

PROJECT PLANNING AND DESIGN GUIDE

2.1 INTRODUCTION

Effective erosion and pollution control begins with project planning and design, continues through construction and is ongoing throughout project establishment and maintenance.

This chapter defines erosion and sediment control and good housekeeping principles, discusses erosion and pollution control considerations in project planning and design, and control methods to support the principles; outlines ADOT categories of construction Best Management Practices (BMPs); and provides guidance for selecting construction BMPs.

Use this chapter, together with Chapter 5 Best Management Practices, as a planning and design guide to define control methods and select BMPs that best address project conditions to achieve water quality goals.

2.2 PROJECT PLANNING AND DESIGN

During the design process, the Landscape Architect and Engineer must endeavor to minimize the impacts to water quality that may be caused by the project.

As part of the project design process, the designer will develop *Erosion and Pollution Control Plans and Details* which specify BMP locations and direct the contractor in the proper installation and maintenance of BMPs. The intent of these plans and details is to provide general direction and specific BMP expectations to the contractor. They will not be considered a *Stormwater Pollution Prevention Plan* (SWPPP) and shall not replace the contractor's SWPPP, since the project plans and details are prepared assuming standard construction practices and may not reflect the contractor's actual methods of construction, access requirements or project phasing. The contractor shall use the project Construction Documents including the *Erosion and Pollution Control Plans and Details* as a guide in developing his or her own SWPPP.

SWPPP vs. Erosion and Pollution Control Plans and Details: What's the Difference?

The **SWPPP**, required to obtain coverage under NPDES or AZPDES CGP permits, will include Erosion and Pollution Control Plans and Details and/or BMPs.

Erosion and Pollution Control Plans and Details are not the SWPPP.

Specific erosion and pollution control design considerations are included with each erosion and sediment control principle discussion in section 2.5 Applying the Principles.

Low Impact Development

The Center for Environmental Excellence by AASHTO defines Low Impact Development (LID) as a stormwater management strategy concerned with maintaining or restoring the natural hydrologic functions of a site to achieve natural resource protection objectives and fulfill environmental regulatory requirements. LID incorporates a set of overall site design strategies as well as highly localized, small-scale, decentralized source control techniques known as Integrated Management Practices. Consider LID strategies and practices in preparing your *Erosion and Pollution Control*

2

PROJECT PLANNING AND DESIGN GUIDE

Plans and Details. Examples of LID site design strategies and practices include:

- Phase and limit the amount of actively disturbed area on a construction site to reduce erosion and sediment loss.
- Grade to encourage sheet flow and lengthen flow paths.
- Maintain natural drainage divides to keep flow paths dispersed.
- Preserve naturally vegetated areas and soil types that slow runoff, filter pollutants, and facilitate infiltration.
- Direct runoff into or across vegetated areas to help filter runoff and encourage recharge.
- Provide small-scale distributed features and devices that help meet regulatory and resource objectives.
- Treat pollutant loads where they are generated, or prevent their generation

Bioretention, filter strips, grassed swales, infiltration trenches, inlet pollution traps/removal devices, and permeable pavers and pavement are some of the common LID tools. Greater use of soil amendments increases the capacity of soil to absorb moisture and sustain vegetation, curbside or in swales, which in turns removes water through transpiration. Additional information is available at http://environment.transportation.org/environmental_issues/construct_maint_prac/compendium/manual/3_7.aspx

2.3 BEST MANAGEMENT PRACTICES

In this manual the term BMP refers to operational activities or physical controls that reduce erosion the discharge of pollutants and minimize potential impacts upon receiving waters. There are two major classifications of Erosion and Pollution Control BMPs within ADOT: construction (temporary) and post-construction (permanent).

This manual focuses primarily on construction BMPs. Construction BMPs are temporary measures to control stormwater quality during the construction process. Most construction BMPs will be removed as construction progresses and stabilization is achieved or at the completion of construction, but some could remain in place as permanent control measures. Table 2.1 lists, by category, construction BMPs included in this manual.

Post-construction BMPs are permanent measures to manage stormwater quality both during and after construction of the project. The *ADOT Post-Construction Best Management Practices Manual* serves to guide the roadway designer in the selection and design of structural post-construction BMPs. Chapter 2 of that manual describes how to properly plan for and select post-construction BMPs on ADOT roadway projects. Off-road, Overland Flow Erosion Control; Roadway Drainage Conveyance; and Water Quality and Treatment are the BMP categories featured in the *ADOT Post-Construction BMP Manual*.

The *ADOT Post-Construction Best Management Practices Manual* should be used with this manual to select the most effective erosion and pollution control measures for each ADOT project.

2.4 EROSION AND SEDIMENT CONTROL AND GOOD HOUSEKEEPING PRINCIPLES

Erosion and pollution control principles serve as the foundation for successful erosion and pollution control on all ADOT projects. These principles drive planning, design, construction and

SC	Sediment Control, continued
SC-12	Compost Sock
SC-13	Rock Berm
GH	Good Housekeeping
GH-1	Vehicle and Equipment Cleaning
GH-2	Vehicle and Equipment Fueling
GH-3	Vehicle and Equipment Maintenance
GH-4	Street Sweeping and Vacuuming
GH-5	Material Delivery and Storage
GH-6	Material Use
GH-7	Stockpile Management
GH-8	Spill Prevention and Control
GH-9	Portable Toilet
NS	Non-Stormwater
NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Milling Operations
NS-4	Temporary Watercourse Crossing
NS-5	Water Diversion
NS-6	Structure Demolition/Removal Over or Adjacent to Water
NS-7	Material and Equipment Use In/Over Watercourses
WM	Waste Management
WM-1	Solid Waste Management
WM-2	Hazardous Waste Management
WM-3	Contaminated Soil Management
WM-4	Concrete Waste Management
WM-5	Liquid Waste Management

CP	Construction Site Planning and Management
CP-1	Construction Sequencing
CP-2	BMP Inspection and Maintenance
EC	Erosion Control
EC-1	Preserve Existing Vegetation
EC-2	Minibenches/Slope Roughening
EC-3	Mulch Cover
EC-4	Seeding
EC-5	Geotextiles/Erosion Control Blankets
EC-6	Soil Binders
EC-7	Crown Ditch
RC	Runoff Control
RC-1	Earth Dikes/Drainage Swales and Lined Ditches
RC-2	Cut to Fill Slope Transitions
RC-3	Erosion Protection at Structures
RC-4	Rock Outlet Protection/ Velocity Dissipation Devices
RC-5	Slope Drains
RC-6	Check Dam
SC	Sediment Control
SC-1	Sediment Control Berm
SC-2	Silt Fence
SC-3	Sediment Trap
SC-4	Sediment Basin
SC-5	Sediment Wattle
SC-6	Sediment Log
SC-7	Gravel Bag Protection
SC-8	Storm Drain Inlet Protection
SC-9	Curb Inlet Protection
SC-10	Stabilized Construction Entrance/Exit
SC-11	Stabilized Construction Roadway

Table 2.1: Construction BMPs

2

PROJECT PLANNING AND DESIGN GUIDE

maintenance of erosion and pollution control measures. They serve as the criteria for all to ensure meeting required water quality goals throughout all project stages.

The EPA document, *Developing Your Own Stormwater Pollution Prevention Plan*, identifies the following Erosion and Sediment Control and Pollution Prevention Principles with example BMPs to assist in developing effective erosion and pollution control measures. Good Housekeeping Principles are also defined to assist contractors in developing site controls to prevent contamination of stormwater runoff.

Erosion Control Principles (1st Line of Defense)

1. Minimize disturbed area and protect natural features and soil (BMP- Preserve Existing Vegetation)
2. Phase construction activity (BMP- Construction Sequencing)
3. Control stormwater flowing onto and through the project (BMP- Earth Dikes/Drainage Swales and Lined Ditches)
4. Stabilize soils promptly (BMPs- Hydroseeding, Soil Binders)
5. Protect slopes (BMPs- Geotextiles/Erosion Control Blankets, Crown Ditch, Slope Drains)

Sediment Control Principles (2nd Line of Defense)

1. Protect storm drain inlets (BMP- Storm Drain Inlet Protection)
2. Establish perimeter controls (BMPs- Silt Fence, Sediment Logs)
3. Retain sediment on-site and control dewatering practices (BMP- Sediment Trap, Sediment Basin, Dewatering Operations)
4. Establish stabilized construction exits (BMP- Stabilized Construction Entrance/Exit)
5. Inspect and maintain controls (BMP- Inspection and Maintenance)

Good Housekeeping Principles

1. Provide for waste management (BMPs- Solid Waste Management, Hazardous Waste Management)
2. Establish proper material handling and staging areas (BMPs- Material Delivery and Storage, Material Use)
3. Designate paint and concrete washout areas (BMP- Concrete Waste Management)
4. Establish proper equipment/vehicle fueling and maintenance practices (BMPs- Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance)
5. Control equipment/vehicle washing and allowable non-stormwater discharges (BMP- Vehicle and Equipment Cleaning)
6. Develop a spill prevention and response plan (BMP- Spill Prevention and Control)

2.5 APPLYING THE PRINCIPLES

Multiple highway design and construction project participants are responsible for project erosion and pollution control from planning to maintenance and although each has a defined role and is responsible for a specific work product (e.g. *Erosion and Pollution Control Plans and Details*,

PROJECT PLANNING AND DESIGN GUIDE

SWPPP-with its many facets, maintenance plan) the ultimate goal is to prevent stormwater pollution. Each party will apply the principles and use this Manual as a guide to develop the erosion and pollution control measures for which he or she is primarily responsible.

The following section presents each principle and provides example suggestions for planners, designers and contractors on selecting and/or developing erosion, pollution and good housekeeping control measures that support each principle. These control measures may include planning and design considerations as well as construction and post-construction BMPs. The examples are not all inclusive, but are intended to generate thought and discussion of project planning and design, erosion control plans and details, SWPPP preparation and BMP selection.

Stormwater management requirements during maintenance activities are discussed in *The Maintenance and Facilities Best Management Practices Manual*. That ADOT manual identifies which maintenance activities require the use of stormwater protection BMPs. ADOT Maintenance actions occur only after the contractor has closed out their Notice of Intent (NOI).

Erosion Control Principles

Erosion controls include non-structural and structural practices to keep sediment in place and are the primary means to minimize stormwater pollution. Non-structural practices include strategic planning such as scheduling to limit soil disturbance. Structural practices protect slopes and direct stormwater-flow through the site. Effective erosion control is the foundation for the most successful stormwater pollution prevention plans. Use the following discussion of erosion control principles as a guide in selecting the best erosion control BMPs for the SWPPP.

Erosion Control Principle #1:

Minimize disturbed area and protect natural features and soil.

Limiting disturbed areas to those only required for the construction of the highway project and preservation of natural vegetation beyond the limits of slope rounding and warping are two cost-saving erosion control methods (BMPs).

Planner/Designer:

- Select highway corridor alignment to limit impact on existing vegetation and natural features
- Design to balance cut and fill and to reduce the length and steepness of slopes and the extent of grading
- Preserve vegetation within transition areas of cuts or fills and outside of clear zones (specify in plans and Special Provisions)
- Specify location of temporary roads to avoid stands of significant vegetation and to follow existing contours
- Specify location of temporary roads within limits of area to be disturbed by permanent road construction
- Establish construction limits to maximize preservation of existing vegetation and natural features
- Assess site conditions for preservation and/or salvage of topsoil

2

PROJECT PLANNING AND DESIGN GUIDE

Contractor:

- Develop SWPPP to include BMPs that support this principle
 - Construction Sequencing, Preserve Existing Vegetation, Soil Binders
- Retain existing vegetation as long as possible where activity is scheduled to occur later in the construction process
- Schedule to limit extent of disturbed areas
- Properly delineate and enforce construction limits and access control
- Delineate and enforce areas to be preserved prior to start of soil-disturbing activities
- Locate temporary roads within limits of area to be disturbed by permanent road construction
- Inspect BMPs per applicable CGP requirements and/or construction documents
- Adjust and maintain BMPs

Erosion Control Principle #2:

Phase construction activity.

Use construction scheduling or sequencing to minimize the amount of soil that is exposed at any one time. Well planned and defined construction schedules contribute to successful erosion and sediment control as measures are taken to limit exposed soil and duration without ground cover.

Contractor:

- Submit a construction schedule per Standard Specifications Section 108.03.
- Schedule construction activities to limit area of exposed soil area at any one time; ADOT specification 104.09 limits that exposed area amount to 750,000 square feet (~17.25 acres).
- Include the Construction Sequencing BMP specifying phased final stabilization (stabilize disturbed soils “as you go”) in the SWPPP

Erosion Control Principle #3:

Control stormwater flowing onto and through the project.

Diversion of and slowing of flows from upstream locations onto and through the project site can assist significantly in preventing or reducing erosion.

Design may increase the amount of impermeable surface area resulting in increased runoff quantities from the project site. Design may also increase the velocities of existing offsite runoff flows by concentrating those flows into smaller drainage structures. Consequently, storm events may result in greater peak runoff rates and discharges into existing drainages than those drainages may have historically received.

PROJECT PLANNING AND DESIGN GUIDE

Planner/Designer:

- Calculate pre- and post-construction impervious area percentages to evaluate increased runoff flows.
- Consider the following to assist in addressing increased runoff rates and quantities:
 - Bridges typically affect offsite run-off less significantly than do culverts and may be less visually intrusive
 - Live fascines or pole plantings
 - Protect receiving drainages by means of vegetation, geotextile mats, rock or riprap
 - Energy/velocity dissipation devices at culvert outlets
 - Smooth transitions between culvert inlets/outlets and drainages to reduce turbulence and scour
 - Detention facilities to reduce peak discharges
 - Spread run-off flows across channel outlet structures to mimic natural drainage channels
- Specify run-on/diversion control BMPs to divert run-on from exposed soil areas and run-off control BMPs to control flows through the site in the Erosion and Pollution Control Plans
- Use ditches and dikes to intercept and direct surface run-off into a drain and/or into an existing drainage. Ditch and dike design considerations:
 - Calculate peak flows, velocities and volumes for all drainage structures; provide erosion control measures where erodible velocities occur
 - Use riprap to prevent down-cutting on all ditches and dikes that exceed five percent slope
 - Install rock check dams to reduce run-off velocity and capture sediment
 - Install crown ditches at tops of slopes to divert run-off from the slope face; provide access for maintenance
 - Install slope ditches at bottom and mid-slope locations to intercept sheet flow and convey concentrated flows
 - Utilize embankment curbs on cut and fill slopes to intercept sheet flow from roadway surfaces
- Protect cut-to-fill slope transitions
- Culvert and structural channel outlets are typically areas of high concern for erosion. Considerations include:
 - Review of inlet invert elevation; if lower than the existing natural channel, protect channel backslope to avoid headcutting by run-off
 - Use of flared end sections at inlets and outlets to help prevent scour
 - Install velocity/energy dissipation devices to protect outlets from scour
 - Protect soil/drainage structure interface with rock or other protective measure to prevent erosion

Contractor:

- Develop SWPPP to include combinations of BMPs that support this principle
 - Crown Ditch, Earth Dikes/Drainage Swales and Lined Ditches, Check Dam, Sediment Trap, Slope Drains
- Inspect BMPs per applicable Construction General Permit (CGP) requirements and/or construction documents
- Adjust and maintain BMPs

2

PROJECT PLANNING AND DESIGN GUIDE

Erosion Control Principle #4:

Stabilize soils promptly.

Minimize erosion by stabilizing exposed soils where grading activities have temporarily stopped or are complete. Select construction and/or post-construction BMPs to achieve temporary or permanent stabilization depending on specific project conditions.

Planner/Designer:

- Require soil testing to evaluate soil type and horticultural properties to support vegetation; specify amendments as necessary to improve revegetation success
- Include soil stabilization BMPs in Erosion and Pollution Control Plans

Contractor:

- Develop SWPPP to include slope and channel stabilization BMPs
 - Seeding, Minibenches/Slope Roughening, Mulch Cover, Geotextile/Erosion Control Blankets, Soil Binders
- Protect soil stockpiles from erosion; use Silt Fence, Sediment Log, Soil Binder BMPs
- Achieve phased final stabilization in areas where construction is complete.
- Inspect BMPs per applicable CGP requirements and/or construction documents
- Adjust and maintain BMPs

Erosion Control Principle #5:

Protect slopes.

Use combinations of BMPs for the most effective control of slope erosion. Minimize stormwater flow onto slopes with diversion techniques, supplement protection with sediment wattles installed along contours, preserve vegetation in place, seed disturbed slopes and use erosion control blankets to protect slopes from direct rainfall.

Vegetated and/or hard surfaces may be used to protect slopes. Vegetated surfaces offer several advantages to hard surfaces including lower runoff volumes, slower runoff velocities, increased times of concentration and lower cost. However, where site-specific conditions would prevent adequate establishment and maintenance of a vegetative cover, hard surfacing should be considered.

Hard surfaces consist of placing concrete, rock or rock and mortar. Typically, these permanent measures are considered where vegetation will not provide adequate erosion control and/or where vegetation will be difficult to maintain. The designer should consider the downstream effects of increased runoff volumes and velocities from hard surfaces. Typical applications include bank protection and bridge abutments. Refer to the *ADOT Slope Erosion Control for Urban Freeways in Arid Climates* poster at http://www.azdot.gov/Highways/Roadway_Engineering/Roadside_Development/Resources.asp for information on 1-1/4 inch granite mulch used for slope erosion control.

PROJECT PLANNING AND DESIGN GUIDE

Planner/Designer:

- Evaluate project site topography, soil type and conditions to support vegetation; specify amendments as necessary to improve revegetation success
- Evaluate existing native vegetation
- Design slopes to maximize rainfall infiltration and minimize concentrated runoff flows and velocity
- Consider salvage of existing project site topsoil and vegetation during clearing and grubbing operations. Use salvaged topsoil as part of surface preparation prior to seeding.
- Include diversion and slope stabilization BMPs in *Erosion and Pollution Control Plans and Details*
 - Install crown ditches at tops of slopes to divert run-off from slope face; provide access for maintenance
 - Install slope ditches at bottom and mid-slope locations to intercept sheet flow and convey concentrated flows
 - Protect cut-to-fill slope transitions
 - Install slope (over-side) drains
 - Prepare slopes for revegetation success- use mini-benching and roughening
 - Use vegetation as long-term (permanent) slope protection

Contractor:

- Develop SWPPP to include diversion and slope stabilization BMPs
 - Geotextile/Erosion Control Blankets, Seeding, Minibenches/Slope Roughening, Sediment Wattle
- Inspect BMPs per applicable CGP requirements and/or project Special Provisions
- Adjust and maintain BMPs

Sediment Control Principles

Sediment controls include structural practices to keep sediment in place and are the “2nd Line of Defense” to minimize stormwater pollution. Properly selected, designed and installed sediment controls, implemented in combination with effective erosion controls, provide the most successful results in stormwater erosion and sediment control. There are numerous structural practices that can be used to retain sediment on the construction site. Use the following discussion of sediment control principles as a guide in selecting the appropriate sediment control BMPs for the SWPPP.

Sediment Control Principle #6:

Protect storm drain inlets.

Storm drain inlet protection both within and outside the project area is an ongoing sediment control measure from project start through project completion. Inspection and maintenance of inlet protection BMPs is very important to successful sediment control. Never use storm inlet protection as a primary BMP; use erosion control techniques to prevent erosion, and sediment control BMPs to backup erosion control BMPs. Storm drain inlet protection is one construction BMP that should be removed at project completion, upon approval of the Engineer.

2

PROJECT PLANNING AND DESIGN GUIDE

Planner/Designer:

- Include Storm Drain Inlet protection BMPs in *Erosion and Pollution Control Plans and Details* together with other upstream erosion and sediment control BMPs to minimize sediment transport to inlets
- Design inlet protection to handle the volume of water from the area being drained
- Design inlet protection to handle anticipated trapped sediment

Contractor:

- Develop SWPPP to include BMPs that support this principle
 - Storm Drain Inlet Protection and other upstream erosion and sediment control BMPs to minimize quantity of sediment reaching inlets
- Install storm drain inlet protection as soon as inlets are installed and before soil-disturbing activities begin in areas with existing storm drain systems.
- Install storm drain inlet protection for storm drains outside the construction area that may receive stormwater runoff from the project
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust and maintain BMPs

Sediment Control Principle #7:

Establish perimeter controls.

Install sediment controls on project perimeter downslopes to stop sediment transport from the site.

Planner/Designer:

- Clearly define limits of disturbance on plans
- Specify BMPs in *Erosion and Pollution Control Plans*
 - Check Dams to reduce run-off velocity and capture sediment before reaching project perimeter
 - Sediment Log, Compost Sock, Silt Fence

Contractor:

- Develop SWPPP to include BMPs that support this principle
 - Check Dam, Silt Fence, Sediment Log, Compost Sock
- Enforce construction limits and perimeter controls
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust, maintain BMPs

PROJECT PLANNING AND DESIGN GUIDE

Sediment Control Principle #8:

Retain sediment on-site and control dewatering practices.

Sediment basins or traps detain runoff allowing sediment to settle before the runoff is discharged. Sediment basins should be used for drainage locations where 10 or more acres are disturbed at any one time. Dewatering methods are used to remove ground water or rain water from work areas to prevent the discharge of muddy water into storm drains and waters of the United States.

Planner/Designer:

- Specify BMPs in *Erosion and Pollution Control Plans*
 - Sediment Basins or Sediment Traps as site conditions dictate and to supplement other sediment controls discussed earlier in this section
 - Dewatering Operations

Contractor:

- Develop SWPPP to include BMPs that support this principle
 - Sediment Basin, Sediment Trap, Silt Fence, Sediment Log, Compost Sock, Dewatering Operations, Curb Inlet Protection
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust and maintain BMPs

Sediment Control Principle #9:

Establish stabilized construction exits.

Designate construction entrances and exits and apply/install tracking controls to stabilize these areas. Use wheel (vehicle) washing and street sweeping BMPs to supplement stabilized construction exits.

Planner/Designer:

- Specify BMPs in *Erosion and Pollution Control Plans*
 - Stabilized Construction Entrance/Exit

Contractor:

- Develop SWPPP to include BMPs that support this principle
 - Stabilized Construction Entrance/Exit, Stabilized Construction Roadway
 - Supplemental BMPs: Vehicle and Equipment Cleaning, Street Sweeping and Vacuuming
- Inspect BMPs per applicable CGP requirements and construction documents
- Adjust and maintain BMPs

PROJECT PLANNING AND DESIGN GUIDE

Sediment Control Principle #10:

Inspect and maintain controls.

Establish routine inspection schedules of control measures per the applicable stormwater discharge permit and, at a minimum, maintain BMPs per permit requirements. Routine and spot inspections will identify if BMPs are performing as intended and timely maintenance will correct deficiencies to ensure compliance with water quality goals.

Contractor:

- Per applicable permit requirements-inspect, maintain, adjust and /or replace with alternate BMP(s) that may be more effective based on specific site conditions

Good Housekeeping Principles

The contractor must implement good housekeeping procedures to prevent contamination of stormwater from litter, construction debris, construction materials and chemicals and/or other construction-related waste or operations. BMPs designed to prevent pollution through the use of good housekeeping measures must be included in the SWPPP. Employee training is a key element of construction site pollution prevention. Training programs should discuss proper material and waste storage, handling, inventory and cleanup techniques for construction sites. Use the following as a guide in selecting good housekeeping BMPs for the SWPPP.

Good Housekeeping Principle #1:

Provide for waste management.

Effective construction site waste management procedures and practices can help to prevent or reduce pollution of stormwater. Designated collection areas for trash, recyclables and hazardous waste; and timely and proper litter clean up are critical to successful construction site waste management.

- Develop SWPPP to include BMPs that promote proper waste management
 - Solid Waste Management, Hazardous Waste Management, Contaminated Soil Management, Concrete Waste Management, Liquid Waste Management

Good Housekeeping Principle #2:

Establish proper construction material handling and staging areas.

Well-defined management and handling of materials, especially hazardous or toxic substances must be included in the SWPPP. Store hazardous materials in designated, preferably covered areas incorporating secondary containment techniques to prevent the spread of spills throughout the site.

PROJECT PLANNING AND DESIGN GUIDE

- Include the following BMPs in the SWPPP
 - Material Delivery and Storage, Material Use, Stockpile Management

Good Housekeeping Principle #3:

Designate paint and concrete washout areas.

Washout areas for concrete, paint or stucco must be provided on-site if contractors cannot utilize facilities at their own plants. Washout water can be highly polluted and must be contained and allowed to evaporate before recycling the solid washout waste. Locate washout areas at least 50 yards away from storm drains and watercourses whenever possible.

- Include the following BMPs in the SWPPP
 - Concrete Waste Management
- Comply with the requirements of the Arizona Aquifer Protection Permit.

Good Housekeeping Principle #4:

Establish proper equipment/vehicle fueling and maintenance practices.

Vehicle fueling and maintenance is a potential source of stormwater pollution. Establish on-site fueling and maintenance areas that are clean, dry and have spill kits readily available to address spill control and containment. Perform fueling and maintenance of equipment and vehicles at an off-site facility if possible.

- Include the following BMPs in the SWPPP
 - Vehicle and Equipment Fueling, Vehicle and Equipment Maintenance

Good Housekeeping Principle #5:

Control equipment/vehicle cleaning and allowable non-stormwater discharges.

Use off-site facilities to wash equipment and vehicles. Alternatively, provide designated cleaning areas with proper containment methods to prevent discharge to storm drains or off-site. Non-stormwater discharges include fire hydrant flushing, dust control water and landscape irrigation, all of which can infiltrate into the ground or be routed to sediment ponds, detention basins or other BMP treatment.

- Include the following BMPs in the SWPPP
 - Vehicle and Equipment Cleaning

PROJECT PLANNING AND DESIGN GUIDE

Good Housekeeping Principle #6:

Develop a spill prevention and response plan.

Discharge permits require inclusion of a spill prevention and response plan in the SWPPP good housekeeping procedures. At a minimum the plan will identify ways to reduce, contain and clean up spills, and specify training methods for employees responsible for spill prevention and response.

- Include the following BMPs in the SWPPP
 - Spill Prevention and Control

2.6 CONSTRUCTION BMP SELECTION GUIDE

Proper BMP design, selection and installation are essential to achieve the goals of this manual. As discussed earlier in this chapter, BMP selection begins during the design phase but must be continued by the contractor and ADOT throughout the life of the project. The most effective way to reduce erosion, transportation of soil and sedimentation, and to prevent the contamination of stormwater is to select and install BMPs that best fit the specific site conditions.

The following BMP selection process suggests a step-by-step approach to facilitate selecting the BMPs that will provide the best erosion and pollution control for each project.

1. Identify and evaluate potential erosion and pollutant sources impacting your project.
2. Use the Erosion and Sediment Control Principles and the Good Housekeeping Principles as guides to develop effective erosion and pollution control for the project.
3. Based upon the sources identified in step 1 above, determine which BMPs should be used to reduce erosion and to reduce or eliminate pollutant discharges from the project site. Develop the list of BMPs from the BMP tool box in Chapter 5 of this manual and/or design additional control measures to meet project-specific needs.
 - a. Further evaluate site factors: specific conditions, limitations (physical constraints) to assist in the selection of BMPs.
 - b. Narrow (edit) the initial list using the BMP information sheets in Chapter 5 Best Management Practices. Start with the AT A GLANCE section, then read the Appropriate Applications, Advantages and Limitations sections on each BMP sheet to confirm or eliminate chosen BMPs. Read the other sections for additional knowledge that may influence choices.
 - c. Analyze costs (design, installation and maintenance) to further edit the list.
4. Verify that BMP combinations have been selected for the most effective control.
5. Finalize the BMP list for the work product (*Erosion and Pollution Control Plan and Details*, SWPPP, Maintenance Plan, etc.).
6. Be prepared to select alternate or replacement BMPs based upon dynamic construction site conditions and BMP performance.

Remember:

Use combinations of BMPs to most effectively control stormwater erosion and pollution.