

## Dry Extended Detention Basin

### BMP MAINTENANCE FACT SHEET FOR

#### FLOW-THRU STRUCTURAL BMP FT-4 DRY EXTENDED DETENTION BASIN

**Dry extended detention basins** are basins that have been designed to detain storm water for an extended period to allow sedimentation and typically drain completely between storm events. The slopes, bottom, and forebay of above-ground dry extended detention basins are typically vegetated. Dry extended detention basins may serve multiple uses including parks, playing fields, tennis courts, open space, and overflow parking lots. This BMP category also includes detention basins that serve a purpose of flow control for hydromodification management only, which may or may not include vegetation. They can be underground structures, in many possible configurations, including both proprietary and non-proprietary systems. They may be constructed of a single large vault, one or multiple large pipes, or other modular units. Outlet structures control outflow from either above-ground or underground detention systems; outlet structures may be weirs, orifice plates, risers, or other control structures. Typical dry extended detention basin components include:

- Forebay for pretreatment
- Surface ponding for captured flows
- Vegetation selected based on basin use, climate and ponding depth (above-ground basins)
- Low flow channel, outlet, and overflow device
- Impermeable liner or uncompacted native soils at the bottom of the facility

#### **Normal Expected Maintenance**

Dry extended detention basins require routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

#### **Non-Standard Maintenance or BMP Failure**

If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface or underground ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of underlying native soils and/or the outlet structure. The specific cause of the drainage issue must be determined and corrected. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

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### Other Special Considerations

Some above-ground dry extended detention basins are vegetated structural BMPs. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural BMP, **routine maintenance is key to preventing this scenario.**

Underground dry extended detention basins are typically designed to be cleaned from above-ground using a vactor. If maintenance conditions require maintenance personnel to enter the underground structure, the maintenance personnel must be trained and certified in confined space entry.

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SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-4 DRY EXTENDED DETENTION BASIN		
<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 basin	Remove and properly dispose of accumulated materials, (without damage to vegetation when applicable).	<ul style="list-style-type: none"> <li>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.</li> <li>Remove any accumulated materials found within the basin area at each inspection.</li> <li>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 basin.</li> </ul>
Obstructed inlet or outlet structure	Clear blockage.	<ul style="list-style-type: none"> <li>Inspect monthly and after every 0.5-inch or larger storm event.</li> <li>Remove any accumulated materials found at each inspection.</li> </ul>
Poor vegetation establishment (when the BMP includes vegetated surface by design)	Re-seed, re-plant, or re-establish vegetation per original plans.	<ul style="list-style-type: none"> <li>Inspect monthly.</li> <li>Maintenance when needed.</li> </ul>
Dead or diseased vegetation (when the BMP includes vegetated surface by design)	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	<ul style="list-style-type: none"> <li>Inspect monthly.</li> <li>Maintenance when needed.</li> </ul>
Overgrown vegetation (when the BMP includes vegetated surface by design)	Mow or trim as appropriate.	<ul style="list-style-type: none"> <li>Inspect monthly.</li> <li>Maintenance when needed.</li> </ul>

\*"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).

## Dry Extended Detention Basin

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-4 DRY EXTENDED DETENTION BASIN (Continued from previous page)		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	<ul style="list-style-type: none"> <li>• Inspect monthly.</li> <li>• Maintenance when needed.</li> </ul>
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	<ul style="list-style-type: none"> <li>• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event.</li> <li>• Maintenance when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.</li> </ul>
Standing water in above-ground BMP for longer than 24-96 hours following a storm event	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or removing/replacing clogged or compacted surface treatments and/or scarifying or tilling native soils. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Maintenance when needed.</li> </ul>
Standing water in underground BMP for longer than 24-96 hours following a storm event	Make appropriate corrective measures such as removing obstructions at the outlet, clearing underdrains, or flushing fine sediment from aggregate layer when applicable. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Maintenance when needed.</li> </ul>

## Dry Extended Detention Basin

SUMMARY OF STANDARD INSPECTION AND MAINTENANCE FOR FT-4 DRY EXTENDED DETENTION BASIN (Continued from previous page)		
Threshold/Indicator	Maintenance Action	Typical Maintenance Frequency
<p>Presence of mosquitos/larvae</p> <p>For images of egg rafts, larva, pupa, and adult mosquitos, see <a href="http://www.mosquito.org/biology">http://www.mosquito.org/biology</a></p>	<p>If mosquitos/larvae are observed: first, immediately remove and properly dispose any standing water; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. For underground detention basins, ensure access covers are tight fitting, with gaps or holes no greater than 1/16 inch, and/or install barriers such as inserts or screens that prevent mosquito access to the subsurface storage.</p> <p>If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, 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.</p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Maintenance when needed</li> </ul>
<p>Damage to structural components such as weirs, inlet or outlet structures</p>	<p>Repair or replace as applicable.</p>	<ul style="list-style-type: none"> <li>• Inspect annually.</li> <li>• Maintenance when needed.</li> </ul>

### 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 Copermitttees. 2016. Model BMP Design Manual, Appendix E, Fact Sheet FT-4.  
[http://www.projectcleanwater.org/index.php?option=com\\_content&view=article&id=250&Itemid=220](http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=250&Itemid=220)

**FT-4**

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## Dry Extended Detention Basin

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-4 DRY EXTENDED DETENTION BASIN PAGE 1 of 5			
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 to the basin area.</p> <p>Materials must be removed from the basin area any time accumulation is observed in the basin area.</p> <p>Maintenance Needed?</p> <p><input type="checkbox"/> YES</p> <p><input type="checkbox"/> NO</p> <p><input type="checkbox"/> N/A</p>	<p><input type="checkbox"/> Remove and properly dispose of accumulated materials, (without damage to the vegetation when applicable)</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.

## Dry Extended Detention Basin

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

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 2 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
<p>Poor vegetation establishment (when the BMP includes vegetated surface by design)</p> <p>Maintenance Needed?</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A</p>	<p><input type="checkbox"/> Re-seed, re-plant, or re-establish vegetation per original plans</p> <p><input type="checkbox"/> Other / Comments:</p>		
<p>Dead or diseased vegetation (when the BMP includes vegetated surface by design)</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 dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans</p> <p><input type="checkbox"/> Other / Comments:</p>		
<p>Overgrown vegetation (when the BMP includes vegetated surface by design)</p> <p>Maintenance Needed?</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A</p>	<p><input type="checkbox"/> Mow or trim as appropriate</p> <p><input type="checkbox"/> Other / Comments:</p>		



## Dry Extended Detention Basin

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

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 3 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Erosion due to concentrated irrigation flow Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Repair/re-seed/re-plant eroded areas and adjust the irrigation system  <input type="checkbox"/> Other / Comments:		
Erosion due to concentrated storm water runoff flow Maintenance Needed? <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan  <input type="checkbox"/> If the issue is not corrected by restoring the BMP to the original plan and grade, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction  <input type="checkbox"/> Other / Comments:		

## Dry Extended Detention Basin

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

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 4 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
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:		
Damage to structural components such as weirs, 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:		

## Dry Extended Detention Basin

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

INSPECTION AND MAINTENANCE CHECKLIST FOR FT-4 DRY EXTENDED DETENTION BASIN PAGE 5 of 5			
Threshold/Indicator	Maintenance Recommendation	Date	Description of Maintenance Conducted
Standing water in above-ground BMP for longer than 24-96 hours following a storm event*	<input type="checkbox"/> Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, or repairing/replacing clogged or compacted soils.*  <input type="checkbox"/> Other / Comments:		
Standing water in underground BMP for longer than 24-96 hours following a storm event*	<input type="checkbox"/> Make appropriate corrective measures such as removing debris obstructions, clearing underdrains, or flushing fine sediment from aggregate layer when applicable.*  <input type="checkbox"/> Other / Comments:		
Presence of mosquitos/larvae  For images of egg rafts, larva, pupa, and adult mosquitos, see <a href="http://www.mosquito.org/biology">http://www.mosquito.org/biology</a>  Maintenance Needed?  <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> N/A	<input type="checkbox"/> Apply corrective measures to remove standing water in BMP when standing water occurs for longer than 24-96 hours following a storm event.**  <input type="checkbox"/> Other / Comments:		

## Dry Extended Detention Basin

\*Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and 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 outlet structure or the underlying soils. The specific cause of the drainage issue must be determined and corrected. If it is determined that the drainage of the basin relies on infiltration and the underlying native soils have been compacted or do not have the infiltration capacity expected, the [City Engineer] shall be contacted prior to any additional repairs or reconstruction.

\*\*If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, 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.