



Maintenance and Inspection of BMPs

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What This Class Covers

What we'll talk about:




- A City's responsibility with maintenance and inspection of stormwater controls.
- Options to make sure you are covering your responsibilities.

What we won't talk about:

- Details on how to maintain each BMP.
- Details on inspecting each BMP.




Post Construction Requirements

<u>Phase I</u>	<u>Phase II</u>
<div style="text-align: center;">  <p>Individual Permits</p> </div> <p>Will trend towards Phase II in the future </p> <p>Focus areas:</p> <ul style="list-style-type: none"> • Storm mapping • Construction waste • Public outreach 	<p>6 Requirements for all Phase IIs:</p> <ul style="list-style-type: none"> • Illicit discharge • Public Education • Public Involvement • Good Housekeeping • Post Construction Controls • Construction Site Controls <div style="text-align: right;">  </div>

Post Construction Requirements

Current Small MS4 Permit

- Must address runoff from new development and re-development of 1 acre or more
- Must ensure controls are in place that would prevent or minimize water quality impacts. The permittee shall:
 - Develop and implement strategies which include a combination of **structural and/or non-structural BMPs** appropriate for the community;
 - Use an ordinance or other regulatory mechanism to **address post-construction runoff** to the extent allowable by state and local law; and
 - Ensure adequate long-term **operation and maintenance of** BMPs.



Post Construction Requirements

Draft Small MS4 Permit

All permittees shall ensure the long-term operation and maintenance of structural stormwater control measures:

- The permittee shall require the owner or operator to develop and implement a maintenance plan addressing maintenance requirements for any structural control measures installed on site.
- The maintenance plan must be filed in the real property records of the county in which the property is located.
- The permittee shall require operation and maintenance performed is documented and retained on site and made available for review by the small MS4.



Post Construction Requirements

Draft Small MS4 Permit

Inspections – Permittees who operate level 4 small MS4s shall develop and implement an inspection program to ensure that all post construction stormwater control measures are operating correctly and are being maintained as required consistent with its applicable maintenance plan. For small MS4s with limited enforcement authority, this requirement applies to the structural controls owned and operated by the small MS4 or its contractors that perform these activities.

Inspection reports – The permittee shall document its inspection findings in an inspection report and make them available for review by the TCEQ.



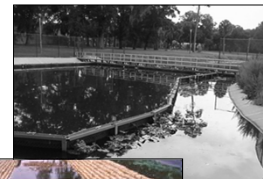
Post Construction Requirements

- Level 1: less than 10,000
- Level 2: 10,000 to 40,000 (also includes all non-traditional small MS4s)
- Level 3: 40,000 to 100,000
- Level 4: greater than 100,000



Post Construction Requirements

What is a Post Construction BMP?



Post Construction Requirements

Category	Integrated Stormwater Controls	Implementation Considerations			
		Residential Subdivision Use	High Density/Ultra Urban	Capital Cost	Maintenance Burden
Bioretention Areas	Bioretention Areas	✓	✓	Moderate	Low
Channels	Enhanced Swales	✓		High	Low
Chemical Treatment	Alum Treatment System	✓	✓	High	High
Detention	Detention, Dry	✓		Low	Moderate to High
	Detention, Extended Dry	✓		Low	Moderate to High
	Detention, Multi-purpose Areas	✓	✓	Low	Low
	Detention, Underground		✓	High	Moderate
Filtration	Filter Strips	✓		Low	Moderate
	Organic Filters		✓	High	High
	Planter Boxes		✓	Low	Moderate
	Sand Filters, Surface/Perimeter		✓	High	High
	Sand Filters, Underground		✓	High	High
Hydrodynamic Devices	Gravity (Oil-Grit) Separator		✓	High	High
Infiltration	Downspout Drywell	✓	✓	Low	Moderate
	Infiltration Trenches	✓	✓	High	High
	Soakage Trenches	✓	✓	High	High
Ponds	Wet Pond	✓		Low	Low
	Wet ED Pond	✓		Low	Low
	Micropool ED Pond	✓		Low	Moderate
Porous Surfaces	Multiple Ponds	✓		Low	Low
	Green Roof		✓	High	High
	Modular Porous Paver Systems		✓	Moderate	High
	Porous Concrete		✓	High	High
Proprietary Systems	Proprietary Systems ¹	✓	✓	High	High
Re-Use	Rain Barrels	✓	✓	Low	High
Wetlands	Wetlands, Stormwater	✓		Moderate	Moderate
	Wetlands, Submerged Gravel	✓	✓	Moderate	High

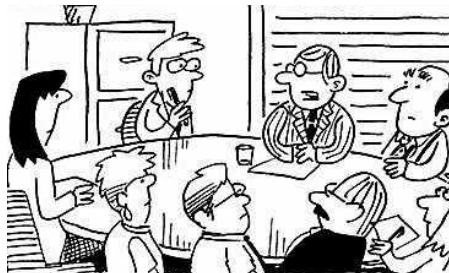
Maintenance Burden

- Low
- Moderate
- Moderate to High
- High



Why Worry About M&I?

Isn't this the developer/owner's problem?



"OK, all those in favour of delegating decision-making, shrug your shoulders"

- What about HOAs?
- Public areas and runoff
- How do you "ensure" long term operation and maintenance is being performed?



Why Worry About M&I?

Effects on City Staff

Inspection



Record Keeping



Engineering Department

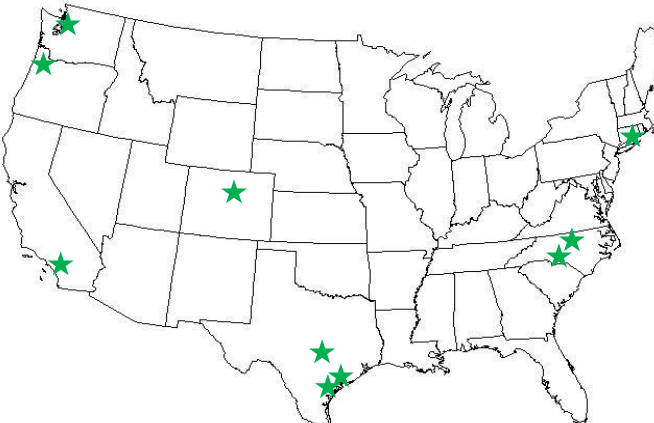


Issues to Consider


1. Private vs. Public Ownership
2. Construction Inspections
3. Operations and Maintenance
4. Waste Management
5. Inspection of Stormwater Controls
6. Appeals
7. Variances
8. Enforcement Actions



Jurisdiction Comparisons



- Austin, TX
- Houston, TX
- Brazoria County, TX
- Guilford County, NC
- Seymour, CT
- Westminster, CO
- Portland, OR
- Seattle, WA
- Charlotte, NC
- Irvine, CA




1. Private vs. Public Ownership

PRIVATE:

1. All controls shall be privately owned and maintained by the property owner or HOA

PUBLIC:

2. If the facility is located in a residential area without a HOA, the City will take ownership.
3. If the facility receives runoff from a public ROW, then it is owned and maintained by the City.
4. A developer may request the City to maintain a facility. If approved, the developer would have to contribute to a stormwater maintenance fund the sum of money equal to the estimated cost (with inflation) of 10-20 years of maintenance.
5. Facilities that will be under City maintenance must go thru a 2-year warranty period after construction with 4 periodic inspection reports within the 2-year period and must pass all inspections.



1. Private vs. Public Ownership

COMPARISON OF ORDINANCE LANGUAGE REGARDING: PRIVATE VS. PUBLIC OWNERSHIP										
Description	Texas			Nationwide						
	Austin	Houston	Brazoria County	Guilford County, NC	Seymour, CT	Westmins ter, CO	Portland, OR	Seattle, WA	Charlotte, NC	Irvine, CA
1 PRIVATE: All controls privately owned and maintained	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2 PUBLIC: If the facility is located in a residential area without HOA) the City will take ownership.	✓									
3 PUBLIC: If the facility receives runoff from a public ROW, then it is owned and maintained by the City.							✓		✓	
4 PUBLIC: A developer may request the City to maintain a facility. If approved, the developer would have to contribute to a stormwater maintenance fund the sum of money equal to the estimated cost (with inflation) of 10-20 years of maintenance.		✓								
5 PUBLIC: Facilities that will be under City maintenance must go thru a 2-year warranty period after construction with 4 periodic inspection reports within the 2-year period and must pass all inspections.									✓	

2. Construction Inspections


1. Use the standard construction inspections procedure (i.e. – no special requirements for controls)
2. Provide specific, minimum inspection requirements within the water quality ordinance.
3. Require periodic inspections during construction at times specified ranging from once every 14 days to once during the rainy season.



2. Construction Inspections

COMPARISON OF ORDINANCE LANGUAGE REGARDING: CONSTRUCTION INSPECTIONS

Description	Texas			Nationwide						
	Austin	Houston	Brazoria County	Gulfport County, NC	Seymour, CT	Westminster, CO	Portland, OR	Seattle, WA	Charlotte, NC	Irvine, CA
1 Use the standard construction Inspections procedure		✓		✓		✓	✓	✓		
2 Provide specific, minimum inspection requirements within the water quality ordinance					✓				✓	
3 Require periodic inspections during construction at specified times ranging from once every 14 days to once during the rainy season			✓						✓	✓



3. Operations and Maintenance

1. O&M plan is required with the final plat detailing the responsible party, maintenance requirements, and method to provide maintenance funding.
2. An Operations and Maintenance template or standard form may be provided by the City or other entity.
3. An annual permit or inspection report is required for each control. A maintenance form or inspection report is provided.
4. Maintenance logs are required to be kept on site and made available to the City when requested.



3. Operations and Maintenance

COMPARISON OF ORDINANCE LANGUAGE REGARDING: OPERATIONS AND MAINTENANCE

Description	Texas			Nationwide						
	Austin	Houston	Brazoria County	Gulfport County, NC	Seymour, CT	Westminster, CO	Portland, OR	Seattle, WA	Charlotte, NC	Irvine, CA
1 O&M plan is required with the final plat detailing the responsible party, maintenance requirements, and method to provide maintenance funding.		✓	✓		✓		✓		✓	✓
2 An Operations and Maintenance template or standard form may be provided by the City or other entity				✓		✓	✓	✓		
3 An annual permit or inspection report is required for each control. A maintenance form or inspection report is provided.	✓									
4 Maintenance logs are required to be kept on site and made available to the City when requested.							✓			

3. Operations and Maintenance

iSWM Tables on Maintenance

Activity	Schedule
<ul style="list-style-type: none"> Pruning and weeding to maintain appearance. Mulch replacement when erosion is evident. Remove trash and debris. 	As needed
<ul style="list-style-type: none"> Inspect inflow points for clogging (off-line systems). Remove any sediment. Inspect filter strip/grass channel for erosion or gullyng. Re-seed or sod as necessary. Trees and shrubs should be inspected to evaluate their health and remove any dead or severely diseased vegetation. 	Semi-annually
<ul style="list-style-type: none"> The planting soils should be tested for pH to establish acidic levels. If the pH is below 5.2, limestone should be applied. If the pH is above 7.0 to 8.0, then iron sulfate plus sulfur can be added to reduce the pH. 	Annually
<ul style="list-style-type: none"> Replace mulch over the entire area. Replace pea gravel diaphragm if warranted (or when the voids are obviously filled with sediment and water is no longer infiltrating). 	2 to 3 years

(Source: EPA, 1999)

4. Waste Management

No ordinances reviewed contained waste management requirements.

Option could be to follow standard waste removal and disposal requirements if testing shows high levels of toxins.



5. Inspection of Stormwater Controls

PRIVATE INSPECTIONS

1. The City may provide or reference sample inspection checklists for each stormwater control
2. A professional engineer or landscape architect shall perform the inspection at a defined interval, typically once a year
3. Documentation of inspections must be kept and made available to the City upon request and/or upon completion of the inspection
4. Inspection intervals are quarterly for the first 2 years, twice a year thereafter, and within 48 hours of a major rainfall event
5. The City reserves the right to inspect and enforce maintenance as required

CITY INSPECTIONS

1. The City will inspect the stormwater control at an interval of every 1 to 3 years
2. If a project fails inspection, owner is notified to correct the issue and is charged a re-inspection fee.



5. Inspection of Stormwater Controls		INSPECTIONS OF STORMWATER CONTROLS									
COMPARISON OF ORDINANCE LANGUAGE REGARDING:		INSPECTIONS OF STORMWATER CONTROLS									
Description	Texas			Nationwide							
	Austin	Houston	Brazoria County	Gulfport County, NC	Seymour, CT	Westmins ter, CO	Portland, OR	Seattle, WA	Charlotte, NC	Irvine, CA	
Private Inspections											
1	The City may provide or reference sample inspection checklists for each stormwater control	✓									✓
2	A professional engineer or landscape architect shall perform the inspection at a defined interval, typically once a year	✓									✓
3	Documentation of inspections must be kept and made available to the City upon request and/or upon completion of the inspection				✓						
4	Inspection intervals are quarterly for the first 2 years, twice a year thereafter, and within 48 hours of a major rainfall event							✓			
5	The City reserves the right to inspect and enforce maintenance as required	✓		✓			✓	✓	✓	✓	✓
Public Inspections											
1	The City will inspect the stormwater control at an interval of every 1 to 3 years	✓				✓					✓
2	If a project fails inspection, the owner is notified to fix the problem and is charged a re-inspection fee	✓									✓

5. Inspection of Stormwater Controls		1. Bioretention/Planter Box Inspection and Maintenance Checklist				
<p>Example of City Provided Inspection Checklists: Santa Barbara, CA</p>	<p>Date: _____ Work Order # _____</p> <p>Type of Inspection: <input type="checkbox"/> post-storm <input type="checkbox"/> annual <input type="checkbox"/> routine <input type="checkbox"/> post-wet season <input type="checkbox"/> pre-wet season</p> <p>Facility: _____ Inspector(s): _____</p>					
	Defect	Conditions When Maintenance Is Needed	Inspection Result (0, 1, or 2)*	Date Maintenance Performed	Comments or Action(s) Taken to Resolve Issue	
Appearance	Untidy					
Trash and Debris Accumulation	Trash, plant litter and dead leaves accumulated on surface.					
Vegetation	Unhealthy plants and appearance.					
Irrigation	Functioning incorrectly (if applicable).					
Inlet	Inlet pipe blocked or impeded.					
Splash Blocks	Blocks or pads correctly positioned to prevent erosion.					
Overflow	Overflow pipe blocked or broken.					
Filter media	Infiltration design rate is met (e.g., drains 36-48 hours after moderate - large storm event).					
<p><small>*Maintenance: Enter 0 if satisfactory, 1 if maintenance is needed and include WOI#, Enter 2 if maintenance was performed same day.</small></p>						

6. Appeals

1. Use the City's standard appeals process.
2. Present appeal to group or person designated to hear appeals regarding stormwater controls.
3. Submit a written request to appeal within 10-30 days following notification.



6. Appeals

COMPARISON OF ORDINANCE LANGUAGE REGARDING:		APPEALS								
Description	Texas			Nationwide						
	Austin	Houston	Brazoria County	Guilford County, NC	Seymour, CT	Westminster, CO	Portland, OR	Seattle, WA	Charlotte, NC	Irvine, CA
1 Using the City's standard appeals process					✓			✓		✓
2 Present appeal to a designated informed person/director or group chosen to hear appeals regarding stormwater controls	✓						✓		✓	
3 Submitted a written request to appeal within 10-30 days following notification		✓	✓	✓		✓			✓	



7. Variances

1. Variances must show that the water quality will not be impacted by the variance and that the intent of the ordinance is met
2. Use standard variance procedure
3. Variances may be reviewed by a designated committee that reviews the variance and submits a recommendation to the determining entity
4. Have a path for minor variances that may be granted by one person and major variances that require the approval of a committee or department
5. If full implementation is not feasible, then the applicant may participate in off-site facilities development by contributing \$2.00-\$4.00 per square foot of unmanaged impervious surface
6. Standards for granted variances are listed as unnecessary hardship, peculiar property conditions, or variance is consistent with the spirit, purpose, and intent of the ordinance.



COMPARISON OF ORDINANCE LANGUAGE REGARDING:		VARIANCES									
Description	Texas			Nationwide							
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1	Variances must show that the water quality will not be impacted by the variance and that the intent of the ordinance is met										
2	Use standard variance procedure										
3	Variances may be reviewed by a designated committee that reviews the variance and submits a recommendation to the determining entity										
4	Have a path for minor variances that may be granted by one person and major variances that require the approval of a committee or department										
5	If full implementation is not feasible, then the applicant may participate in off-site facilities development by contributing \$2.00-\$4.00 per square foot of unmanaged impervious surface										
6	Standards for granted variances are listed as unnecessary hardship, peculiar property conditions, or variance is consistent with the spirit, purpose, and intent of the ordinance.										

8. Enforcement Actions

1. The City can suspend a permit, site plan, and certificate of occupancy, right-of-way use, or variances.
2. The owner is subject to fines of an amount ranging from \$300 to \$5,000 per violation per day.



8. Enforcement Actions

COMPARISON OF ORDINANCE LANGUAGE REGARDING:

ENFORCEMENT

Description	Texas			Nationwide						
	Austin	Houston	Brazoria County	Guilford County, NC	Seymour, CT	Westminster, CO	Portland, OR	Seattle, WA	Charlotte, NC	Irvine, CA
1 The City can suspend a permit, site plan, plat recordation, utility connections, certificate of occupancy, right-of-way use, or variances.	✓	✓								✓
2 The owner is subject to fines of an amount ranging from \$300 to \$5,000 per violation per day				✓	✓	✓	✓	✓	✓	✓



In Summary

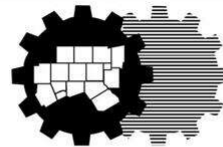
- Lots of choices and decisions to make.
- Additional work may be involved:
 - City specific maintenance requirements?
 - City specific inspection forms?
- Discuss with City Staff team members
- Make choices that fit your City



QUESTIONS?

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