CDM

Pollutants of Concern and Selection of Proper BMPs

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SQUIMP BMP Objectives

- "The development shall be designed so as to **minimize**, to the maximum extent practicable (MEP), the introduction of **pollutants of concern** that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system."
- **One or a combination of suitable source control BMPs and treatment control BMPs** are required in order to meet this objective

BMP Selection

- Types of BMPs
  - Source Control (may be non-structural or structural)
  - Treatment Control
- BMP Selection
  - BMP Performance
  - Water Quantity
  - Site Conditions
  - Design, Construction, and O&M Costs
  - Vector Control
  - Other Considerations

Best Management Practices

Structural Source Control BMPs

- Low-technology practices
- Designed to prevent pollutants from contacting stormwater runoff or to prevent discharge of contaminated runoff to the storm drainage system

Outdoor Trash/Material Storage Area

Source Control BMPs Identified in the County's *Technical Guidance Manual for Stormwater Quality Control Measures*

- S-1: Storm Drain Message and Signage
- S-2: Outdoor Material Storage Area Design
- S-3: Outdoor Trash Storage Area Design
- S-4: Outdoor Loading/Unloading Dock Area Design

Source Control BMPs Identified in the County's *Technical Guidance Manual for Stormwater Quality Control Measures*

- **S-5: Outdoor Repair/Maintenance Bay Design**
- **S-6: Outdoor Vehicle/Equipment/Accessory Washing Area Design**
- **S-7: Fueling Area Design**
- **S-8: Proof of Control Measure Maintenance**

Source Control BMPs Required Use

	S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8
Commercial Developments	R	R(d)	R(d)	R(d)	R(d)	R(d)	R(d)	R
Automotive Repair Shops	R	R(d)	R(d)	---	R(d)	R(d)	R(d)	R
Retail Gasoline Outlets	R	R(d)	R(d)	---	R(d)	R(d)	R	R
Restaurants	R	R(d)	R(d)	R(d)	---	R(d)	---	R
Parking Lots	R	R(d)	R(d)	---	---	---	---	R
Hillside Single-Family Residences	R	R(d)	---	---	---	---	---	R
Home Subdivisions	R	R(d)	---	---	---	---	---	R
ESA areas	R	R(d)	R(d)	R(d)	R(d)	R(d)	R(d)	R

R = Required if applicable to project
R(d) = Required if activity area is included in the project

Treatment Control BMPs

- Engineered technologies designed to remove pollutants from stormwater runoff

Media Filter

Engineered Treatment Control BMPs Identified in the County's Technical Guidance Manual for Storm Water Quality

- T-1 Grass Strip Filter
- T-2 Grass Swale Filter
- T-3 Extended Detention Basin
- T-4 Wet Detention Basin
- T-5 Constructed Wetland Basin
- T-6 Detention Basin/Sand Filter

Grass Swale Filter

Engineered Treatment Control BMPs Identified in the County's Technical Guidance Manual for Storm Water Quality

Infiltration Trench

- T-7 Porous Pavement Detention
- T-8 Porous Landscape Detention
- T-9 Infiltration Basin
- T-10 Infiltration Trench
- T-11 Media Filter
- T-12 Alternative Control Measures and Proprietary Control Measures

Treatment Control BMPs Required Use

SQUIMP Project Category	T1-T12
Commercial Developments	S
Automotive Repair Shops	S
Retail Gasoline Outlets	S
Restaurants (1)	S
Parking Lots	S
Hillside Single-Family Residences	S
Home Subdivisions	S
ESA areas	S

(1) Excluding <5,000 ft^2 of development

S = Select one or more applicable treatment control measures

About Environmentally Sensitive Areas

- All projects located in or directly adjacent to or directly discharging to an Environmentally Sensitive Area (ESA) are subject to stormwater mitigation requirements, where the development will:
  - Discharge stormwater and urban runoff that is likely to impact a sensitive biological species or habitat; and
  - Create 2,500 square feet or more of impervious surface area
  - Re-development of single family homes are exempt.

ESAs

- According to the *Technical Guidance Manual for Stormwater Quality Control Measures*, ESAs include:
  - 303d listed water bodies in all reaches that are unimproved and soft-bottomed
  - All California Coastal Commission's *Environmentally Sensitive Habitat Areas* as delineated on maps in Local Coastal Plans

Brown Pelican

303d List

- Section 303(d) of the Clean Water Act requires states to develop a list of impaired waters (Federal 303 (d) List)
- Water quality assessments conducted by the Regional Board identified impairment, or threatened impairment, of beneficial uses of water bodies in the Ventura Coastal Watersheds.
- *303(d) list identifies impaired water bodies and the pollutants causing impairments*

Total Maximum Daily Loads (TMDLs)

- The CWA requires states to establish priority rankings for 303 (d) listed waters and develop action plans, or Total Maximum Daily Loads for pollutants allowed in those water bodies, to improve water quality.
- TMDLs specify the maximum amount of a pollutant that a 303 (d) listed water body can receive and still meet water quality standards.
- TMDLs allocate pollutant loadings among various sources (wastewater discharge, industrial discharge, storm water discharge)

http://www.epa.gov/owow/tmdl/overviewfs.html

Complete / In-progress TMDLs in Ventura County

Water Body	Pollutant (s)
Malibu Creek	Bacteria, Nutrients
Calleguas Creek	Pesticides, PCBs, Siltation, Toxicity, Salts, Nitrogen
Santa Clara River	Chloride, Nitrogen
Ventura Coastal	Bacteria

Types of Treatment BMPS

- Detention and Settling
  - Porous Pavement Detention
  - Landscape Detention
  - Extended Detention Basin
  - Wet Detention Basin
  - Constructed Wetland Basin
  - Detention Basin/Sand Filter

Types of Treatment BMPS

- Infiltration
  - Infiltration Trench
  - Infiltration Basin
- Biofiltration
  - Grass Strip Filter
  - Grass Swale Filter
- Filter
  - Media Filter

T-12 Alternative Control Measures and Proprietary Control Measures

- Example Separator Systems
  - BaySaver Separation System
  - CDS Technologies
  - Downstream Defender
  - Stormceptor System
  - StormTreat System
  - V2B1
  - Vortechs Stormwater Treatment System

T-12 Alternative Control Measures and Proprietary Control Measures

- Example Filtration Devices
  - AquaShield
  - DrainPac Storm Drain Filter
  - Hydro-Kleen Filtration System
  - StormFilter
  - Ultra Urban Filters
- Example Infiltration Devices
  - Cultec
  - Rainstore3
  - Storm Chamber

BMP Selection

Factors to Consider

- Pollutants of Concern
- BMP Performance/Effectiveness
- Quantity of storm water
- Project site conditions
- State General Industrial Permit requirements, when applicable
- Design, construction, and maintenance costs
- Vector Control and Other Issues

Pollutants of Concern (POCs)

- The development shall be designed so as to **minimize**, to the maximum extent practicable (MEP), the introduction of **pollutants of concern** that may result in significant impacts, generated from site runoff of directly connected impervious areas (DCIA), to the storm water conveyance system.

Board Order No. 00-108, NPDES Permit No. CAS004002

Ventura County Potential POCs

POCs include those pollutants that are specifically identified as causing impairment in each downstream water body. Impairments listed for one or more waterbodies include:

- **Sediments**
- **Bacteria (e.g. total and fecal coliform)**
- **Metals (e.g. copper, lead)**
- **Trash and Debris**
- **Toxic Organics (e.g. PCBs, PAHs)**
- **Oxygen Demanding Substances (e.g. nutrients, suspended solids)**
- **Nutrients (e.g. nitrogen, phosphorous, ammonia)**

SQUIMP Project Categories and Expected Pollutants

SQUIMP Project Category	Pollutant Category of Concern						
	Sediment	Nutrients	Metals	Trash and Debris	Oxygen Demand	Toxic Organics	Bacteria
Commercial Developments (≥ 100,000 SF)	X	X	X	X	X	X	X
Automotive Repair Shops	X		X	X	X	X	
Retail Gasoline Outlets	X		X	X	X	X	
Restaurants		X		X	X	X	X
Parking Lots (≥ 5,000 SF or 25 spaces)	X		X	X	X	X	
Hilllside Single-family Residences	X	X	X	X	X	X	X
Home Subdivisions (≥ 10 units)	X	X	X	X	X	X	X
Projects Located Within or Directly Adjacent to, or Discharging Directly to Environmentally Sensitive Area (see Appendix I)	X	X	X	X	X	X	X

X = Pollutant likely to be present in stormwater runoff from project area

Project Pollutants of Concern

- Consider expected pollutants
- Consider downstream impairments
  - 303d List
  - all California Coastal Commission's *Environmentally Sensitive Habitat Areas* as delineated on maps in Local Coastal Plans.
- Project pollutants of concern = expected pollutants plus water body impairments

BMP Performance

- Select BMP(s) that are most suitable for the Project Pollutants of Concern

Pollutant of Concern	Stormwater Treatment Control Measures[a]										
	Grass Strip Filter (T-1)	Grass Swale Filter (T-2)	Extended Detention Basin (T-3)	Wet Detention Basin (T-4)	Constructed Wetland (T-4)	Detention Basin/Sand Filter (T-6)	Porous Pavement Detention (T-7)	Porous Landscape Detention (T-8)	Infiltration Basin (T-9)	Infiltration Trench (T-10)	Media Filter (T-11)
Sediment	H	M	H	H	H	H	H	H	H	H	H
Nutrients	M	L	M	M	M	M	M	M	M	M	M
Metals	M	M	M	M	M	M	M	M	M	M	M
Trash and Debris	H	H	H	H	R	R	R	R	R	R	R
Oxygen Demand	M	M	M	M	M	M	M	M	M	M	M
Toxic Organics	M	M	M	M	M	M	M	M	M	M	M
Bacteria	M	L	L	H	M	M	M	M	M	M	M

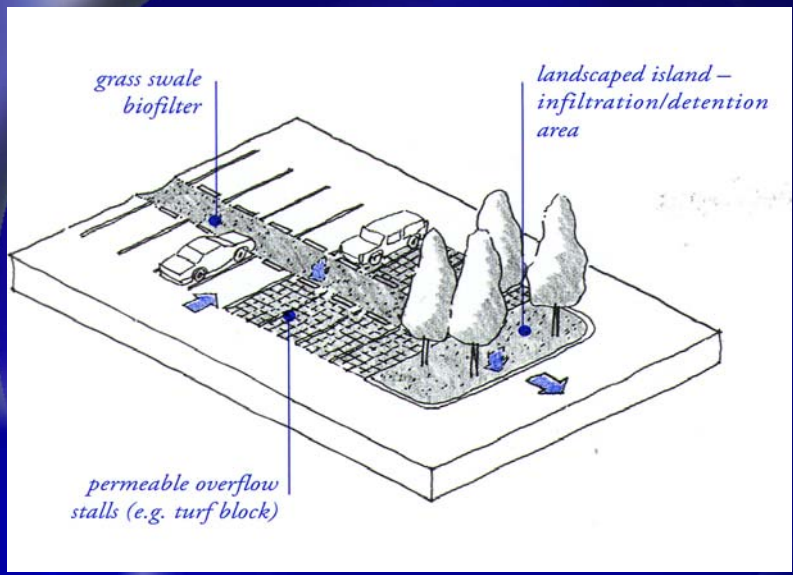
Treatment Train Approach

- Treatment Trains may be required to address all POCs
- Treatment trains consist of various BMPs laid out in a series
  - One BMP's effluent is the next BMP's influent
  - One BMP maximizes performance for one pollutant while the next BMP focuses on another

Treatment Train Approach

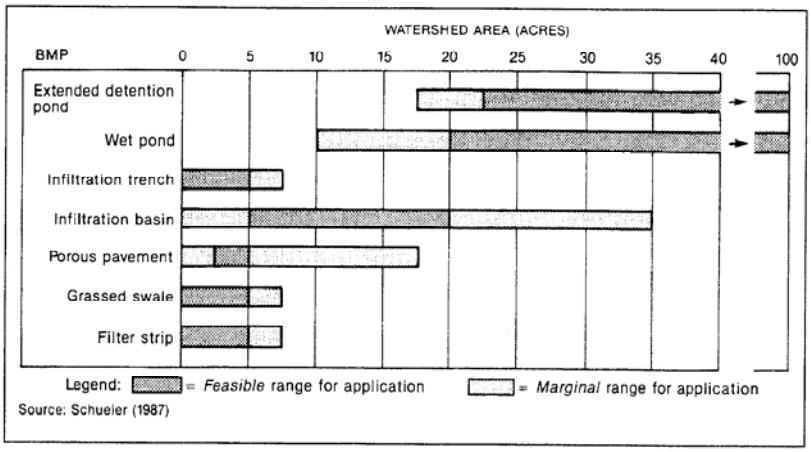
- Examples:
  - Installing a trash and solids separation BMP "upstream" of a disinfection or infiltration BMP
  - Using open channel vegetated systems as pretreatment devices for other BMPs

Treatment Train Approach in an Overflow Parking Lot



Storm Water Quantity must be considered in narrowing the BMP selection

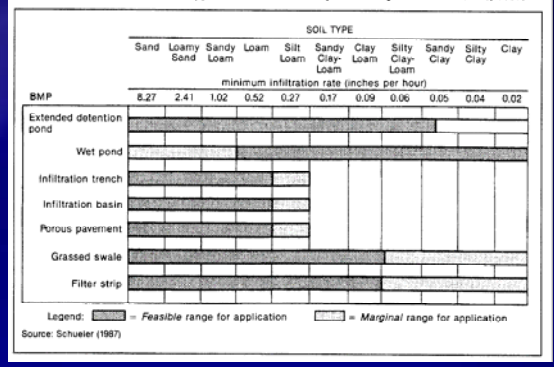
FIGURE 2: Feasible BMPs for different watershed sizes. *Source: Schueler, 1987.*



Project site conditions will provide additional BMP contraints

- Tributary shape and area
- Perennial flow
- Soil type
- Available hydraulic head
- Depth to groundwater
- Available land
- Aesthetics

FIGURE 3: Restrictions for BMP application based on soil permeability. *Source: Schueler, 1987.*



Design, Construction, and O&M Costs

- O&M Costs can be significant and need to be considered up front.

Poorly Maintained BMP

Design, Construction, and O&M Costs

Volume-Based Treatment BMPs	
BMP	Cost /cfs
Constructed Wetland Basin	$$$$
Detention Basin/Sand Filter	$$$$
Wet Detention Basin	$$$$
Extended Detention Basin	$$
Media Filter	$$$$
Infiltration Trench	Not available
Infiltration Basin	$
Porous Pavement Detention	Not available
Porous Landscape Detention	Not available
Proprietary Control Measures	Not available

Design, Construction, and O&M Costs

Flow -Based Treatment BMPs	
BMP	Cost /cfs
Grass Strip Filter	$$
Grass Swale Filter	$$
Proprietary Control Measures	Not available

State Industrial Permit Requirements

- An Industrial development project may have BMP requirements or restrictions from the State General Industrial Permit.

Vector Control

- Vector Control from rodents to mosquitos must be considered - Mosquitos breed in standing water.
- BMPs, such as ponds and wetlands, that are designed to hold water or include sumps or vaults may require routine inspections and treatment by local vector control agencies

Constructed Wetland Basin

Extended Detention Basin

Other Considerations/Local Preferences

- Consult with local agency staff early in process to assure a common understanding of POCs and acceptable BMPs.
- The use of BMPs identified in the Technical Services Manual are preferred by the County and will generally ensure timely plan check review.
- Alternative technologies that provide equivalent treatment must be approved by the governing stormwater agency (City or County) on a case by case basis and may result in additional time for agency review and approval, unless coordinated in advance with the agency staff.