

# **Watershed Protection Ordinance (WPO) Phase 2**

## **Stakeholder Meeting:**

# **Porous Pavement, Artificial Turf, and Rainwater Harvesting**

**March 21, 2014**

# Agenda

- **Porous Pavement**
  - Water quality credit
  - Flood detention
- **Artificial Turf**
  - Brief summary of policy
- **Rainwater Harvesting (RWH)**
  - RWH for conservation & water quality
  - RWH with green roof irrigation
  - RWH and Impervious Cover Determination
- **Wrap-up/Next meetings**

# Porous Pavement Proposal

## for 4<sup>th</sup> Quarter ECM Submittal (Fall 2014)

- Expand ECM criteria to allow water quality credit for porous pavement for non-pedestrian surfaces
- Limited to privately maintained facilities
  - Yes: private parking lots, driveways, streets and alleys
  - No: public roads and public sidewalks
- Cannot propose over karst/recharge zone or certain “hot spot” land uses (e.g., gas stations, etc.)
  - OK on “hot spot” site, just not in area drained by hot spot use
- Acceptable systems: interlocking concrete pavement and porous asphalt for both vehicular & pedestrian surfaces; porous concrete for pedestrian surfaces only

# Proposed ECM Design Info for Porous Pavement

## Water Quality Applications

- Require 5 inches gravel thickness
  - Accommodates “half-inch-plus” water quality volume sizing
  - Addresses loss volume via sedimentation
- Must show captured water infiltrates into underlying soil within 48 hours
- City pond inspectors to inspect every 3 years (per standard cycle like other controls)

# Proposed ECM Design Info for Porous Pavement

## On-Site Testing

- Essential to test on-site conditions:
  1. Prior to design proposal to determine infiltration rates
  2. During construction to confirm design infiltration rates have been maintained (prior to placement of gravel & pavement)
- Must have minimum 12 inches soil above bedrock and 3 feet above water table
  - If not accounted for, groundwater can fill the water quality volume, creating more bypasses of stormwater

# Porous Pavement & Flood Mitigation

## **Flood Detention for Water Quality design (5-inch gravel)**

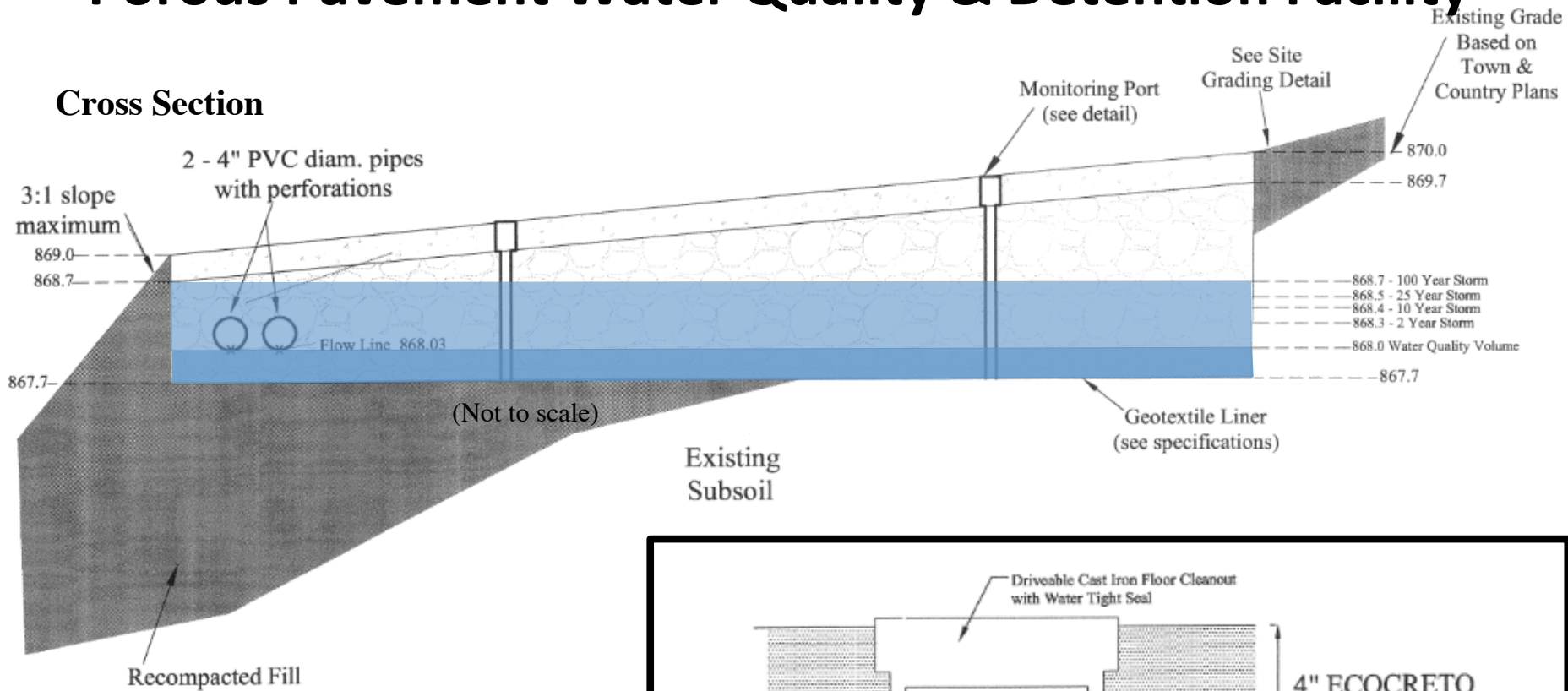
- Same as sedimentation-sand filter methodology:  
Quick Sheet (credit for volume provided after 24 hours)
- Surface assumed to be impervious for Curve Number (CN) since effectively impervious after WQ volume fills
- If want both Water Quality credit and flood detention, must provide stacked volumes for each with appropriately placed outlet for detention

# Porous Pavement & Flood Mitigation

## Stand-Alone Flood Detention Systems

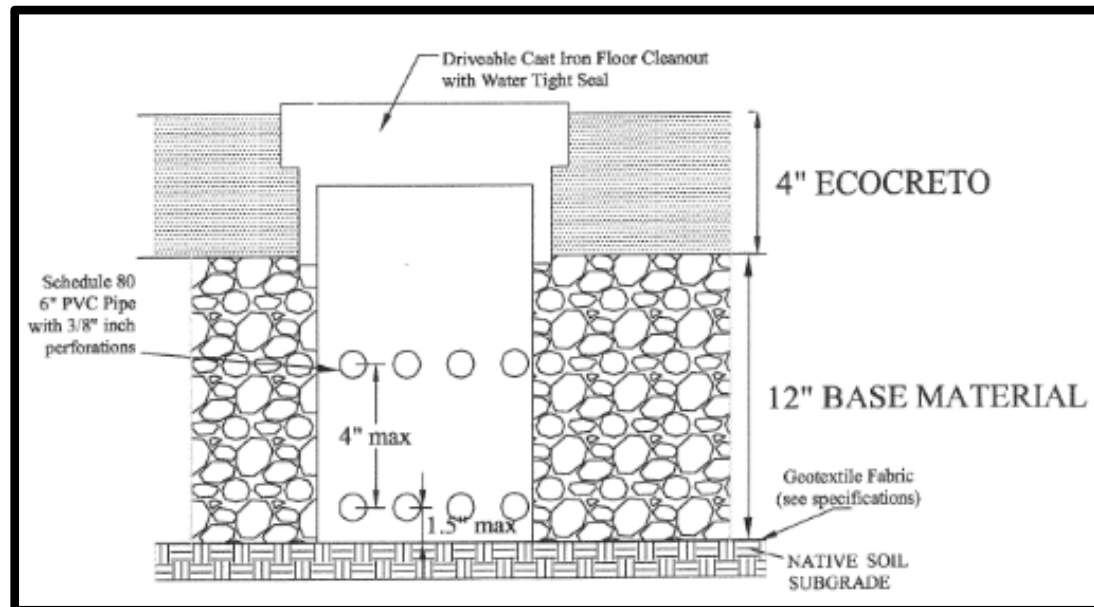
- Provide flood storage in rock below pavement similar to water quality applications
- Must provide monitoring port
- Must provide annual 3<sup>rd</sup> party inspection (like other subsurface ponds)
- Must provide extra storage for sedimentation

# Town & Country Optimist Club Parking Lot: Porous Pavement Water Quality & Detention Facility



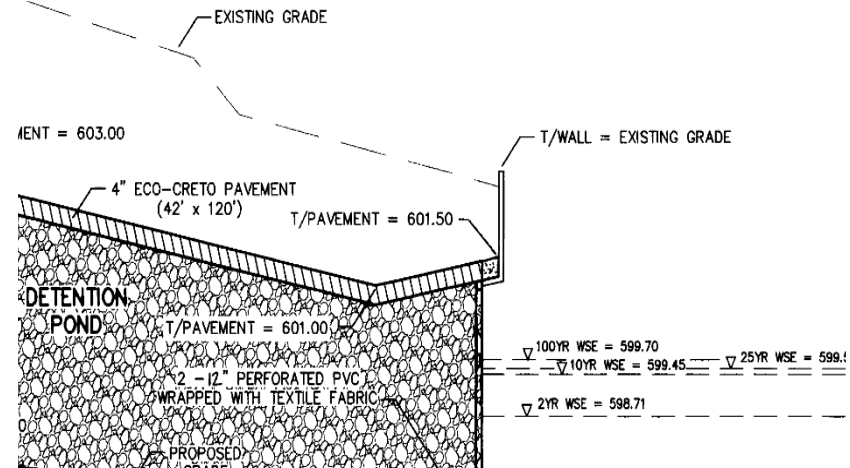
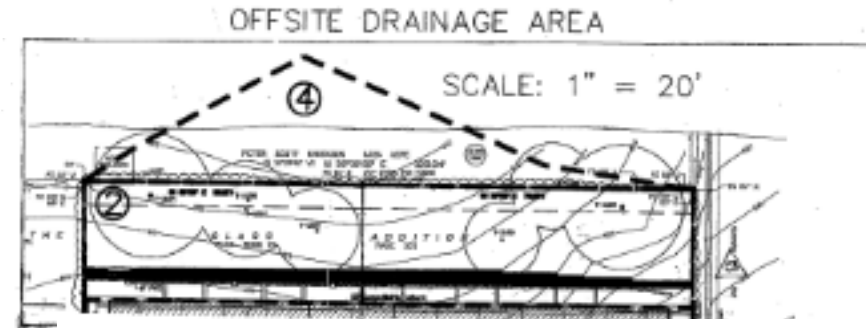
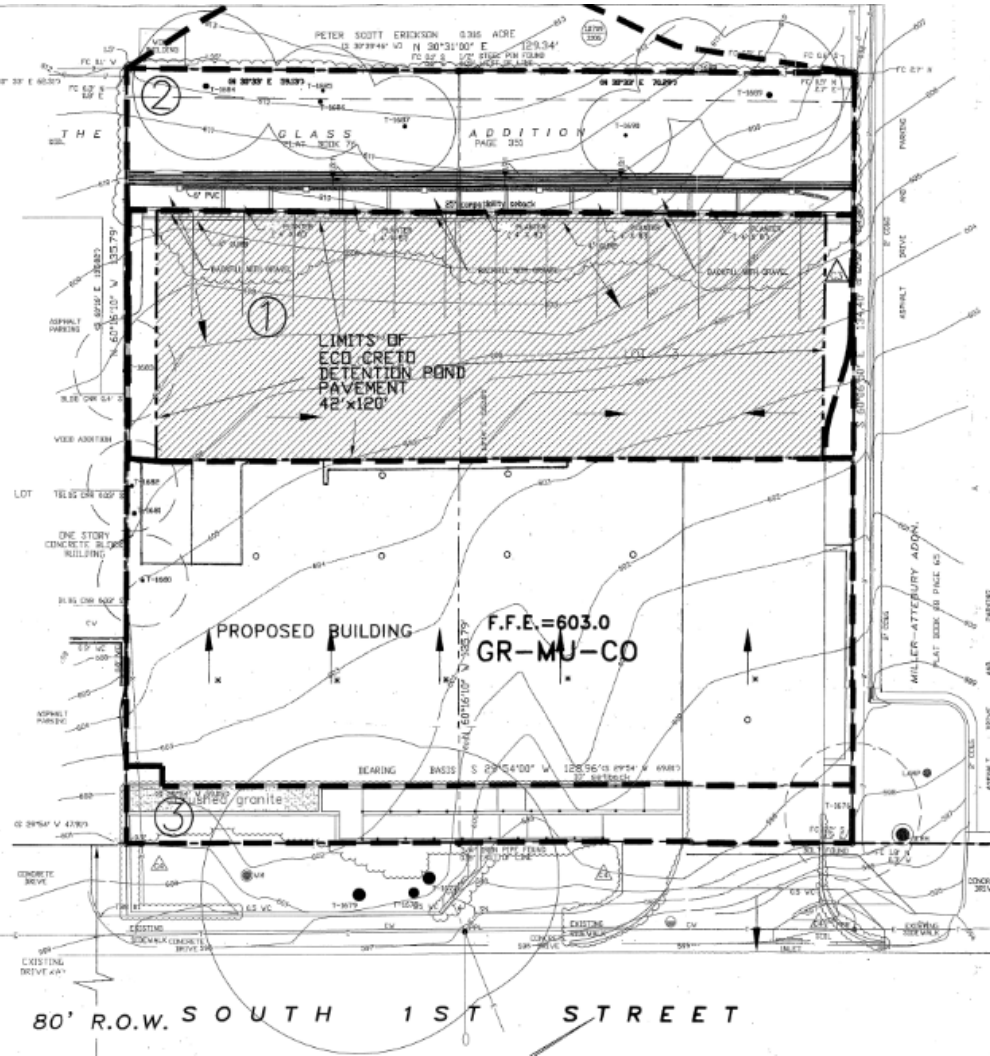
Detention Storage and Peak Flow Limits Summary

Storm Event	Peak Flow Allowable (cfs)	Peak Flow Discharge (cfs)	Volume Required (ft <sup>3</sup> )	Base Material Required for Storage (ft)	Volume Provided in 8 inches of Base (ft <sup>3</sup> )
2-Yr.	2.89	1.69	10,307	0.22	30,749
10-Yr.	4.77	2.88	17,624	0.38	30,749
25-Yr.	6.10	3.66	22,413	0.49	30,749
100-Yr.	8.87	4.89	29,895	0.65	30,749





# Moon Units Condominiums: Porous Pavement Detention Facility



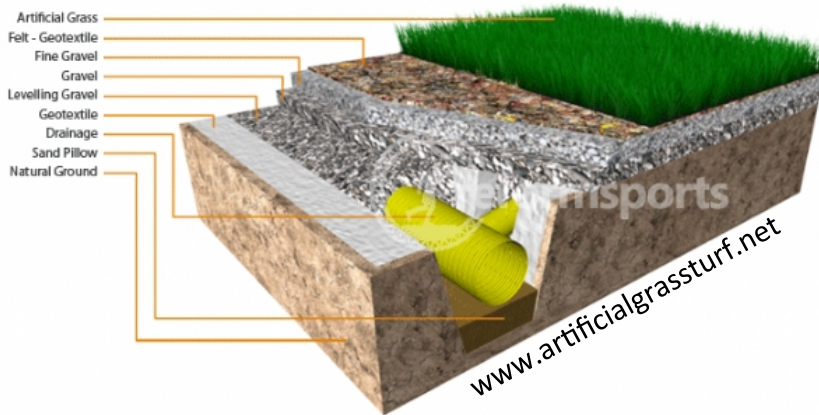
## HYDROLOGIC SUMMARY

Area Name	EXISTING		PROPOSED			
	1, 2 & 3 COMB.	1 TO POND	2 & 3 BYPASS	POND OUTFALL	W.S.E.	BYPASS AREAS 2, 3 & POND OUTFALL COMBINED
Drainage Area (ac)	0.40	0.30	0.10			
CN #	65	98	76			
% Imperv.	0	100	10			
Tc (hrs)	0.083	0.083	0.083			
Lag Time (hrs)	0.050	0.050	0.050			
2 year Discharge (cfs)	0.25	1.54	0.18	0.08	598.71	0.24
10 year Discharge (cfs)	0.90	2.13	0.38	0.19	599.45	0.46
25 year Discharge (cfs)	1.26	2.56	0.51	0.66	599.55	0.82
100 year Discharge (cfs)	1.99	3.00	0.69	1.55	599.70	1.93

# Artificial Turf



Example cross sections



Tony Burger Center, Austin, Texas  
(from Google Maps)

# Artificial Turf Proposal

## **Artificial turf considered impervious**

No water quality credit: need to provide water quality controls

Pollutant levels too high

Can receive flood mitigation credit: applicant must demonstrate peak flow reduction

# Rainwater Harvesting

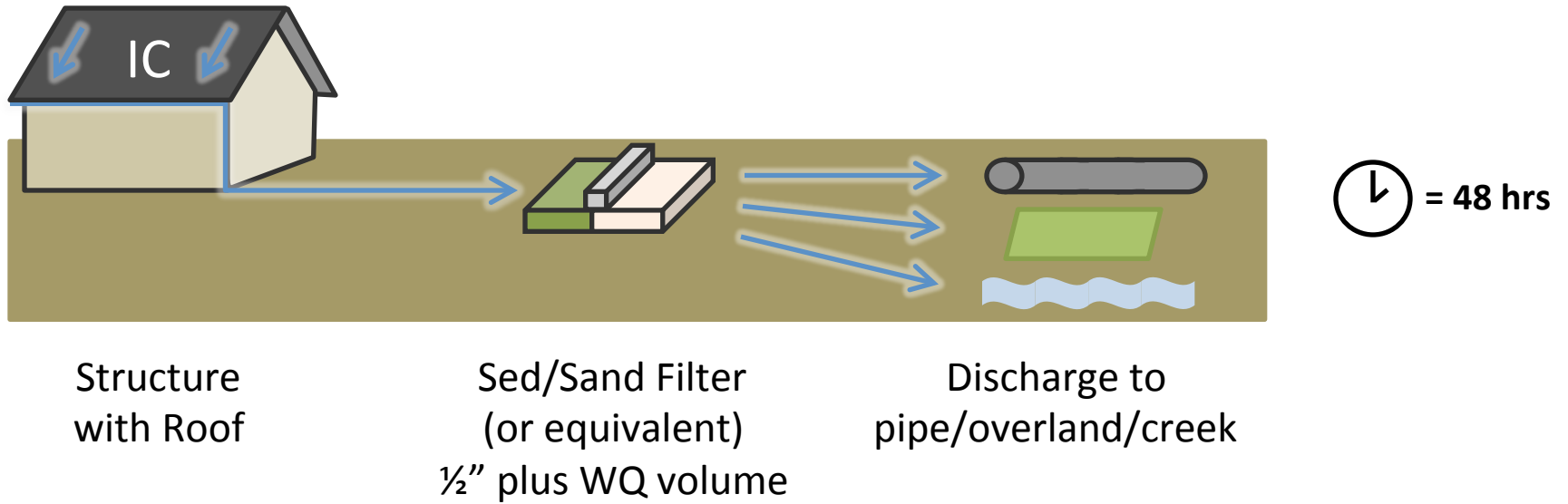
Insert photos & captions

# Rainwater Harvesting for Water Quality and Conservation

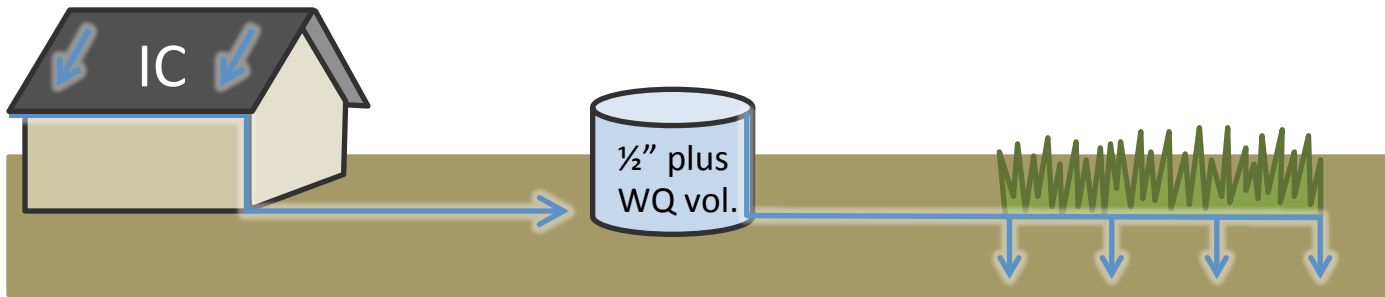
Staff proposal:

- Develop ECM criteria and spreadsheet calculator to demonstrate “equivalency” of rainwater systems with standard water quality controls
  - Flexibility to release water from tanks longer than allowed under existing criteria (5 days) for greater conservation
  - Cannot receive flood detention credit since cannot assure required storage is available
- Explain additional options in ECM, e.g., installation of second, separate tank for water conservation.

# Standard Water Quality (WQ) Compliance



# Current ECM Criteria: Rainwater Harvesting (RWH)




Structure  
with Roof

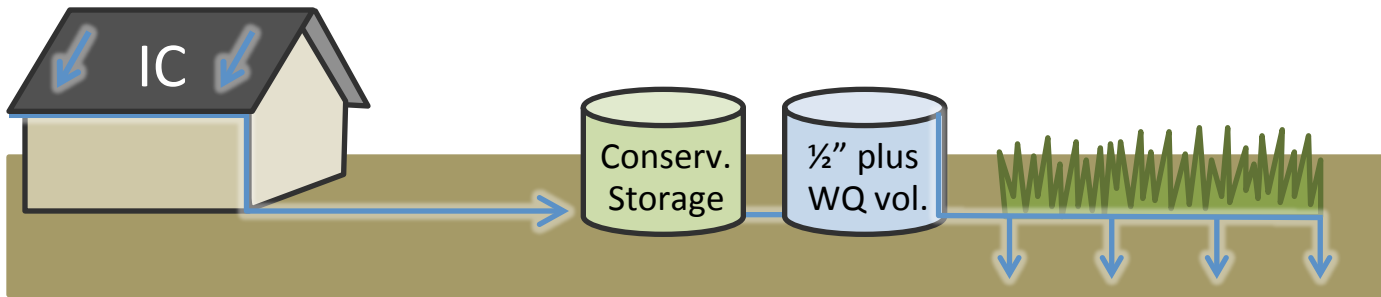
RWH Tank  
½" plus WQ volume

Discharge  
via infiltration

Discharge tank in:

 < 48 hrs

# Existing Criteria to Add Conservation Storage




Structure  
with Roof

RWH Tank  
1/2" plus WQ volume  
+ Conservation Storage

Discharge  
via infiltration

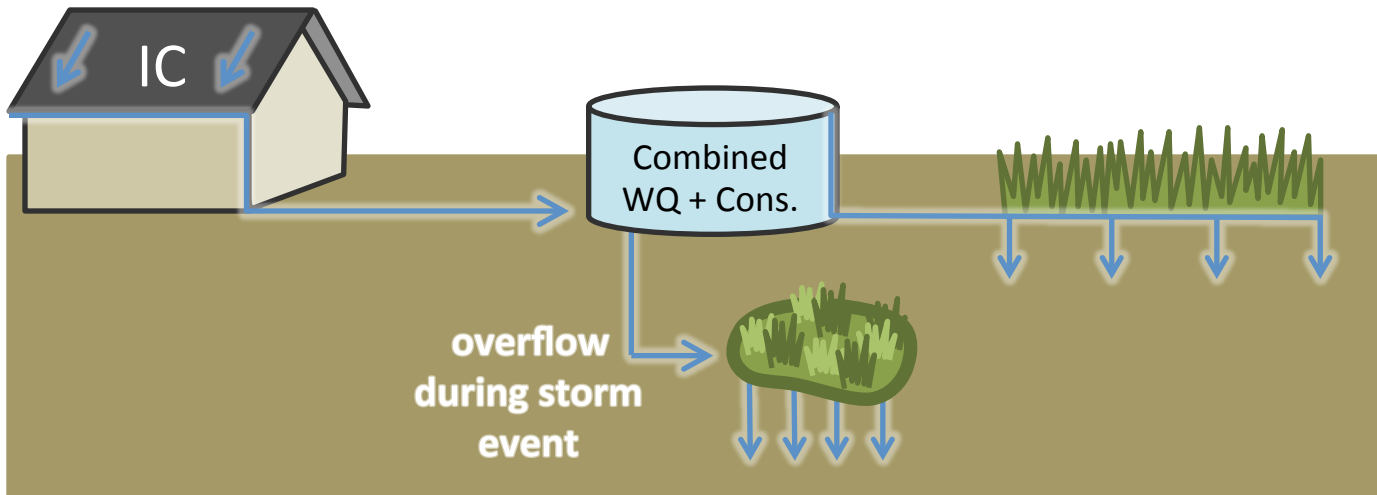
Discharge tank in:

 < 48 hrs

 As needed



# New Option to Combine WQ & Conservation Storage



Discharge tank in:



As needed

Structure  
with Roof

RWH Combo Tank  
 $\frac{1}{2}$ " plus WQ volume  
+ Conservation Storage

Discharge  
via infiltration

Rain Garden if needed  
(if avg. annual capture < sand filter baseline)

# Rainwater Harvesting + Green Roof Irrigation

- *Options to use green roofs for stormwater control exist now but are not widely known and lack ECM & DCM criteria*

Staff proposal:

- Add ECM option to treat water with rainwater harvesting (storage) & green roof (irrigation). Applicant must consider:
  - Storage of water quality volume;
  - Application rate and drawdown time;
  - Infiltration rate of green roof;
  - Other factors such as ET, flow-back to tank, etc. to show how water moves through and out of the system.
  - Plan to frame in simplified text for 4<sup>th</sup> Quarter ECM; expand later
- Add DCM consideration for rooftop detention
  - Will be very similar to parking lot detention

# Rainwater Harvesting & Impervious Cover Determination

- *Are rainwater harvesting systems given impervious cover credits for tank and/or catchment areas?*

Staff proposal:

- WPO/code: water quality controls don't count against impervious cover limits. So rainwater tank footprints are counted as pervious
  - Discuss conservation-only systems
  - Note: some systems capture water from lid (via drains) to tank
- Staff does not support counting the drainage catchment area as pervious

# WPO Phase 2 Schedule, 2014

<b>Phase 2 Kickoff</b>	<b>Jan. 22</b>
<b>Perviousness: Introduction</b>	<b>Feb. 21</b>
<b>Perviousness: Porous Pavement (part 1)</b>	<b>Mar.07</b>
<b>Porous Pavement (part 2), Artificial Turf &amp; Rainwater Harvesting</b> <ul style="list-style-type: none"><li>• Porous pavement: conclusion</li><li>• Rainwater harvesting options (conservation storage, green roofs, etc.)</li></ul>	<b>Mar.21</b>
<b>Rain Gardens for Single-Family Residential</b>	<b>Apr. 04</b>
<b>Beneficial Use of Stormwater: Potential Policy Approaches</b>	
<b>Introduction/National Examples</b>	<b>Apr. 18</b>
<b>Conclusion</b>	<b>May 02</b>
<b>Next Steps</b>	<b>TBD</b>

# Contact Information

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# Artificial Turf Benefits

➤ *Artificial turf differs from a conventional, pervious athletic field in fundamental ways, such as:*

- Permits rainfall to pass through into substrate
- Offers temporary storage for detention

→ **Thus rationale for potentially giving stormwater credit**

Other non-stormwater benefits:

- Water conservation
- Higher durability/allows more frequent use
- No fertilizers, pesticides, herbicides needed (but runoff can still contain pollutants from components)

# Why Artificial Turf Does Not Address Many Pervious Cover Functions

- *Artificial turf does not perform well as actual pervious cover for other functions:*
    - Displaces vegetation and related benefits & functions
    - Higher surface temperature than vegetation (heat island impacts)
    - Does not address urban design, aesthetics, etc.
    - Does not fully mitigate hydrologic impacts of impervious cover (i.e., water quality and groundwater connectivity due to liners)
- **Thus rationale for not giving impervious cover credit**