

HMP and LID SIZING CALCULATOR for the SAN DIEGO REGION

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San Diego, California
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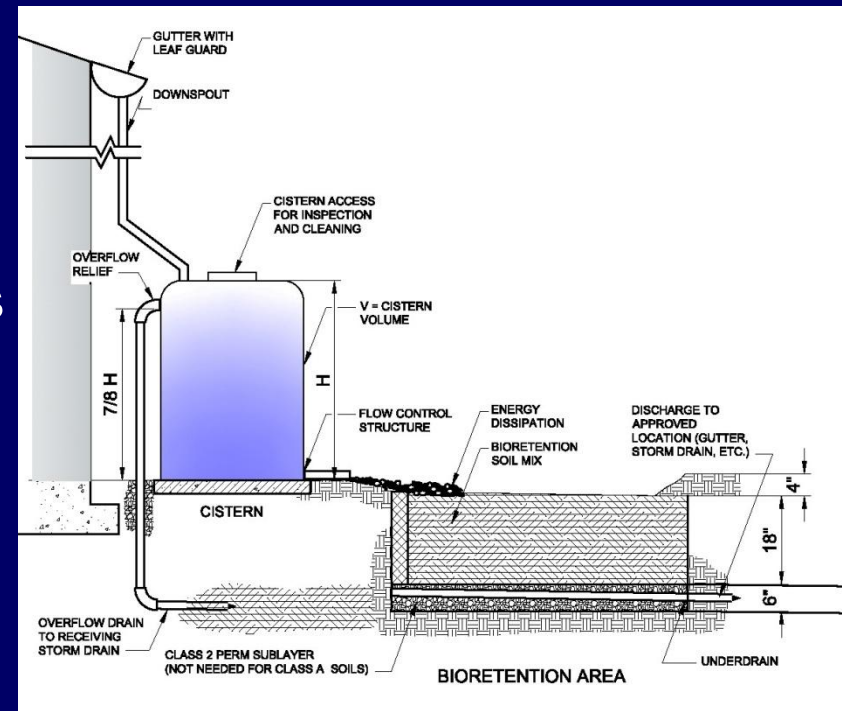


References

- Dan Cloak Environmental Consulting
 - Contra Costa Clean Water Program – Tom Dalziel
 - County of San Diego – Sara Agahi
 - San Diego County Copermittees
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Topics To Be Covered

- Sizing Calculator Development Process
- San Diego HMP Overview
- Proposed Enhancements to San Diego County Sizing Calculator



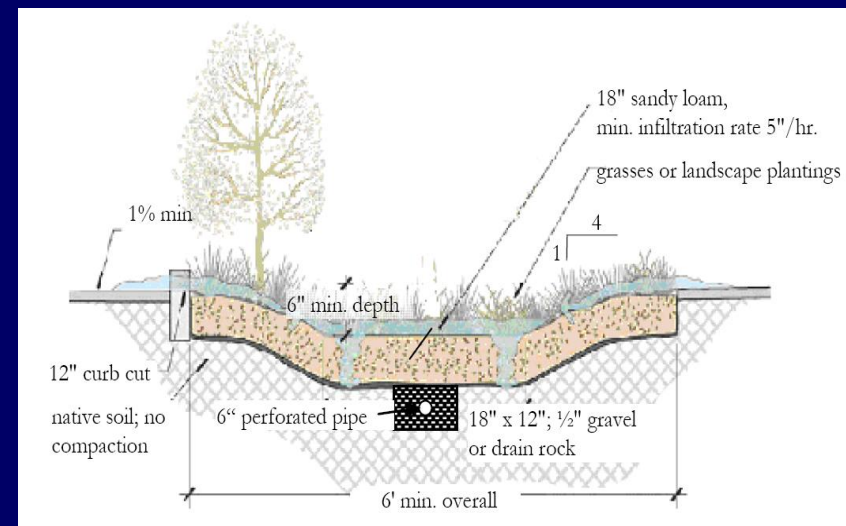
LID Treatment Approach

- Avoid Standing Water in Flow Control Facilities
- Combined WQ Treatment and HMP Flow Control Mitigation



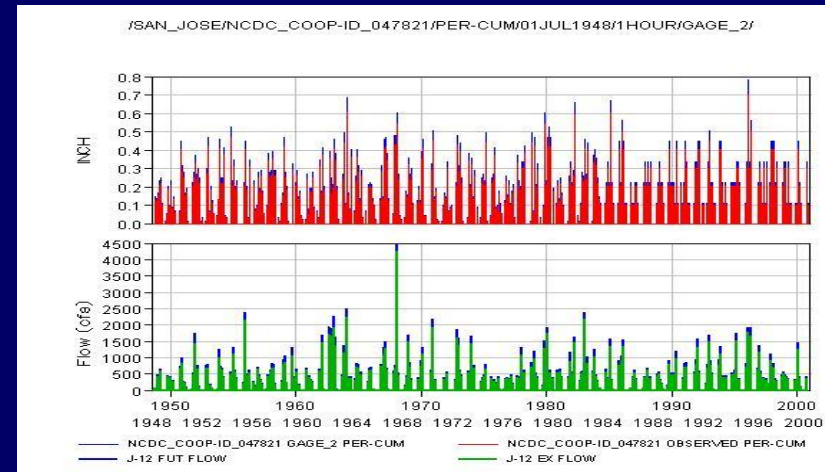
Integrated Management Practices

- Bioretention basins
- Flow-through planter boxes
- Dry wells
- Bioretention in combination with cistern
- Bioretention in combination with vault
- Self-retaining areas



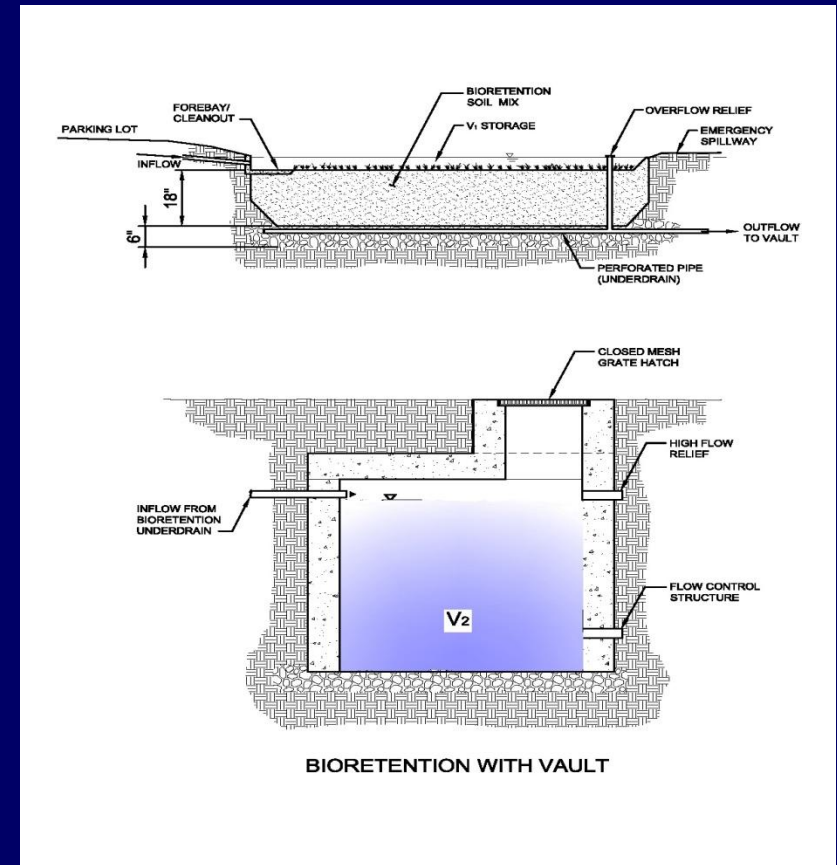
Hydrologic Modeling Requirements

- Continuous simulation modeling with HSPF
- Match pre-project flows and durations in the geomorphically significant flow range
- Peak flow frequency statistics based on partial duration calculations
- Parameter estimation (infiltration, evaporation)



Sizing Factor Development

- ❑ Soil type / land Use
- ❑ Mitigation approach
- ❑ Amended soil layer
- ❑ Soil physics at BMP layer interfaces
- ❑ WQ only sizing factors
- ❑ WQ + flow control sizing factors

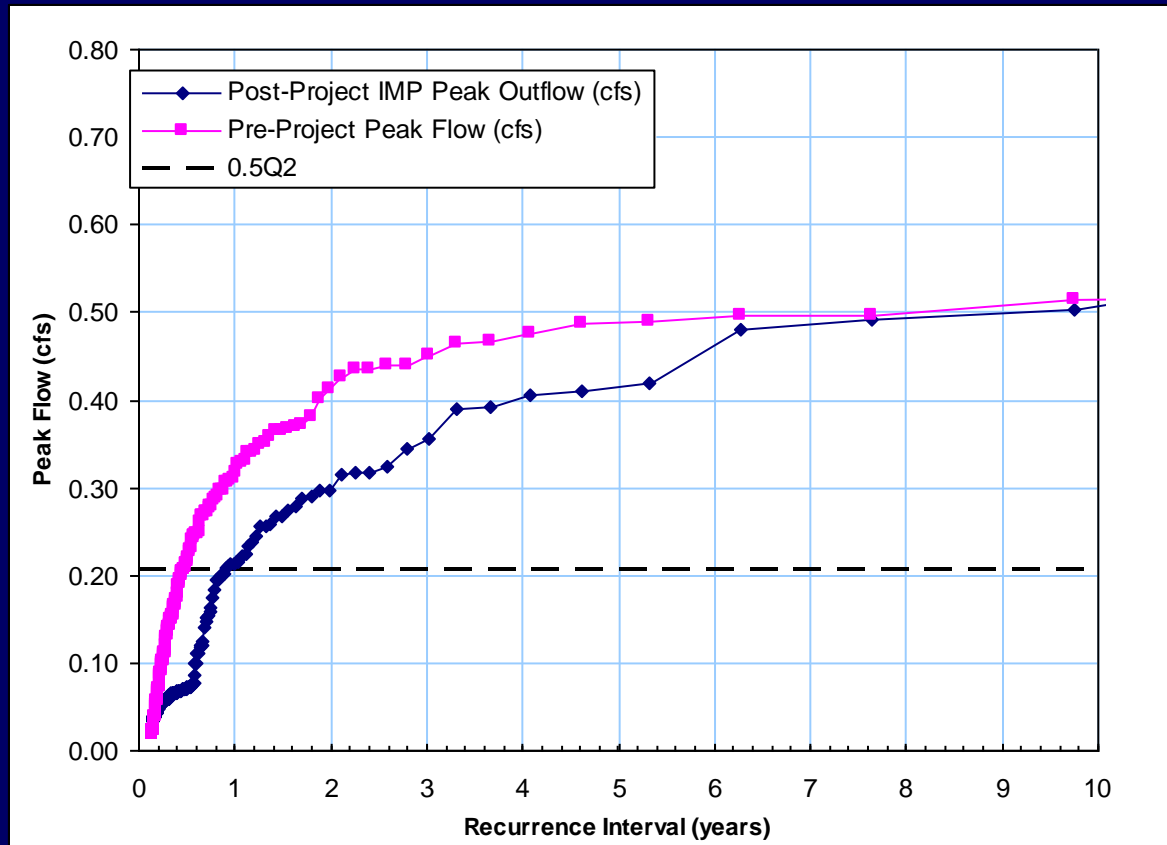




Sizing Factor Development

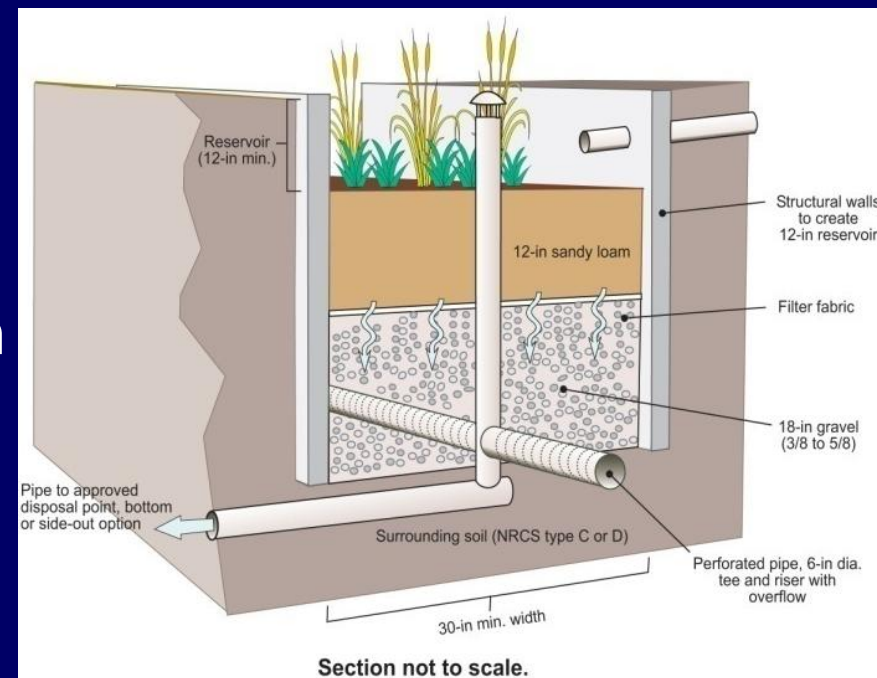
Treatment & Flow Control	NRCS Soil Group			
	A	B	C	D
Bioretention Facility				
A	0.07	0.11	0.06	0.05
V ₁	0.058	0.092	0.050	0.042
V ₂	N/A	N/A	0.066	0.055
Flow-through Planter				
A	N/A	N/A	0.06	0.05
V ₁	N/A	N/A	0.050	0.042
V ₂	N/A	N/A	0.066	0.055
Dry Well				
A	0.05	0.06	N/A	N/A
V	0.130	0.204	N/A	N/A
Cistern + bioretention facility				
A (bioretention facility)	0.04	0.04	0.04	0.04
V (cistern)	0.193	0.228	0.088	0.060

Sizing Factor Development – Peak Flow Mitigation



Adjustments and Final Sizing Requirements

- ❑ Rainfall variations within County
- ❑ Regression equation Development
- ❑ Maximum underdrain flow
- ❑ Bioretention area and volume sizing
- ❑ Lookup tables



Input Summary

Integrated Management Practice Calculator

File Tools Help

Project Information

All of the project information is required. Please fill in all of the information before editing the DMAs and IMPs.

Project Name:

Location:

APN:

Total Area: sq ft Mean Annual Precip: in

Design Goal

Treatment Plus Flow Control

Treatment Only

Drainage Management Areas (DMAs) | **Integrated Management Practices (IMPs)** | Calculation Warnings(2) | Summary Report

IMP1

Soil Group:

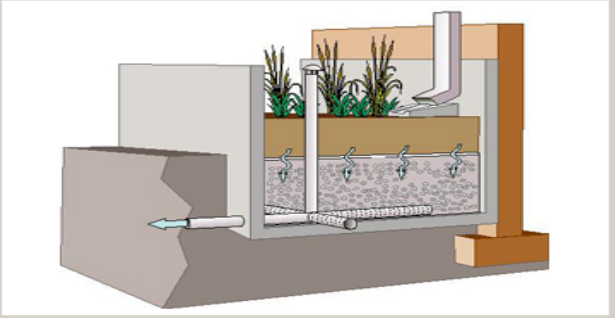
Type:

Minimum Area (sq ft):

Planned Area (sq ft):

Max Underdrain Flow (cfs):

IMP currently attached to the following DMAs:



Add New IMP Remove Current IMP Rename Current IMP

Total Area (Calculated)

Drainage Management Areas	<input type="text" value="10000"/>	sq. ft.
Integrated Management Practices	<input type="text" value="0"/>	sq. ft.
Total	<input type="text" value="10000"/>	sq. ft. (WARNING: Total area of DMAs and IMPs does not equal the total project area)

Output Summary

Integrated Management Practice Calculator [example.xml]

File Tools Help

Project Information

All of the project information is required. Please fill in all of the information before editing the DMAs and IMPs.

Project Name: Riverview Estates

Location: Sacramento, California

APN: []

Total Area: 200000 sq ft Mean Annual Precip: 20 in

Design Goal: Treatment Plus Flow Control Treatment Only

Drainage Management Areas (DMAs) | Integrated Management Practices (IMPs) | Calculation Warnings(0) | Summary Report

	Total	10,000	Sizing Factor	Adjustment Factor	Area or Volume	Area or Volume
Area			0.050	1.007	604	650
Surface Volume			0.050	1.007	504	550
Subsurface Volume			0.066	1.007	665	700
Maximum Underdrain Flow (cfs)					0.01	
Orifice Diameter (in)					0.71	

IMP Name: IMP3 (Soil Type: C)
 IMP Type: Bioretention Facility
 Soil Type: C

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
DMA3	80,000	Concrete or Asphalt	1.00	80,000	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA4	70,000	Landscape	0.50	35,000				
Total				115,000	0.060	1.007	6,951	7,500
Area					0.050	1.007	5,792	6,000
Surface Volume					0.066	1.007	7,646	8,000
Subsurface Volume					Maximum Underdrain Flow (cfs)		0.21	
					Orifice Diameter (in)		2.96	

Total Area (Calculated)

Drainage Management Areas	191400	sq. ft.
Integrated Management Practices	8600	sq. ft.
Total	200000	sq. ft.

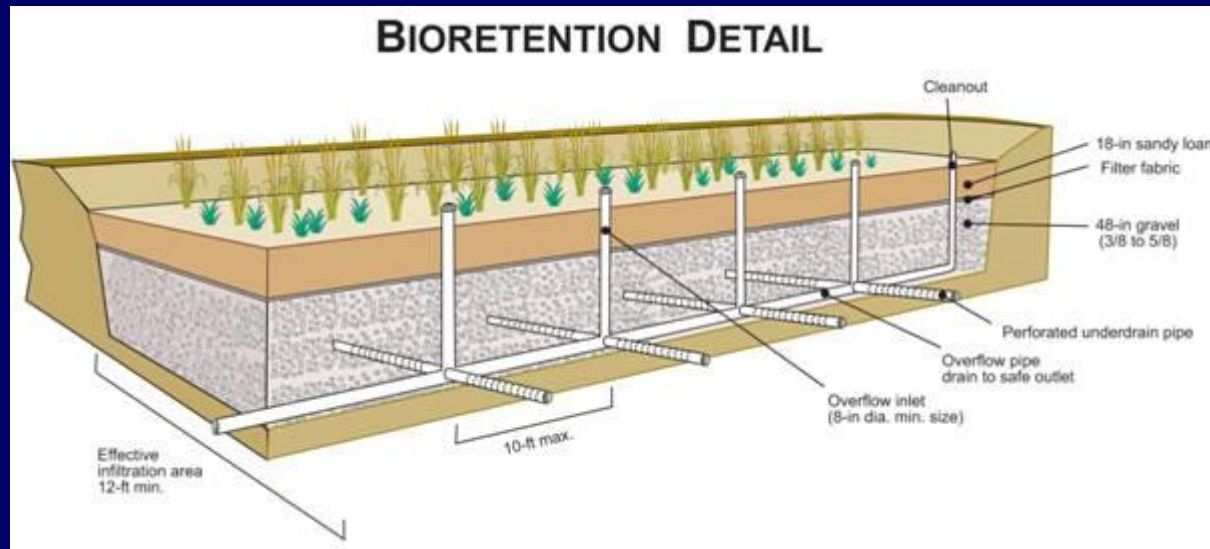
Design Considerations

- ❑ Locate LID in areas of pervious (A or B) soils
- ❑ Surface reservoir must fill
- ❑ Drawdown time requirement
- ❑ Offsite area restrictions
- ❑ Dispersed facilities – minimize contributing drainage area



Contra Costa Implementation

- Ease of Use for Project Applicants
- Ease of Use for Reviewers



San Diego HMP Overview

- Tools for determining site-specific lower flow thresholds
- HMP Decision Matrix
- LID flow control options
- Extended detention flow control options
- Stream rehabilitation options



Proposed Features for San Diego Sizing Calculator

The Basics:

- Standalone software that can be used to easily size stormwater controls that comply with HMP
- Stormwater control options tailored to San Diego Copermittee input
- Pre-sized LID facilities, stormwater ponds, mixed LID and ponds
- Summary output report and integrated help system

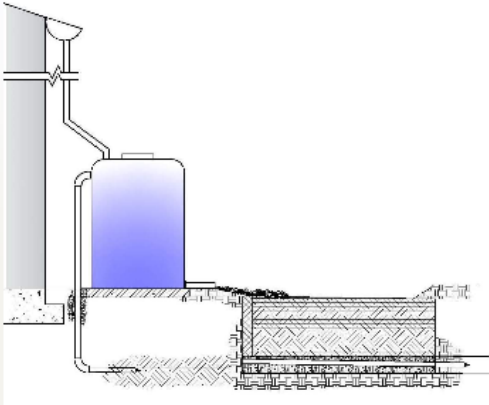
IMP1

Soil Type

IMP Type

Parameter	Minimum	Actual
Bioretention Area (sq ft)	<input type="text" value="0"/>	<input type="text" value="0"/>
Cistern Volume (cubic ft)	<input type="text" value="0"/>	<input type="text" value="0"/>
Cistern Height (ft)		<input type="text" value="0.00"/>
Orifice Diameter (in)		<input type="text"/>

Connected

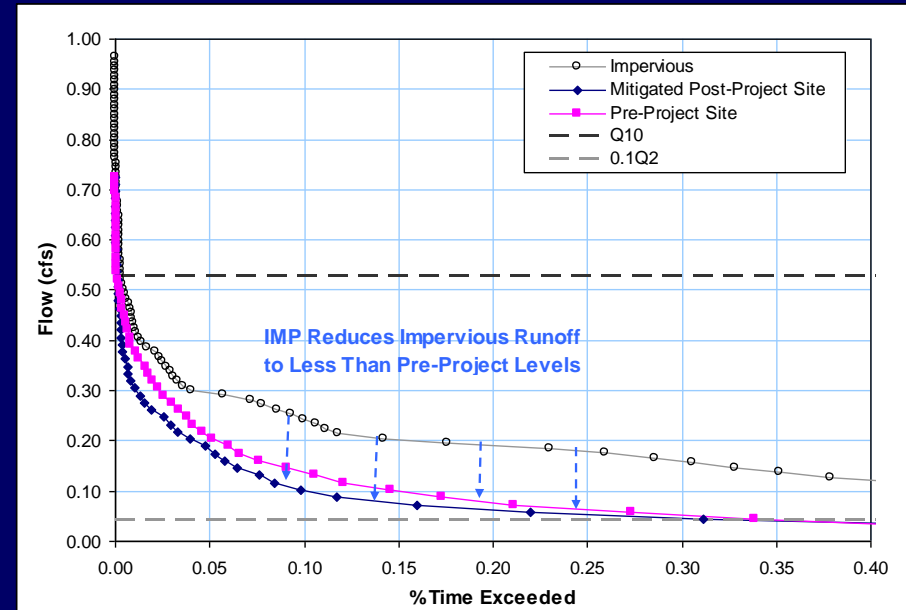
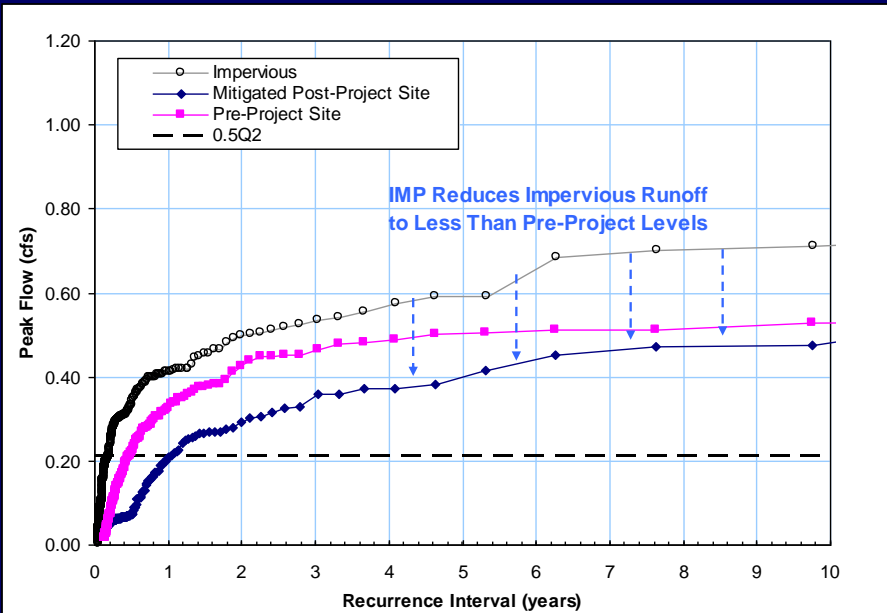




Proposed Enhancements to San Diego County Calculator

- Detention basin calculator (low flow orifice and overflow weir)
 - Pond configuration and outlet structure criteria
 - Graphical output of peak flow frequency and flow duration response
 - Automated rainfall gage selection
 - Varying lower flow thresholds
-

Example Performance Curves





Proposed Enhancements to San Diego County Calculator

- Infiltration Devices for Parking Lots (scaling factor that varies with depth / bottom area ratio)
 - Infiltration strips and tree wells
 - Treatment only option for vegetated swales
 - Extended detention basin option
 - Pervious pavement
-



Questions?

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