



**Proposed Changes to Environmental Criteria Manual
(ECM) Section 1.6.9: Guidance for Compliance with
Technical Requirements of the SOS Ordinance**

**Mike Kelly
City of Austin
Watershed Protection Department
Watershed Protection Ordinance Meeting
June 13, 2014**

Photo By Treye Rice
www.treyerice.com/



Agenda

- Proposed Environmental Criteria Manual (ECM) Changes for **Section 1.6.9: SOS Ordinance Technical Requirements** (90 minutes)
- Break (10 minutes)
- Update on **New Option Proposed for Rain Gardens for Single-Family Residential Subdivisions** (15 minutes)
- Next steps (5 minutes)



Key Changes to ECM 1.6.9

1. Introducing Stormwater Control Measures
2. Emphasizing the load-based approach
3. Pre-approved controls in the Barton Springs Zone
4. Update data tables
5. Update the pollutants list
6. Implications of updates
7. Provide guidance for acceptance of alternative controls
8. Introduce the Stormwater Load Analysis Tool (SLAT)

1. Introducing Stormwater Control Measures

- Terminology of “Best Management Practice” is broad and charged
- For Austin’s engineered structural or non-structural systems, use:
Stormwater Control Measure (SCM)

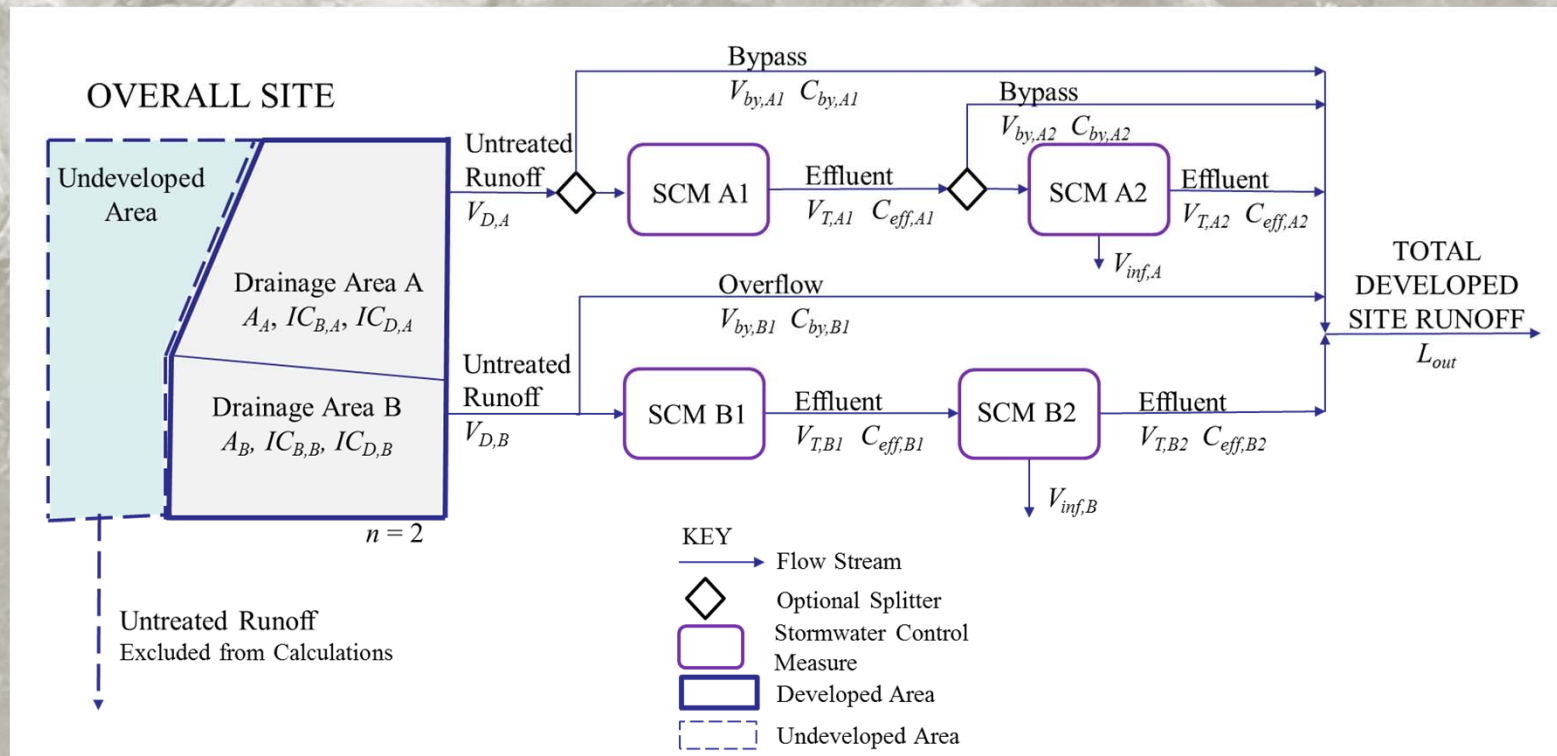


Photo: Knox County Conservation District

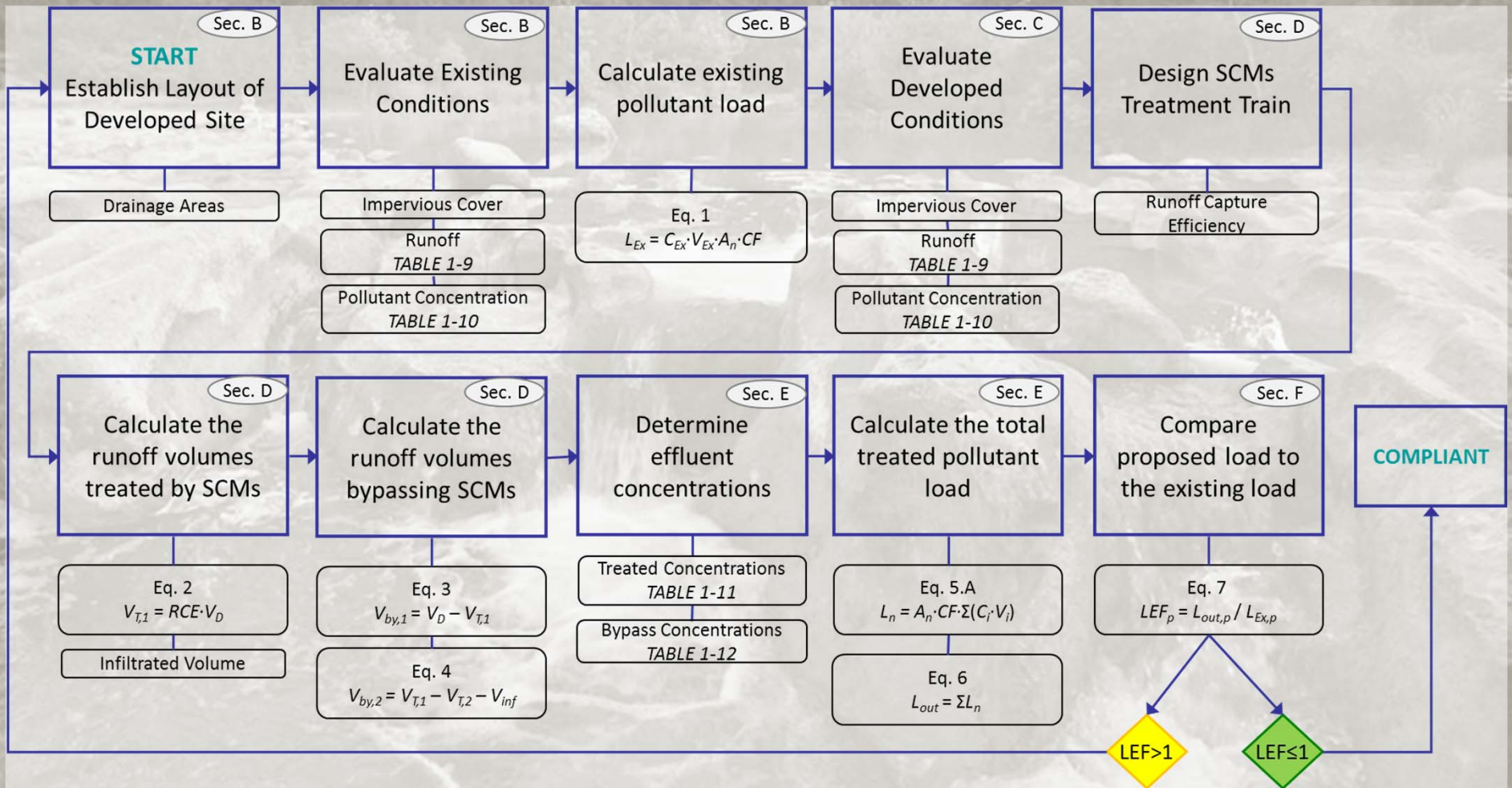
2. Emphasizing the Load-Based Approach

- Updating the calculation procedure
- ~~Removal efficiency~~ → Effluent concentration
- No prescribed water quality volume

Example site with treatment trains and calculation variables

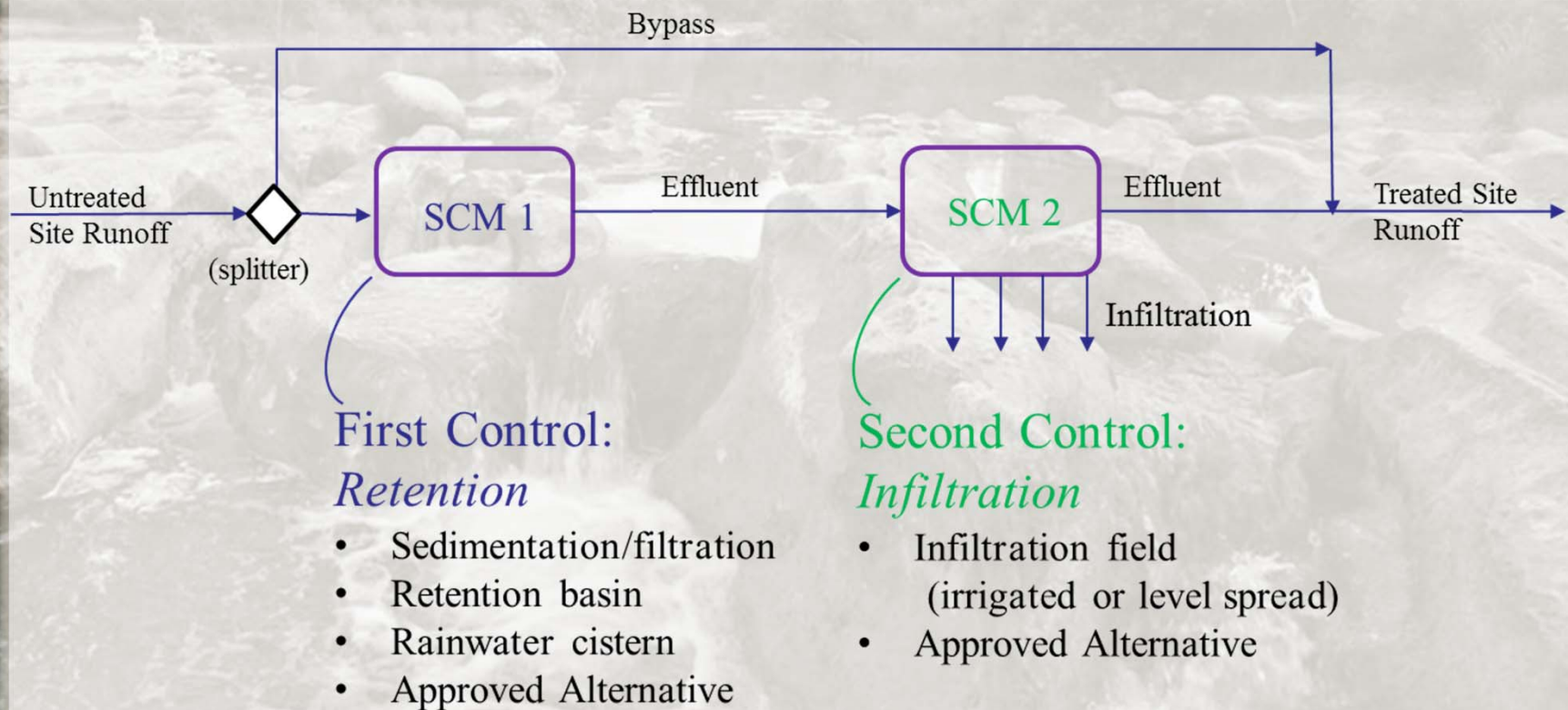


2. Emphasizing the Load-Based Approach



Proposed Calculation Procedure

3. Pre-Approved Controls in Barton Springs Zone



4. Update Data Tables

Updated Table 1-9

Impervious Cover, IC (%)	Runoff-Rainfall Ratio, R_v	Depression Storage, S_d (in)	Annual Number of Runoff Events, θ	Annual Runoff, V (in/yr)
0	0.064	0.218	46.0	1.18
10	0.136	0.180	50.6	2.76
20	0.208	0.148	54.8	4.55
30	0.279	0.122	58.5	6.54
40	0.351	0.100	61.8	8.67
50	0.423	0.082	64.6	10.9
60	0.494	0.068	66.9	13.2
70	0.566	0.056	69.0	15.6
80	0.637	0.046	70.7	18.0
90	0.709	0.038	72.2	20.5
100	0.781	0.031	73.4	22.9
Austin Total	--	--	79.3	31.7

Updated Table 1-10

Pollutant, i		Pollutant Concentration, C_{Ex} or C_D	
		A Site Contains Development ($IC \geq 0\%$)	B Site Completely Undeveloped ($IC = 0\%$)
COD	mg/L	$= 38.9 + 66.6 \cdot IC$	38.9
E. coli	CFU/100 mL	25000	8370
Pb	mg/L	$= 0.00428 \cdot \exp(2.42 \cdot IC)$	0.00428
TN	mg/L	2.22	1.19
TP	mg/L	0.396	0.124
TSS	mg/L	166	166
Zn	mg/L	$= 0.0236 \cdot \exp(2.18 \cdot IC)$	0.0236

4. Update Data Tables

New Table 1-11: Effluent Concentrations for Approved SCMs

Pollutant	Unit	C_{eff}					
		Infiltration Field		Retention Basin	Rainwater Harvesting	Sedimentation/ Filtration	Approved Alternative SCM
		Non-Infiltrated Fraction	Infiltrated Fraction				
COD	mg/L	$= \min (C_{D,COD}, C_{eff-1,COD})$	38.90	43.79	43.79	22.40	Applicant Provided
EC	CFU/100 mL	$= \min (C_{D,Ecol}, C_{eff-1,Ecol})$	8370.	11070	11070	4895	Applicant Provided
Pb	mg/L	$= \min (C_{D,Pb}, C_{eff-1,Pb})$	0.00428	.00831	.00831	.00574	Applicant Provided
TN	mg/L	$= \min (C_{D,TN}, C_{eff-1,TN})$	1.19	1.42	1.42	1.07	Applicant Provided
TP	mg/L	$= \min (C_{D,TP}, C_{eff-1,TP})$	0.124	0.224	0.224	.0990	Applicant Provided
TSS	mg/L	$= \min (C_{D,TSS}, C_{eff-1,TSS})$	166	134	134	20.6	Applicant Provided
Zn	mg/L	$= \min (C_{D,Zn}, C_{eff-1,Zn})$	0.0236	.0453	.0453	.0230	Applicant Provided

4. Update Data Tables

New Table 1-12: Bypass Concentrations

Pollutant	Unit	SCM 1 Bypass Concentration, $C_{by,1}$		SCM 2 Bypass Concentration, $C_{by,2}$
		Offline Control	Online Control	
COD	mg/L	$= \exp[4.493-0.510(WQV)]$	$= \exp[4.916-0.545(WQV)]$	$= C_{eff-1}$, Table 1-11
EC	CFU/100 mL	$= \exp[10.18-0.465(WQV)]$	$= \exp[10.79-0.624(WQV)]$	$= C_{eff-1}$, Table 1-11
Pb	mg/L	$= 0.001 \cdot \exp[2.882- 0.489(WQV)]$	$= 0.001 \cdot \exp[3.522- 0.529(WQV)]$	$= C_{eff-1}$, Table 1-11
TN	mg/L	$= \exp[0.957-0.267(WQV)]$	$= \exp[1.322-0.236(WQV)]$	$= C_{eff-1}$, Table 1-11
TP	mg/L	$= \exp[-0.613-0.469(WQV)]$	$= \exp[-0.223-0.400(WQV)]$	$= C_{eff-1}$, Table 1-11
TSS	mg/L	$= \exp[5.290-0.934(WQV)]$	$= \exp[5.862-0.765 (WQV)]$	$= C_{eff-1}$, Table 1-11
Zn	mg/L	$= 0.001 \cdot \exp[4.610- 0.442(WQV)]$	$= 0.001 \cdot \exp[5.200- 0.531(WQV)]$	$= C_{eff-1}$, Table 1-11

5. Update the Pollutants List

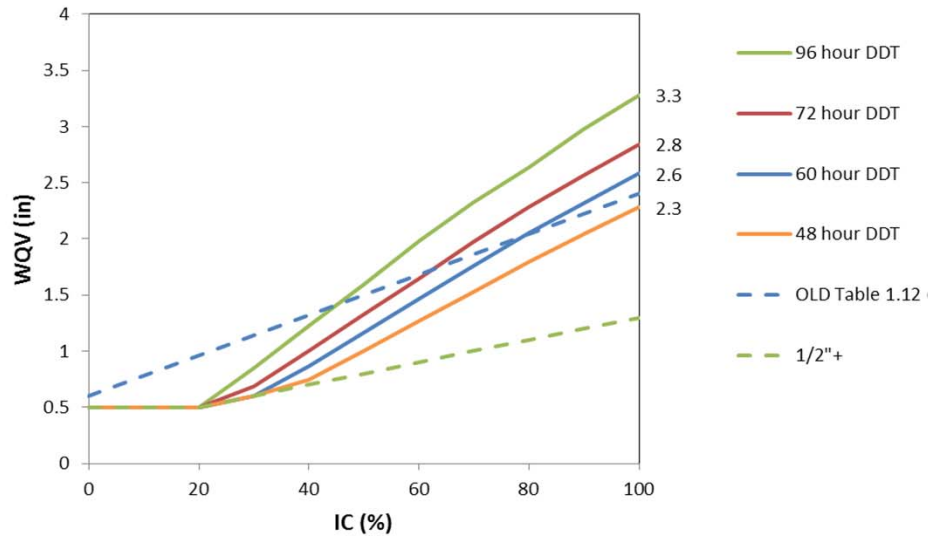
(Pollutants for load calculations only)

NEW LIST	OLD LIST
E. coli [added ¹]	Fecal Coliform [deleted ¹] Fecal Streptococci [deleted ¹]
Chemical Oxygen Demand	Chemical Oxygen Demand
Total Lead	Total Lead
Total Nitrogen	Total Nitrogen
Total Phosphorus	Total Phosphorus
Total Suspended Solids	Total Suspended Solids
Total Zinc [substitute]	Cadmium [substituted]
	Biochemical Oxygen Demand [deleted ¹]
	Total Organic Carbon [deleted ²]

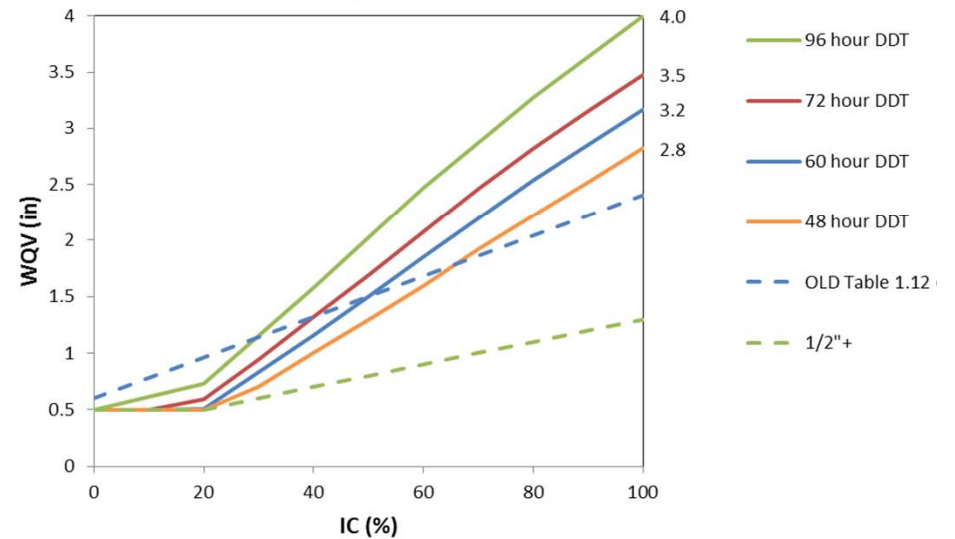
1. Code already changed
2. Will require a code change

6. Implications of Updates

**Minimum Water Quality Volume Comparison
(Off-Line Control)**

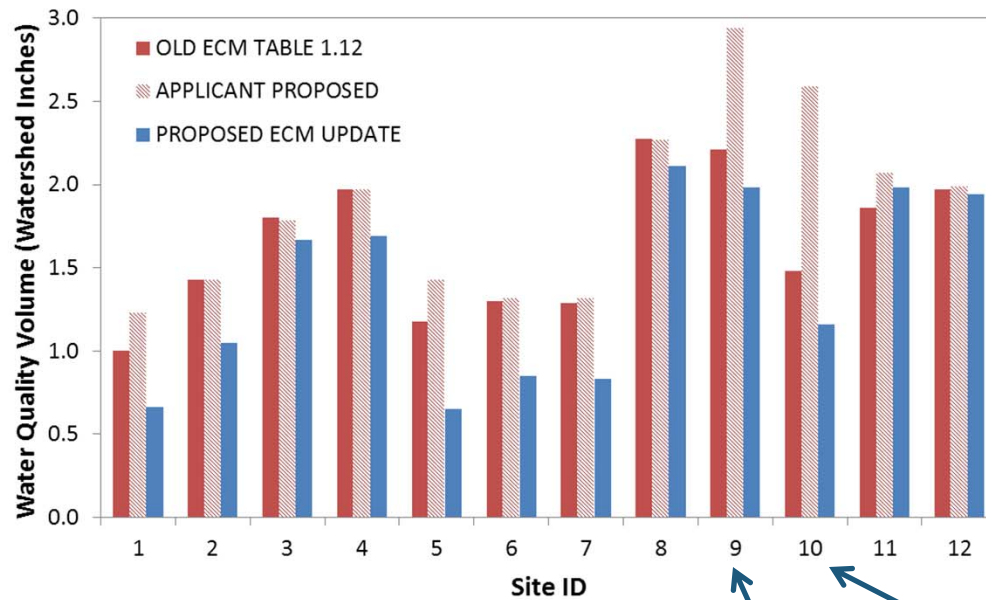


**Minimum Water Quality Volume Comparison
(On-Line Control)**

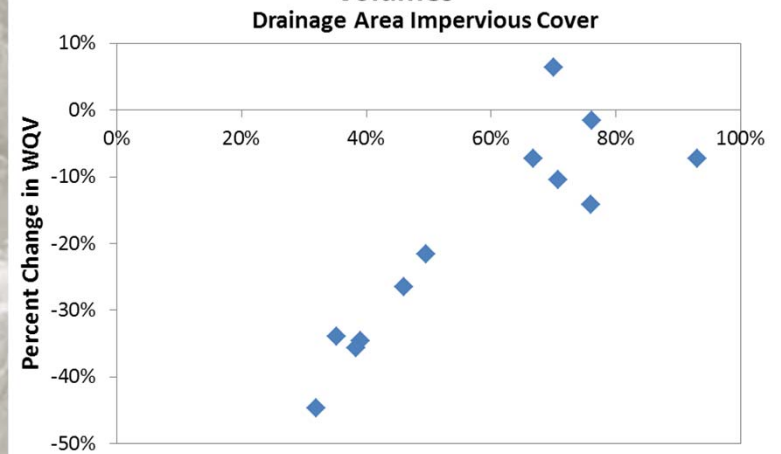


6. Application to Random Example Sites

Old and New Water Quality Volumes for Example Sites



Comparing Old vs New Water Quality Volumes



Site ID	Site Name
1	Austin Waldorf School
2	McMeans Store
3	Muhich Office Warehouse
4	Hilltop Park
5	Dick Nichols District Park
6	Heights at Loma Vista Phase 1 - Pond 1
7	Heights at Loma Vista Phase 1 - Pond 2
8	Oak Hill Branch Library
9	HEB #23 at William Cannon/Brodie
10	The Shops at Arbor Trails (Costco)
11	Williamson Pointe Office Warehouse
12	Parkway Village

Costco at William Cannon & MoPac

Drainage Area = 83.4 Ac
 Drainage Area Impervious Cover = 49.6%
 Drawdown Time = 60 hrs
 Has Splitter

HEB at Brodie & William Cannon

Drainage Area = 12.0 Ac
 Drainage Area Impervious Cover = 70.8%
 Drawdown Time = 71 hrs
 Has Splitter

Analysis from SLAT Output



7. Alternative Controls

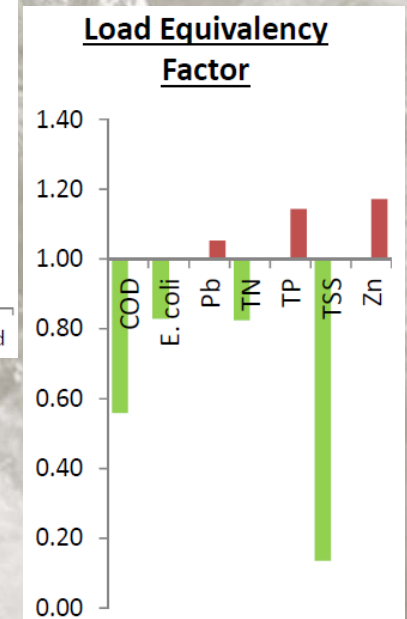
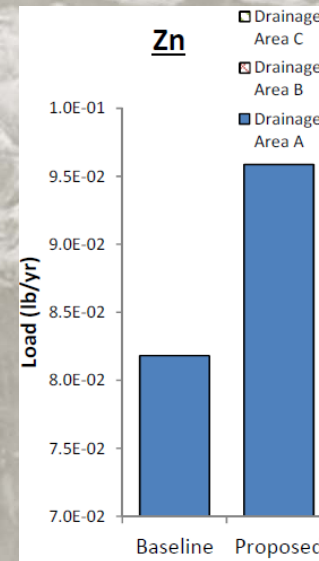
- Alternative controls allowed
- Applicant provides effluent concentrations from accepted testing protocol
 - ABET approved university study
 - Peer-reviewed journal article
 - Washington State TAPE protocol
 - Technology Acceptance Reciprocity Partnership (TARP) protocol
- Must still prove that effluent pollutant loads meet non-degradation requirements

8. Introducing SLAT

- Stormwater Load Analysis Tool for simple treatment trains
- Advanced design or stormwater routing would require engineering analysis (eg. SWMM)
- Open SLAT

SLAT: Stormwater Load Analysis Tool 1/2								
Site Name: Parkway Village Tract 107			By: MRA			Date: 6/12/2014		
RESULTS: COMPLIANCE TABLE								
POLLUTANT		DEVELOPED LOAD, WITH CONTROLS				EXISTING LOAD	LOAD EQUIV. FACTOR	COMPLIES?
		Drainage Area A	Drainage Area B	Drainage Area C	Total			
COD	lbs/yr	7.55E+01	0.00E+00	0.00E+00	7.55E+01	1.35E+02	0.56	YES
E. coli	10 ⁶ MPN/yr	1.09E+05	0.00E+00	0.00E+00	1.09E+05	1.32E+05	0.83	YES
Pb	lbs/yr	1.57E-02	0.00E+00	0.00E+00	1.57E-02	1.49E-02	1.05	NO
TN	lbs/yr	3.41E+00	0.00E+00	0.00E+00	3.41E+00	4.13E+00	0.82	YES
TP	lbs/yr	4.92E-01	0.00E+00	0.00E+00	4.92E-01	4.31E-01	1.14	NO
TSS	lbs/yr	7.81E+01	0.00E+00	0.00E+00	7.81E+01	5.76E+02	0.14	YES
Zn	lbs/yr	9.59E-02	0.00E+00	0.00E+00	9.59E-02	8.18E-02	1.17	NO

NOT COMPLIANT



SLAT Screenshots



Original Option Proposed for Rain Gardens for Single-Family Residential Subdivisions

- Proposed in April 4, 2014 WPO meeting:
 1. City of Austin to inspect & provide functional maintenance
 2. Homeowners may supplement maintenance, add additional native landscaping
 3. Must be located in the right-of-way, dedicated common area, or within a drainage easement that is accessible by standard maintenance equipment from the right-of-way
 4. Must treat clusters of single-family residences (i.e., not individual lots)
 5. Cannot be located in backyards or fenced-in yards
- Moving forward with this option.
- And offering a second option (see next slide)



New, Additional Option for Rain Gardens for Single-Family Residential Subdivisions

- Will draft pre-July 14 ECM stakeholder meeting:
 1. Private owner to provide maintenance
 2. The City of Austin will inspect every 3 years—and potentially later on an as-needed, complaint-basis
 3. OK to install on individual single-family lots
 4. Cannot be located in backyards
 5. Must verify at point-of-sale of property that exist and are in good working order (like septic systems); provide literature re: maintenance
- Will schedule stakeholder brainstorming session
- Pilot: Want this to go well; good design and installation will be critical

WPO Phase 2 Schedule, 2014

Phase 2 Kickoff	Jan. 22
Perviousness: Introduction	Feb. 21
Perviousness: Porous Pavement (part 1)	Mar.07
Porous Pavement (part 2), Artificial Turf & Rainwater Harvesting	Mar.21
Rain Gardens for Single-Family Residential	Apr. 04
Beneficial Use of Stormwater: Potential Policy Approaches	
Introduction/National Examples	Apr. 18
Beneficial Use of Stormwater: Follow-Up Discussion	May 30
New Criteria for SOS Ordinance Compliance/ECM 1.6.9	June 13
RSMP-Plus (Regional Stormwater Mgmt. Program)	July 11 or 25?
Next Steps	TBD/Fall



Contact Information

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<http://austintexas.gov/departments/watershed-protection-ordinance>