

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
TECHNICAL STANDARD
DEWATERING PRACTICES FOR SEDIMENT CONTROL
1061

DEFINITION

A practice or combination of practices that are used to prevent or reduce the discharge of sediment-laden water from dewatering operations.

PURPOSE

The purpose of this standard is to prevent water pollution from the discharge of sediment during dewatering of construction sites. The standard identifies several common methods which may be used to meet this purpose and specifies best management practices to ensure their effectiveness.

CONDITIONS WHERE PRACTICE APPLIES

This standard applies to land disturbing construction activities such as construction of buildings or roads, or the installation of utilities where sediment-laden runoff and/or groundwater accumulates in ponds, pits, trenches or other excavations and needs to be removed by pumping or other means of dewatering.

CRITERIA

General Criteria

Be aware of applicable federal, state, and local laws, regulations, or permit requirements governing dewatering operations. This standard does not contain the text of federal, state, or local laws.

Select and design dewatering practices that are appropriate for the: 1) pumping or *discharge rate*¹, and 2) and removal of the *target soil particle*, which is determined based on the predominant soil texture in the immediate area surrounding the accumulated water and the contributing drainage area.

Use combinations of dewatering practices (e.g., settling followed by filtering, *water-applied additive* followed by settling and/or filtering) when stand-alone practices are not effective for removal of the target soil particle (see Operation and Maintenance).

Discharge Locations

Locate and install dewatering practices so that discharges from the practice will not come in contact with or flow across exposed soils. Discharge to *stable surfaces* is not necessary for *internally drained areas*.

Provide energy dissipation at the outfalls of dewatering practices to minimize the potential for erosion caused by concentrated flows.

For discharges to storm sewer or sanitary sewer systems, contact the owner of the system to determine if flow rate or other discharge limitations apply.

Avoid discharges to steep slopes.

For discharges to waterways or wetlands:

- (1) Do not discharge at a rate or volume that will increase erosion or flood elevations in the receiving water.

¹ Words in the standard that are shown in italics are described in the Glossary section. The words are italicized the first time they are used in the text. Technical Standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your local WDNR office or the Standards Oversight Council office in Madison, WI at (608) 441-2677.

- (2) Do not discharge pollutant concentrations or pollutant loads that will cause or contribute to exceedance of water quality standards or does not protect or preserve the functional values or uses of wetlands.

Do not discharge at a rate or volume that will increase erosion or flooding on off-site properties.

Avoid discharging to a *karst feature* or other direct groundwater connection.

Contact the Wisconsin Department of Natural Resources (DNR) if proposing to discharge to an Outstanding Resource Water (ORW) or Exceptional Resource Water (ERW).

Note: Locations of ORW and ERW waterbodies can be found at <https://dnr.wi.gov/topic/surfacewater/swdv/>.

Dewatering Best Management Practices

It is acceptable to use the following dewatering best management practices:

Internally Drained Areas

Discharges to internally drained upland areas meeting the following criteria do not require sediment removal prior to discharge:

- (1) The area is either on-site or the off-site landowner has provided written approval for the discharge.
- (2) The area can contain and infiltrate the volume of water without a surface discharge. If applicable, the impact of frozen ground conditions and/or other sources of water (e.g., runoff, groundwater) should be evaluated.
- (3) The area is not considered or does not contain a wetland or waterway.
- (4) The area does not contain endangered resources or cultural resources that can be impacted by the discharge.
- (5) The area is not an existing or proposed storm water infiltration practice.
- (6) The area is not a *karst feature* or other direct groundwater connection.

Internal drained areas can be created using temporary containment barriers (e.g., berm).

Sediment Basins and Sediment Traps

Discharge to existing construction site sediment traps (WDNR Technical Standard 1063) sediment basins (WDNR Technical Standard 1064) and provided the discharge does not cause an exceedance of the design discharge rates for target soil particle removal from the basin or trap.

Temporary or Portable Settling Basins/Tanks

Discharge to temporary or portable settling basins/tanks with at least two baffled compartments.

Provide at least 3 feet of depth as measured from the bottom of the basin/tank to the invert of the outlet from the basin/tank.

Determine the minimum surface area of the basin/tank using the following equations:

Target Particle Size	Basin or Tank Surface Area Equation
Sand*	$Sa = 1.83 \times Q$
Silt**	$Sa = 30 \times Q$
Clay	$Sa = 180 \times Q$

Sa = Surface area (square feet), Q = Pumping rate and/or discharge rate (gallons per minute).

* Use the sand equation for silty soils when filter baffles and/or water-applied additives are used.

** Use silt equation for clayey soils when filter baffles and/or water-applied additives are used.

It is acceptable to reduce the settling basin or tank surface area when filter baffles and/or water-applied additives are used to increase the removal efficiency.

Geotextile Filtering Practices

Discharge to *geotextile filter bags* (Figures 1 and 2) or *geotextile filter basins* (Figure 3) fabricated using WisDOT Type R, WisDOT HR or equivalent geotextile.

Provide a minimum geotextile surface area of 100 square feet. Geotextile surface areas of less than 100 square feet can be used for low volume discharges (less than 100 cubic feet).

Determine the required geotextile surface area based on the specified geotextile product water flow rate (gallons per minute/square feet) and the following correction factors (see Example 1):

- (1) Reduce the specified geotextile product water flow rate by 50% to account for clogging.
- (2) For filter bags and basins, do not consider the bottom geotextile surface area unless the bag or basin is placed on permeable bedding material (e.g., open-graded base) that will not impede or reduce the flow through the geotextile.

Use water-applied additives prior to geotextile filters when needed to increase removal efficiency.

Example 1

- 1) Calculate the required geotextile filter surface area based on a pumping rate of 1,000 gallons per minute and a geotextile product flow rate of 50 gallons per minute/square foot.

Solution 1

- 1) Multiply the geotextile product flow rate (50 gpm/sf) by 50% to get the corrected flow rate to account for clogging (25 gpm/sf).
- 2) Divide the pumping rate (1,000 gpm) by the corrected flow rate (25 gpm/sf) to get the required geotextile surface area (40 sf).

NOTE: Increase the geotextile surface area to at least 100 square feet if a filter bag or basin will be used.

Filter Baffles

Discharge to settling basins/tanks or *dewatering channels* with one or more filter baffle (Figures 4 and 5).

Fabricate filter baffles with geotextile or other materials providing equivalent particle filtering.

Control discharge rates so that no filter baffle overtopping or bypassing occurs. For filter baffles in series, overtopping or bypassing can occur prior to the last baffle.

Use water-applied additives prior to filter baffles when needed to increase removal efficiency.

Manufactured Filtering Practices

Discharge to manufactured filtering devices such as sand, wound cartridge or membrane filters in accordance with manufacturer specifications.

Use water-applied additives prior to manufactured filtering devices when needed to increase removal efficiency.

Water-Applied Additives

Use water-applied additives as needed to increase the removal efficiency of filtering or settling practices.

Select water-applied additives that have WDNR allowable usage rates.

Do not use water-applied additives above the WDNR allowable usage rate for specific additive.

Select water-applied additives in accordance with manufacturer's specifications.

Note: WDNR maintains a list of additive allowable usage rates at

<https://dnr.wi.gov/topic/stormWater/documents/allowableUsageRatesWaterAppliedAdditives.pdf>

Groundwater Dewatering Wells

During well development, discharge sediment-laden water to appropriate dewatering practices.

During well operation, it is acceptable to bypass dewatering practices with clear water discharges if applicable discharge location criteria are met.

If *high capacity well systems* will be constructed, contact the WDNR Drinking Water and Groundwater program for information on applicable permits and requirements.

If a dewatering well has the potential to discharge contaminated groundwater, contact the WDNR Wastewater program to discuss testing, storage and discharge options. Additional WPDES permits may be required.

If a groundwater dewatering well will discharge to waters of the state, contact the WDNR Wastewater program to determine if a dewatering wastewater general permit is required.

CONSIDERATIONS

- (1) If available and appropriate, discharge to internally drained areas or existing sediment traps or basins before using the other options.
- (2) Effective removal of clay-sized particles can be difficult using stand-alone practices such as geotextile filters or portable settling tanks. When the target soil particle is clay, plan for the use of combinations of practices to provide effective treatment.
- (3) Geotextile with lower apparent opening size (AOS) may be more effective for removal of small particles. However, rapid clogging of the geotextile may occur.
- (4) For long-duration pumping operations, plan for the potential replacement of dewatering practices due to clogging.
- (5) If possible, site-specific dewatering plans should be developed. The plans should show all components of the dewatering system and adjacent construction operations to verify that adequate space is available and potential conflicts are minimized.
- (6) The practices in this standard are not appropriate for treatment or discharge of contaminated water or groundwater. If oily sheens, odors or colors indicating potentially contaminated water are observed, stop dewatering operations and notify the WDNR spills hotline at 1-800-943-0003.
- (7) See Figure 6 for practice specific considerations.

PLANS AND SPECIFICATIONS

Prepare plans and specifications in accordance with the criteria of this standard and describe the requirements for applying the practice to achieve its intended use.

OPERATION AND MAINTENANCE

General

Unless conducting a hydraulic dredging operation, utilize a floating suction hose or equivalent method to minimize the potential for pumping sediment directly from the bottom of a pond, pit or trench.

During dewatering operations, conduct at least daily monitoring of dewatering practices and discharge locations and keep monitoring records.

Evaluate sediment removal effectiveness of dewatering practices during daily monitoring. Use a *transparency tube* (Figure 7) or other field test method to evaluate sediment removal effectiveness. If transparency cannot be observed through 12.5 cm (5 inches) of water, modification or enhancement of dewatering practices is needed.

Modify or enhance dewatering practices that are not providing effective sediment removal.

Properly dispose of all sediment collected in dewatering practices. Sediment can be disposed on-site.

Settling Basin or Tanks

Remove accumulated sediment as needed to maintain effectiveness.

Geotextile Filters

Slowly increase the pumping rate to allow a filter cake to develop on the fabric and improve the ability of the fabric to remove soil particles that are smaller than the fabric openings.

Securely connect inflow hoses to filter bags to minimize leakage.

Replace clogged, torn or damaged geotextile filters.

Filter Baffles

Replace clogged, torn or damaged filter baffles.

Manufactured Filters

Operate and maintain filters per manufacturer's instructions.

If filter backwashing is required, properly dispose of the backwash water.

Water-Applied Additives

Apply or introduce water-applied additives in accordance with the manufacturer's instructions.

Verify proper dosing (lbs/gallon) with the manufacturer and limit to WDNR allowable usage rates.

Provide appropriate contact/mixing time prior to the filtering or settling practice.

GLOSSARY

Dewatering channels: Ditches or swales with stable surfaces and one or more filter baffle.

Discharge rate: The rate of water flow (e.g., gallons per minute) to a dewatering practice from a pump or other mechanism.

Filter baffle: A vertically oriented filter that is fabricated with geotextile or other materials that provide filtration.

Geotextile filter bag: Geotextile fabric sewn into a completely enclosed bag with double-stitched seams and a snout to allow for a hose connection.

Geotextile filter basin: A temporary water storage area created with and/or over permeable material (e.g. open graded stone) and overlain with geotextile fabric.

High-capacity well systems: Any well or combinations of wells that in aggregate have a combined pumping capacity of 70 or more gallons per minute.

Internally drained areas: Areas that can contain and infiltrate the entire dewatering volume without generating a surface discharge.

Jar test: A pilot-scale test that simulates the coagulation/flocculation process in water.

Karst feature: An area or geologic feature subject to bedrock dissolution so that it is likely to provide a conduit to groundwater, and may include caves, enlarged fractures, mine features, exposed bedrock surfaces, sinkholes, springs, seeps or swallets.

Stable Surfaces: Surface that is not susceptible to rapid erosion when subject to moving water. Examples include areas covered with 6 inches or more of wash aggregate, pavement, dense vegetation in good condition or anchored erosion control mat.

Target soil particle: The soil particle (sand, silt or clay) that needs to be removed by the dewatering practice (See Figure 8).

Transparency tube: A tube with a black and white disc in the bottom, which is marked in centimeters or inches along its side. It is used for assessing the clarity of water.

Water-applied additive: Chemical products used for water clarification.

Wells: Drillholes or other excavations or openings deeper than they are wide that extend more than 10 feet below the ground surface constructed for the purpose of obtaining groundwater.

REFERENCES

Wisconsin DNR, Outstanding and Exceptional Resource Waters, <https://dnr.wi.gov/topic/SurfaceWater/orwerw.html>

Wisconsin DNR, Storm Water Construction Technical Standards, https://dnr.wi.gov/topic/stormwater/standards/const_standards.html

Wisconsin DNR, Water Application of Additives for Sediment Control, Technical Standard 1051, <https://dnr.wi.gov/topic/stormWater/documents/1051WaterAppliedAdditives.pdf>

Wisconsin DNR, Remediation and Redevelopment Database (WRRD), Contamination Sites, <https://dnr.wi.gov/topic/Brownfields/wrrd.html>.

Wisconsin DNR, High Capacity Wells, <https://dnr.wi.gov/topic/Wells/HighCap/Apply.html>

Wisconsin DOT, Geosynthetics, Standard Specification Section 645, <https://wisconsin.dot.gov/rdwy/stndspec/ss-06-45.pdf>

University of Wisconsin Extension, Transparency, A Water Clarity Measure, <https://wateractionvolunteers.org/files/2019/10/5Transparency-Monitoring2010.pdf>

**Figure 1:
Geotextile Filter Bag**

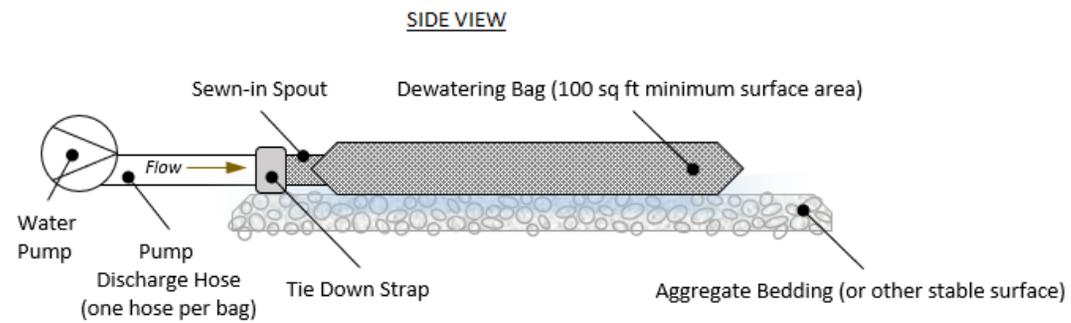
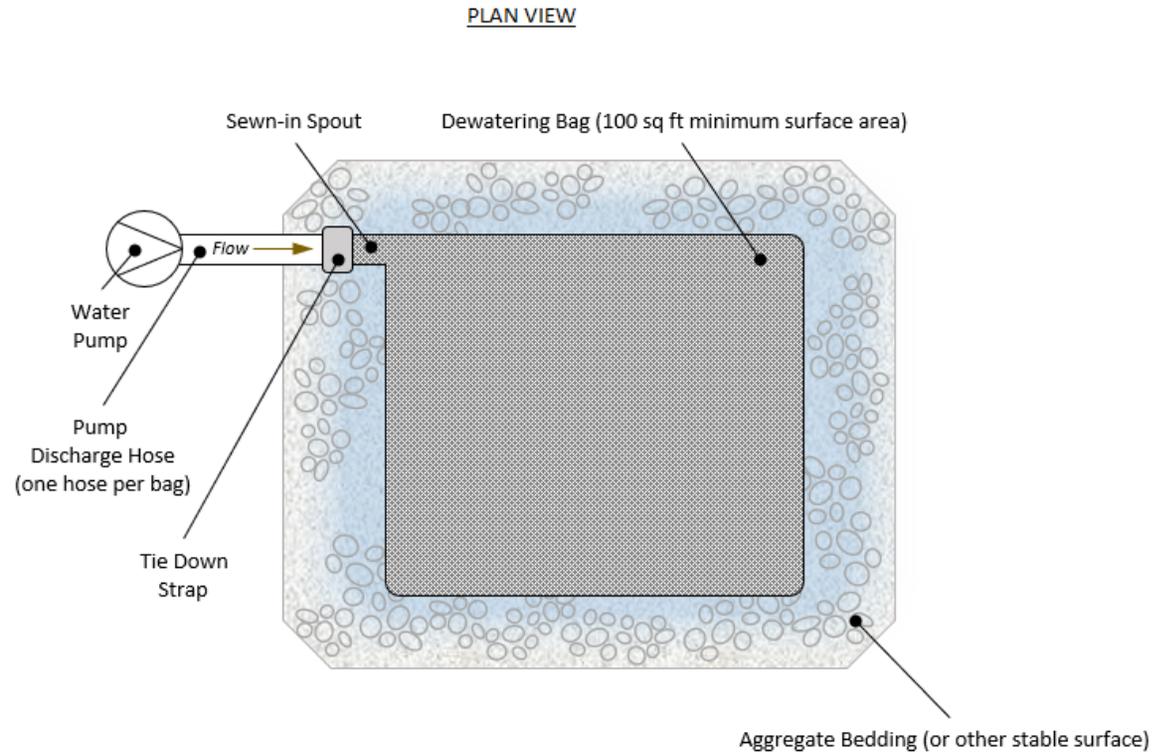
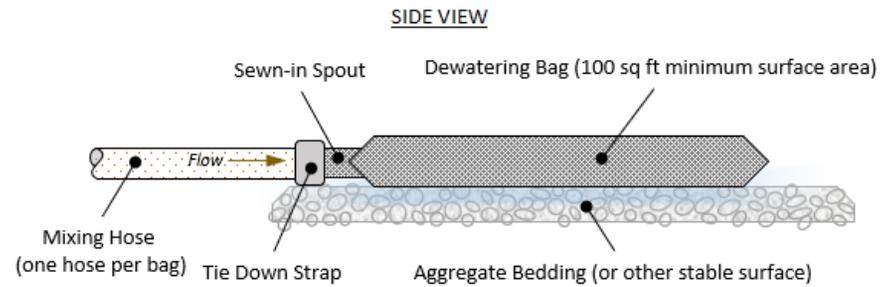
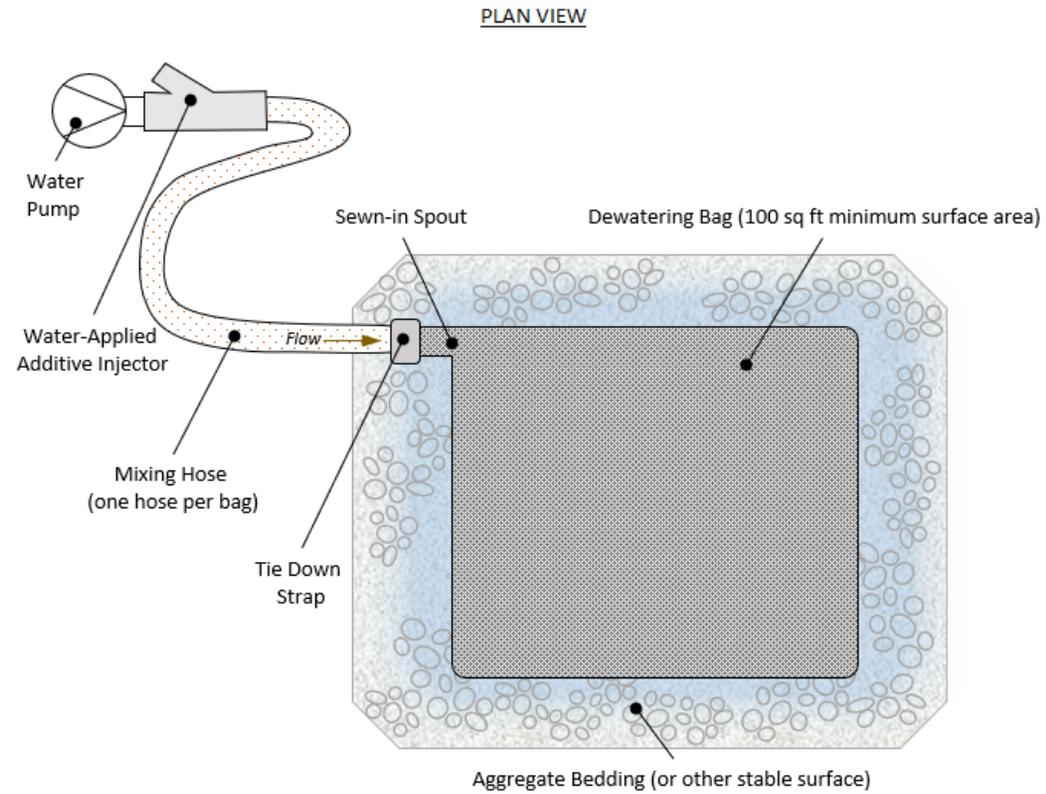
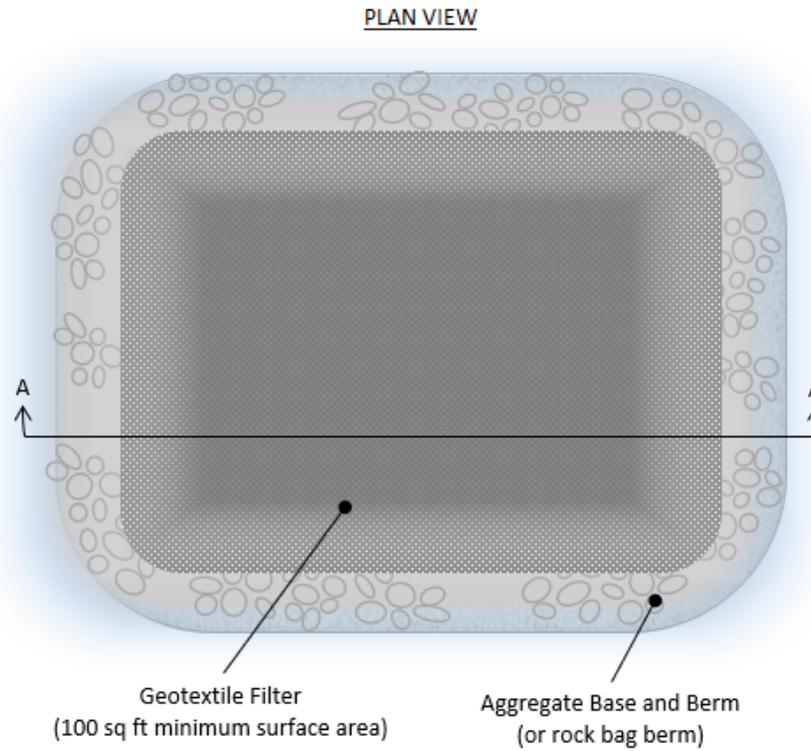


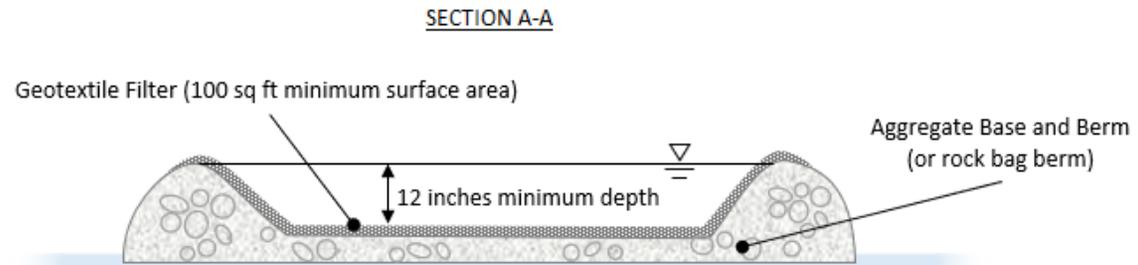
Figure 2:
Geotextile Filter Bag with Water-Applied Additive



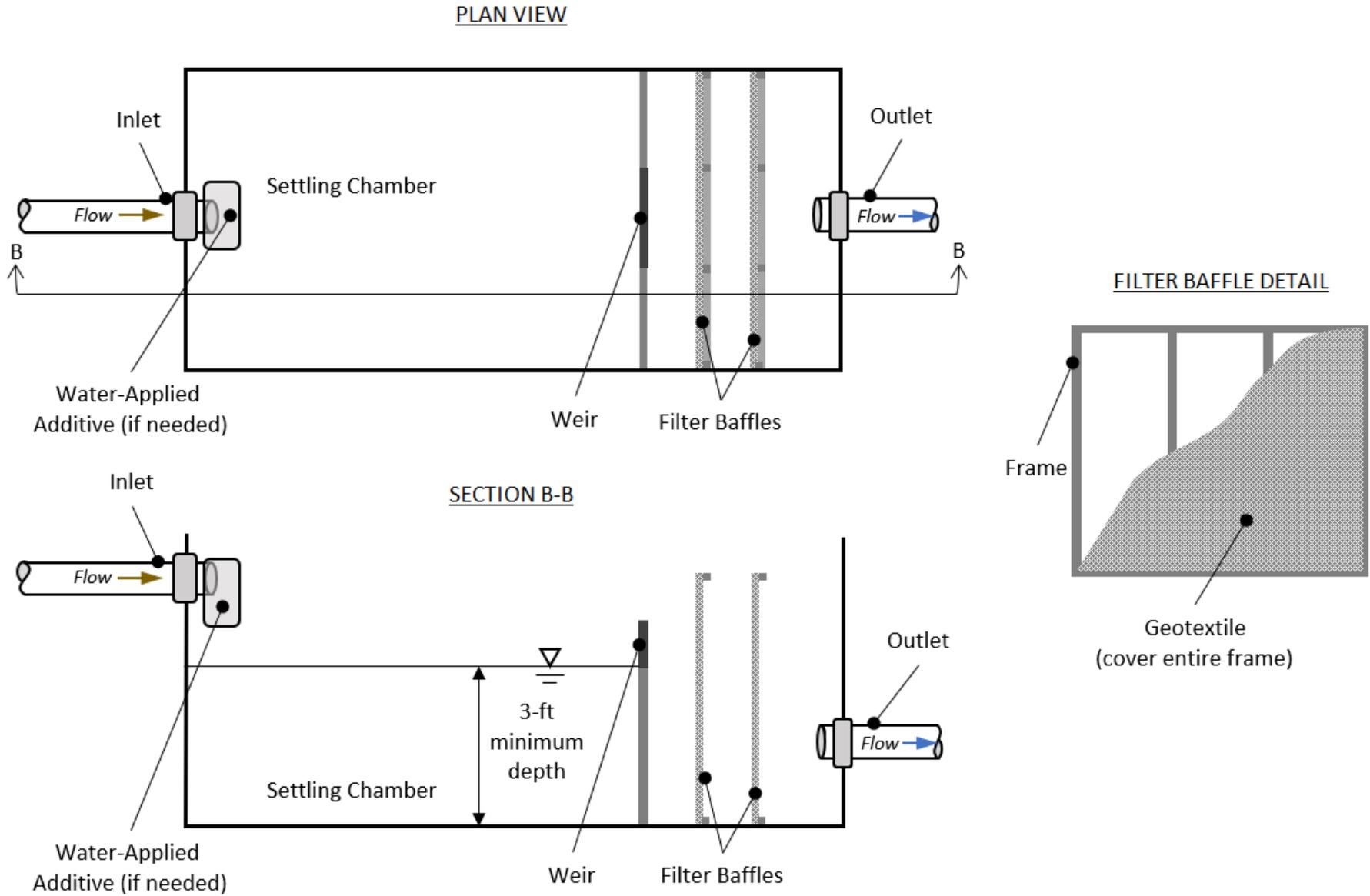
**Figure 3:
Geotextile Filter Basin**



Note: Overlap adjacent geotextile by at least 12 inches.

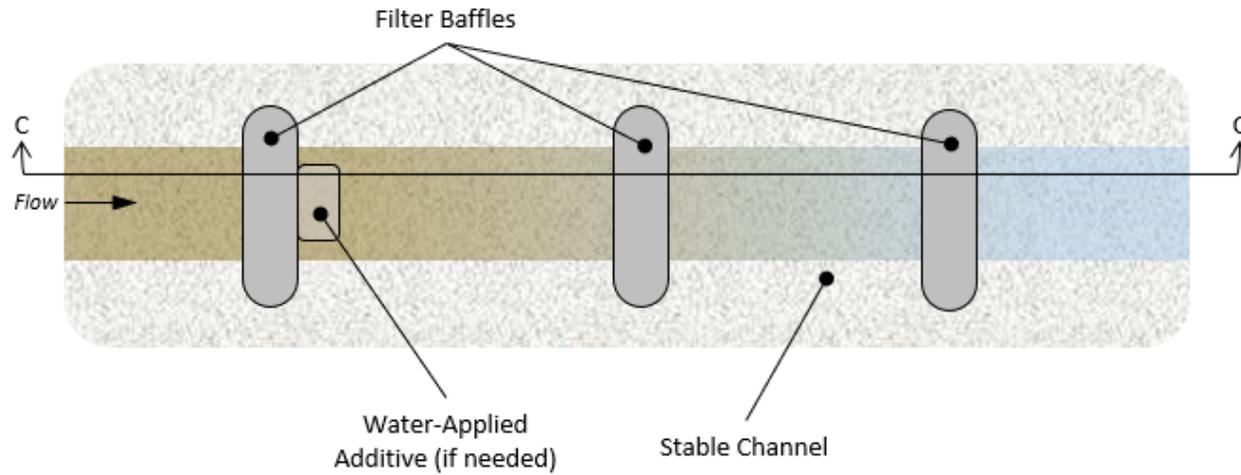


**Figure 4:
Settling Tank with Geotextile Filter Baffles**

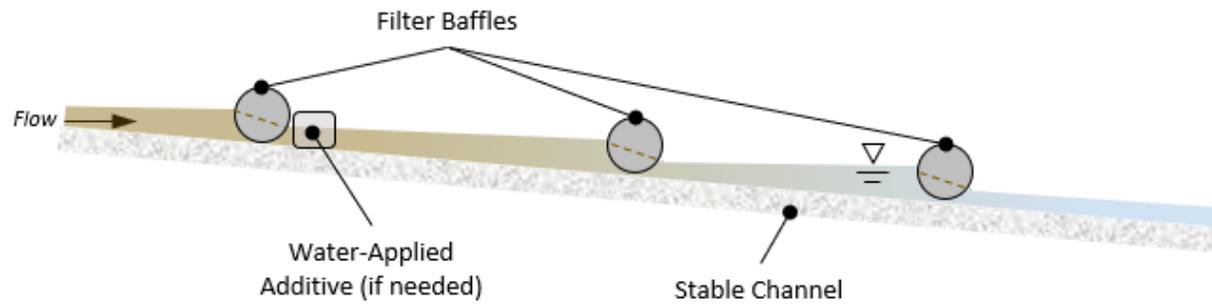


**Figure 5:
Dewatering Channel**

PLAN VIEW



SECTION C-C



**Figure 6:
Dewatering Practice Considerations**

Dewatering Practice	Considerations
Sediment Basins/ Traps	<ul style="list-style-type: none"> • The target soil particle size should be consistent with the soil texture that was used to design the sediment basin or trap. • For sediment basins, the discharge rate from the basin should not exceed the design inflow and discharge rates from the basin for a 1-yr, 24-hr design storm. • For sediment traps, the discharge rate to the trap should not exceed the peak runoff rate to the trap for a 1-yr, 24-hr design storm.
Settling Basins/Tanks	<ul style="list-style-type: none"> • For silt and clay particles, discharge rates may be limited by available basin/tank sizes. If needed, a flow splitter can be used to direct the inflow to multiple basins/tanks.
Geotextile Filters	<ul style="list-style-type: none"> • Discharge rates may be limited by available geotextile sizes. If needed, a flow splitter can be used to direct the inflow to multiple filter bags or basins.
Manufactured Filters	<ul style="list-style-type: none"> • DNR does not maintain a list of approved manufactured filter devices and cannot provide information regarding the performance of these devices. • Manufactured filters can potentially treat high flow rates (1,000 gallons per minute or more).
Water-Applied Additives	<ul style="list-style-type: none"> • The ability of water-applied additives to effectively flocculate silt and/or clay particles is site-specific. <i>Jar testing</i> (or equivalent) should be conducted to verify that the product will be effective prior to full scale implementation.

Figure 7:
**Sediment Control Effectiveness Using Transparency to Determine
Sediment Control Effectiveness**

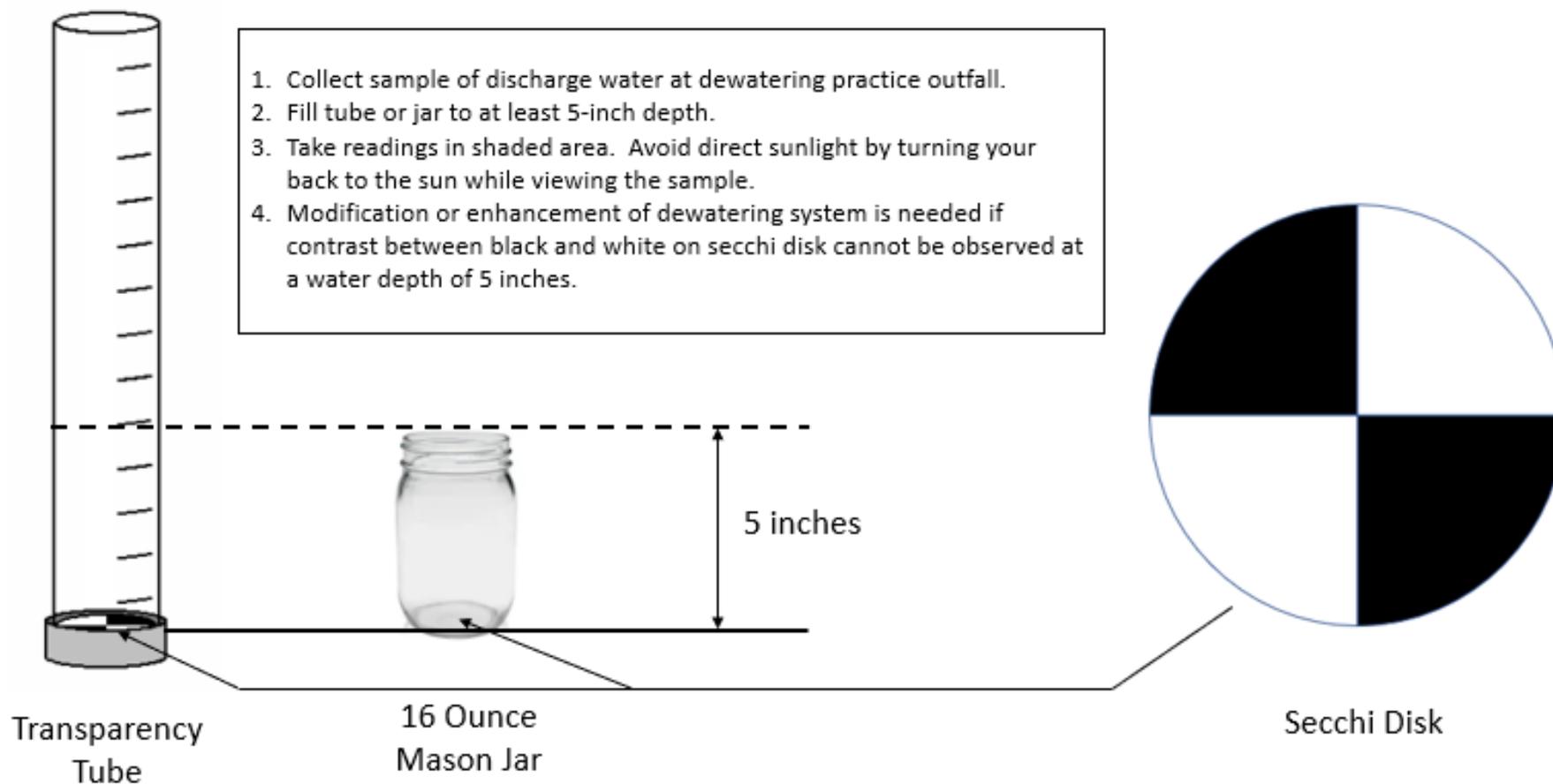


Figure 8:
Target Soil Particle Based on Soil Texture

Soil Texture	Target Soil Particle
Sand	Sand
Loamy Sand	
Sandy Loam	
Loam	Silt
Silt	
Silt Loam	
Clay Loam	Clay
Silty Clay	
Clay	