Proper Selection of BMP Alternatives for Larger Projects

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Proper Selection of BMP Alternatives for Larger Projects

Marleina Lyons-Wolfe

Senior Environmental Scientist

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Learning Objectives

- ❑ Review stormwater basics
- ❑ Common deficiencies on construction projects
- ❑ How to select appropriate BMPs
- ❑ Available alternatives when selecting BMPs
- ❑ Audience polling (*optional*)

Stormwater Basics

What is stormwater? How do I deal with it? Do I have to deal with it? Where does it go anyway? What are BMPs? Don't they cost a lot? **Do I have options?** Are my BMPs good enough? Can't I just set 'em and forget 'em? What if they fail? Will I get fined?.....

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Stormwater Basics - Definitions

- Stormwater
  - Urban runoff and snowmelt runoff consisting only of those discharges, which originate from precipitation events. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

    (CCH Storm Water BMP Manual)

- Best Management Practices (BMPs)
  - Schedule of activities, prohibitions of practices, maintenance procedures, management practices, treatments, and temporary or permanent Structures or devices that are intended and designed to eliminate and Minimize the Discharge of Pollutants, directly or indirectly, to Receiving Waters, to the maximum extent practicable

    (CCH Rules Relating to Water Quality)

Survey Questions

- True/False – Stormwater runoff normally discharges through the storm drain system and empties into receiving waterbodies without any treatment
  - **True**
  - **False**
- What does the acronym BMP stand for?
  - **Best Management Plans**
  - **Best Maintenance Practices**
  - **Best Management Practices**

Common BMP Deficiencies

- ❑ Conducting Inspections
- ❑ Preparing Inspection Reports
- ❑ Utilizing an Asset Management System
- ❑ Data Analysis
- ❑ Identifying Trends

Common BMP Deficiencies

- Concrete Waste
  - 2016 – 10.95%
  - 2017 – 13.8%
  - 2018 – 10.91%
- Drop Inlets
  - 2016 – 15.6%
  - 2017 – 14.25%
  - 2018 – 12.47%
- Street Sweeping/Construction Entrance
  - 2016 – ?
  - 2017 – 13.22%
  - 2018 – 14.53%

Selecting Appropriate BMPS

Have you considered the following?

- ❑ What type of activities will occur?
- ❑ Schedule/Frequency of these activities
- ❑ Proximity to MS4 and receiving waterbody
- ❑ Regulatory requirements
- ❑ Design requirements
- ❑ BMP alternatives
- ❑ Installation & maintenance requirements
- ❑ Costs (initial, labor, disposal)*

What? When? Where? Why?

- **What** to consider when selecting the site-specific BMP?
  - Potential effects
  - Types of activities
  - Design requirements
  - BMP alternatives
- **When** to install, maintain, inspect, and remove BMPs?
- **Where** should the BMP be installed?
- **Why** do we have to implement BMPs?
  - Rules/Regulations

Concrete Washout/Management

Purpose

Prevent or reduce the discharge of pollutants to stormwater from concrete waste

Survey Questions

- True/False – Concrete washout water is slurry containing toxic metals
  - **True**
  - **False**
- What is the approximate pH of concrete washout water?
  - **6.5**
  - **8**
  - **12**
- What is the pH of Drano liquid drain cleaner?
  - **6.5**
  - **9**
  - **13.5**

EPA United States Environmental Protection Agency

Stormwater Best Management Practice

Concrete Washout

NPDES

Minimum Measure

Construction Site Stormwater Runoff Control

Subcategory

Good Housekeeping/Materials Management

Description of Concrete Washout at Construction Sites

Concrete and its ingredients

Concrete is a mixture of cement, water, and aggregate material. Portland cement is made by heating a mixture of limestone and clay containing oxides of calcium, aluminum, silicon and other metals in a kiln and then pulverizing the resulting clinker. The fine aggregate particles are usually sand. Coarse aggregate is generally gravel or crushed stone. When cement is mixed with water, a chemical reaction called hydration occurs, which produces glue that binds the aggregates together to make concrete.

Concrete washout

After concrete is poured at a construction site, the chutes of ready mixed concrete trucks and hoppers of concrete pump trucks must be washed out to remove the remaining concrete before it hardens. Equipment such as wheelbarrows and hand tools also need to be washed down. At the end of each work day, the drums of concrete trucks must be washed out. This is customarily done at the ready mixed batch plants, which are usually off-site facilities, however large or rural construction projects may have on-site batch plants. Cementitious (having the properties of cement) washwater and solids also come from using such construction materials as mortar, plaster, stucco, and grout.

Construction workers should handle wet concrete and washout water with care because it may cause skin irritation and eye damage. If the washwater is dumped on the ground (Fig. 1), it can run off the construction site to adjoining roads and enter roadside storm drains, which discharge to surface waters such as rivers, lakes, or estuaries. The red arrow in Figure 2 points to a ready mixed truck chute that's being washed out into a roll-off bin, which isn't watertight. Leaking washwater, shown in the foreground, will likely follow similar

Figure 1. Chute washwater being dumped on the ground

Figure 2. Chute washwater leaking from a roll-off bin being used as a washout container

paths to nearby surface waters. Rainfall may cause concrete washout containers that are uncovered to overflow and also transport the washwater to surface waters. Rainwater polluted with concrete washwater can percolate down through the soil and alter the soil chemistry, inhibit plant growth, and contaminate the groundwater. Its high pH can increase the toxicity of other substances in the surface waters and soils. Figures 1 and 2 illustrate the need for better washout management practices.

Environmental and Human Health Impacts

Concrete washout water (or washwater) is a slurry containing toxic metals. It's also caustic and corrosive, having a pH near 12. In comparison, Drano liquid drain cleaner has a pH of 13.5. Caustic washwater can harm fish gills and eyes and interfere with reproduction. The safe pH ranges for aquatic life habitats are 6.5 – 9 for freshwater and 6.5 – 8.5 for saltwater.

Best Management Practice Objectives

The best management practice objectives for concrete washout are to (a) collect and retain all the concrete washout water and solids in leak proof containers, so that this caustic material does not reach the soil surface and then migrate to surface waters or into the ground water, and (b) recycle 100 percent of the collected concrete washout water and solids. Another

Office of Water, 4203M
www.epa.gov/npdes/pubs/concretewashout.pdf
www.epa.gov/npdes/stormwater/menuofbmps

EPA 833-F-11-006
February 2012

Questions

- What…
  - Are the potential effects? **SW pollution, alter soil chemistry, inhibit plant growth, contaminate groundwater, harm fish gills and eyes and interfere with reproduction**
  - Types of activities will occur? **Concrete pours, demolition activities, sawcutting, coring, grinding, mixing stations, washing concrete equipment**
  - Are the design requirements? **Check plans and BMP Manual**
  - Are the alternative options for washing out? **Kiddie pools, pits, proprietary devices**
- Where….
  - should the designated area be on site? **Away from traffic or access areas**
  - Is the nearest waterbody or storm drain system? **≥ 50 ft.**
- When….
  - should the washout area be constructed? **Prior to concrete work beginning**
  - Is maintenance required? **75% of capacity**
  - Should the washout be inspected? **Before, during, and after concrete activities**
- Why…..
  - Do I have to manage concrete waste/washout? **CCH Rules, CCH BMP Manual, DOH Permits**

Regulations and Guidance

- **CCH Rules Relating to Water Quality**
  §20-3-46 Good Housekeeping Practices
  (m) Concrete Waste Management

- **CCH Storm Water Best Management Practices Manual (2011)**
  WM-8 Concrete Waste Management

  - Prevent or reduce the discharge of pollutants to storm water from concrete waste
  - Conduct washing off site or performing onsite washout in a designated area constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations
  - Temporary concrete washout facilities should be located a minimum of 50 ft. from storm drain inlets, open drainage facilities, and watercourses.
  - Plastic lining a minimum of 10 milliliter polyethylene free of holes, tears, or other defects that compromise the impermeability of the material
  - Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75 percent full

Regulations

- **HAR, Ch.11-55, App. C**

Section 5.3.3.4 - Washing of applicators and containers used for paint, concrete, or other materials.

- Provide an effective means of eliminating the discharge of water from the washout and cleanout
- Direct all washwater into a leak-proof container or leak-proof pit
- Container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation
- Locate any washout or cleanout activities away from state waters or storm water inlets
- To the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas

Plastic Pool

- Pros
  - Readily available
  - Portable
  - Low cost
  - Used in small areas
  - Low maintenance
- Cons
  - Limited capacity
  - Cracks easily
  - Not re-usable

On-Site Washout

- Pros
  - Constructed on-site
  - Large capacity
  - Above-grade (berm)
  - Below-grade (pit)
  - Low cost
- Cons
  - Space requirement (10'x10')
  - Minimum 50 ft. from inlets & waterbodies
  - Leaks
  - Stationary
  - Maintenance

HDPE Washout Bins

- Pros
  - Durable
  - Portable
  - Re-usable
  - Used in small area
  - Low maintenance
- Cons
  - Limited capacity

Portable Washout Container

- Pros
  - Moderate capacity
  - Stick resistant
  - Re-usable
  - Portable
- Cons
  - Leaks

Portable Washout Bins

- Pros
  - Portable
  - Re-usable
  - Small and medium concrete pours
- Cons
  - Limited capacity

Drop Inlet Protection

Purpose

Measure used to prevent sediment from entering an inlet by filtering or temporarily ponding runoff before it enters the storm drain, allowing sediment to settle.

Survey Questions

- True/False – Inlet protection measures temporarily pond runoff before it enters the storm drain
  - **True**
  - **False**
- What is the maintenance required for inlet protection?
  - **Sediment accumulates to one-third (1/3) the barrier height**
  - **Filter becomes clogged**
  - **Performance is compromised**
  - **All of above**

Questions

- What…
  - Can go into storm drain inlets? **Stormwater**
  - Types of activities will occur? **Land disturbing activities**
  - Are the design requirements? **Check plans and BMP Manual**
  - Are there options for inlet protection? **Filter fabric, filter roll, geotextile inserts, bags, doughnuts, covers**
- Where….
  - should inlet protection be installed? **Inlets that have the potential to receive sediment-laden surface runoff**
- When….
  - should inlet protection be installed? **Prior to the start of land disturbing activities**
  - Is maintenance required? **Sediment accumulation reaches one-third (1/3) the barrier height**
  - Should the inlet protection be inspected? **Prior to forecasted rain, daily during extended rain, after rain events, weekly during rainy season, and every two weeks during non-rainy season.**
- Why…..
  - Do I have to implement inlet protection? **CCH Rules, CCH BMP Manual, DOH Permits**

Regulations & Guidance

- **CCH Rules Relating to Water Quality**
  §20-3-39 Storm Drain Inlet Protection
- **CCH Storm Water Best Management Practices Manual (2011)**
  SE-10 Storm Drain Inlet Protection

  - Every storm drain inlet receiving sediment-laden runoff should be protected
  - Sediment levels may not exceed one third of the height of a sediment barrier or inlet protection device
  - Sediment barriers and inlet protection devices must be unclogged and clean when performance is compromised
  - Torn, weathered or sagging sediment barriers or inlet protection devices must be repaired or replaced immediately
  - Drainage area should not exceed 1-acre

Regulations

- **HAR, Ch.11-55, App. C**

Section 5.1.2.9 – Protect storm drain inlets

- Install inlet protection measures that remove sediment from the discharge prior to entry into the storm drain inlet
- Clean, or remove and replace, the protection measures as sediment accumulates, the filter becomes clogged, and/or performance is compromised
- Where there is evidence of sediment accumulation adjacent to the inlet protection measure, the permittee shall remove the deposited sediment by the end of the same work day in which it is found or by the end of the following work day if removal by the same work day is not feasible
- Inlet protection measures can be removed in the event of flood conditions where safety or loss of property is of concern or to prevent erosion

Inlet Inserts

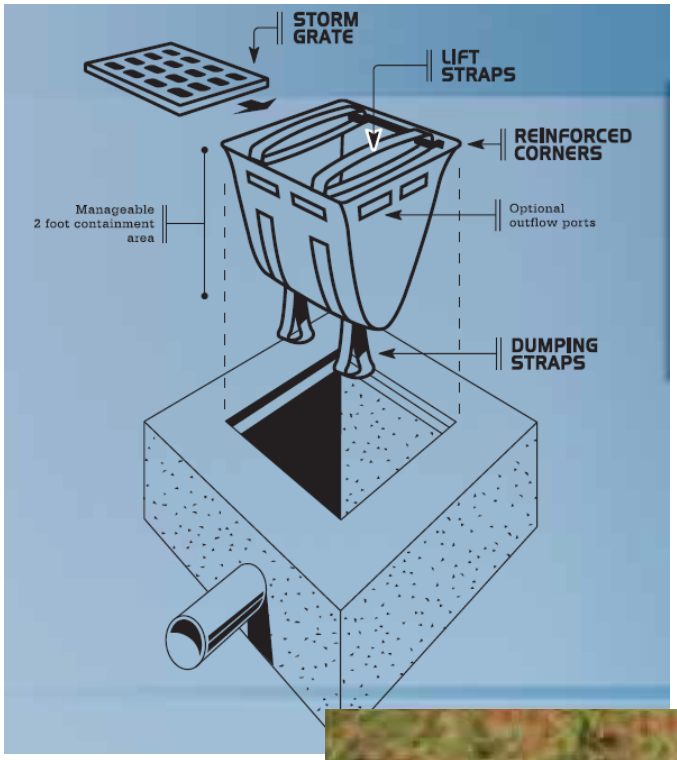
- Pros
  - Moderate capacity
  - Removes hydrocarbons, oil & grease
  - 3-6 month life
  - Overflow port
  - 40 lbs. sediment
- Cons
  - Grate removal

Grate Bag

- Pros
  - Durable
  - Easy maintenance
  - Re-usable
  - Single grates
  - Lift straps
  - Custom sizes
- Cons
  - Double grates

Inlet Sack

- Pros
  - Durable
  - Overflow ports
  - Re-usable
  - Lift straps
  - Custom sizes
- Cons
  - Grate removal

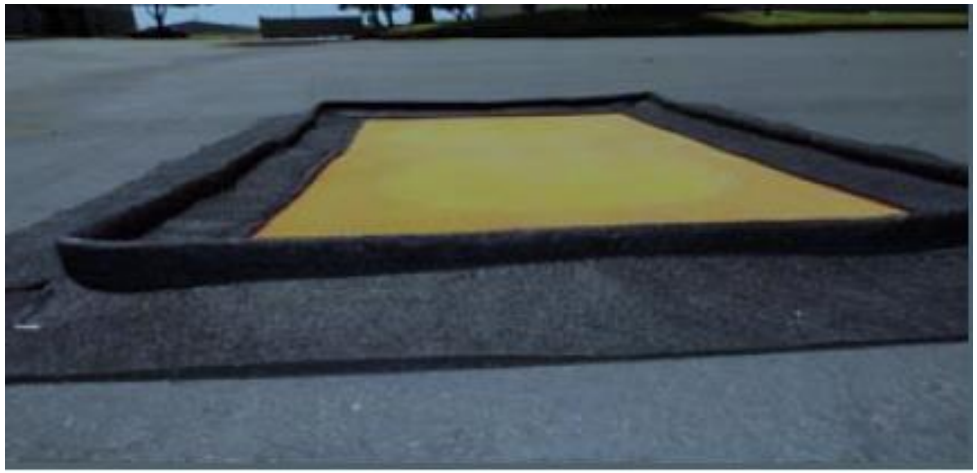


Grate Doughnut

- Pros
  - Compressible
  - Woven and non-woven fabric
  - Flood bypass
  - Easy maintenance
- Cons
  - Gaps dependent on grate
  - Installation

Grate Cover

- Pros
  - Berm layer
  - Flow bypass
  - Heavy HDPE outerjacket
  - Easy installation
  - Easy maintenance
  - Resistant to traffic
  - Re-usable
  - Custom sizes
- Cons
  - Gaps – (need to extend 3” beyond grate)



Construction Entrance/Exit

Purpose

Point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto paved roads by construction vehicles

Survey Questions

- True/False – Wash water from tire wash racks may be discharged to the MS4 or State Waters
  - **True**
  - **False**
- Stabilized construction entrances for Categories 1C, 3, 4, and 5 Projects are required to have the following:
  - **3-6 inch diameter gravel**
  - **Geotextile mat**
  - **Turning radius sufficient to accommodate the construction vehicles entering the project site**
  - **All of above**

Questions

- What…
  - Are the potential effects? **SW pollution, tracking sediment into roadway**
  - Do I have to do if I need to construct a tire wash? **Connect it to a sediment trapping device**
  - Are the design requirements? **Check plans and BMP Manual**
  - Are the alternative options for construction entrances? **Modular systems, mats, steel rumble strips**
- Where….
  - should the construction entrance be constructed? **Where vehicles exit to paved streets**
- When….
  - should the entrance be constructed? **Prior to start of land disturbing activities**
  - Is maintenance required? **When the BMP is clogged with sediment**
- Why…..
  - Do I have to install a construction entrance/exit? **CCH Rules, CCH BMP Manual, DOH Permits**

Regulations and Guidance

- **CCH Rules Relating to Water Quality**

  §20-3-43 Tracking Control

  §20-3-44 Stabilized Construction Entrance and Exits

- **CCH Storm Water Best Management Practices Manual (2011)**

  TR-1 Stabilized Construction Entrance/Exit

  - Minimize sediment track-out onto off-site streets, other paved areas, and sidewalks from vehicles exiting the construction Site
  - All pollutants and materials that are dropped, washed, tracked, spilled, or otherwise discharged from a project site to off-site streets, other paved areas, sidewalks or the MS4 must be cleaned immediately using dry methods such as sweeping or vacuuming.
  - Categories 1C, 4, and 5 Projects: 3-6 diameter gravel placed on geotextile mats to a minimum of 12 inches, 50 ft. long, 30 ft. wide
  - Categories 3 Projects: 3-6 diameter gravel placed on geotextile mats to a minimum of 8 inches, 30 ft. long, 20 ft. wide
  - Tire wash facilities may also be required

Regulations

❑ HAR, Ch.11-55, App. C

Section 5.1.2.3 – Minimize sediment track-out

- Minimize track-out of sediment onto off-site streets, other paved areas, and sidewalks from vehicles exiting the construction site.
- Restrict vehicle use to properly designated exit points
- Use appropriate stabilization techniques at all points that exit onto paved roads so that sediment removal occurs prior to vehicle exit
- Where necessary, use additional controls to remove sediment from vehicle tires prior to exit
- Where sediment has been tracked-out from the site onto the surface of off-site streets, other paved areas, and sidewalks, remove the deposited sediment by the end of the same work day
- Prohibited from hosing or sweeping tracked-out sediment into any storm water conveyance (unless it is connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or state water.

Rock entrances/exits

- Pros
  - Low tech
  - Proven effective
  - Material availability
- Cons
  - Material availability
  - High cost
  - Maintenance

Mats

- Pros
  - Durable
  - Flexible
  - Re-usable
  - Portable
  - Easy set-up
  - Easy maintenance
- Cons
  - Cost
  - Heavy – 7’ L x 12’ W, 430 lbs.

Modular Systems

- Pros
  - Durable
  - Flexible
  - Re-usable
  - Portable
  - Easy set-up
- Cons
  - Initial Cost
  - Maintenance

Steel Rumble Strips

- Pros
  - Durable
  - Re-usable
  - Portable
  - Easy set-up

- Cons
  - Initial Cost
  - Maintenance

Questions?????

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