

FT-3

Sand Filter

BMP MAINTENANCE FACT SHEET FOR FLOW-THRU STRUCTURAL BMP FT-3 SAND FILTER

Sand filters operate by filtering storm water through a constructed sand bed with an underdrain system. Runoff enters the filter and spreads over the surface. As flows increase, water backs up on the surface of the filter where it is held until it can percolate through the sand. The treatment pathway is downward (vertical) through the media to an underdrain system that is connected to the downstream storm drain system. Sand filter beds can be enclosed within concrete structures or within earthen containment. There is usually a forebay at the inlet to trap sediment, trash and debris so that only the runoff is passed through the sand bed without the solid materials. Typical sand filter components include:

- Forebay for pretreatment / energy dissipation
- Surface ponding for captured flows
- Sand filter bed
- Aggregate storage layer with underdrain(s)
- Overflow structure

Normal Expected Maintenance

Sand filters require routine maintenance to: remove accumulated materials such as sediment, trash, and debris from the forebay; and clear the underdrain(s). To ensure runoff is passed through the sand bed, sand at the top of the sand bed (approximately 2 inches, or more if necessary) must be removed and replaced to restore flow when the drain time exceeds 24-96 hours. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure

The normal expected maintenance described above ensures the BMP functionality. Lapses in the normal expected maintenance can lead to clogging of the BMP and runoff bypassing the filter. If clogging is observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. In addition, clogged BMPs can lead to flooding, standing water and mosquito breeding habitat. Corrective maintenance and increased inspection and maintenance will be required. For persistent clogging or presence of mosquitos, contact the [City Engineer] to determine a permanent solution. For example, adding pretreatment measures within the tributary area draining to the BMP to intercept sediment, trash, and debris. Pretreatment components, especially for sediment, will extend the life of the sand bed. For mosquitos, a Vector Management Plan, prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.

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SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-3 SAND FILTER		
<p>The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.</p> <p>Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.</p>		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Accumulation of sediment, litter, or debris in forebay and/or filter bed	Remove and properly dispose of accumulated materials.	<ul style="list-style-type: none"> • Inspect monthly. If the forebay is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found within the filter bed at each inspection. • When the BMP includes a forebay, materials must be removed from the forebay when the forebay is 25% full*, or if accumulation within the forebay blocks flow to the filter bed.
Standing water in BMP for longer than 24-96 hours following a storm event	Make appropriate corrective measures to restore drainage such as removing obstructions of debris from the forebay, clearing underdrains or repairing/replacing clogged sand bed.	<ul style="list-style-type: none"> • Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Clogged sand bed This is indicated when the drain time of the surface of the sand bed exceeds 24-96 hours.	Remove and properly dispose sand from the top of the sand bed (approximately 2 inches of sand, or as much as needed to restore flow). Restore sand depth to the design depth.	<ul style="list-style-type: none"> • Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed.
Obstructed inlet or outlet structure	Clear blockage.	<ul style="list-style-type: none"> • Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.

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SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-3 SAND FILTER		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove and properly dispose any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	<ul style="list-style-type: none"> • Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintenance when needed
Damage to structural components of the BMP such as weirs, underdrains, inlet or outlet structures	Repair or replace as applicable.	<ul style="list-style-type: none"> • Inspect annually. • Maintenance when needed.

References

American Mosquito Control Association.

<http://www.mosquito.org/>

California Storm Water Quality Association (CASQA). 2003. Municipal BMP Handbook.

<https://www.casqa.org/resources/bmp-handbooks/municipal-bmp-handbook>

County of San Diego. 2014. Low Impact Development Handbook.

<http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/susmp/lid.html>

San Diego County Copermittees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet FT-3.

http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220

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Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	
Property / Development Name:		Responsible Party Name and Phone Number:
Property Address of BMP:		Responsible Party Address:

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-3 SAND FILTER PAGE 1 of 3			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
<p>Accumulation of sediment, litter, or debris</p> <p>Materials must be removed from the forebay when the forebay is 25% full*. In any case, materials must be removed if accumulation blocks flow through the filter bed.</p> <p>Materials must be removed from the filter bed any time accumulation is observed in the filter bed.</p> <p>Maintenance Needed?</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A</p>	<p><input type="checkbox"/> Remove and properly dispose of accumulated materials</p> <p><input type="checkbox"/> If accumulation within the forebay is greater than 25% in one month, increase the inspection and maintenance frequency**</p> <p><input type="checkbox"/> Other / Comments:</p>		

*"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

**If no forebay is present, if sediment, litter, or debris accumulation exceeds 25% of the surface ponding volume within one month, add a forebay or other pre-treatment measures within the tributary area draining to the BMP to intercept the materials.

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Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-3 SAND FILTER PAGE 2 of 3			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Standing water in BMP for longer than 24-96 hours following a storm event* Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Make appropriate corrective measures to restore drainage such as removing obstructions of debris from the forebay, clearing underdrains, or repairing/replacing clogged sand bed <input type="checkbox"/> Other / Comments:		
Clogged sand bed This is indicated when the drain time of the surface of the sand bed exceeds 24-96 hours. Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Remove and properly dispose sand from the top of the sand bed (approximately 2 inches of sand, or as much as needed to restore flow) <input type="checkbox"/> Restore sand depth to the design depth <input type="checkbox"/> Other / Comments:		
Obstructed inlet or outlet structure Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Clear blockage <input type="checkbox"/> Other / Comments:		

*Surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the sand bed, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected. For persistent clogging, the [City Engineer] shall be contacted to determine a solution.

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Date:	Inspector:	BMP ID No.:
Permit No.:	APN(s):	

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-3 SAND FILTER PAGE 3 of 3			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Remove and properly dispose standing water** <input type="checkbox"/> Remove accumulated materials that obstruct flow through the BMP** <input type="checkbox"/> Other / Comments:		
Damage to structural components of the filtration system such as weirs, underdrains, inlet or outlet structures Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Repair or replace as applicable <input type="checkbox"/> Other / Comments:		

**If mosquitos persist following corrective measures to remove standing water, the [City Engineer] shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.