

Description This BMP includes measures for collecting runoff from a staging area, materials storage site, or industrial activity area or for diverting water flow away from such areas so that pollutants do not mix with clean stormwater runoff. Various flow diversion structures, called stormwater conveyances, can be used to contain runoff on site, to channel it around the industrial area, or to carry pollutant-laden water directly to a treatment device or facility. Several options are available:

Stormwater Conveyances: This term includes many kinds of channels, gutters, drains, and sewers. Stormwater conveyances can be either temporary or permanent. They are constructed or lined with many different materials, including concrete, clay tiles, asphalt, plastics, metals, riprap, compacted soils, and vegetation. The type of material used depends on the use of the conveyance.

Dikes or Berms: Diversion dikes or berms are ridges built to block runoff from passing beyond a certain point. Temporary dikes are usually made with compacted soil or compost. More permanent ones are constructed out of concrete, asphalt, or other durable materials.

Diversion dikes are used to prevent the flow of stormwater runoff onto construction or staging/storage areas. Limiting the flow across these areas reduces the volume of stormwater that may carry pollutants from the area and may, therefore, require treatment. This method is suitable for sites where significant volumes of stormwater runoff tend to flow onto active materials handling or equipment staging sites and other construction areas.

Graded Areas and Pavement: Land surfaces can be graded, or graded and paved, so that stormwater runoff is directed away from construction activity areas. The slope of the grade allows the runoff to flow, but keeps it from washing over areas that may be contaminated with pollutants. Like conveyances and dikes, grading can prevent runoff from entering construction areas and becoming contaminated with pollutants from these areas. Grading can be a permanent or temporary control measure.

Applications **Stormwater Conveyances:** Stormwater conveyances can be used for two different purposes. The first is to keep uncontaminated stormwater from getting into areas of a construction site where it may become contaminated. This can be accomplished by collecting the stormwater in a conveyance and directing the flow away from those areas. Secondly, conveyances can be used to collect stormwater downhill from construction areas and keep it separate from runoff that has not been in contact with those areas. When potentially contaminated stormwater is collected in a conveyance like this, it can be directed to a treatment device or another facility on the site if desired.

Other beneficial aspects of stormwater conveyances include:

- Prevention of temporary flooding at industrial sites.
- Low maintenance.
- Erosion-resistant conveyance of stormwater runoff.
- Long-term control of stormwater flows.

Dikes or Berms: Typically, dikes are built on slopes just uphill from an active construction area together with some sort of a conveyance, such as a swale. The conveyance is necessary to keep the water away from the dike so that the water will not pool and seep through the dike. See BMP 41-Earth Dike.

Some advantages of diversion dikes are that they:

- Effectively limit stormwater flows over industrial site areas.
- Can be installed at any time.
- Are economical, temporary structures when built from soil on site.
- Can be converted from temporary to permanent at any time.

Graded Areas and Pavement: Grading is appropriate for any construction site where outdoor activities may pollute stormwater runoff--parking lots or outdoor storage areas, for example. Grading is often used in conjunction with coverings, buffer zones, and other practices to reduce the runoff velocity, increase infiltration of uncontaminated runoff, or direct pollutant-laden runoff to stormwater treatment facilities. Grading and paving are relatively inexpensive and easy to implement.

Limitations

Drainage area - unlimited

Minimum bedrock depth - N/A

NRCS soil type - ABCD

Drainage/flood control – yes

Maximum slope – 15%

Minimum water table – N/A

Freeze/thaw – good

Stormwater Conveyances:

Once the stormwater is concentrated in conveyances, it should be routed through stabilized structures all the way to its discharge to a receiving water or other stormwater BMP.

- May increase flow rates.
- May be impractical if there are space limitations.
- May be expensive to install, especially for small facilities or after a site has already been constructed.

Dikes and Berms

- Are not suitable for large drainage areas unless there is a gentle slope.
- May require maintenance after heavy rains.

Graded Areas and Pavement

- May be uneconomical to re-grade and resurface large areas.
- May not be effective during heavy precipitation.

Targeted
Pollutants
Design
Parameters

Sediment

Stormwater Conveyances: In planning for stormwater conveyances, consider the amount and speed of the typical stormwater runoff. Also, consider the stormwater drainage patterns, so that channels may be located to collect the most flow and can be built to handle the amount of water they will receive. When deciding on the type of material for the conveyance, consider the resistance of the material, its durability, and its compatibility with any pollutants it may carry.

Conveyance systems are most easily installed when a facility is first being constructed. Where possible, use existing grades to decrease costs. Grades should be positive to allow for the continued movement of the runoff through the conveyance system; however, grades should not create an increase in velocity that causes an increase in erosion. Consider the materials used for lining the conveyance and the types of outlet controls provided.

Dikes and Berms: In planning for the installation of dikes, consider the slope of the drainage area, the height of the dike, the amount of runoff it will need to divert, and the type of conveyance that will be used with the dike. Steeper slopes result in higher volumes of runoff and higher velocities, which the dike should be capable of handling. Remember that dikes are limited in their ability to manage large volumes of runoff. See BMPs 41-Earth Dike for additional parameters.

Graded Areas and Pavement: When designing graded and paved areas, be sure to consider both control and containment of runoff flows. The grading should control the uncontaminated flow by diverting it around areas that may have pollutants. The grading should also contain the contaminated flows or divert them to treatment facilities.

Construction
Guidelines

Stormwater Conveyances: Specific construction methods apply to the type of conveyance being used.

Dikes and Berms: Ideally, dikes are installed before construction activity begins. However, dikes can be easily constructed at any time. Temporary dikes (usually made of dirt) generally only last for 18 months or less, but they can be made into permanent structures by stabilizing them with vegetation. Slope protection such as vegetation is crucial for preventing the erosion of the dike.

Graded Areas and Pavement: Staging/storage areas should be designated prior to the start of construction.

Maintenance

- It is best to inspect stormwater conveyances within 24 hours of a rainstorm and remove debris promptly. Make daily inspections during periods of prolonged rainfall, since heavy storms may clog or damage the conveyances. It is important to repair damage to these structures as soon as possible.

- Dikes should be inspected regularly for damage. This is especially important after storm events since a heavy rain may wash parts of a temporary dike away. Any necessary repairs should be made immediately to make sure the structure continues to function effectively.
- Inspect unpaved, graded areas to check for gullies and other signs of erosion. Inspect paving regularly for cracks that may allow contaminants to seep into the ground. Also, check to make sure that the drains receiving the discharge from the paved area remain free of clogged sediment or other debris so that the water does not back up into areas where pollutants may be.