities and the potential for increased flooding and increased maintenance frequency;
- Clogging and failure of Underground Injection Control (UIC) facilities;
- Destruction of vegetation, topsoil and seeds;
- Increased turbidity, reducing water quality in water bodies;
- Impacts to fish spawning or reduced habitat productivity due to interference of photosynthesis of aquatic plants; and,
- Air pollution due to fugitive dust.

Implementation of an effective ESC plan using the BMPs referenced in this chapter may help to reduce these potential impacts as well as other unforeseen environmental impacts and associated costs.

## 9.2 APPLICABILITY

Land-disturbing activities are activities that result in a change in the existing soil cover (both vegetative and non-vegetative) and/or the existing site topography. Land-disturbing activities include, but are not limited to, demolition, construction, clearing and grubbing, grading and logging.

The following land-disturbing activities require an ESC plan:

- Major land-disturbing activities involving one acre or more of disturbed area (including total disturbance for all phases of development). Note that when the project has the potential to discharge to surface water or a conveyance system that leads to surface water, the project also requires a NPDES Stormwater Discharge Permit (1200-C for construction activity) from the Oregon DEQ.
- Minor land-disturbing activities, such as grading or landscaping, involving less than one acre of disturbed when required by the local jurisdiction or DEQ.

An ESC plan, when required, shall be submitted with either the road and drainage plans or permit application, prior to any land-disturbing activity. Clearing and grading activities for developments will be permitted only if conducted pursuant to an approved site development plan that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration shall be given to minimizing removal of existing trees and minimizing disturbance and compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas with a preservation requirement, such as critical or sensitive areas, buffers, native growth protection easement areas, or tree retention areas, shall be delineated on the site plans and ESC plan. ESC plans are only required to address the area of land that is subject to the land-disturbing activity for which a permit is being requested and/or the area of land that will serve as the stockpile or staging area for materials.

In addition to the requirements outlined in this chapter, projects that include one acre or more of soil disturbing activity (for all project phases) and have the potential to discharge to surface water are required to obtain and follow the conditions of DEQ's 1200-C permit for construction activity.

### **9.2.1 EXEMPTIONS**

An ESC plan is typically not required for the following land-disturbing activities:

- Commercial agriculture practices involving working the land for production, except land disturbance related to the construction of new, permanent impervious surfaces;
- Forest practices regulated under the Oregon Forest Practices Act (ORS 527.610-527.770, 527.990(1), and 527.992), except conversions from timberland to other land uses;
- Actions by a public utility or any other governmental agency to remove or alleviate an emergency condition, restore utility service, or reopen a public thoroughfare to traffic;
- Issuance of permits and/or approvals for land divisions, interior improvements to an existing structure, or other approvals for which there is no physical disturbance to the surface of the land; and,
- Minor land-disturbing activities that do not require a permit from the local jurisdiction.

Although an ESC plan may not be required for those situations noted above, that does not relieve the proponent from the responsibility of controlling erosion and sediment during construction nor the liability of damage claims associated with adverse impacts to offsite properties.

## 9.3 DESIGN CRITERIA

Although the construction phase of a project is usually considered a temporary condition, construction work may take place over several seasons. All BMPs used in the course of construction should be of sufficient size, strength, and durability to readily outlast the expected construction schedule and operate properly during the design storm rainfall conditions. Erosion and sediment control performance standards are outlined in Section 9.5.

BMP design guidelines from DEQ's *Erosion and Sediment Control Manual* (April 2005) are provided in Appendix 9B. The 2-year 24-hour NRCS Type I design storm peak flow or volume shall be used in sizing sediment control BMPs (i.e. check dams, temporary sediment basins, etc). Other sources of design guidelines are available including the *ODOT Erosion Control Manual*. Project proponents should select the BMPs and design criteria most applicable to their project site.

## 9.4 EROSION AND SEDIMENT CONTROL (ESC) PLAN

### 9.4.1 INTRODUCTION

The ESC plan shall be prepared by an Engineer with a good working knowledge of both hydrology and ESC practices. The ESC plan must accompany the road and drainage plan submittal or grading plan/permit request and should be integrated into the grading plan whenever possible. It must contain sufficient information to demonstrate to the local jurisdiction that the potential problems associated with erosion, sediment, and pollution have been adequately addressed for the proposed project. The drawings and notes should be clear, concise and describe when and where the various BMPs are to be utilized.

During construction, a copy of the ESC plan must be kept on the construction site where it is readily available to construction and inspection personnel. As site construction progresses, the ESC plan may require modification to reflect the changes in site conditions.

### 9.4.2 MINIMUM REQUIREMENTS FOR ESC PLANS

At a minimum, all ESC plans must be legible, reproducible, and contain the following information:

- Title block, north arrow, scale and plan preparation date;
- Name of property owner, permit applicant, anticipated contact person onsite, and the stamp and signature of the Engineer who prepared the plan;
- Vicinity map, Section-Township-Range, project address, project boundaries and dimensions;

- Description of project, list of onsite soils and existing vegetation, location of any existing water bodies and/or critical areas, location of any areas to be protected from disturbance or compaction;
- Site map;
- Summary description of ESC BMPs utilized (see Section 9.4.3);
- Installation details for all BMPs referenced (see Appendix 9B);
- Recommended inspection frequencies for all BMPs;
- Seed mix for any vegetation proposed as a stabilization measure (see EP-5 in Appendix 9B);
- Applicable ESC Standard Plan Notes (see Appendix 9A); and
- Construction Sequence (see Section 9.4.3).

### 9.4.3 BEST MANAGEMENT PRACTICES FOR ESC PLANS

Best Management Practices (BMPs) must be used to comply with the requirements of this chapter. At a minimum, the following 16 numbered items shall be addressed in the ESC plan<sup>1</sup> (detailed information follows).

- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. Project Management        | 9. Concrete Washout                  |
| 2. Construction Sequence     | 10. Material Storage/Stockpile       |
| 3. Clearing Limits           | 11. Cut and Fill Slopes              |
| 4. Construction Access Route | 12. Channel and Outlet Stabilization |
| 5. Sediment Controls         | 13. Dewatering                       |
| 6. Soil Stabilization        | 14. Control of Other Pollutants      |
| 7. Inlet Protection          | 15. Permanent Facilities             |
| 8. Runoff Control            | 16. Maintenance of BMPs              |

As the season and site conditions dictate, alterations to the BMPs may be warranted and/or additional ESC BMPs may be required. Examples and descriptions of the BMPs referenced in this Manual can be found in DEQ's *Erosion and Sediment Control Manual* (April 2005), sections of which have been included as Appendix 9B. All ESC plans shall be prepared by an Engineer who has a good working knowledge of both hydrology and ESC practices.

It is not the intent of this chapter to limit any innovative or creative effort to effectively control erosion and sedimentation. Experimental ESC management practices are encouraged as a means of solving erosion and sedimentation problems in an effort to improve erosion control technology and meet the purpose and intent of

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<sup>1</sup> Projects that are subject to a 1200-C Construction Stormwater Permit from DEQ (i.e. sites larger than one acre that have the potential to discharge to surface water) should consult DEQ's *Construction Stormwater Permit Guidance – 1200-C NPDES General Permit* (July 2008) for specific requirements and additional standard plan notes:

this chapter. Minor modifications to standard BMPs will be considered an experimental ESC management practice and, as with any proposed BMP, must be reviewed and accepted by the local jurisdiction.

**Items below that are shown in *italics* are considered *General Erosion and Sedimentation Control Notes* and are expected to be shown on the ESC plan, when applicable to the given project site (see Appendix 9A for the complete list).**

### 1. Project Management

- *Hold a pre-construction meeting that includes the inspector to discuss erosion and sediment control measures and construction limits;*
- *The ESC plan must be kept onsite at all times when work is occurring;*
- *The ESC measures shown on this plan are minimum requirements for anticipated site conditions. During the construction period, the measures must be upgraded as needed to comply with all applicable local, state, and federal erosion and sediment control regulations;*
- Erosion and sediment control measures shown on the plan must be installed in such a manner to ensure that sediment or sediment laden water does not leave the construction site or enter surface waters or the conveyance system; and
- Consult DEQ for review of any treatment system or operational plan that may be necessary to treat contaminated construction dewatering water or sediment and turbidity in stormwater runoff.

### 2. Construction Sequence

- *Schedule major land disturbing activities during the dry months and allow time before the wet season begins to adequately stabilize the disturbed ground (see the Soil Stabilization step below).*
- *Phase and/or schedule construction to limit the amount of disturbed, unstabilized soil exposed at any one time.*
- *The following construction sequence shall be followed in order to best minimize the potential for erosion and sedimentation control problems:*
  - a) *Fence or flag areas to be protected or left undisturbed during construction;*
  - b) *Install graveled or paved construction entrances, exits, and parking areas to reduce the tracking of sediment onto public or private roads;*
  - c) *Clear and grub sufficiently for installation of temporary ESC BMPs;*
  - d) *Install temporary ESC BMPs; constructing sediment trapping BMPs as one of the first steps prior to grading;*
  - e) *Clear, grub and rough grade for roads and utility locations;*

- f) *Clear, grub and grade individual lots or groups of lots;*
- g) *Temporarily stabilize, through re-vegetation or other appropriate BMPs, lots or groups of lots in situations where substantial cut or fill slopes are a result of the site grading;*
- h) *Construct roads, buildings, permanent stormwater facilities (i.e. inlets, ponds, UIC facilities, etc.);*
- i) *Protect all permanent stormwater facilities utilizing the appropriate BMPs;*
- j) *Remove temporary ESC controls when permanent stormwater facilities have been installed, all land-disturbing activities have ceased, and vegetation has been established in the areas noted on the accepted ESC plan.*

### 3. Clearing Limits

- Distinctly mark all clearing limits, both on the plans and in the field, taking precaution to visibly mark separately any sensitive or critical areas, and their buffers, and trees that are to be preserved, prior to beginning any land-disturbing activities, including clearing and grubbing;
- *Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum extent and duration practical;*
- Where clearing is required, limit the compaction of disturbed soil by laying mulch, chipped wood, or plywood sheets.
- If clearing and grubbing has occurred, there is a window of 10 calendar days during the dry season (July 1 through September 30) and 5 calendar days during the wet season (October 1 through June 30) in which construction activity must begin, otherwise the cleared area must be stabilized.
- Suggested BMPs:
  - EP-2 Preservation of Existing Vegetation

### 4. Construction Access Route

- Limit access for construction vehicles to one route whenever possible;
- Establish construction equipment paths throughout the site to limit compaction of proposed landscaping and stormwater facility areas. Whenever possible, establish equipment paths on the proposed street and paved parking locations.
- Stabilize the construction access route with a 3-6 inch rock or similar sized crushed aggregate construction entrance to minimize the tracking of sediment onto roadways;

- *Inspect all roadways adjacent to the construction access route at the end of each day. Significant amounts of sediment that leaves the construction site must be cleaned up within 24 hours and stabilized back on the site or properly disposed. The cause of sediment release must be identified and prevented from causing a recurrence of the discharge within the same 24 hours. Vacuuming or dry sweeping must be used to clean-up released sediment and sediment must not be intentionally washed into storm sewers, drainage ways, or water bodies;*
- *Locate wheel wash or tire baths onsite, if applicable, disposing of wastewater into a separate temporary onsite treatment facility, or note that washout will be done offsite;*
- *Cover and secure all dump truck loads leaving the construction site to minimize spillage on roads; and*
- *Restore construction access route equal to or better than the pre-construction condition.*
- Suggested BMPs:
  - SC-10 Entrance/Exit Tracking Control
  - SC-11 Entrance/Exit Tire Wash

#### 5. Sediment Controls

- Pass stormwater runoff from disturbed areas through a sediment pond prior to leaving a construction site or discharging to an infiltration facility;
- Limit compaction of the bottom area of both temporary and permanent stormwater control facilities.
- Keep sediment on the project site, to the maximum extent practical, in order to protect adjacent properties, water bodies, and/or roadways;
- Stabilize earthen structures such as dams, dikes, and diversions with either crushed aggregate, seed or mulch, erosion control blankets, turf reinforcing mats, or a combination thereof;
- Locate sediment facilities such that they will not interfere with natural drainage channels and/or streams; and
- Inspect sediment control BMPs weekly, at a minimum, and daily during a storm event, and after any discharge from the site (stormwater or non-stormwater). The inspection frequency may be reduced to once every two weeks if the site is stabilized and inactive. Keep records of inspections, results, and corrective actions.
- Suggested BMPs:
  - SC-1 Sediment Fence
  - SC-2 Sand Bag Barrier

- SC-3 Gravel Bag Berm
- SC-7 Fiber Rolls or Wattles
- SC-9 Temporary Sediment Basin

#### 6. Soil Stabilization

- Select appropriate BMPs that protect the soil from the erosive forces of raindrop impact, flowing water, and wind erosion, taking into account the expected construction season, site conditions and estimated duration of use;
- *Control fugitive dust from construction activity.* Note that dust control must be continuous, particularly during the dry season (i.e. not limited to the 5/10 calendar day limits listed below);
- *Stabilize exposed unworked soils (including stockpiles), whether at final grade or not, within 10 calendar days during the regional dry season (July 1 through September 30) and within 5 calendar days during the regional wet season (October 1 through June 30).* This time limit may be adjusted by DEQ if your site requires a 1200-C permit or by the local jurisdiction if local precipitation conditions justify a different standard. In addition to the above guidelines, contractors are expected to track weather conditions and forecasts and stabilize sites as needed to prevent erosion and meet the performance standards outlined in Section 9.5.1;
- Stockpile soil stabilization materials at the project site, particularly during the wet season; and
- Stabilization practices include, but are not limited to, temporary and permanent seeding, mulch, sod, matting, plastic covering, early application of gravel base on areas to be paved, and dust control.
- Suggested BMPs:
  - EP-5 Temporary Seeding and Planting
  - EP-8 Mulches
  - EP-10 Erosion Control Blankets and Mats
  - EP-13 Wind Erosion Control

#### 7. Inlet Protection

- *Protect inlets, drywells, catch basins and other stormwater management facilities from sediment, whether or not facilities are operable, so that sediment does not enter the conveyance system (both on and offsite).*
- Inlet protection devices should be installed in such a manner as to allow filtered water to enter the facility and prevent localized flooding. As an alternative, a bypass can be provided to an alternate collection location;

- *Keep roads adjacent to inlets clean; sediment and street wash water shall not be allowed to enter the conveyance system (both on and offsite) without prior treatment; and*
- *Inspect inlets weekly at a minimum and daily during storm events. Clean or remove and replace inlet protection devices before six inches of sediment can accumulate.*
- Suggested BMP:
  - SC-8 Storm Drain Inlet Protection

#### 8. Runoff Control

- Protect downstream properties, waterways, and stormwater facilities from possible impacts due to increased flow rates, volumes, and velocities of stormwater runoff from the project site that may temporarily occur during construction;
- *Install sediment controls along the site perimeter on all down gradient sides of the construction site before commencing earth disturbing activities.*
- *Whenever possible, construct stormwater control facilities (detention/retention storage pond or swales) before grading begins. These facilities should be operational before the construction of impervious site improvements;*
- Protect permanent infiltration ponds that are used for flow control during construction; and
- Suggested BMPs:
  - SC-1 Sediment Fence
  - SC-6 Compost Berms or Socks
  - SC-7 Fiber Rolls or Wattles
  - SC-9 Temporary Sediment Basin
  - RC-11 Check Dams

#### 9. Concrete Washout

- Designate the location of a slurry pit where concrete trucks and equipment can be washed out. Slurry pits are not to be located in, or upstream of, a swale, drainage area, stormwater facility, water body, or in an area where a stormwater facility exists or is proposed.
- Suggested BMPs:
  - SC-11 Entrance/Exit Tire Wash
  - NS-14 Concrete Management

#### 10. Material Storage/Stockpile

- Identify location for storage/stockpile areas, within the proposed ESC plan boundaries, for any soil, earthen and landscape material that is used or will be used onsite;
- *Stockpile materials (such as topsoil) onsite, keeping off of roadway and sidewalks;* and
- Maintain onsite, as is feasible, items such as gravel and a roll of plastic, for emergency soil stabilization during a heavy rain event, or for emergency berm construction.
- Suggested BMPs:
  - NS-9 Stockpile Management

#### 11. Cut and Fill Slopes

- Consider soil type and its erosive properties;
- Reduce slope runoff velocities by reducing the continuous length of slope with terracing and diversion, and roughening the slope surface;
- Place check dams at regular intervals within ditches/trenches that are cut into a slope; and
- Stabilize soils on slopes.
- Suggested BMPs:
  - EP-5 Temporary Seeding and Planting
  - RC-2 Energy Dissipator
  - RC-11 Check Dams

#### 12. Channel and Outlet Stabilization

- Design, construct and stabilize all temporary onsite conveyance channels to prevent erosion from the expected flow velocity of a 2 year, 24 hour frequency storm in the post-developed condition; and,
- Stabilize outlets of all conveyance systems adequately to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches.
- Suggested BMPs:
  - EP-10 Erosion Control Blankets and Mats
  - RC-2 Energy Dissipator
  - RC-11 Check Dams

#### 13. Dewatering

- Discharge into a controlled system, prior to discharge into a sediment trap or sediment pond, any effluent of dewatering operations that has similar

characteristics to stormwater runoff at the site, such as foundation, vault, and trench dewatering;

- Handle highly turbid or otherwise contaminated dewatering effluent, such as from a concrete pour, construction equipment operation, or work inside a coffer dam, separately from stormwater disposed of onsite;
- Consider other disposal options such as infiltration, transport offsite for legal disposal, and/or treat and dispose onsite with chemicals or other technologies;
- If the site requires dewatering, check to determine if there are any toxic pollutants in the soil or groundwater by checking for odors, discoloration, or an oily sheen. Also check site records for soil and groundwater test results for commercial projects. If toxic pollutants are suspected, the water should be tested by a certified lab and the results discussed with municipal and DEQ staff prior to any dewatering activity; and
- Applicable methods for dewatering include filter boxes, portable sediment tanks, and sump pits with perforated stand pipes wrapped in filter packs and surrounded by stone.
- Suggested BMPs:
  - NS-1 Dewatering and Pondered Water Management

#### 14. Control of Other Pollutants

- Control all onsite pollutants, such as waste materials and demolition debris, in a manner that does not cause contamination of stormwater or groundwater; woody debris may be chopped or mulched and spread onsite;
- *Cover, contain and protect all chemicals, liquid products, petroleum products, other hazardous materials, and non-inert wastes present onsite from precipitation and/or vandalism. Maintain a supply of materials on hand to address and contain spills;*
- *Locate designated vehicle and equipment service areas, fuel, and materials away from drainage inlets, watercourses, and canals. Properly contain areas using berms, sandbags, or other barriers. Regularly inspect and maintain equipment, especially for damaged hoses and leaky gaskets;*
- *Conduct maintenance and repair of heavy equipment and vehicles (i.e. oil changes, fuel tank drain down, etc) that may result in discharge or spillage of pollutants using spill prevention measures, such as drip pans. Clean all contaminated surfaces immediately following any discharge or spill incident. Perform repairs onsite using temporary plastic or oil absorbing blankets beneath the vehicle;*
- *Designate an area for cleaning painting equipment and tools. Never clean brushes or rinse containers into the street, gutter, drainage inlet, or waterway;*

- *Apply landscaping or agricultural chemicals, including fertilizers and pesticides, in such a manner, and at application rates, that inhibits the loss of chemicals into stormwater runoff facilities.* Use drop spreaders, rather than broadcast spreaders to help prevent chemicals from being spread onto sidewalks, streets, or storm drainage systems. Guidelines on proper use and application of chemicals, including fertilizers and pesticides, can be found in the *Pacific Northwest Weed Control Handbook*, published by the Extension Services of Oregon State University, Washington State University, and the University of Idaho (revised annually);
- Locate pH-modifying sources, such as bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and cutting, exposed aggregate processes, and concrete pumping and mixer washout waters, away from any stormwater facilities or location of proposed stormwater facilities; and
- See Chapter 10 – Source Control for additional guidance.

#### 15. Permanent Facilities

- Utilize permanent BMPs (i.e. stormwater ponds) in the ESC plan to ensure that successful transition from temporary BMPs to permanent BMPs occurs;
- During final site stabilization, inspect, maintain (i.e. remove sediment) and revegetate all permanent stormwater ponds that were used for sediment control;
- When possible, select vegetation designed to reduce the need for fertilizers or pesticides (i.e. native, pest resistant, xeriscaping); and
- Consider improving the stormwater retention capability of the site soils by amending with organics or mulch prior to vegetation installation.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contaminants from contacting stormwater runoff.

#### 16. Maintenance of BMPs

- *Inspect on a regular basis (at a minimum weekly, and daily during/after a runoff producing storm event) and maintain all erosion and sediment control BMPs to ensure successful performance of the BMPs.*
- Conduct maintenance and repair in accordance with individual ESC BMPs outlined in this section. Recommended maintenance standards include:
  - Sediment must be removed from behind a Sediment Fence when it has reached a height of 1/3 of the fence height and also before fence removal,
  - Sediment must be removed from behind Bio Bags, Straw Wattles, and other barriers when it has reached a height of 2 inches and also before BMP removal, and

- Sediment must be removed from a sediment basin, sediment trap, or catch basins when it has filled half (50%) of the facility storage capacity and also at the completion of the project.;
- *Remove temporary ESC BMPs within 30 days after the temporary BMPs are no longer needed. Permanently stabilize areas that are disturbed during the removal process.* Properly dispose of or store for future use any ESC materials following removal; and
- In addition to the above guidelines, contractors are expected to track weather conditions and forecasts and stabilize sites as needed to prevent erosion and meet the performance standards outlined in Section 9.5.1.

#### **9.4.4 MODIFICATION TO ESC PLANS**

ESC plans may be modified with approval by the reviewing agency. An amended plan shall be submitted and approved by the reviewing agency to illustrate any modifications to the techniques and methods used to prevent and control erosion and sedimentation.

#### **9.4.5 MAINTENANCE RESPONSIBILITY**

The proponent is responsible to ensure BMPs are utilized, maintained, and/or repaired so that the performance standards continue to be met. After all land-disturbing activity is complete and the site has been permanently stabilized, maintenance and the prevention of erosion and sedimentation is the responsibility of the property owner. DEQ's *Erosion and Sediment Control Manual* includes additional guidance on proper inspection of BMPs. A sample inspection form is included in Appendix 9C.

### **9.5 PERFORMANCE STANDARDS**

The performance standards set forth below are intended to provide a minimum threshold for controlling soil erosion and sedimentation caused by land-disturbing activities and will be used to determine if the requirements of this chapter have been met. Individual projects may have additional requirements beyond those listed in this manual. The project proponent is responsible to ensure that all conditions of DEQ's 1200-C permit have been met in addition to meeting these performance criteria.

The specific criteria for each performance standard are outlined below:

1. Minimize Tracking onto Roadways

This performance standard has not been met if soil, dirt, mud or debris is visibly tracked onto the road area and a reasonable attempt to control it through the use of ESC BMPs is not evident.

2. Protection of Roadways, Properties and Stormwater Facilities

This performance standard has not been met if there is visible downstream deposition of soil, dirt, mud or debris, originating from the project site, onto adjacent and/or downstream roads, properties and/or a stormwater system.

3. Proper Washout of Concrete Trucks and Equipment

This performance standard has not been met if there is any concrete washout outside the area designated for concrete washout on the accepted ESC plan or if washout material is not removed (when dry) and properly disposed.

4. Protection of Water Bodies, Streams, Canals and Wetlands

This performance standard has not been met if there is obvious turbidity or deposition of soil, dirt, mud, or debris from the project site into adjacent water bodies and/or into sensitive areas and their buffers. In addition, the performance standard requires that no construction activity, materials or equipment encroaches into sensitive areas.

## APPENDIX 9A – ESC STANDARD PLAN NOTES

The following ESC Standard Plan Notes are the basis of the guidelines in Section 9.4.3. These notes are an overall set; use only what applies to the given project.

- Hold a pre-construction meeting that includes the inspector to discuss erosion and sediment control measures and construction limits.
- The ESC plan must be kept onsite at all times when work is occurring.
- The ESC measures shown on this plan are minimum requirements for anticipated site conditions. During the construction period, the measures must be upgraded as needed to comply with all applicable local, state, and federal erosion and sediment control regulations.
- The following construction sequence shall be followed in order to best minimize the potential for erosion and sedimentation control problems:
  - (a) Fence or flag areas to be protected or left undisturbed during construction;
  - (b) Install graveled or paved construction entrances, exits, and parking areas to reduce the tracking of sediment onto public or private roads;
  - (c) Clear and grub sufficiently for installation of temporary ESC BMPs;
  - (d) Install temporary ESC BMPs, constructing sediment trapping BMPs as one of the first steps prior to grading;
  - (e) Clear, grub and rough grade for roads and utility locations;
  - (f) Clear, grub and grade individual lots or groups of lots;
  - (g) Temporarily stabilize, through re-vegetation or other appropriate BMPs, lots or groups of lots in situations where substantial cut or fill slopes are a result of the site grading;
  - (h) Construct roads, buildings, permanent stormwater facilities (i.e. inlets, ponds, UIC facilities, etc.);
  - (i) Protect all permanent stormwater facilities utilizing the appropriate BMPs;
  - (j) Remove temporary ESC controls when permanent stormwater facilities have been installed, all land-disturbing activities have ceased, and vegetation has been established in the areas noted on the accepted ESC plan.
- Retain the duff layer, native topsoil, and natural vegetation in an undisturbed state to the maximum extent and duration practical.
- Inspect all roadways adjacent to the construction access route at the end of each day. Significant amounts of sediment that leaves the construction site must be cleaned up within 24 hours and stabilized back on the site or properly disposed. The cause of sediment release must be identified and prevented from causing a recurrence of the discharge within the same 24 hours. Vacuuming or dry sweeping must be used to clean-

up released sediment and sediment must not be intentionally washed into storm sewers, drainage ways, or water bodies.

- Cover and secure all dump truck loads leaving the construction site to minimize spillage on roads.
- Restore construction access route equal to or better than the pre-construction condition.
- Control fugitive dust from construction activity.
- Stabilize exposed unworked soils (including stockpiles), whether at final grade or not, within 10 calendar days during the regional dry season (July 1 through September 30) and within 5 calendar days during the regional wet season (October 1 through June 30).
- Protect inlets, drywells, catch basins and other stormwater management facilities from sediment, whether or not facilities are operable.
- Keep roads adjacent to inlets clean.
- Inspect inlets weekly at a minimum and daily during storm events. Clean or remove and replace inlet protection devices before six inches of sediment can accumulate.
- Install sediment controls along the site perimeter on all down gradient sides of the construction site before commencing earth disturbing activities.
- Whenever possible, construct stormwater control facilities (detention/retention storage pond or swales) before grading begins. These facilities should be operational before the construction of impervious site improvements.
- Stockpile materials (such as topsoil) onsite, keeping off of roadway and sidewalks.
- Cover, contain and protect all chemicals, liquid products, petroleum product, and non-inert wastes present onsite from vandalism. Maintain a supply of materials on hand to address and contain spills.
- Locate designated vehicle and equipment service areas, fuel, and materials away from drainage inlets, watercourses, and canals. Properly contain areas using berms, sandbags, or other barriers. Regularly inspect and maintain equipment, especially for damaged hoses and leaky gaskets.
- Conduct maintenance and repair of heavy equipment and vehicles (i.e. oil changes, fuel tank drain down, etc) that may result in discharge or spillage of pollutants using spill prevention measures, such as drip pans. Clean all contaminated surfaces immediately following any discharge or spill incident. Perform repairs onsite using temporary plastic or oil absorbing blankets beneath the vehicle.
- Designate an area for cleaning painting equipment and tools. Never clean brushes or rinse containers into the street, gutter, drainage inlet, or waterway.
- Apply landscaping or agricultural chemicals, including fertilizers and pesticides, in such a manner, and at application rates, that inhibits the loss of chemicals into stormwater runoff facilities.

- Inspect on a regular basis (at a minimum weekly, and daily during/after a runoff producing storm event) and maintain all erosion and sediment control BMPs to ensure successful performance of the BMPs.
- Remove temporary ESC BMPs within 30 days after the temporary BMPs are no longer needed. Permanently stabilize areas that are disturbed during the removal process.

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## APPENDIX 9B – ESC BMP DESIGN GUIDELINES

The following reference document includes pages from DEQ’s Erosion and Sediment Control Manual (April 2005, prepared by GeoSyntec Consultants). This document presents the best management practices (BMPs) for erosion and sediment control including typical applications and design criteria for each BMP. The following ESC BMPs are included in this appendix, as they have been determined to be the most commonly used and/or most widely applicable in Central Oregon:

- EP-2 Preservation of Existing Vegetation
- EP-5 Temporary Seeding and Planting
- EP-8 Mulches
- EP-10 Erosion Control Blankets and Mats
- EP-13 Wind Erosion Control
- SC-1 Sediment Fence
- SC-2 Sand Bag Barrier
- SC-3 Gravel Bag Berm
- SC-6 Compost Berms and Socks
- SC-7 Fiber Rolls or Wattles
- SC-8 Storm Drain Inlet Protection
- SC-9 Temporary Sediment Basin
- SC-10 Entrance/Exit Tracking Controls
- SC-11 Entrance/Exit Tire Wash
- RC-2 Energy Dissipator
- RC-11 Check Dams
- NS-1 Dewatering and Poned Water Management
- NS-9 Stockpile Management
- NS-14 Concrete Management

Additional ESC guidance and additional BMP design guidelines can be found by reviewing the full manual, as well as the *ODOT Erosion Control Manual* (April 2005, prepared by Harza Engineering Company and ODOT Geo/Environmental Section), both of which are available from the respective agency websites.

**INSERT SELECT PAGES FROM  
DEQ'S EROSION AND SEDIMENT CONTROL MANUAL**

## **APPENDIX 9C – SAMPLE ESC INSPECTION FORM**

The following Construction Site BMP Inspection Report Form is from DEQ's 1200-C Construction Stormwater Permit Registration Guidelines. This sample form may be helpful for construction site inspectors in reviewing ESC measures on active construction sites.

**INSERT DEQ FORM:**  
*Construction Site BMP Inspection Report Form*