

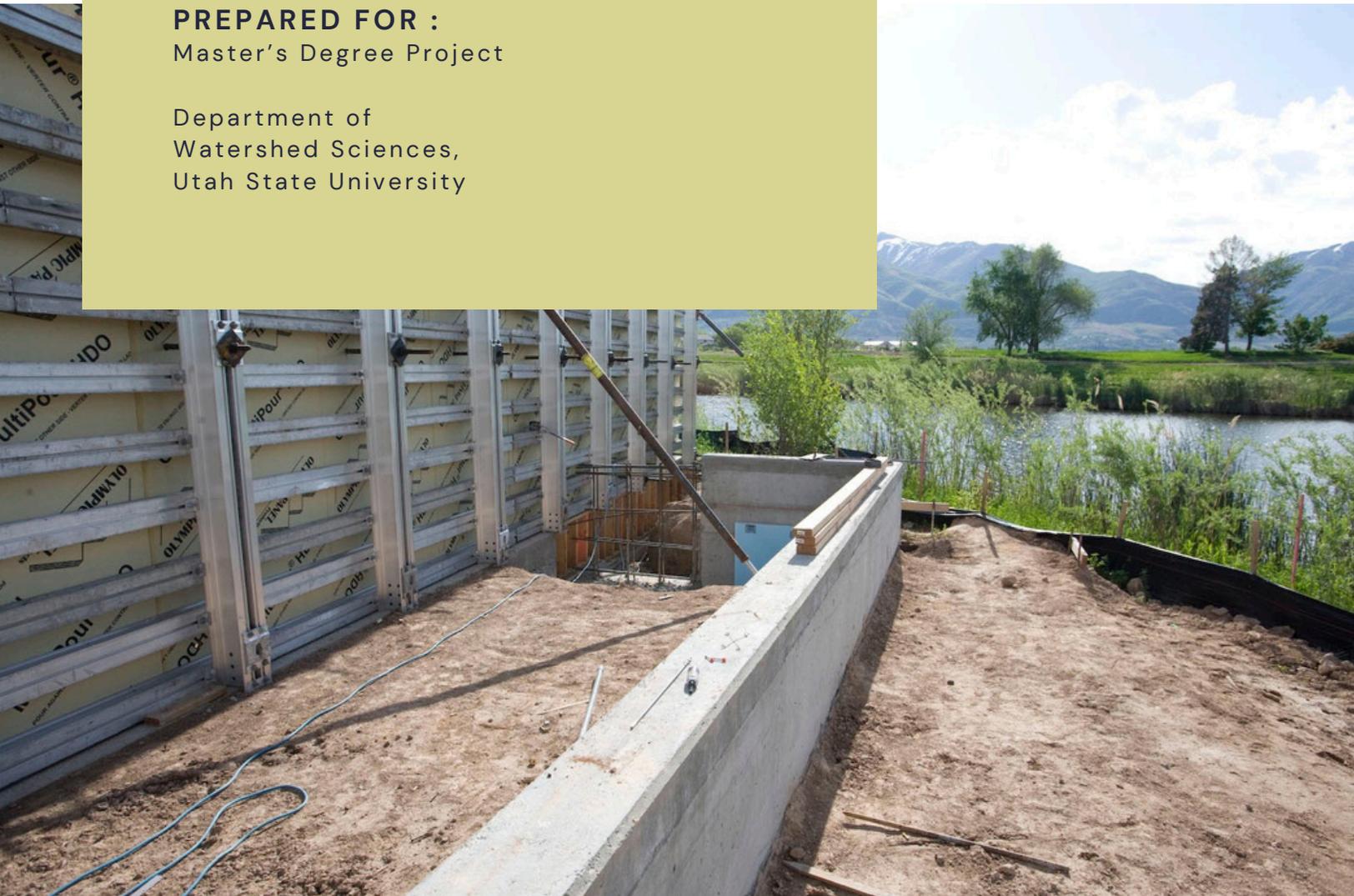
April 2024

APPENDIX 2

Construction Stormwater Best Management Practices

PREPARED FOR :
Master's Degree Project

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Introduction

Construction activities that disturb one or more acres of land must obtain a stormwater permit to be authorized under the Utah Pollutant Discharge Elimination System (UPDES). These permits are required to help prevent construction site stormwater discharges from negatively impacting applicable state water quality standards. When it rains or snows, water flows over disturbed soil surfaces, creating stormwater runoff. This runoff picks up loose sediment, debris, and other pollutants and transports them to nearby municipal storm sewer systems or directly to waterbodies. Excess sediment in waterbodies can have adverse impacts on aquatic life and drinking water supplies; whereas sediment, debris, and pollutants can be harmful to both human and wildlife health as well as difficult to remove from community water supplies.

Proper stormwater controls are critical for stopping these pollutants from entering waterways and the surrounding environment to protect Utah's water. Best management practices (BMPs) are techniques used to minimize the water quality impacts from construction activities. Construction project managers can include BMPs in their project's stormwater prevention plan to help protect water sources, prevent pollution, control erosion, and better meet permit requirements. It is best to identify BMPs before a construction project begins for more effective stormwater management on site. Individual practices or a combination of BMPs can help prevent degradation to waterbodies across the state due to development. Effective stormwater management is critical to avoid the expensive and difficult task of restoring impaired waters.

The following list of BMPs has been compiled from the Utah Division of Water Quality (DWQ) and Environmental Protection Agency (EPA). It is not a comprehensive list. The information for each BMP provides a brief overview, considerations, and additional benefits other than protecting waterways.

General Waste Management

It is imperative to manage and dispose of waste on site to reduce the risk of pollution to stormwater. Construction waste can include building materials, solid wastes, hazardous materials, pesticides, fertilizers, petroleum products, detergents, and any other materials needed for construction. Best management practices differ depending on the type of waste. Some general BMPs to protect stormwater include:

- Assign a waste collection spot on site, preferably where stormwater does not collect or flow frequently.
- Collect and/or cover materials that can be displaced by stormwater or wind.
- Prevent spills and leaks from liquid waste.
- Collect and dispose of waste more frequently. Do not allow it to accumulate.
- Separate recyclable materials and dispose separately.
- Know the proper locations to dispose of each type of waste. Contact appropriate authorities if necessary.
- Store liquid and building materials properly to prevent spills and displacement.

Considerations	Benefits
<ul style="list-style-type: none"> • Train construction staff on proper waste management and disposal methods. • Require all staff to follow established procedures. • Use signage to explain procedures and remind staff to follow them. • Waste management BMPs are most effective when everyone follows them properly. • Inspect storage, collection, and equipment sites frequently. • Immediately repair, replace, or dispose of defective materials, containers, and equipment. 	<p>Proper waste management reduces the potential for waste to wash off site with stormwater, contaminate surface water, or seep into groundwater sources. This protects human health, wildlife and aquatic habitats, and water sources.</p>

Sediment Control BMPs

Construction Track-Out Controls

Construction track-out controls are used to minimize the amount of sediment vehicles take out of a construction site. They should be installed anywhere construction vehicles leave the site. Common track-out controls include:

Vehicle Wash Stations

Regularly rinsing off vehicles before they leave the site can help remove loose sediment and dust. Water from the wash stations should be diverted into a sediment trap to keep it on site.

Photo Source: Meeds Environmental , LLC; Montana Stormwater Manual



Stabilization Measures

Installing a gravel pad over a filter cloth at the construction site exit helps remove sediment from wheels.

Photo Source: PG Environmental for USEPA; EPA Construction Track-Out Controls Fact Sheet



Shaker Racks

These can also be called rumble strips, exit grids, or cattle guards. When vehicles pass over these, the shaking knocks mud and loose sediment off tires.

Photo Source: Tetra Tech; Montana Stormwater Manual



Considerations	Benefits
<ul style="list-style-type: none">• Track-out controls are most effective when all vehicles are required to use them.• These BMPs can be problematic for sites with multiple exits.	<ul style="list-style-type: none">• Less sediment tracked onto local roadways and into neighborhoods shows community members that efforts are being made to prevent sediment pollution.• This can improve not only the appearance of the construction site, but also public perception of the project.

Silt Fencing

Silt fences are used to keep disturbed soil and sediment on the construction site. A silt fence is a temporary barrier held up by posts and made of porous fabric. Stormwater runoff leaving the site flows off site through the porous fabric, while the sediment is trapped on site. Silt fencing is inexpensive and easy to set up and move.



Considerations	Benefits
<ul style="list-style-type: none">• This BMP is commonly used on construction sites; however, they do not work properly because of poor design, installation, and/or maintenance.• Construction sites should be divided into drainage areas of a quarter of an acre or less with sediment storage areas made up of multiple silt fences.• The best set up captures as much sediment as possible before it reaches paved surfaces.• Silt fences should be supplemental to other sediment control BMPs for the most effective means of keeping sediment on site.	<ul style="list-style-type: none">• Preventing sediment from being washed out of construction sites with stormwater protects water resources, aquatic habitats, and storm sewers from being clogged.• It also helps avoid the expensive and difficult task of restoring impaired waters and habitats and cleaning out storm sewers.

See the EPA's [fact sheet](#) for more information on effective silt fence installation.

Storm Drain Inlet Protection

This BMP prevents sediment and debris from entering storm drains throughout the construction process. Inlet protection controls can be internal or external. Internal protection uses a filter to trap sediment within the storm drain. External protection uses a filter barrier made of gravel and/or fabric to create ponding, slow flow velocity, and filter out sediment and debris before water enters the inlet.



Photo Source: PG Environmental for USEPA; EPA Storm Drain Inlet Protection Fact Sheet

Considerations	Benefits
<ul style="list-style-type: none">• The size of the gravel or rocks used is important to help trap sediment and debris. Inlet filters need to be maintained regularly for continued effectiveness.• The filters should be checked after every storm and damaged filters should be immediately replaced.• Inlet protection is a secondary control practice and should be supplemental to other sediment and erosion control BMPs. Stormwater can quickly overload inlet protection controls when used without additional BMPs.	<ul style="list-style-type: none">• Preventing sediment and debris from entering inlets with stormwater protects water resources, aquatic habitats, and storm sewers from being clogged.• Inlet protection is considered the last opportunity to treat stormwater before it discharges into storm sewers and natural habitats.

Vegetated Buffers

Buffer zones provide an area for stormwater to runoff before it reaches any waterbodies, streets, or existing structures next to a construction site. Vegetated buffers use existing or established vegetation as a means of capturing stormwater runoff, allowing it to permeate into the soil and filtering out sediment.



Photo Source: Steven Chase for USEPA; EPA Vegetated Buffers Fact Sheet

Considerations	Benefits
<ul style="list-style-type: none">• Periodically mow and replant buffers as needed to maintain their effectiveness.• Vegetated buffers should be inspected after large storms.• Many conditions impact the effectiveness of vegetated buffers including the vegetation type used, soil conditions, the buffer width and slope, and location.	<ul style="list-style-type: none">• Vegetative buffers slow and filter stormwater runoff before it enters a waterbody or neighboring area. This helps prevent excess sediment from leaving a construction site as well as decreases soil erosion and impedes streambank collapse.• This BMP is most effective on sites near waterbodies, wetlands, and floodplains.

Additional Sediment Control BMPs

There are many BMPs that can be used to prevent sediment from leaving construction sites and impairing water resources. Additional BMPs can be found in the EPA's National Menu of Best Management Practices for Stormwater Construction [fact sheets](#) on all of the following BMPs:

- Brush barriers - Structures made of branches, root mats, and debris from the site used to block coarse sediment and slow flow velocity.
- Filter berms - A temporary ridge made of gravel, stone, or small rocks that filter sediments from stormwater flow. They can be covered with filter fabric for extra filtration.
- Compost filter berms - Made of compost product placed next to disturbed areas to control erosion and retain sediment.
- Compost filter socks - A filter berm typically contained in a mesh tube to help provide three-dimensional filter to retain sediment and other pollutants.
- Fiber rolls - Tube-shaped structures filled with straw, fiber materials, composted materials, or the like used to reduce erosion potential on long or steep slopes.
- Sediment basins and rock dams - A constructed or natural depression (basin) used to capture and pool stormwater allowing it to slowly drain from the site, while also settling sediment to the bottom and reducing the amount leaving the site.
- Straw or hay bales - Placing straw or hay on top of disturbed areas to stabilize soil and loose sediment.
- Treatment for particulate removal - A method where chemicals are added to stormwater to stabilize sediment by aggregating particles into larger masses that can be filtered out or settled back into the site.

Erosion Control BMPs

Dust Control

Dust control BMPs are focused on preventing dust from disturbed soil surfaces from becoming airborne. Dust carried off site by wind threatens public health, air quality, and nearby waterbodies. Common dust controls include:

- Irrigation - Watering disturbed soil surfaces until they are moist can effectively prevent blowing dust.
- Vegetative cover - Using vegetation to hold down soil in areas where construction and vehicle traffic is not occurring.
- Mulch - Laying down mulch over exposed soil is a fast method of controlling dust. This is best for smaller areas for cost efficiency.
- Wind breaks - These are natural or constructed barriers designed to slow down the speed of wind on site. Wind breaks can be trees, shrubs, hay bales, snow fences, or constructed walls.
- Rocks - Gravel can be used at the site entrances and exits to hold down dust. Rocks can also be used as a mulch in areas without vegetation.

Considerations	Benefits
<ul style="list-style-type: none">• The inspection and maintenance requirements for each site may necessitate the use of specific types of dust controls.• Chosen dust controls should be regularly inspected and maintained for continued effectiveness.• Cost and suitability of different dust BMPs will depend on the site and level of dust control needs.	<ul style="list-style-type: none">• Dust controls are especially important in semi-arid regions where soils are drier and easier to blow off site.• Preventing airborne dust helps protect against air quality and respiratory issues for nearby communities and unsafe working conditions for construction staff.

Permanent Seeding

Seeding creates a permanent vegetation cover over disturbed soils. This process is a cost effective and practical method for permanently stabilizing soil.



Photo Source: EPA Erosion Control Permanent Seeding Fact Sheet

Considerations	Benefits
<ul style="list-style-type: none">• Vegetation will take time to establish, requiring temporary erosion and sediment controls to prevent soils from leaving the site.• Seeds may fail to establish due to local climate and growing conditions and will need to be replanted.• Carefully choosing plants that are suitable for the site will help with establishment and overall effectiveness.	<ul style="list-style-type: none">• Seeding creates areas for stormwater to seep into the ground, which slows down stormwater runoff velocity, reduces erosion, and stabilizes soil.• This BMP adapts well to different site conditions through plant selection.

Mulching

This BMP places natural materials such as wood chips, straw, or gravel over exposed soils to stabilize them and prevent soil loss. Mulching is most effective when paired with seeding practices or existing vegetation. Other mulching methods use large mats or nets to cover larger areas or hold down mulch until plants establish.



Photo Source: Stormwater Hawaii; Construction BMP Tip: Mulching

Considerations	Benefits
<ul style="list-style-type: none">• Mulches can be washed away by large stormwater flows.• It is important to use additional erosion and sediment control BMPs in areas where concentrated stormwater flows are possible.• The type of mulch used and site conditions will impact the effectiveness of this BMP.	<ul style="list-style-type: none">• Mulching creates areas for stormwater to seep into the ground, which reduces stormwater runoff velocity and erosion.• Mulch is a common practice for aiding plant growth and seed establishment. Mulch can insulate plant roots protecting them from extreme temperatures, help retain moisture and runoff on site, and hold newly planted seeds down giving them a better chance at establishment.

See the EPA's [fact sheet](#) for more information on mulching materials and application.

Temporary Slope Drains

This BMP creates a temporary conduit to convey stormwater to a chosen location downslope from the construction area. Channels or swales are used to divert stormwater to the mouth of the slope drain. Slope drains should only be used until permanent drainage and erosion controls can be installed.



Photo Source: EPA Temporary Slope Drains Fact Sheet

Considerations	Benefits
<ul style="list-style-type: none">• The end of the slope drain, where water discharges, should be protected.• The drainage area for a temporary slope drain should only be 5 acres or less. Otherwise, drain failures can occur due to overflowing stormwater, leakages, or mudslides.• Slope drains should be inspected after every storm to maintain effectiveness.	<ul style="list-style-type: none">• Temporary slope drains help prevent erosion down disturbed slopes or slopes adjacent to construction sites.• They are particularly effective when used on extremely disturbed slopes to prevent gully erosion from large stormwater flows.• Properly installed slope drains are easy to use and maintain.

Additional Erosion Control BMPs

There are many BMPs that can be used to prevent sediment from leaving construction sites and impairing water resources. Additional BMPs can be found in the EPA's National Menu of Best Management Practices for Stormwater Construction for [fact sheets](#) for the following BMPs:

- Chemical Stabilization - Applying chemicals to the soil surface of disturbed sites to bind sediment together and prevent wind and stormwater erosion.
- Compost Blankets - A layer of composted material applied to disturbed soil to reduce runoff and erosion.
- Geotextiles, Matting, and Netting - Porous fabrics made into sheets and placed over loose sediment to prevent erosion. Serves a similar purpose as mulch but is more stable.
- Land Grading - Reshaping the land surface of the construction site based on a preplanned design created to provide the appropriate topography for facilities, land uses, and the control of stormwater during and after construction.
- Riprap - A layer of large stones used to hold down sediment in areas of high or concentrated runoff flows.
- Sodding - Laying a cover of grass sod on exposed soils to prevent erosion, reduce flow velocity, and increase infiltration. More permanent option when seeding is not available.
- Soil Retention - Using structures (such as retaining walls, concrete or steel structures, grading, or shoring) to control erosion and protect the construction site and workers.
- Soil Roughening - Temporarily controls erosion by creating horizontal grooves using stair-stepping or equipment to roughen the soil surface.
- Temporary Stream Crossings - Providing a way for construction traffic to cross waterways to reduce damage to channels and streambeds, stabilize banks, and minimize the amount of sediment loading into the water.
- Wind Fences and Sand Fences - Permeable fabric or wooden slats used to reduce wind velocity and trap blowing sediments.

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