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Storm Water Design Control Measures

Day 2 of the 2010 Got SWPPP? Storm Water Workshops

Today's municipal sponsors ...



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WELCOME!



Jeff Wingfield
Port of Stockton



Christina Walter
City of Stockton



Brandon Nakagawa
San Joaquin County



Thank you!

... to our corporate sponsors





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Today's Workshop

(Introduction - 8:30-9:00 am)

- Compliance with **regulatory mandates**
- Hands-on project involving **key storm water concepts**
- Limited to **budgetary and aesthetic constraints**
- **Complimentary resources** available – internet, regulations, handbooks, vendors, agencies

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Regulatory Mandates

- California – Phase I and Phase II MS4s
- California – General Construction Permit (CGP)
- City of Stockton – Stormwater Quality Control Criteria Plan (SQCCP)
- Port of Stockton – Development Standards Plan (DSP)
- California – Model Water Efficiency Landscape Ordinance (MWELO)



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Key Storm Water Concepts

- Hydromodification
- Low Impact Development (LID)
- Treatment Controls
- Water Efficiency Landscaping
- Integrated Pest Management
- Landscape Maintenance



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Budgetary Constraints

- Minimal cost
- Show approximate cost of each storm water tool
- Optimal Treatment and Control
- Aesthetics



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Our Assignment:

Design a storm water control project that is **regulation compliant** and that intelligently incorporates **storm water design** features in an reasonably **economic** manner.



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Proposed Development Location



High spot : 27 ft. AMSL

Proposed development site
152,000 sq. ft.

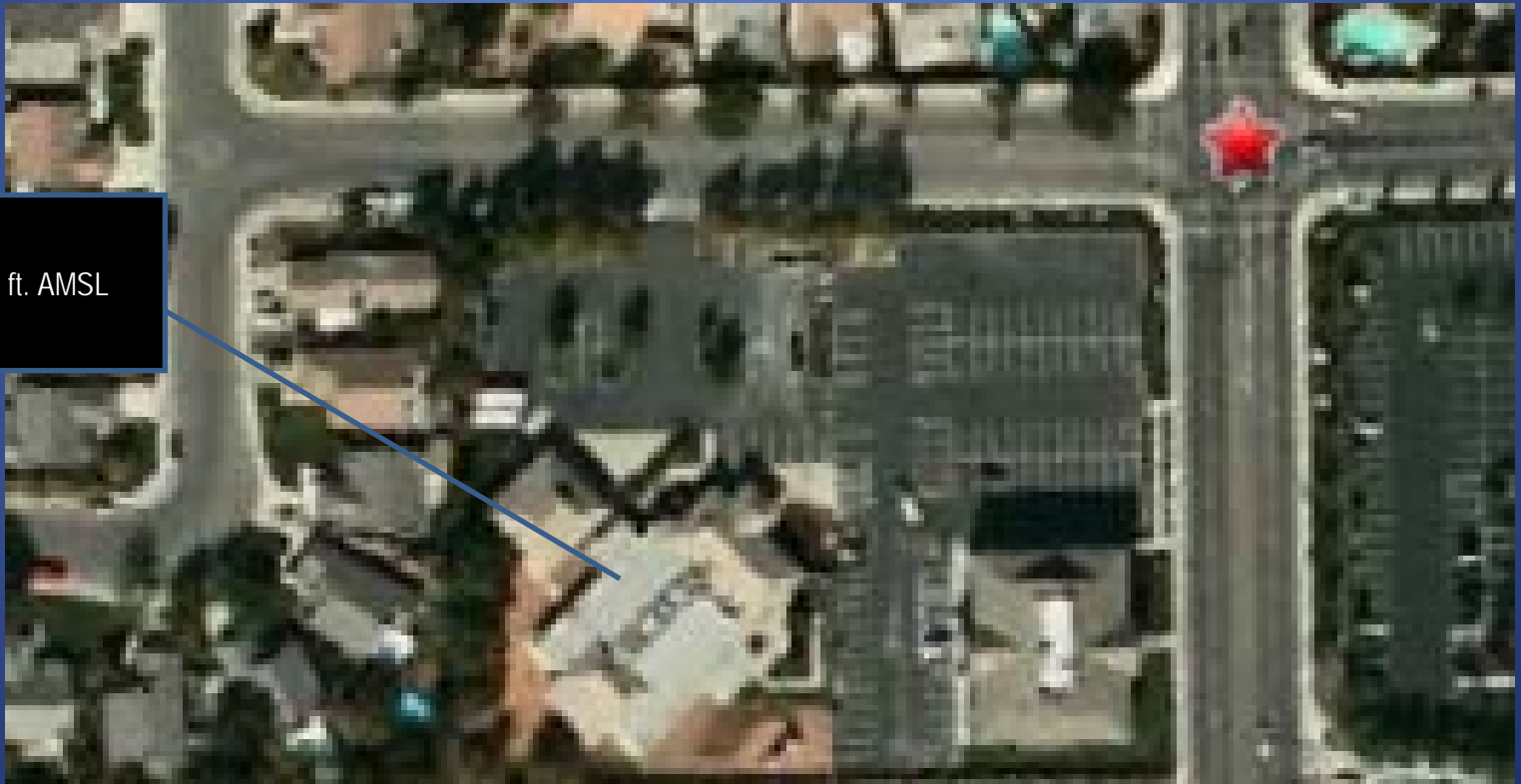
Drainage Creek
Low spot: 7 ft. AMSL

38° 00' 16"N 121° 15' 51"W

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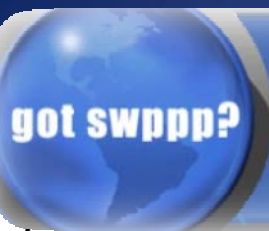
Developed Property



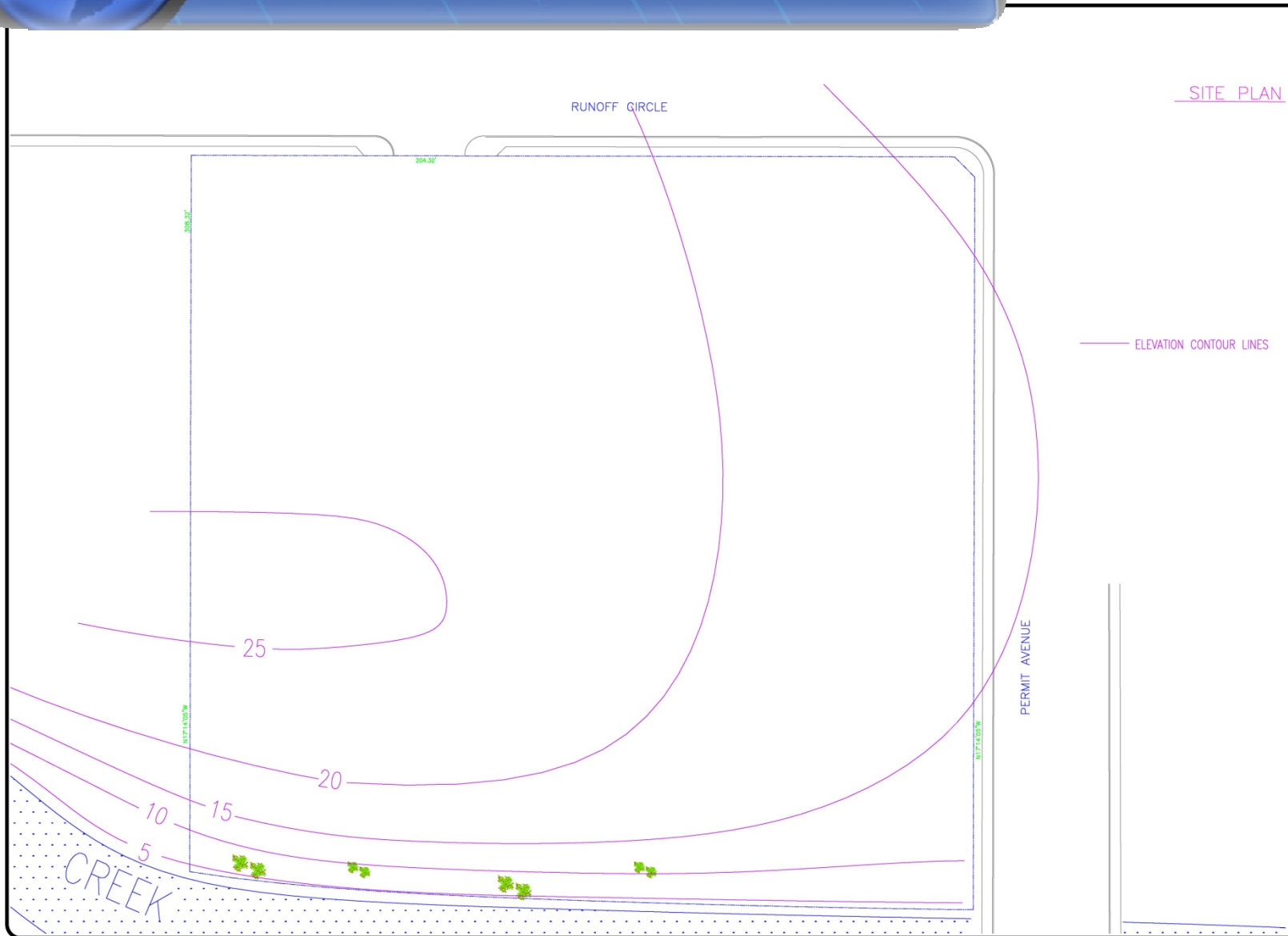
High spot : 27 ft. AMSL

38° 00' 16"N 121° 15' 51"

Courtesy of MapQuest.com



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SITE PLAN

REVISIONS	BY

WGR
SOUTHWEST, INC.
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CANTON, CA 95921
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DESIGN ASSOCIATES
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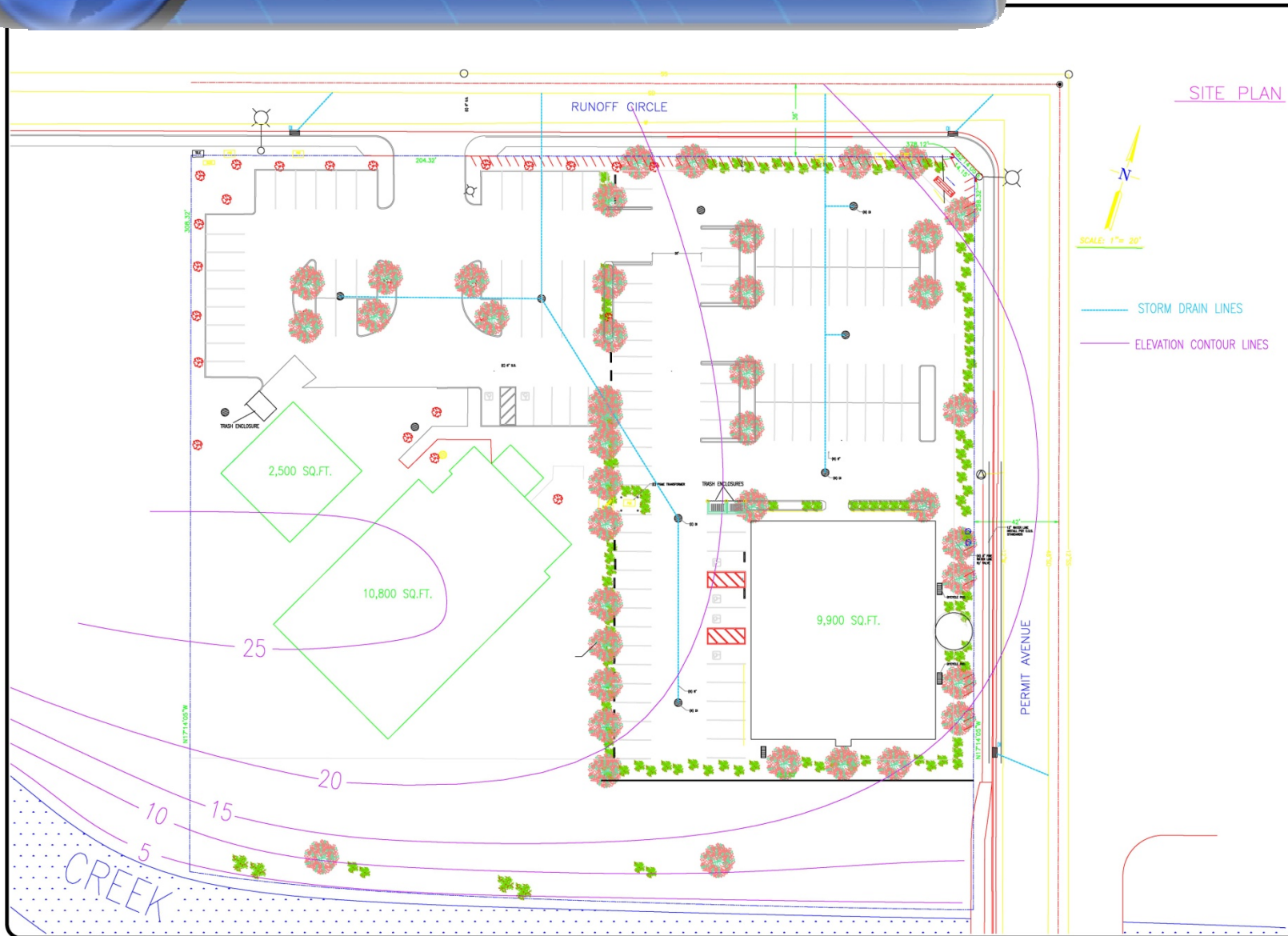
"GOTSWPPP?"
BUSINESS PARK

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SCALE:	1"=40'
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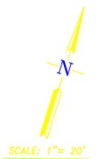
SHEET
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SITE PLAN



- STORM DRAIN LINES
- ELEVATION CONTOUR LINES

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"GOTSWPPP?"
 BUSINESS PARK

DATE:	
SCALE:	
DRAWN:	
CHECK:	

SHEET
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"GOT SWPPP?"
BUSINESS PARK

DATE: 8-9-04
SCALE: 1/4" = 1' OR AS SHOWN
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JOB:
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A-5.5
OF SHEETS



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Stormulator

- Tool to *calculate runoff flow* (SWQF) from the property
- Addresses Hydromodification, LID solutions
- <http://www.stocktongov.com/MUD/General/stormwater/SWQCCP.cfm>

A circular logo with a blue globe background and the text "got swppp?" in white. The logo is positioned on the left side of a blue banner at the top of the slide.

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Project Details:

- 3 Buildings (total 23,200 sq. ft.)
- Parking lot 53,400 sq. ft.
- Undeveloped lot
- Total disturbed soil = 150,000 sq. ft.
- Receiving water is Stockton MS4 and a tributary creek to the San Joaquin River
- CGP and SWQCCP apply



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General Contractors

Specializing in Environmental Friendly Projects

(800) GOT - SWPPP

A blue globe icon showing the Americas, with the text "got swppp?" overlaid in white.

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A large, bright yellow starburst shape with multiple points, containing the word "Activity" in black text.

Activity



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Review Available Materials

With the rest of your table, look over and familiarize yourself with available items

- Site drawings in table – look at slope, pervious and impervious surfaces
- Regulatory documents on thumb drive and why they are pertinent
- Imagine potential storm water control tools

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Our Assignment:

- Site Design Features and Concepts (9:00 – 9:55 AM)
- Selection/Design of Controls (10:10 – 11:30 AM)
Lunch Break (11:30 – 12:30 PM)
- Site Tour (12:30 – 1:00 PM)
- Finalize Selection/Design of Controls (1:00 – 2:00 PM)
- Landscape Maintenance (2:15 – 2:45 PM)
- Evaluate and Review (2:55 – 3:30 PM)



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Site Design Features and Concepts

9:00 – 9:55 AM



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Key Storm Water Concepts

- Local Coordination - Integrating Design and Planning
- Hydromodification
- Low Impact Development (LID)
- Treatment Controls
- Water Efficiency Landscaping
- Integrated Pest Management
- Landscape Maintenance
- Within budget!



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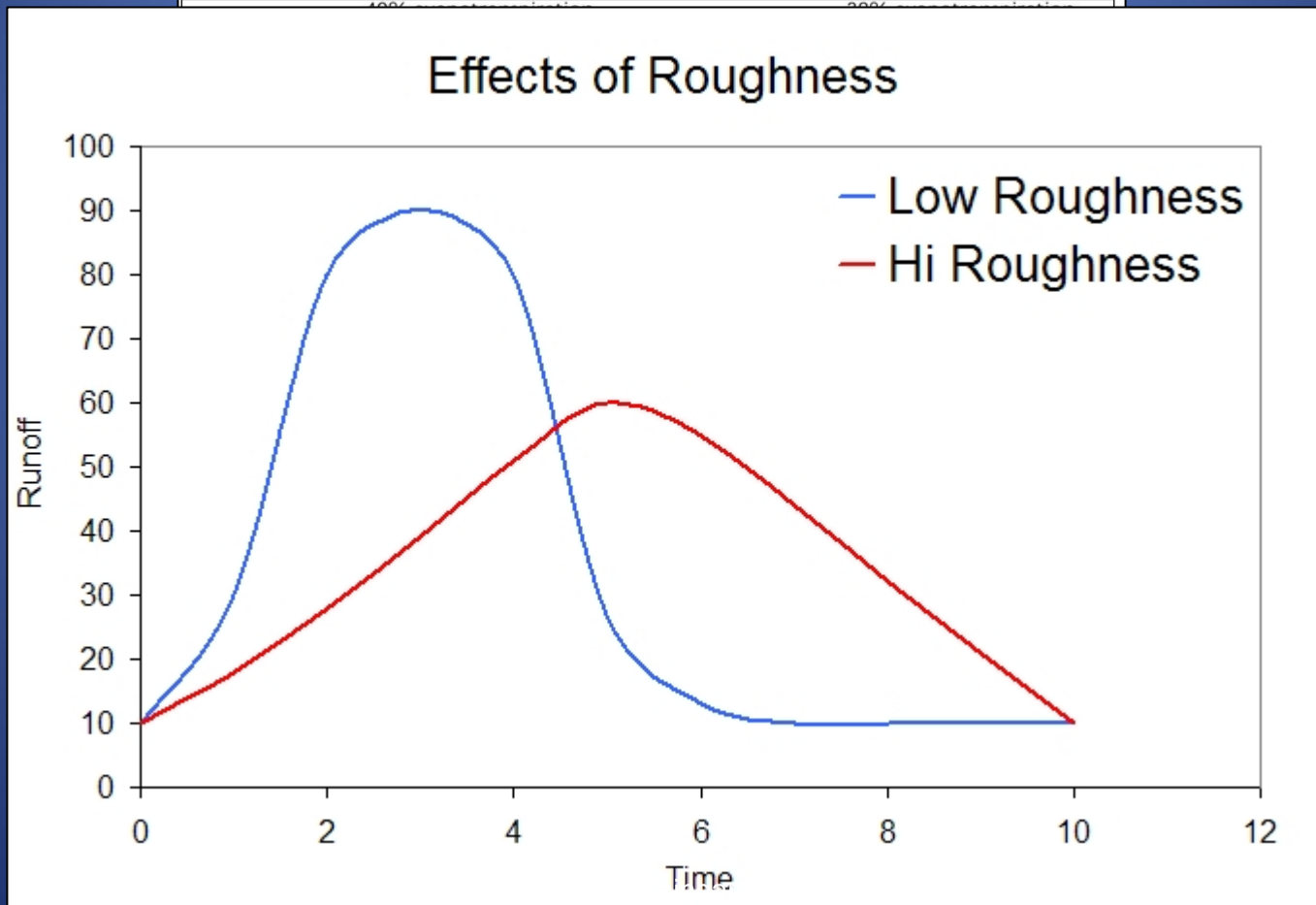
Local Coordination

- The local agency needs to know what they want!
- Local departments, such as planning, public works, etc., should be on the same page
- Need to be involved in the design stage



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Hydromodification



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Water Efficiency

California Model Water Efficient Landscape Ordinance

- Adopted January 1, 2010
- Homeowner-installed landscapes > 5,000 sq. ft.
- Developer-installed landscapes, private development, and public agency projects > 2,500 sq. ft.
- Local audits for existing landscapes > 1 acre
- Local agencies do irrigation audits and approve or deny a Landscape Document Package (LDP) which includes a soil report, a landscape design plan, irrigation design plan and grading design plan



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Last but not Least - Landscape Maintenance

- Needs to be arranged by local agencies
 - Section 7 of SWQCCP
- Integrated Pest Management



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Our Assignment:

Design a storm water control project that is **regulation compliant** and intelligently incorporates **storm water design** features in an reasonably **economic** manner.

A circular icon featuring a blue globe with white outlines of continents. The text "got swppp?" is written in white, lowercase letters across the globe.

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A bright yellow, multi-pointed starburst or explosion shape with a jagged, irregular border.

Activity



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Project Examples

Think of real or imagined examples where LID was or could be helpful economically or practically

- What storm water tools would be used?
- Why is it helpful?
- How could it be economical?

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Site Design Features

- Priority Project Status



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Priority Projects (SCHARRPS?)

- Significant Redevelopment
- Home Subdivisions
- Commercial Developments
- Automotive Repair Shops
- Restaurants
- Parking Lots
- Streets and Roads
- Retail Gasoline Outlets



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Site Design Features

- Priority Project Status
- Semi-Arid Climate
- Evapotranspiration (ET) Levels
- Plant Type
- Soil Type
- Natural Drainage
- Potential Receptors
- Pollutants of Concern (POCs)
- Minimum budget



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Local Conditions

- Semi-Arid Climate

See WMELO excerpt on thumb drive

- Soil Type

<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

- Drought-Tolerant Plants

http://arboretum.ucdavis.edu/arboretum_all_stars.aspx

- Watershed Characteristics

- Drainage

- Receiving Water

- Pollutants of Concern



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Proposed Development Location



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Proposed development site
152,000 sq. ft.

Drainage Creek
Low spot: 7 ft. AMSL

38° 00' 16"N 121° 15' 51"W



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New Development Project Category	Pollutant Category of Concern						
	Sediment	Nutrients	Metals	Trash 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	X	
Home Subdivisions (>10 units)	X	X	X	X	X	X	X



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Selection/Design of Storm Water Controls

10:10 – 11:30 AM

A blue globe icon showing the Americas, with the text "got swppp?" overlaid in white.

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A large, bright yellow starburst shape with multiple points, containing the word "Activity" in black text.

Activity



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Review and Discuss

Think of real or imagined examples where LID was or could be helpful economically or practically

- What storm water tools would be used?
- Why is it helpful?
- How could it be economical?



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Storm Water Controls

- Site Design Controls – planning prep phase
- Source Controls – specific pollutant control
- Volume Reduction Controls – runoff control
- Treatment Controls – water quality control



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Site Design Controls

*Tools incorporated throughout the **original landscape design** to minimize runoff source*

- Conserve Natural Areas
- Protect Slopes and Channels
- Minimize Soil Compaction
- Minimize Impervious Area



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Source Controls

- Targets *specific source areas* which are a likely runoff pollution
 - Storm Drain Message and Signage
 - Outdoor Trash Storage/Waste Handling Area
 - Outdoor Material Storage Area
 - Loading/Unloading Dock Area Design
 - Outdoor Repair/Maintenance Bay
 - Outdoor Vehicle/Equip./Accessory Wash Area
 - Fueling Area

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Volume Reduction Control

- Tools to *reduce runoff volume*
- Addresses hydromodification
 - Rain Garden
 - Rain Barrel
 - Vegetated Roof
 - Interception Trees
 - Grassy Channel
 - Vegetated Buffer Strip



[http://](http://www.wsdot.wa.gov/Environment/WaterQuality/Research/Reports.htm)

[htt](http://www.wsdot.wa.gov/Environment/WaterQuality/Research/Reports.htm)

<http://www.wsdot.wa.gov/Environment/WaterQuality/Research/Reports.htm>

<http://www.wsdot.wa.gov/Environment/WaterQuality/Research/Reports.htm>

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Treatment Controls

- Tools to *treat runoff*
- Addresses LID solutions
 - Bioretention
 - Storm Water Plant
 - Tree-well Filter
 - Infiltration Basin
 - Infiltration Trench
 - Vegetated (Dry)
 - Grassy Swale
 - Grassy Filter Strip



<http://>

<http://www.trinkausengine.com/>
http://www.sleepycreekwatershedassociation.org/Content/StormWaterMgmt/rain_gardens.htm

<http://www>

<http://www.lamtcare.org/>
<http://www.lakecountyl.gov/Stormwater/LakeCountyWatersheds/BMPs/DryWells.htm>



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Stormulator

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Budgetary Review

- *Visit vendors*
- *Consult cost list*



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LUNCH TIME

11:30 – 12:30 PM



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Site Tour

(12:30 – 1:00 PM)



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Finalize Selection/Design of Controls

(1:00 – 2:00 PM)



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Landscape Maintenance

2:15 – 2:45 PM



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Landscape Maintenance

- Section 7 of the SQCCP
- California Model Water Efficient Landscape Ordinance
- Integrated Pest Management

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SECTION 7 CONTROL MEASURE MAINTENANCE

Continued effectiveness of control measures specified in this SWQCCP depends on diligent ongoing inspection and maintenance. To ensure that such maintenance is provided, the City and County require submittal of a Maintenance Plan and execution of a Maintenance Agreement with the owner/operator of stormwater control measures prior to final acceptance of a private development project, which may include one or more of the control measures detailed in Sections 3, 4, 5, and 6. The property owner or his/her designee is responsible for compliance with the agreement. Requirements for the maintenance plan and agreement are presented and discussed in this section. Sample agreements are presented in **Appendix D**.

7.1 MAINTENANCE PLAN

A post-construction Maintenance Plan shall be prepared and submitted to the City or County as part of the Project Stormwater Quality Control Plan submittal. The Maintenance Plan should address items such as:

- Operation plan and schedule, including a site map;
- Maintenance and cleaning activities and schedule;
- Equipment and resource requirements necessary to operate and maintain facility; and
- Responsible party for operation and maintenance.

This section identifies the basic information that shall be included in a maintenance plan. Refer to Fact Sheets for individual control measures regarding device-specific maintenance

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Model Water Efficiency Landscape Ordinance

- Adopted January 1, 2010
- Homeowner-installed landscapes > 5,000 sq. ft.
- Developer-installed landscapes, private development, and public agency projects > 2,500 sq. ft.
- Local audits for existing landscapes > 1 acre
- Local agencies oversee irrigation audits and approve or deny a **Landscape Document Package (LDP)** which includes a soil report, a landscape design plan, irrigation design plan and grading design plan



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Integrated Pest Management Plan

- Landscape management approach using the least toxic means
- Preventative approach: healthy soil/plants, beneficial insects, natural enemies, routine monitoring for pest, pest identification, non-toxic or less toxic chemicals before toxic ones
- Contact your master gardener/county agriculture department



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Evaluate, Report, & Review

2:55 – 3:30 PM



Thank you for attending ...

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Significant Redevelopment

- The creation or addition of **at least 5,000 square feet of impervious surfaces** on an already developed site
- Where significant redevelopment results in an increase of less than 50% of the impervious surfaces of a previously existing development and the existing development was not subject to development standards, the numeric sizing criteria discussed below applies only to the addition, and not the entire development.



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Home Subdivisions

- Single-family homes, multi-family homes, condominiums and apartments
- **10 housing units or more**
- POCs: Sediment, nutrients, trash/debris, oxygen demand and bacteria



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Commercial Developments

- Any development on private land that is not for heavy industrial or residual uses
- Includes, but is not limited to hospitals, laboratories, schools, apartment complexes, etc.
- Land area for development is **greater than or equal to 5,000 square feet of impervious area**
- Area does not include parking lot
- POCs: Mainly trash/debris; some sediment, nutrients, oxygen demand, toxic organics and bacteria

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Automotive Repair Shops

- A facility categorized in any one of the following Standard Industrial Classification (SIC) codes: 5013, 5014, 5541, 7532-7534, or 7536-7539
- Total impervious area for development is **greater than or equal to 5,000 square feet**
- POCs: Metals, trash/debris and toxic organics



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Restaurants

- A facility categorized by SIC code: 5812
- Total impervious area for development is **greater than or equal to 5,000 square feet**
- POCs: Trash/debris, oxygen demand, bacteria; some nutrients



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Parking Lots

- Parking lot has 25 or more parking spaces or has a total impervious area for development **greater than or equal to 5,000 square feet**
- POCs: Metals, trash/debris; some sediment, nutrients and oxygen demand



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Streets and Roads

- Paved surfaces used for transportation of automobiles, trucks, motorcycles, and other vehicles
- Includes any paved surfaces equal to or **greater than one acre of impervious area**
- POCs: Sediment, metals and trash/debris; some oxygen demand



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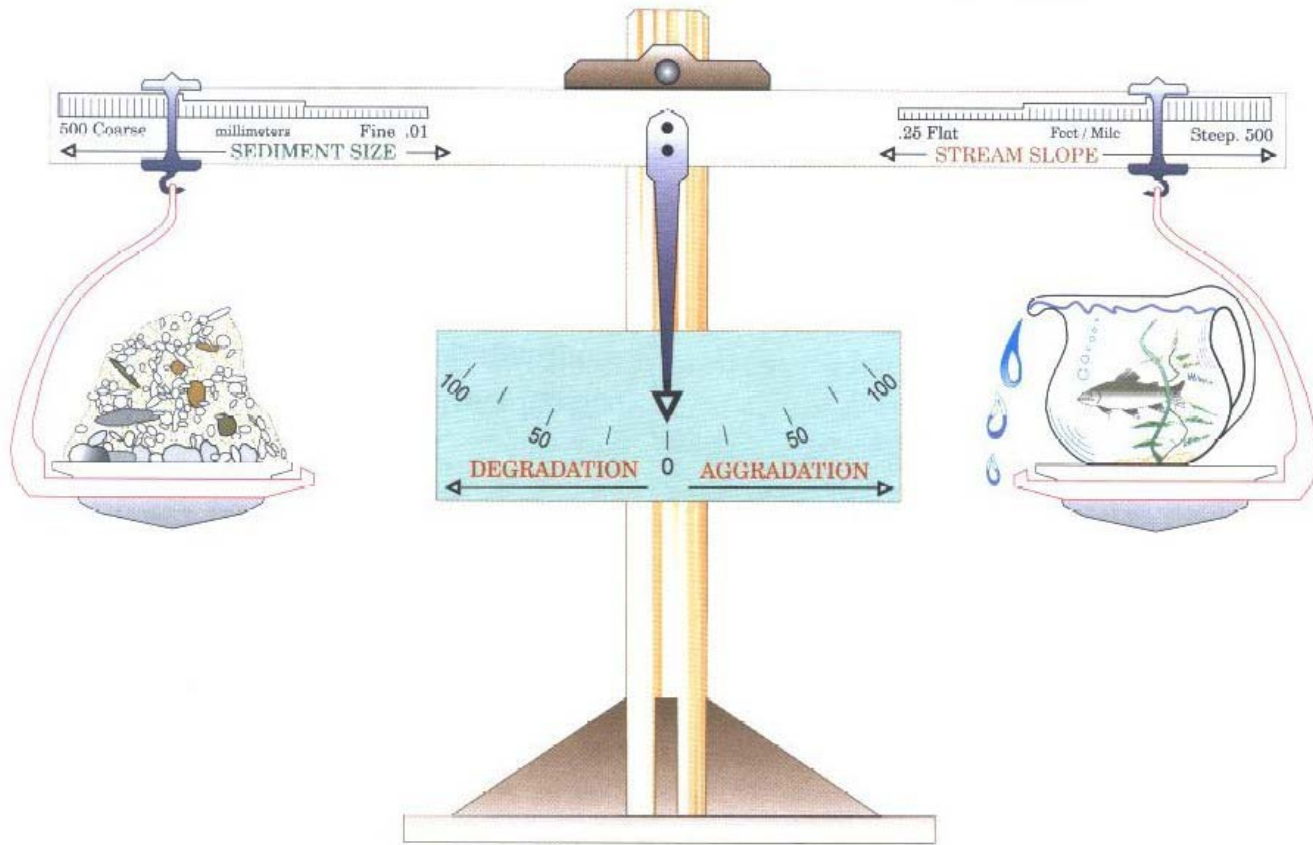
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Retail Gasoline Outlets

- Includes any facility engaged in selling gasoline
- Total impervious area for development is **greater than or equal to 5,000 square feet**
- POCs: Sediment, metals, trash/debris and toxic organics; some nutrients and toxic organics

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$$(\text{Sediment LOAD}) \times (\text{Sediment SIZE}) \propto (\text{Stream SLOPE}) \times (\text{Stream DISCHARGE})$$

After Lane (1955) as cited in Rosgen (1996)