Water Conservation for Developers – 101

Water Conservation: half-empty or half-full?
Regional Webinar Series
April 26, 2011
Water Conservation for Developers:
Sustainable Urban Water Systems:
diversity, adaptation, resilience

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Key Elements of LID

Conservation
Preserves native trees, vegetation and soils.
Maintains natural drainage patterns.

Small-scale Controls
Mimics natural hydrology and processes.

Customized Site Design
Ensures each site helps protect the entire watershed.

Directing Runoff to Natural Areas
Encourages infiltration and recharge of streams, wetlands and aquifers.

Maintenance, Pollution Prevention and Education
Reduces pollutant loads and increases efficiency and longevity.
Educates and involves the public.
if instead, **match the Source to the Service:**

- use Greywater/Ditchwater for > Landscaping & Toilets
- use Rainwater for > Laundry

> could reduce potable water use 77%!
Australia 2005
SF Boulder County avg:
> 40,000 gallons/cap/yr

AUSTRALIA GOAL 2030:
110 l/p/d = < 11,000 g/p/yr

< 100K ~ 26,300 gallons

epa.qld.gov (accessed Sep 09)
ReUse of Site Resources

* Boulders/Cobble
* Tree Transplanting
* Save and Reuse Topsoil
* Seed Mix Rates should be High
* Native wildflowers: germination & “cover crop”
* Use Water from adjacent Properties/Roadways

[]  sites southwest []
STAPLETON, Denver, CO

INNOVATIVE APPROACH

* Conserving Resources
* Integrating Natural Processes into the Built Fabric of Parks and Open Space
* Unique Water Quality Guidelines as Development Framework

[] wenk associates []
Sustainability goals include:

- Reducing potable water consumption by 65 percent
- Reducing home energy consumption by 50 percent over 1995 model energy code
- Reducing internal vehicle miles by 40 percent
- Providing 20 percent "affordable housing" with 1 job/ every 2 residences
Advanced Biological Stormwater Management System

• Residential RAIN GARDENS harvest from DOWNSPOUTS & PARKING LOTS

• PERCOLATION PARKS: detention basin & neighborhood park

• STREET-SIDE RAIN GARDEN: ROAD RUNOFF filtering, TREE watering

[] michael tavel architects <> david kahn studio []
Intent
To limit or eliminate the use of potable water and other natural surface or subsurface water resources on project sites, for landscape irrigation.

Requirements
Reduce water consumption for outdoor landscape irrigation by 50% from a calculated midsummer baseline case.

Option 1 – Turf shall not exceed 40 percent of the landscapable area. Turf shall not be installed on slopes greater than 4:1.

Option 2 – Develop the landscape design using a water budget approach. The evapotranspiration (ET) limit on the landscapable area shall be no more than 60 percent of the reference ET (ET₀). For purposes of the ET calculation, the available rainfall shall be no more than 25 percent of the average annual rainfall amount. Turf shall not be installed on slopes greater than 4:1.
Designing Context-based Policy:

Water budget: 15 gal/sq.ft x irrigable sq. footage, allocated by monthly ET requirements *

<table>
<thead>
<tr>
<th>Boulder, CO</th>
<th>$/1000 gallons</th>
<th>(% of budget)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block 1</td>
<td>$1.88 (3/4 the base)</td>
<td>0% - 60%</td>
</tr>
<tr>
<td>Block 2</td>
<td>$2.50 (&quot;base rate&quot;)</td>
<td>61% - 100%</td>
</tr>
<tr>
<td>Block 3</td>
<td>$5.00 (2 x base)</td>
<td>101% - 150%</td>
</tr>
<tr>
<td>Block 4</td>
<td>$7.50 (3 x base)</td>
<td>151% - 200%</td>
</tr>
<tr>
<td>Block 5</td>
<td>$12.50 (5 X base)</td>
<td>&gt; 200%</td>
</tr>
</tbody>
</table>

*Note: ET = Evapotranspiration
Rate Structure & Plant Material Selection Reduces Water Use Irvine Ranch, CA

- Since rates adopted in 1991:
  - Average water use dropped from 3.5 AF/Acre to 1.9 AF/Acre
  - Stabilization of dry weather runoff
  - Changes in plant material selection shown below

- From 1992 to 2000:
  - Irrigated area doubled
  - Irrigation water use only increased by 3%
### Table 3-1: Water Demand Standard

<table>
<thead>
<tr>
<th>Water Use Sector</th>
<th>Existing Standard</th>
<th>Sterling Ranch Planning Standard ¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>0.75 ac-ft/yr/unit</td>
<td>0.28 ac-ft/yr/unit</td>
</tr>
<tr>
<td>Irrigated Open Space</td>
<td>2.50 ac-ft/yr/acre (18.7 gallons/yr/sf)</td>
<td>2.32 ac-ft/yr/irrigated acre (17.4 gallons/yr/sf)</td>
</tr>
<tr>
<td>Non-Residential</td>
<td>0.75 ac-ft/yr per 6,695 sf of bldg space</td>
<td>1.50 ac-ft/yr/gross acre</td>
</tr>
<tr>
<td>School</td>
<td>Sufficient water supply for the proposed uses, based on estimates of the proposed usage and analysis by the County</td>
<td>Indoor Elementary &amp; Middle School: 0.0138 ac-ft/yr/student High School: 0.0209 ac-ft/yr/student Outdoor 2.32 ac-ft/yr/irrigated acre (17.4 gallons/yr/sf)</td>
</tr>
</tbody>
</table>

¹ Includes an initial 20% factor of safety and 4% system loss.
Resources

http://a4we.org/ Alliance for Water Efficiency-cost/benefit for water conservation
http://www.cnt.org/ Center N’hood Technology- cost/ben of Green Infrastructure
http://www.cwp.org/ Center for Watershed Protection-costs of high impact development
http://cuwcc.org/ CA Urban Water Conservation Council-cost/ben models, economics of wc
http://epa.gov/WaterSense/ EPA Water Sense program- LS standard for new home development, water budget information

irrigation.org Irrigation Association- professional standards, guidelines
http://www.irwd.com/ Irvine Ranch Wtr Dist, CA- studies on LS runoff, water budget
http://lafoundation.org/ Landscape Architecture Fdtn- landscape performance program
http://sustainablesites.org/ Site development standards due to join LEED system 2013

Philadelphia Green Infrastructure Plan- large scale plan, new method of development
(http://www.phillywatersheds.org/what_were_doing/documents_and_data/cso_long_term_control_plan/ or
http://www.economist.com/node/17493291 )

Books: