Storm Water Design Control Measures

Day 2 of the 2010 Got SWPPP? Storm Water Workshops

Today’s municipal sponsors …
Jeff Wingfield
Port of Stockton

Christina Walter
City of Stockton

Brandon Nakagawa
San Joaquin County
Thank you!

... to our corporate sponsors
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
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)
Key Storm Water Concepts

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

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

Design a storm water control project that is regulation compliant and that intelligently incorporates storm water design features in a reasonably economic manner.
High spot: 27 ft. AMSL

Low spot: 7 ft. AMSL

Proposed development site
152,000 sq. ft.

Proposed Development Location

38° 00’ 16”N 121° 15’ 51”W

Drainage Creek
Low spot: 7 ft. AMSL

Courtesy of Google Earth
Developed Property

High spot: 27 ft. AMSL

38° 00' 16"N 121° 15' 51"

Courtesy of MapQuest.com
Stormulator

- Tool to *calculate runoff flow* (SWQF) from the property
- Addresses Hydromodification, LID solutions
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
Specializing in Environmental Friendly Projects

(800) GOT - SWPP
Activity
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
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)
Site Design Features and Concepts

9:00 – 9:55 AM
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!
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
Hydromodification

Effects of Roughness

- Low Roughness
- Hi Roughness

Runoff

Time

http://www.fgmorph.com/fg_2_17.php
To mimic natural hydrology and thus improve runoff quality, Low Impact Development (LID) techniques are employed. Images courtesy of - Low Impact Development Center, Inc.- www.lowimpactdevelopment.org, lid-stormwater.net.
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
Last but not Least -
Landscape Maintenance

• Needs to be arranged by local agencies
  - Section 7 of SWQCCP
• Integrated Pest Management
Our Assignment:

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

- Priority Project Status
Priority Projects (SCHARRPS?)

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

- Semi-Arid Climate
  See WMELO excerpt on thumb drive
- Soil Type
- Drought-Tolerant Plants
  [http://arboretum.ucdavis.edu/arboretum_all_stars.aspx](http://arboretum.ucdavis.edu/arboretum_all_stars.aspx)
- Watershed Characteristics
  - Drainage
  - Receiving Water
- Pollutants of Concern
Proposed Development Location

- High spot: 27 ft. AMSL
- Low spot: 7 ft. AMSL
- Proposed development site: 152,000 sq. ft.
- Drainage Creek
- Low spot: 7 ft. AMSL

38° 00’ 16”N   121° 15’ 51”W

Courtesy of Google Earth
<table>
<thead>
<tr>
<th>New Development Project Category</th>
<th>Pollutant Category of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sediment</td>
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<tr>
<td>Commercial Developments (&gt;100,000 sf)</td>
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</tr>
<tr>
<td>Automotive Repair Shops</td>
<td>X</td>
</tr>
<tr>
<td>Retail Gasoline Outlets</td>
<td>X</td>
</tr>
<tr>
<td>Restaurants</td>
<td>X</td>
</tr>
<tr>
<td>Parking Lots (&gt;5,000 sf or 25 spaces)</td>
<td>X</td>
</tr>
<tr>
<td>Home Subdivisions (&gt;10 units)</td>
<td>X</td>
</tr>
</tbody>
</table>
Selection/Design of Storm Water Controls

10:10 – 11:30 AM
Activity
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?
Storm Water Controls

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

- Tools to reduce runoff volume
- Addresses hydromodification

  - Rain Garden
  - Rain Barrel
  - Vegetated Roof
  - Interception Trees
  - Grassy Channel
  - Vegetated Buffer Strip

http://www.emmitsburg.net/gardens/articles/adams/2008/rain_garden.htm
http://www.uwsp.edu/cnr/wcee/keep/Resources/Photos/Photos.htm
http://www.fs.fed.us/fstoday/080822/05Research%20Roundup/gas.html
http://www.lmce.net/projects_schools_americas_choice_high_school.html
http://www.wsdot.wa.gov/Environment/WaterQuality/Research/Reports.htm
Treatment Controls

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

[Links to relevant resources]
Stormulator

- Tool to *calculate runoff flow* (SWQF) from the property
- Addresses Hydromodification, LID solutions
Budgetary Review

- Visit vendors
- Consult cost list
LUNCH TIME

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
Landscape Maintenance

• Section 7 of the SQCCP
• California Model Water Efficient Landscape Ordinance
• Integrated Pest Management
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.
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
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
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.
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
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
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
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
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
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
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
After Lane (1955) as cited in Rosgen (1996)