GLOBAL CONNECTIONS DAY
OCTOBER 23, 2019
WATER: SAFETY, EFFICIENCY AND CONSERVATION

2019 ANNUAL CONFERENCE
Oct. 20–23, 2019 | Rio Hotel & Convention Center
STORMWATER RETENTION
SOLUTIONS FROM LOS ANGELES BASIN

Ara Sargsyan & Lisa Naslund
Los Angeles Basin Chapter ICC
Stormwater Retention – Solutions from La Basin

<table>
<thead>
<tr>
<th>Our Planet Faces enormous challenges</th>
<th>Global Warming</th>
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<td>Resource Shortages</td>
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<td>Mass migration</td>
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“Business as usual” won’t work

We have to assist our planet

What we do as stormwater regulators, enforcers, collaborators is a small but significant contribution
Stormwater Retention – Solutions from La Basin

What would happen if the water ran out:

It already almost did in Cape Town, South Africa. They had been bracing for 4 years to have ZERO water in April 2018. Rains in June 2018 relieved a shortage of water for 4 million people. Chennai, India has been the next city to face water supply failure. Los Angeles, El Paso TX, Miami FL, Phoenix AR, and Atlanta GA are US cities that could run out of water. *

Los Angeles Basin is diverse in geography

- From beaches to deserts
- From urban to rural

All projects in these various locales have the potential to make a contribution – to recharge the water table
Storing our most valuable resource - WATER
We know what we should and could do. Now how do we implement stormwater retention to do our part?

**Today’s Topics:**
- Brief overview of LA Basin’s stormwater Low Impact Development (LID) Requirements – above and beyond the minimum
  - Small scale residential
  - Large scale non-residential
- LID review and inspection
- Project Examples
- Instead of this . . . do that . . .
  - Paradigm shift for designers, contractors, inspectors
- Concerns – vector control, removals (rain barrels), maintenance
Los Angeles Basin LID

**SUSMP**
- Became effective in 2002 by MS4 Permit issued by LA-RWQCB
- Covered 8 categories
- Infiltrate or treat runoff from 3/4" storm

**LID**
- Became the law of the land in 2013 through MS4 by Waterboard
- City and County of LA adopted more stringent ordinances

**LID Applicability**
- New residential structures and significant additions
- Non-Residential that have 500 sq. ft. or more disturbed area

**LID Requirements**
- Must retain 85th or first ¾" rain event
- If not feasible; then biofilter 1.5 times the volume
History of LID in the LA Basin

SUMP required through MS4 Permit issued by LA-RWQCB
Only 8 categories
Infiltrate OR treat runoff from the first ¾” – that’s it!!

LID becomes law of the land for ALL Cities within LA County
MUST retain the 85th percentile or first ¾” inches whichever is greater through infiltration, capture & use. If not, biofilter (150%)

2002
Low Impact Development Ordinance passed – more stringent than Regional Board Requirements
Now ALL new residential projects and non-residential projects that create additional impervious area required to comply
Can retain first ¾” rain event if not apply water conservation measures

2012

2014
LID Project Categories

Small Scale Residential
- Four units or less
- Pick Two BMPs

Non-Residential
- All other development
  - 500 SF vs. 10,000 SF impervious area
- 2500 SF in Significant Ecological Area
- Residence disturbing 1 acre and 10,000 impervious area

Non-Residential Implementation
- Infiltration of Vm
- Capture and Use of Vm
- Biofiltration of 1.5 times Vm
Stormwater Retention – Solutions from La Basin

Single Family Residence Requirements – Pick Two!

- Disconnect Impervious Surfaces
- 2 Drought Tolerant Trees and a Smart Irrigation Controller
- Dry Well
- Porous pavement
Single Family Residence Requirements – Pick Two!

Staff Picks:
- Disconnect Impervious Surfaces
- 2 Drought Tolerant Trees and a Smart Irrigation Controller

Why? Virtually no maintenance, how it built is how it stays and how it functions. A true no-brainer.
Both paved areas and roof drainage diverted with cross slopes to pervious front landscaping
Guidelines To Implementation Techniques - Small Scale Residential

Prescriptive Method - No report or calculations

1. Rain Barrels or Tanks
   ▪ Placement Guidelines – evenly distributed
   ▪ Sizing : 200 gallons (4 50 gallon tanks)

2. Rain Garden (lined & Unlined)
   ▪ Design Guidelines (Lined or Unlined)
   ▪ Sizing: 200 Gallons

3. Planter Box
   ▪ Design Guidelines - 10 Ln ft, 2.5' depth,
   ▪ 2' wide, evenly distributed
   ▪ Sizing: 200 Gallons
Guidelines To Implementation Techniques - Small Scale Residential

Prescriptive Method - No report or calculations (Cont.)

4. Porous Pavement (incidental & retention)
   - Design Guidelines for concentrated flow
   - Sizing

5. Dry Well
   - Design Guidelines - feasibility, setback requirements, minimum soils permeability
   - Sizing: 200 gallons
Sample Design Calculations For Large Scale Development

LA City Planning and Land Development Handbook for LID 2016
• Appendix F – Sample Design Calculations

FLOW RATE AND VOLUME CALCULATION EXAMPLE

*Volume must be calculated for each tributary area to size each BMP.*

PROJECT NAME: Commercial Site (Intersection of Western Ave & Washington Blvd)

Provide proposed project characteristics

- **A<sub>Total</sub>:** 1.15 Acres
- **Type of Development:** Commercial
- **Flow Path Length:** 200 ft
- **Flow Path Slope:** 0.01 (1%)
- **% of Project Impervious:** 87%
- **Predominate Soil Type #:** 13
- **Design Storm**: 85<sup>th</sup> percentile

*Projects are required to use the larger of the Stormwater Quality Design Storm.
- The volume of runoff produced from a 0.75 inch (or 0.0625 ft) storm event, or
- The 85<sup>th</sup> percentile, 24-hr runoff event at this location = 1.1 inch (or 0.91 ft)*

Refer to LA County Hydrology GIS Map
http://dpw.lacounty.gov/wrd/hydrologygis/
Sample Design Calculations For Large Scale Development

LA City Planning and Land Development Handbook for LID 2016
• LA County Hydrology Map - https://dpw.lacounty.gov/wrd/hydrologygis/
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LOW IMPACT DEVELOPMENT (LID) CHECKLIST
SMALL SCALE RESIDENTIAL (4 UNITS OR LESS)

WPD Project Plan Checker:
Counter: 213-482-7066

The following is a list of outstanding items that are required in order for the project to be approved by the WPD for compliance with the stormwater runoff requirements.

☐ Complete the Project Summary Clearance Form (Reverse side)
☐ Chose from prescriptive list of BMP options (Appendix E) and size adequately by tributary area.
☐ Provide Hydrology Calculation (Vm) of mitigated stormwater runoff for each sub drainage area and provide adequate BMP for mitigation. Provide summary table on plans.
☐ Show on architectural site plan location and size of BMP(s) to scale. Provide dimensions, reference to detail, include inlet and outlet invert elevations.
☐ Identify vegetated landscape areas on plans.
☐ Identify all hardscapes on plans.
☐ Show on plans detail drawings (w/sizes & model) of BMP device(s).
☐ Show on roof plans roof drainage layout and connection(s) to treatment system(s).
☐ Show on architectural elevation plans(s) the down spouts / roof drains and BMP device(s) drawn to scale.
☐ Fill out and provide Stormwater BMP Verification Form on plans.
☐ Provide Stormwater Observation Report Form on plans.
☐ Stencil at all drainage inlets (i.e. catch basins, trench drains). Stencil requirements shall be noted on plans.
☐ Obtain infiltration system approval letter from Building & Safety, Grading Division (include soil report and percolation test). Include copy of Approval Letter on plans.
☐ Stormwater use approval from County or Los Angeles, Department of Public Health, provide approval letter on Plans.
☐ Submit completed Covenant & Agreement (C&A) Form with Operation and Maintenance (O&M) Plan for approval and signature prior to County recordation. Provide 8.5”x11” Plot Plan showing location and size of each BMP(s).
☐ Submit Supplemental C&A.
☐ Submit Termination C&A
☐ Submit letter of authority/grant deed for the individual(s) signing the Covenant and Agreement.
☐ Provide one (1) set of full size plans for first time review, two (2) sets of full size plans at the FINAL SIGN OFF. Engineer’s wet stamp and signatures is required for projects over 2,500 SF of impervious area.
☐ Return marked up plans with resubmittal.

For additional information: www.lacitysan.org/lid
LID Report: Project description and scope of work; existing and proposed drainage; hydrology calculations; feasibility discussions of implementation techniques; BMP type, and size; summary table; AND most IMPORTANTLY supporting documents

Plans: LID elements shall be part of the permit set:

- Architect – Site plans identifying all pervious and impervious areas; location of BMPs; size and dimensions. Roof and elevation plans shall show DS and connection to the BMP

- Civil – Grading and drainage plans showing BMPs, size and dimensions, POC, invert, depths, and over flow connection to the street, BMP details...

- Plumbing – Show all drainage (AD, RD, DS, PD, DD...) and how they are routed to each BMP or POC with reference, and simplify in riser diagrams.

- Landscape – Location of cistern system with reference to POCs, landscape area served by the cistern, drip irrigation network, LA County Health approval letter

LOW IMPACT DEVELOPMENT (LID) CHECKLIST

<table>
<thead>
<tr>
<th>ALL OTHER DEVELOPMENT PROJECTS</th>
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<tr>
<td>Fees: $721 (GC 721) $357 (GC 716) $1,061.50</td>
</tr>
<tr>
<td>Expedit (add): $594 (GC 714) $489 (GC 717) $1,232</td>
</tr>
<tr>
<td>Fee: $1,038 (GC 715) $560 (GC 718) $1,545</td>
</tr>
<tr>
<td>Other: ____________________________</td>
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<tr>
<td>Includes 3% surcharge fee</td>
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Inspection Checklists

- Learn as you go
- Ensure Consistency
- Built-In Training material
Stormwater Retention - Final Field Approval

Submittals
Photos throughout construction
Certification from civil or contractor
120 projects implemented either cistern or infiltration systems. Total retained volume ~ 3 million gallons per event. One month supply for 1000 people.
Metropolis: Mixed use development on 6 acres. Combination of biofiltration, and cistern systems for cooling tower operation and landscape irrigation. Total storage volume over 130K gallons.

Wilshire Grand - 74 story mixed use building on 2.7 acres. 50K gallons cistern system designed to capture stormwater, then use treated volume in the cooling tower operation.

Ocean Wide Plaza: 1-49 story building and 2–40 story buildings on 4 acres. Dry well system designed to infiltrate/retain over 100K gallons.

LAFC is a 22K seats soccer stadium on ~20 acres site. Retains and infiltrates over 400K gallons through the implementation of 7 dry wells and 2 unlined vegetated swales.
Dan Blocker Beach New Parking Lot and Restrooms

- 0.5 acre site, 22,842 sq. ft. new impervious area
- Challenges; High Water Table, unstable sand scarps
- Solution: proprietary biofiltration with dispersal wall
- Still allows lots of evaporation, infiltration, and biofiltration
Biofiltration - Beach Solution on Pacific Coast Hwy
Stormwater Retention - Beach Solution on PCH
Stormwater Retention - Agua Dulce Library – Desert Solution
Stormwater Retention - Agua Dulce Library – Desert Solution

- Infiltration areas - allowed ponding
- Overflow catch basins to storm drain system
- Flow direction
Stormwater Retention - Acton Agua Dulce Library
Rainwater Harvest - Pacific Palisades Village

Pacific Palisades Village Shopping Plaza and Parking Lot

- 3.42 acre site, 138,085 sq. ft. new impervious area. With 10,890 sq. ft. landscaping
- Challenges: Large project with multiple tributary areas
- Solution: 52,000 gallons retained through use of cisterns and permavoid system
- Still allows lots of evaporation, infiltration, and biofiltration
Rainwater Harvest - Pacific Palisades Village

Roof drainage to landscaping/permavoid system
Rainwater Harvest - Pacific Palisades Village

Permavoid – recycling water system
Rainwater Harvest - Pacific Palisades Village

Peripheral Roof drainage to cistern system
Rainwater Harvest - Pacific Palisades Village

NOTES:
1. CONTRACTOR SHALL FOLLOW FILTER VESSEL MANUFACTURER'S INSTALLATION INSTRUCTIONS. For complete design and product information contact Trident Filtration, Inc. or Water Recycling Systems.
2. The filter vessel should be placed on a level concrete slab, well supported, or equivalent position so that the piping connections, control valves, and accessories are accessible for operation and service.
3. Loading the filter vessel, with media shall be performed in accordance with the MFR specifications.
4. All connections to filter vessel shall be water-tight per MFR.
5. The filter vessel operates under high pressure. Prior to servicing filter vessel, turn pump off to prevent damage to the system.

EGS-1: ABOVE GROUND SAND FILTER VESSEL DETAIL

Scale: 1/75
Dos and Don’ts

Instead of . . .

Putting the drain at the bottom of the swale invert

No ponding, no detention time

This Photo by Unknown author is licensed under CC BY-NC-ND.
Dos and Don’ts

Do . . .

Put the drain inlet 12’’ or higher to allow ponding

Open connection for vector control :-)
Dos and Don’ts

Instead of . . .

Planters higher than parking lot

no chance for infiltration or biofiltration
Dos and Don’ts

Do . . .

Drain parking lot to landscaped planters

Lower planter below parking lot for infiltration
Dos and Don’ts

Instead of . . .

Draining entire lot directly to the street
Dos and Don’ts

Do . . .

retrofit a grass or concrete swale and divert water to rain garden - while still maintaining site drainage
Flash Drive Documents and Links

DOCUMENTS:
▪ LA County LID Forms and Publications – Includes Samples
▪ LA County Hydrocalc Program - Flows and Volume Calculator
▪ LA City LID Manual
▪ LA County LID Standards Manual
▪ LACBC Stormwater Inspection Checklists

LINKS:
▪ LA County Hydrology Map
▪ LA County LID Website
Thank You!

Contact Information:

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