

# Ventura County Hydromodification Control Plan (HCP)

Public Meeting

July 30, 2013



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- Arne Anselm – Ventura County Watershed Protection District
- Lisa Austin – Geosyntec Consultants
- Judd Goodman – Geosyntec Consultants

# Goal of Meeting

Present and discuss the Draft  
Hydromodification Control Plan (HCP)  
with the public.

- What is Hydromodification?
- Permit Requirement
- Schedule
- Commenting Process
- Draft HCP Contents

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# What is Hydromodification?



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# What is Hydromodification?

Hydromodification = Changes in runoff characteristics and in-stream processes caused by altered land use.

Restoration vs. Hydromodification Management

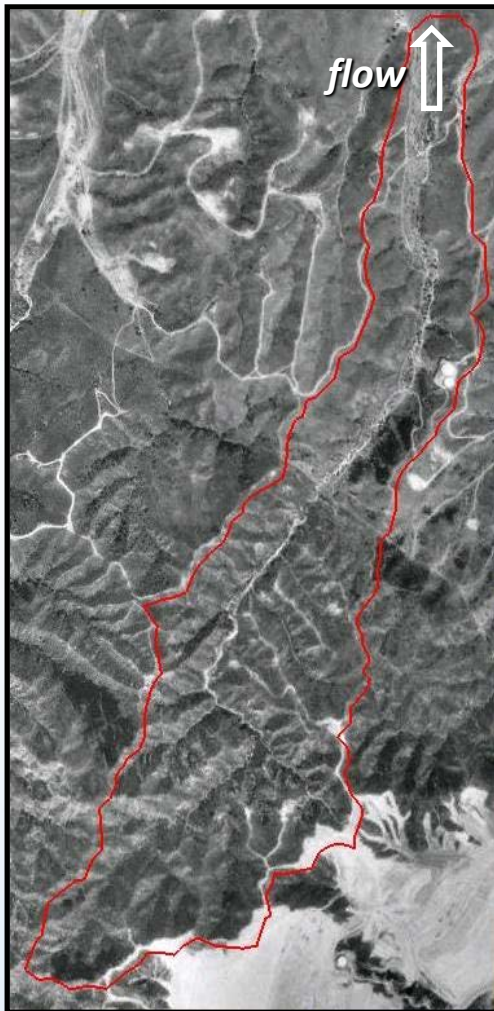


Fix an existing  
geomorphic  
impact

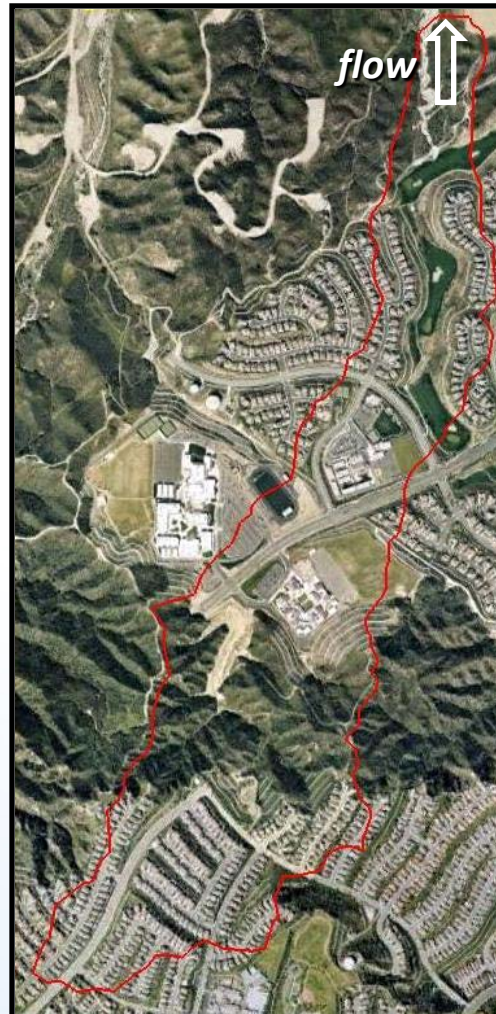


Prevent a future  
geomorphic  
impact

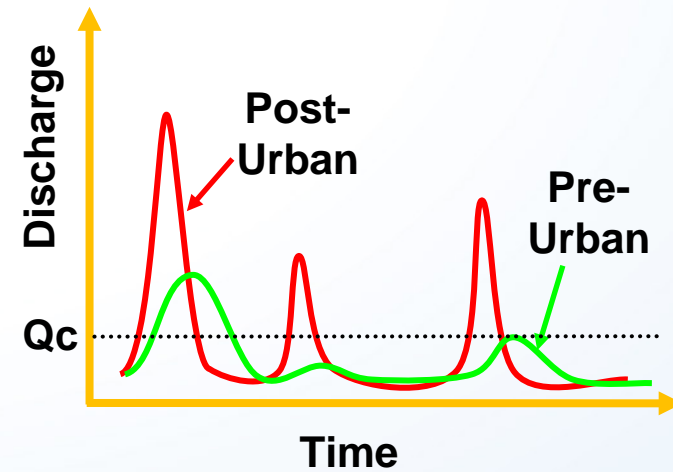
# What is Hydromodification?



Pre-Development



Post-Development



# What is Hydromodification?



**Pre-Development**



**Post-Development**





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# Permit Requirement



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# NPDES Permit Requirement

- Order No. R4-2010-0108 contains hydromodification control requirements applicable to new development and redevelopment projects in Ventura County
- Requires the Permittees to develop and implement watershed specific Hydromodification Control Plans as part of the Final (Flow/Volume/Duration) Hydromodification Control Criteria

# NPDES Permit Requirement

- Subpart 4.E.III.3 of Order No. R4-2010-0108  
*“to prevent accelerated downstream erosion and to protect stream habitat in natural drainage systems”*
- Natural drainage systems include unlined or unimproved (not engineered) creeks, stream and tributaries

# NPDES Permit Requirement

- Shall be achieved by maintaining the Erosion Potential ( $E_p$ ) in streams at a value of 1
  - Unless as alternative value can be shown to be protective
- Hydromodification Controls may include one, or combination of, on-site, regional or sub-regional BMPs, LID strategies, stream restoration, or hydromodification controls.

# NPDES Permit Requirement

- Does not require addressing existing creek channel erosion problems.
  - focus on preventing an increase in erosion or sedimentation beyond the natural rates due to rates and durations of stormwater runoff from new development and redevelopment projects.

# NPDES Permit Requirement

## Subpart 4.E.III.3.(a)(4)

<b>Chapter of HCP</b>	<b>Conditions Satisfied</b>
1. Introduction	
2. Physical Setting	(A)(i)(I) Stream Classifications
3. Applicability	(B)(ii) Hydromodification Management Control Areas (B)(iii) Projects Subject to the HCP
4. Hydromodification Management Standard	(A)(i)(II) Flow Rate and Duration Control Methods (A)(i)(III) Sub-Watershed Mitigation Strategies (B)(i) Hydromodification Management Standards (B)(vi) Range of Flows to Control and Goodness of Fit Criteria
5. Hydromodification Control BMPs	(A)(i)(IV) Stream Restoration Measures (B)(iv) Authorized BMPs
6. Sizing Guidance	(B)(v) BMP Design Criteria. (B)(vii) Allowable Low Critical Flow (B)(viii) Description of the approved Hydromodification Model (B)(ix) Alternate Hydromodification Model and Design (B)(x) Stream Restoration Measures Design Criteria
7. Monitoring and Effectiveness	(B)(xi) Monitoring and Effectiveness Assessment (B)(xii) Record Keeping

## Ep is defined in the NPDES Permit

### ATTACHMENT E

#### Determination of Erosion Potential

$E_p$  is determined as follows- The *total effective work* done on the channel boundary is derived and used as a metric to predict the likelihood of channel adjustment given watershed and stream hydrologic and geomorphic variables. The index under urbanized conditions is compared to the index under pre-urban conditions expressed as a ratio ( $E_p$ ). The effective work index ( $W$ ) is computed as the excess shear stress that exceeds a critical value for streambed mobility or bank material erosion integrated over time and represents the total work done on the channel boundary:

$$W = \sum_{i=1}^n (\tau_i - \tau_c)^{1.5} \cdot V \cdot \Delta t_i \quad (1)$$

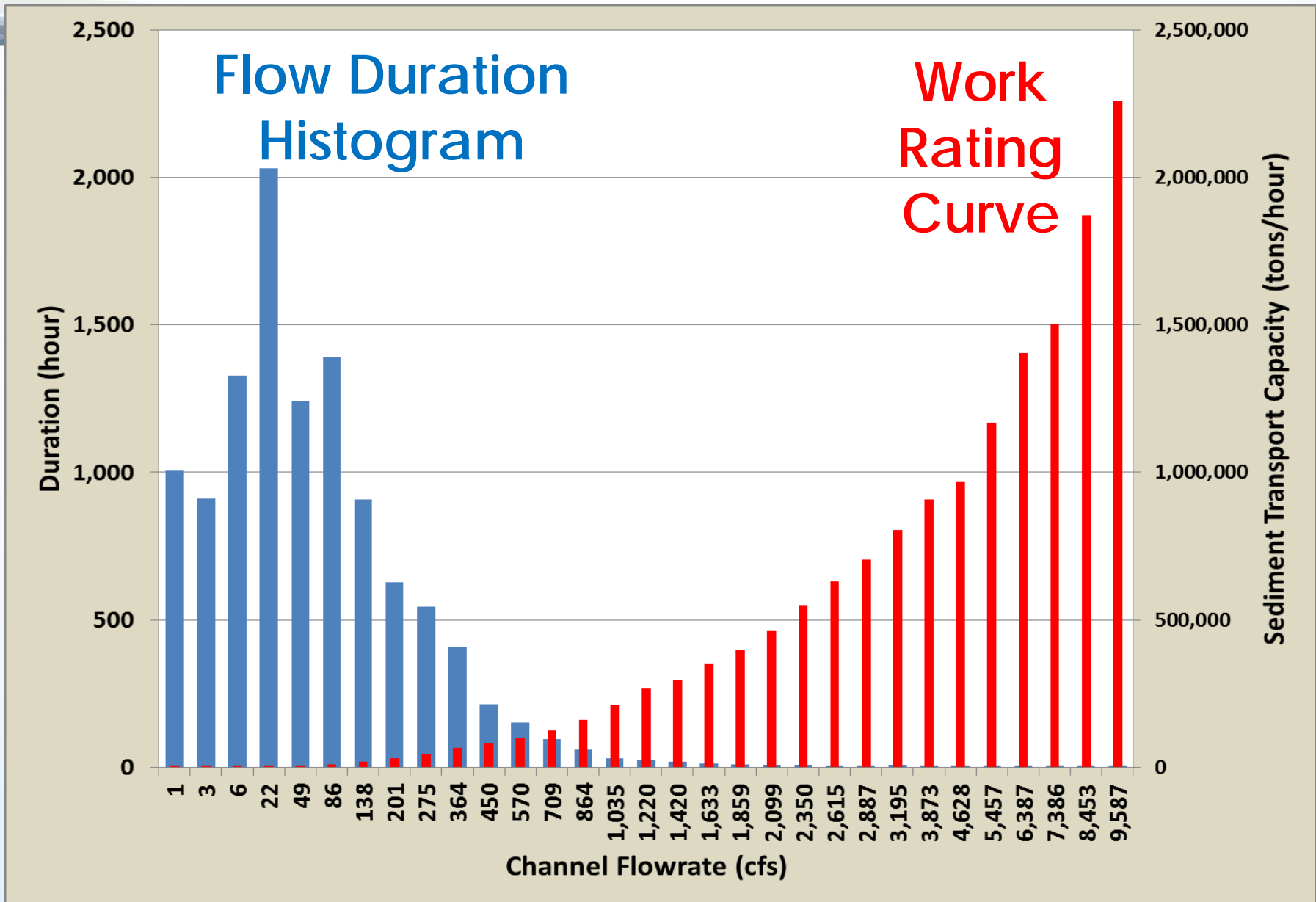
Where  $\tau_c$  = critical shear stress that initiates bed mobility or erodes the weakest bank layer,  $\tau_i$  = applied hydraulic shear stress,  $\Delta t$  = duration of flows (in hours), and  $n$  = length of flow record. The effective work index for presumed stable stream channels under pre-urban conditions is compared to stable and unstable channels under current urbanized conditions. The comparison, expressed as a ratio, is defined as the Erosion Potential ( $E_p$ )<sup>1</sup> (McRae (1992, 1996)).

$$E_p = \frac{W_{post}}{W_{pre}} \quad (2)$$

where:

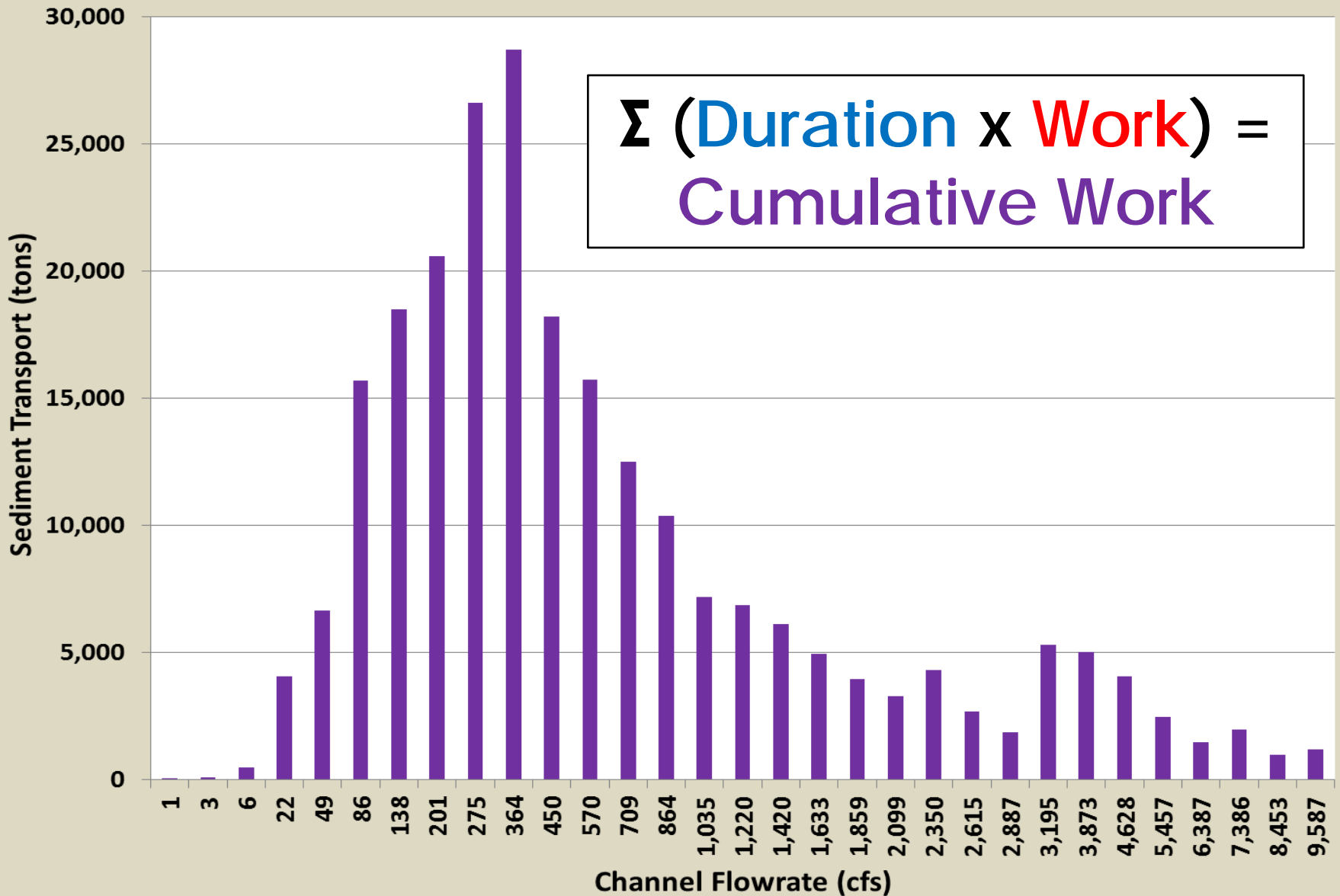
$W_{post}$  = work index estimated for the post-urban condition  
 $W_{pre}$  = work index estimated for the pre-urban condition

# Erosion Potential

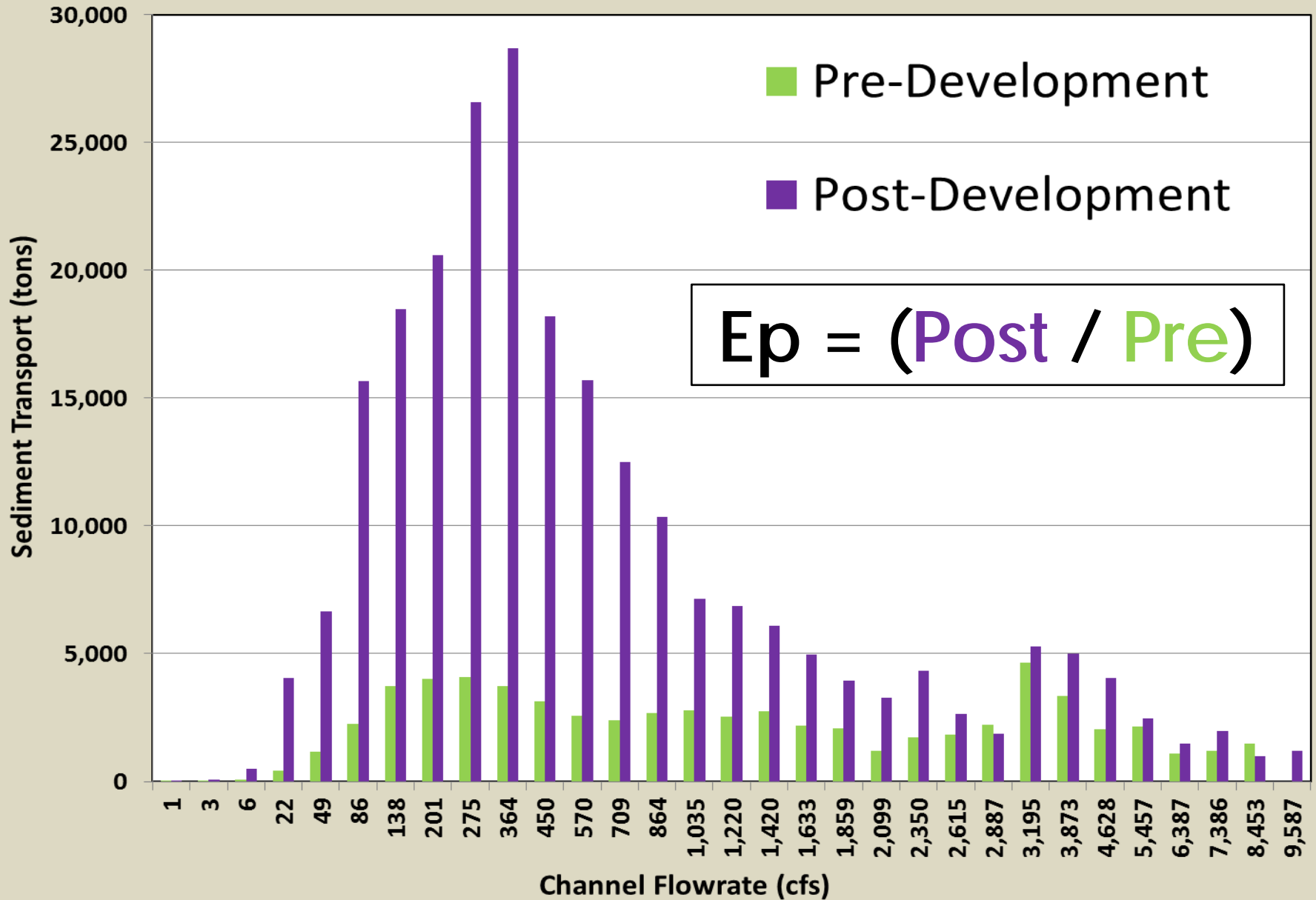




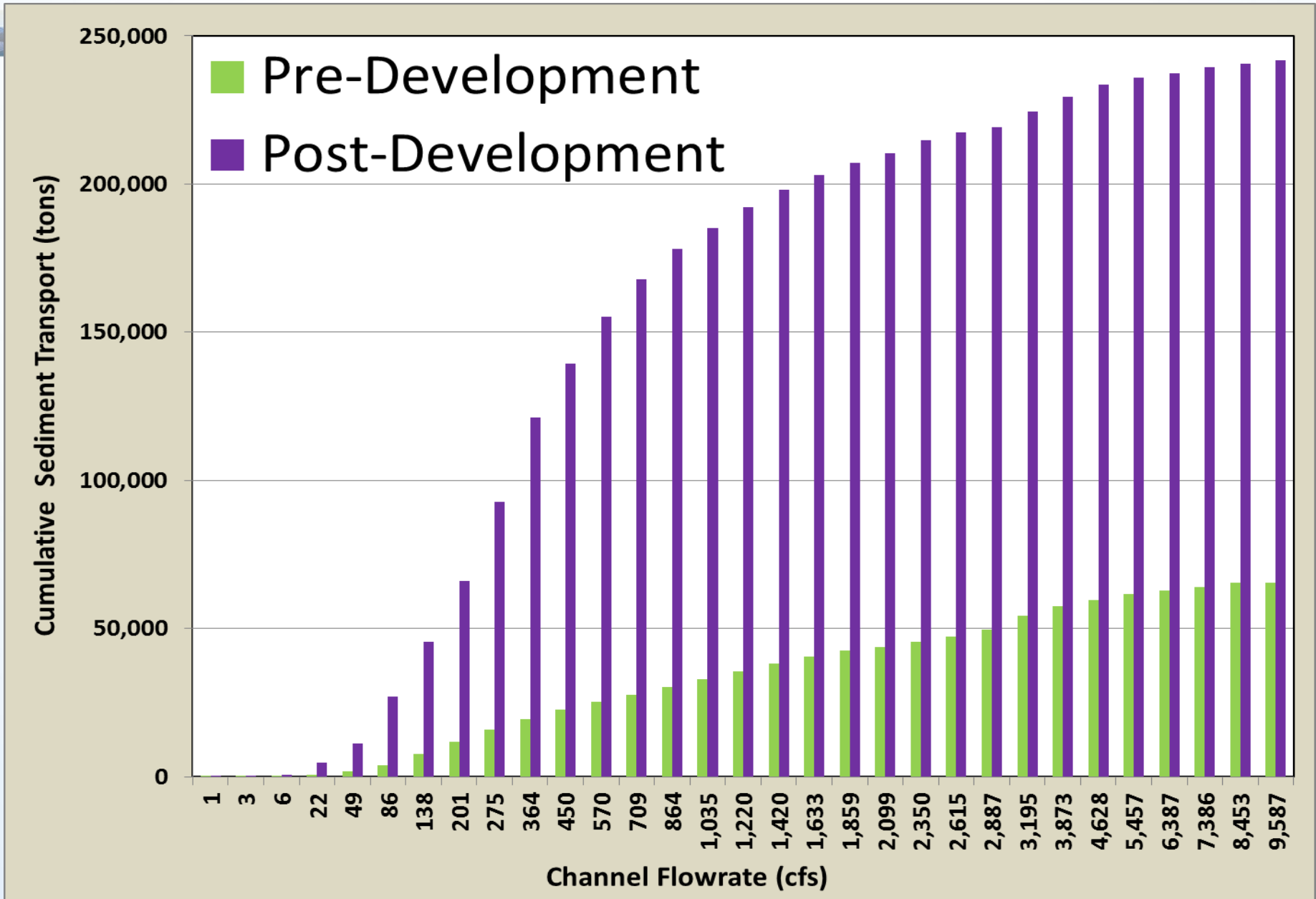
# Erosion Potential



# Erosion Potential



# Erosion Potential



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# Schedule



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Date	Action
July 16	Draft HCP Released
July 30	Stakeholder Meeting
August 15	Comments due to Ventura County
August 22	Comments due to Regional Board
September 26	Final Document due to Regional Board for Executive Officer Approval
October ?	Effective upon Executive Officer Approval
October ? + 90 days	90 day implementation window for communication and training

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# Commenting Process



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# Commenting Process

- Send to: [Arne.Anselm@Ventura.org](mailto:Arne.Anselm@Ventura.org)
- Send to: [losangeles@waterboards.ca.gov](mailto:losangeles@waterboards.ca.gov) with the subject line “Comments on Ventura County MS4 Draft Hydromodification Control Plan”
- and concurrently to:  
[Ivar.Ridgeway@waterboards.ca.gov](mailto:Ivar.Ridgeway@waterboards.ca.gov)
- Comments should be submitted as a PDF file.

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# Draft HCP Contents



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1. Introduction
2. Physical Setting
3. Applicability
4. Hydromodification Management Standard
5. Hydromodification Control BMPs
6. Sizing Guidance
7. Monitoring and Effectiveness Assessment

HCP will be incorporated into Ventura County Technical Guidance Manual for Stormwater Quality Control Measures (**TGM**)

# Chapter 1: Introduction

Provides information about hydromodification, the objective of the HCP, and information about permit requirements.

1.1 Problem Statement and Objective →

1.2 Regulatory Background

1.3 Hydromodification vs. Flood Control

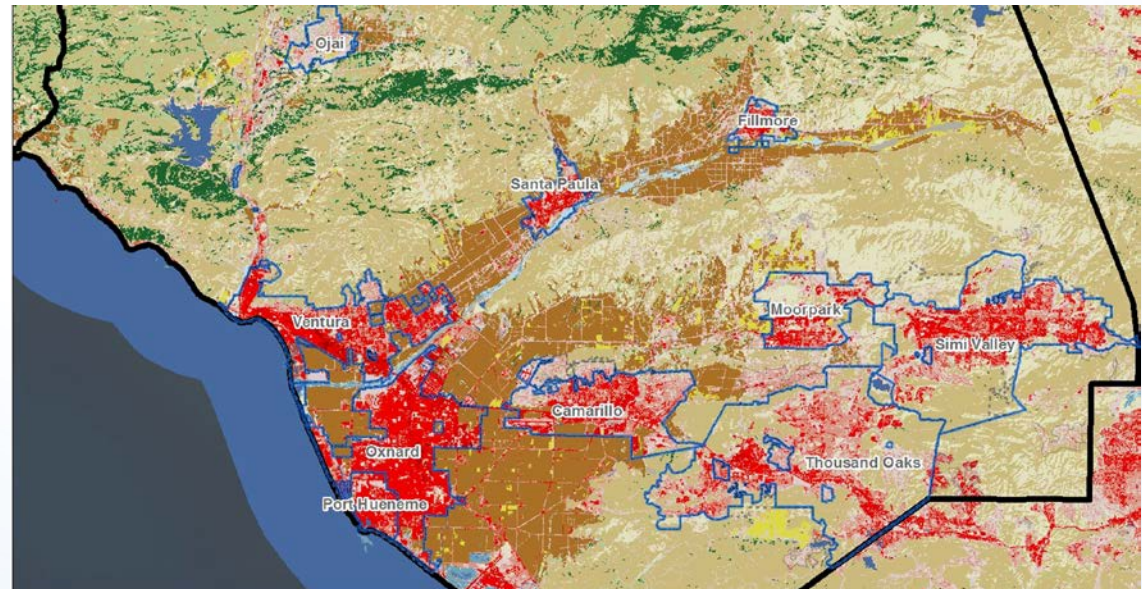
1.4 Organization of HCP

- Minimize hydromodification impacts associated with future new development and redevelopment in Ventura County
- Cost effective
- Comply with MS4 Permit

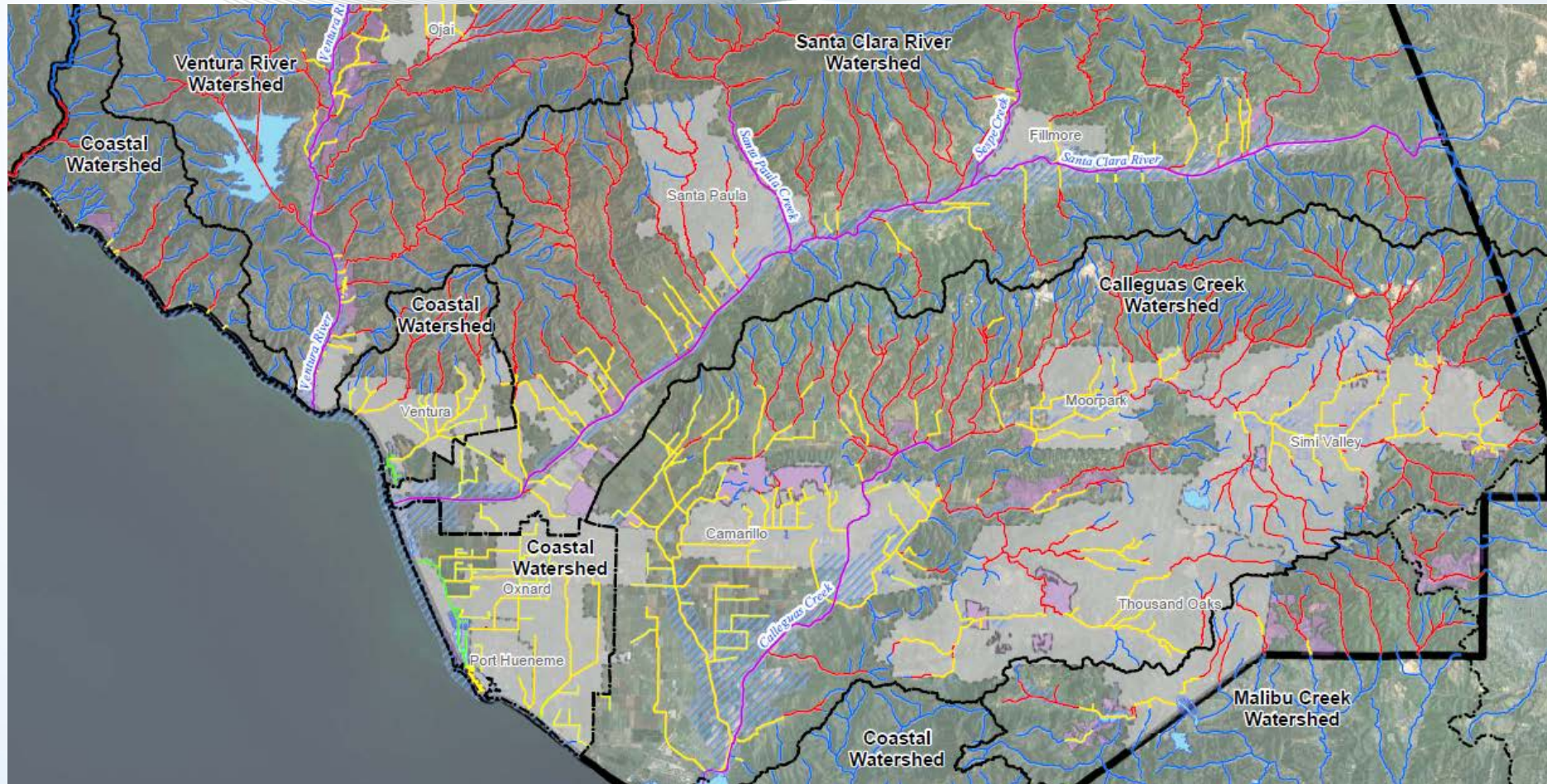
# Chapter 2: Physical Setting











Qualitatively describes the physical setting for the five watersheds (Ventura River, Santa Clara River, Calleguas Creek, Malibu Creek, Miscellaneous Coastal):

- Location and HCP Boundary
- Watershed Characteristics
- Geology
- Climate
- Land Cover →
- Receiving Water Susceptibility
- Hydromodification Screening Tools



# Chapter 2: Physical Setting



- |   |   |
|---|---|
|  Large Channel (Q100>25,000 cfs) - Not Susceptible |  CURB Boundary       |
|  Modified Channel - Not Susceptible                |  Urban County        |
|  Tidal Channel - Not Susceptible                   |  Ventura Lakes       |
|  Natural Redline Channel - Susceptible             |  100 Year Floodplain |
|  Natural Blueline Channel - Susceptible            |  Basins              |

# Chapter 3: Applicability

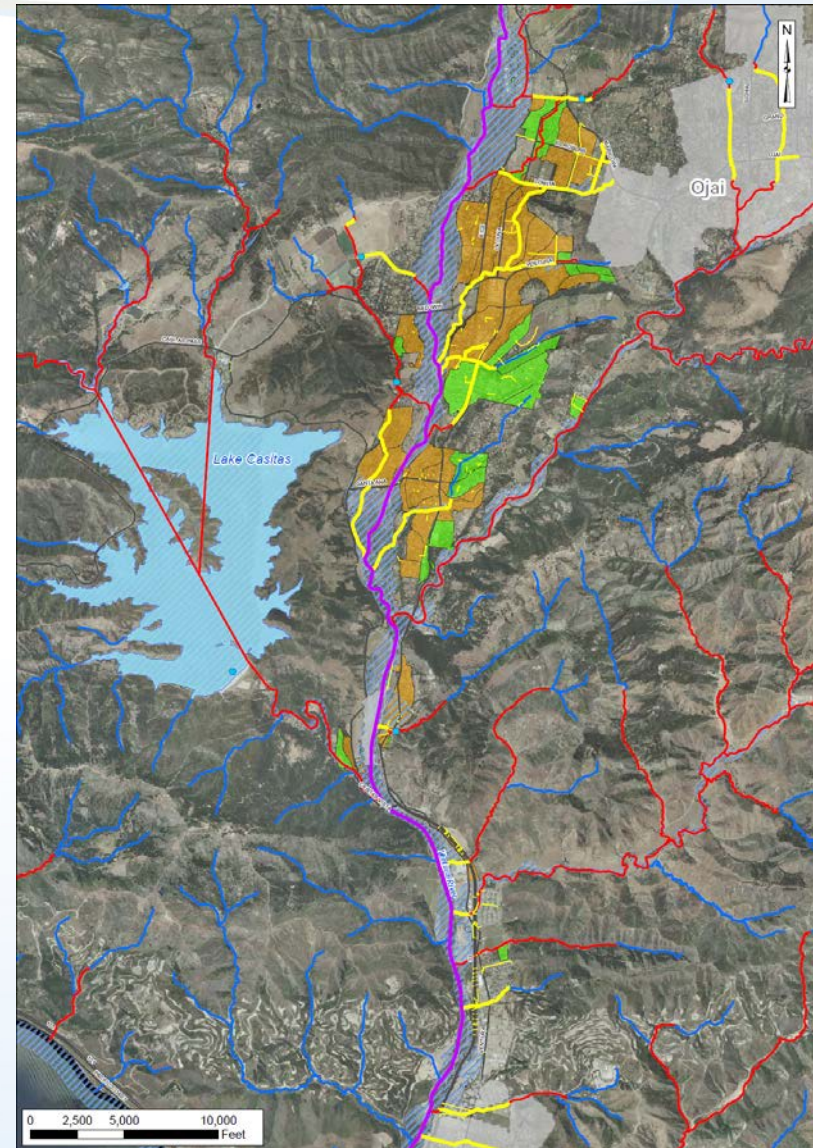
Describes the projects for which the Hydromodification Management Standard applies and where it is exempt.

3.1 Exemptions to the Hydromodification Management Standard

3.2 HCP Effective Date

3.3 Applicability Maps →

3.4 Negligible Risk



# Chapter 3: Applicability

- **Applicability:**
  - Same “regulated” project categories as TGM Section 1.5
- **Exemptions:**
  - Disturb less than one acre
  - Single family structures which create, add, or replace less than 10,000 square feet of impervious surface area
  - Replacement, maintenance or repair of existing flood control facility, storm drain, or transportation network
  - Redevelopment in the Urban Core that does not increase impervious area or decrease the infiltration capacity
  - Applications deemed complete for processing prior to the HCP Effective Date (same grandfathering language as in TGM)
  - Located in an area that is exempt according to the Applicability Maps
  - “Negligible risk” demonstrated through approved study

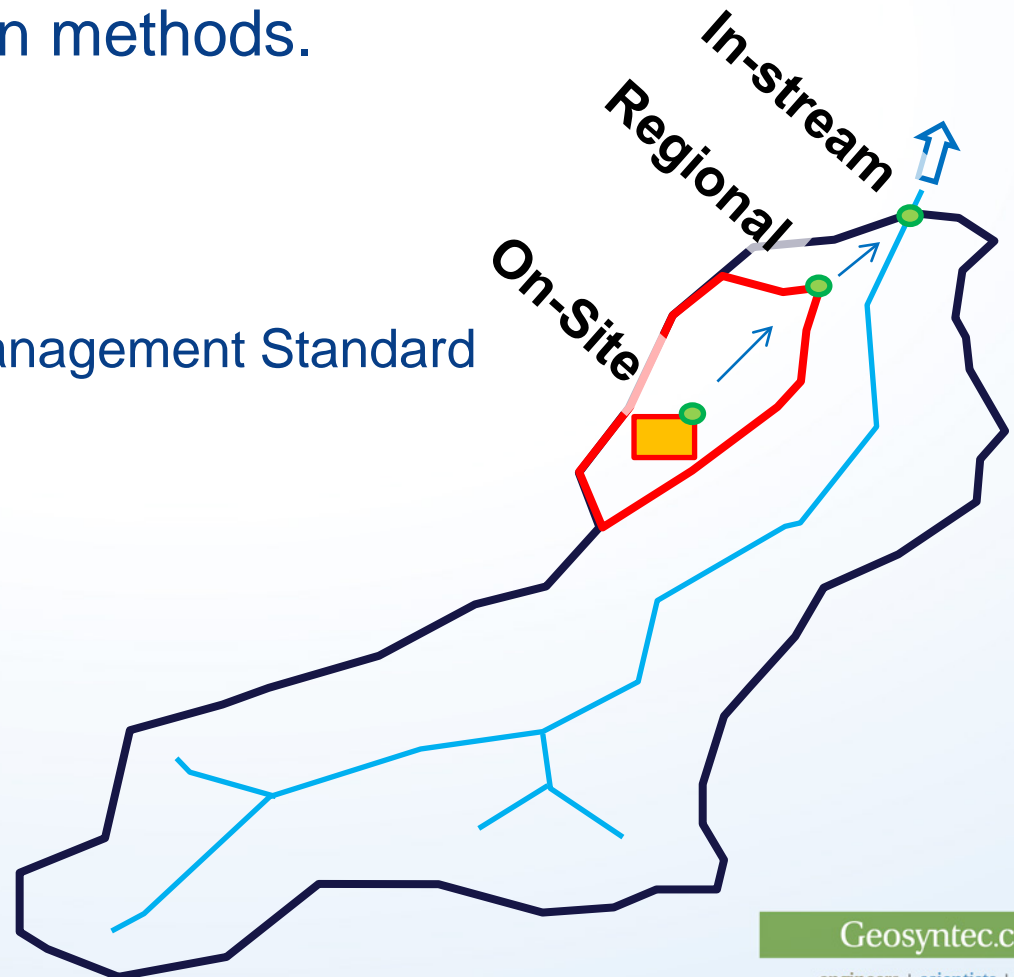
# Chapter 4: Hydromodification Management Standard

Defines the Hydromodification Management Standard and describes implementation methods.

## 4.1 Management Standard

## 4.2 Methods to Meet the Management Standard

- On-Site Control
- Regional Control
- In-Stream Control



# Chapter 4: Hydromodification Management Standard

## Hydromodification Management Standard:

*Hydromodification control BMPs shall be selected and applied to maintain the Erosion Potential ( $E_p$ ) in-stream at a value of 1.0, unless an alternative value can be shown to be protective of the downstream natural drainage system from erosion, incision, and sedimentation. If the median grain size ( $D_{50}$ ) of the receiving channel's bed sediment is greater than 8 mm, then an allowable alternative  $E_p$  value is :*

$$E_p = 0.78 * D_{50}^{0.12}$$



# Chapter 4: Hydromodification Management Standard

## Hydromodification Management Standard:

*This hydromodification management standard shall be achieved through onsite BMPs, regional BMPs, in-stream controls, or a combination thereof.*

BMPs that are designed to provide flow duration control to the pre-project condition meet the erosion potential management standard and comply with this HCP.

# Chapter 4: Hydromodification Management Standard

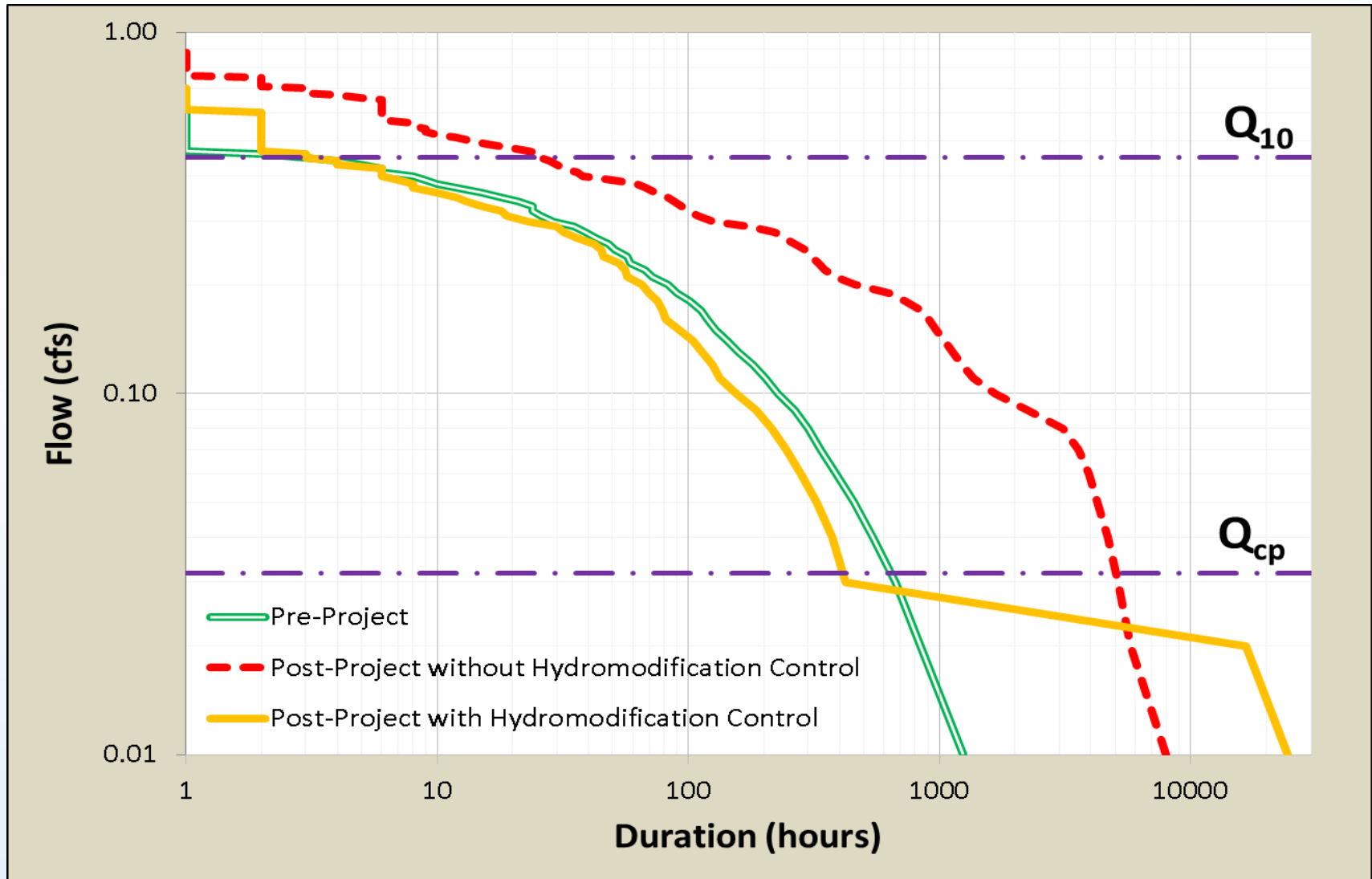
## Hydromodification Management Standard:

### *Goodness-of-Fit Criteria:*

*Flow duration controls shall be designed such that post-project stormwater discharge rates and durations match pre-project discharge rates and durations above 10 percent of the pre-project 2-year peak flow (or an alternative low flow discharge determined based on a stream-specific critical threshold analysis ) up to the pre-project 10-year peak flow. The post-project flow duration curve shall not deviate above the pre-project flow duration curve by more than 10 percent .*

# Chapter 4: Hydromodification Management Standard

Flow Duration Control



# Chapter 4: Hydromodification Management Standard

## Methods to Meet the HCP Management Standard

### ■ On-Site Control

- Nomographs or Sizing Factors for LID-based BMPs
- California Hydrology Model (CAHM)
- System Specific Flow Duration Control Analysis
- System Specific Erosion Potential Analysis

### ■ Regional Control

- California Hydrology Model (CAHM)
- System Specific Flow Duration Control Analysis
- System Specific Erosion Potential Analysis

### ■ In-Stream Control

- System Specific Erosion Potential Analysis

- 
- Watershed specific
  - Ep or FDC
  - Credit for LID
  - Account for permanent open space

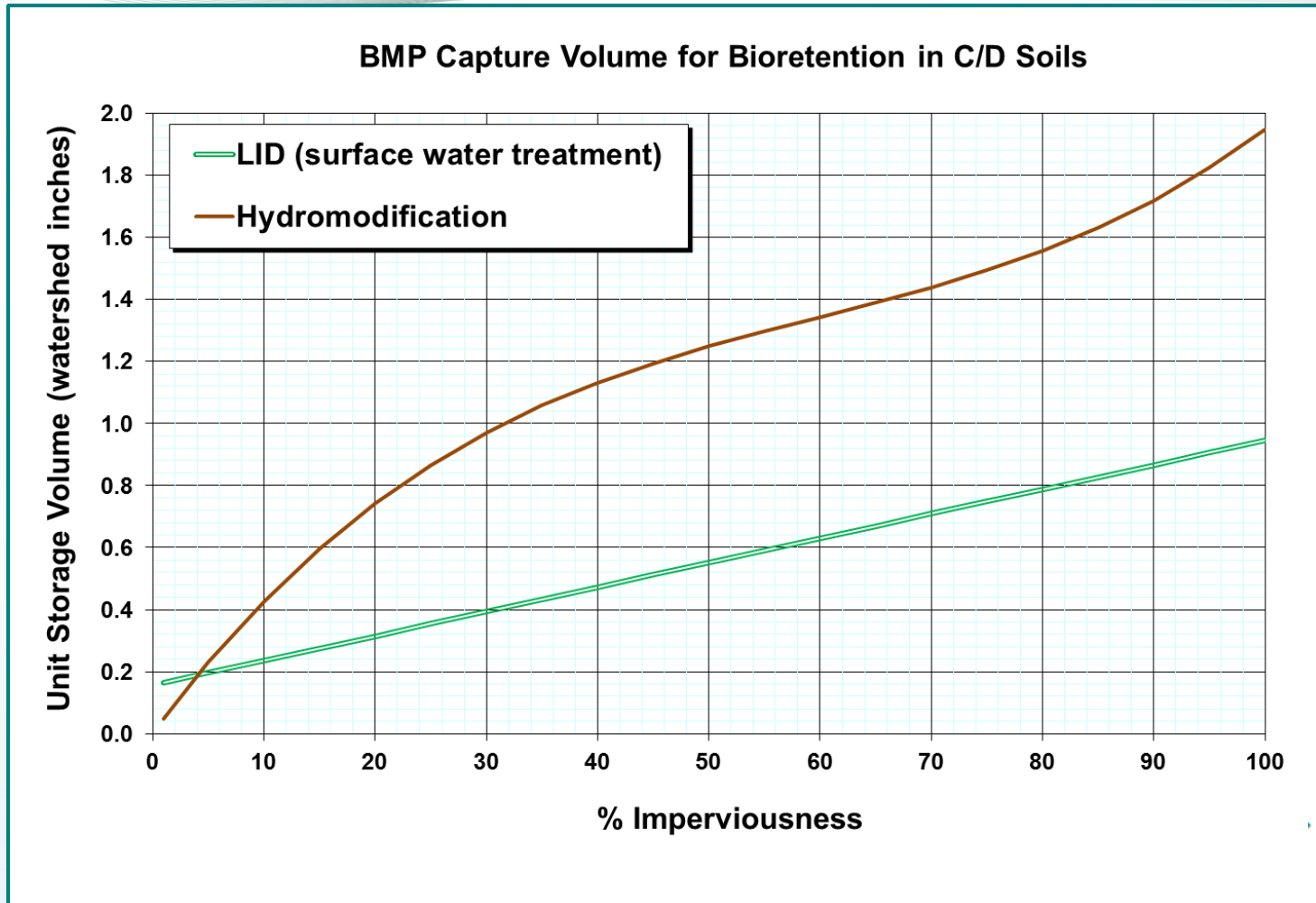
# Chapter 4: Hydromodification Management Standard

## BMP Sizing Options

	Onsite	Regional	In-Stream
Nomographs or Sizing Factors	X		
California Hydrology Model (CAHM)	X	X	
System-Specific Analysis	X	X	X

↓ Complexity

# Chapter 4: Hydromodification Management Standard

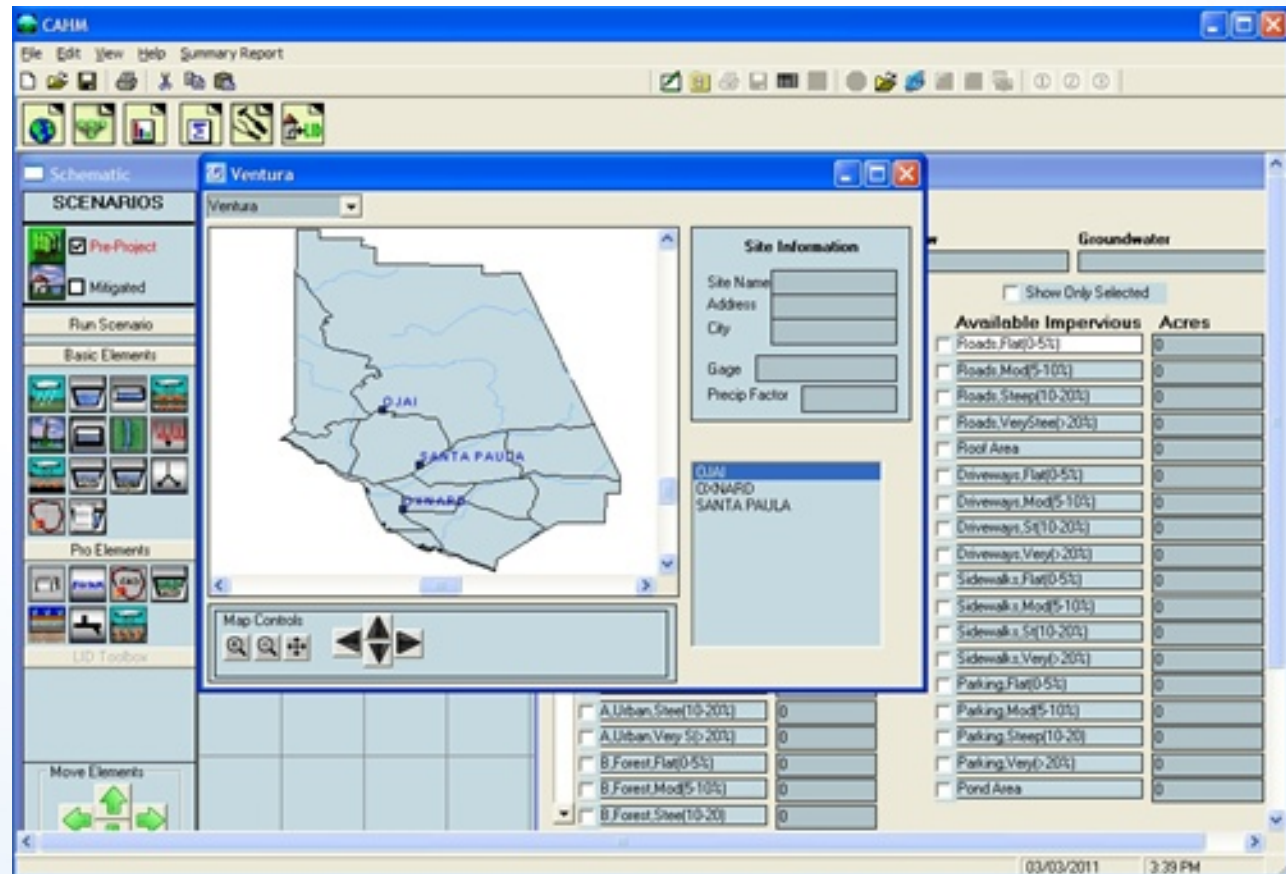


Example Nomograph

# Chapter 4: Hydromodification Management Standard

## CAHM for Ventura County

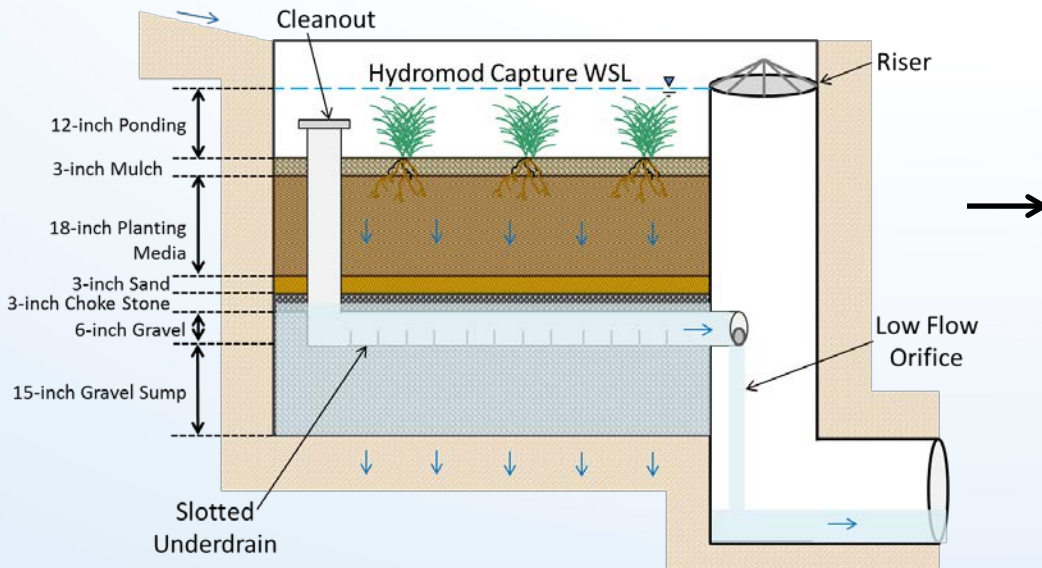
**\$400  
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# Chapter 5: Hydromodification Control BMPs

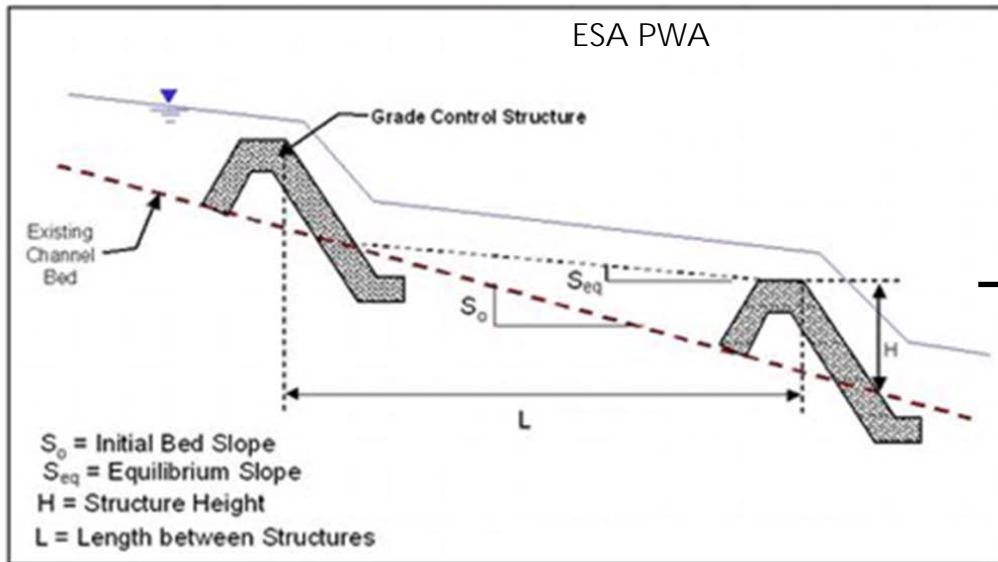
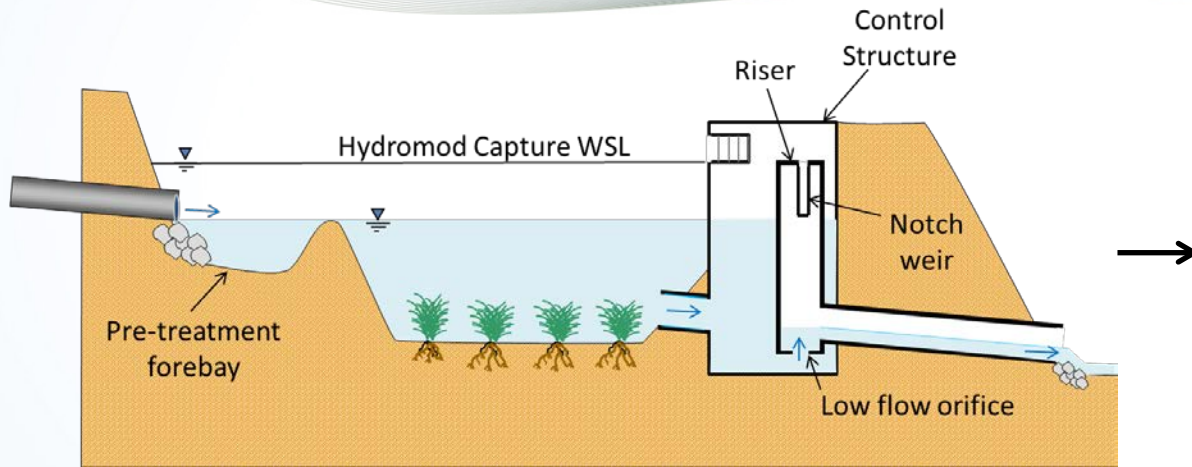
Describes the selection and types of BMPs that can be used to meet the Management Standard.

- 5.1 Selection of Hydromodification Control BMPs
- 5.2 Non-structural BMPs
- 5.3 Structural BMPs

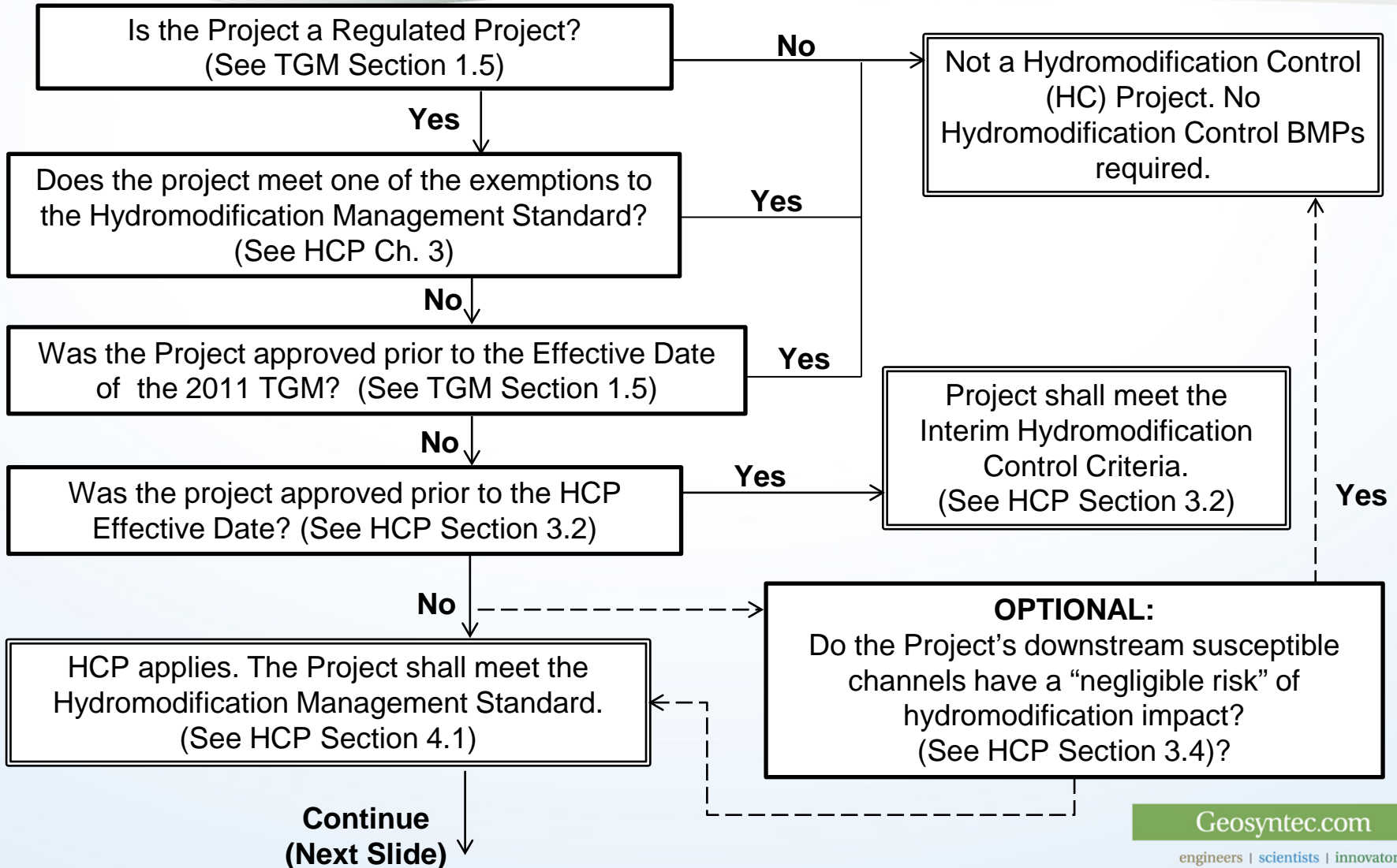




# Chapter 5: Hydromodification Control BMPs

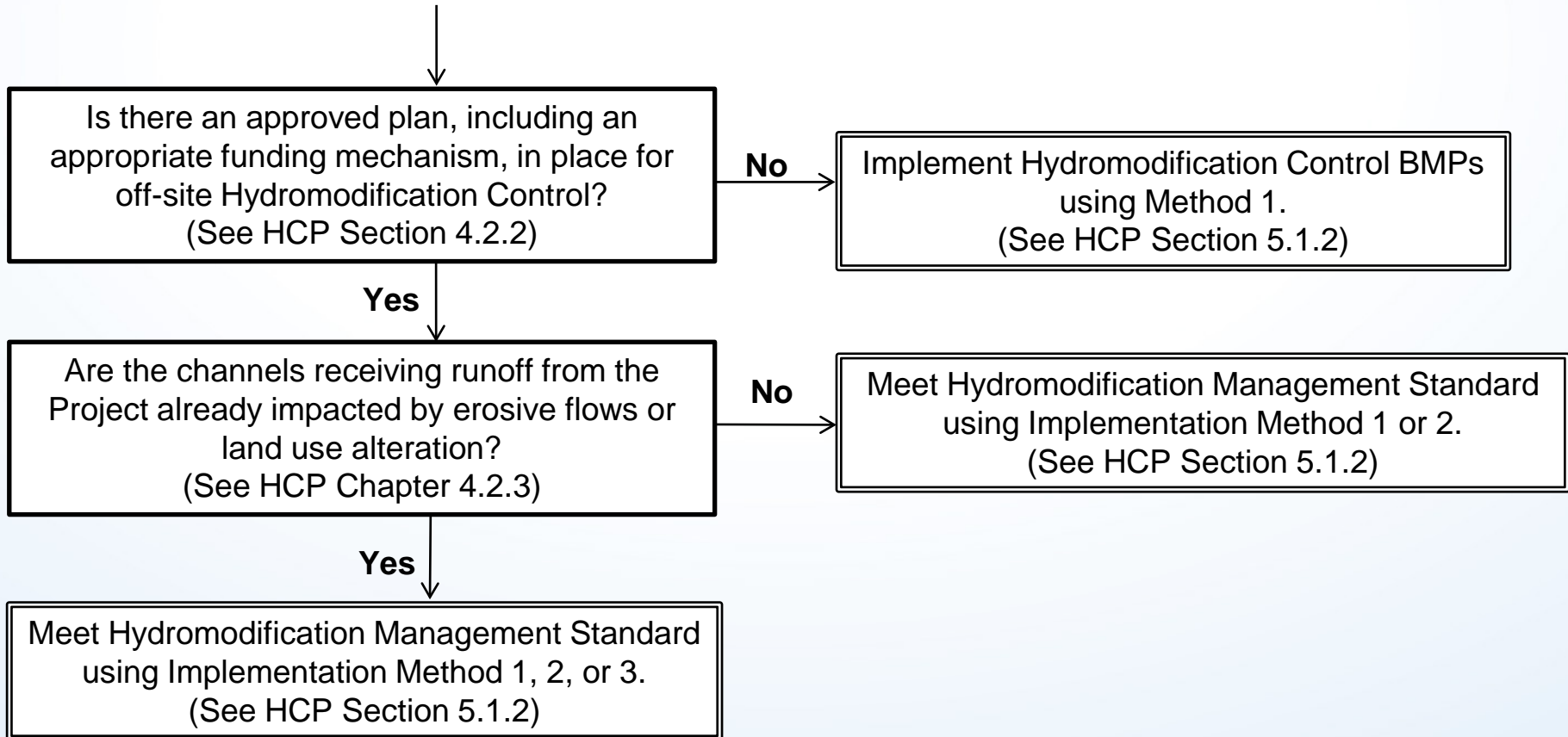


# Chapter 5: Hydromodification Control BMPs



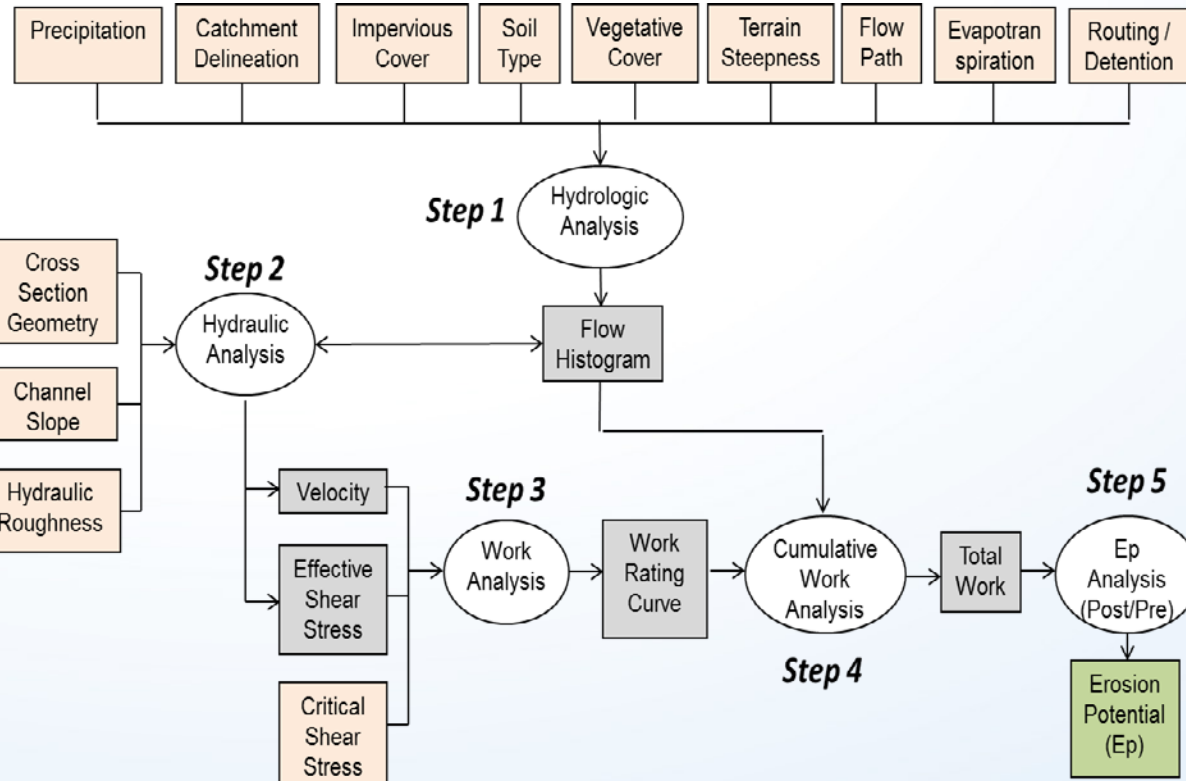
# Chapter 5: Hydromodification Control BMPs

Continued  
(from previous slide)



# Chapter 6: Sizing Guidance

Provides guidance on how to size Hydromodification Control BMPs.



6.1 Low Flow Threshold Analysis

6.2 Flow Duration Control Analysis

6.3 Erosion Potential Analysis →

# Chapter 7: Monitoring and Effectiveness Assessment

Provides guidance on post-construction monitoring to evaluate the performance and effectiveness of the HCP.

## 7.1 Elements of Hydromodification Monitoring

## 7.2 Data Collection

## 7.3 Record Keeping



# Chapter 7: Monitoring and Effectiveness Assessment

## Elements of Hydromodification Monitoring

- **Performance monitoring** = evaluate whether a facility or practice meets its intended or designed performance, independent of whether that intended design is beneficial for receiving waters
  - At point of compliance
- **Effectiveness monitoring** = evaluate how well management actions or a suite of actions reduce or eliminate hydromodification impacts on receiving waters
  - In receiving channel of concern

# Chapter 7: Monitoring and Effectiveness Assessment

Monitoring Measure	Responsibility	# of Sites	Frequency	Duration
Maintenance Inspection	Project Owner	All projects with Hydromodification Control BMPs	Annually or once every 2 years	Indefinitely
Aerial Photographic Monitoring	Program	Regional review with at least one specific reach per watershed	Annually or once every 2 years	Indefinitely
In-Stream Photographic Monitoring	Project Owner	One reach per Large Project which requires 401 certification or disturbs 50 acres or greater	Annually or once every 2 years	5 to 10 years
Physical Channel Survey	Project Owner	One reach per Large Project which requires 401 certification or disturbs 50 acres or greater	Upon observation of channel adjustment, min of once every 3 years	5 to 10 years
Biological Assessment	Program, assuming the SMC program exists	Per SMC protocol	Per SMC protocol	5 to 10 years

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Questions?



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# Commenting Process

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- Send to: [losangeles@waterboards.ca.gov](mailto:losangeles@waterboards.ca.gov) with the subject line “Comments on Ventura County MS4 Draft Hydromodification Control Plan”
- and concurrently to:  
[Ivar.Ridgeway@waterboards.ca.gov](mailto:Ivar.Ridgeway@waterboards.ca.gov)
- Comments should be submitted as a PDF file.