Water Conservation for Developers – 101

Water Conservation: half-empty or half-full?
Regional Webinar Series
April 26, 2011
A Florida Perspective on Water Conservation for Developers - 101

Pierce Jones, Director
Program for Resource Efficient Communities

UF UNIVERSITY OF FLORIDA
IFAS Extension
Program for Resource Efficient Communities

We promote application of design, construction and management practices that minimize environmental degradation and make more efficient use of energy, water and other natural resources in master planned community developments.
Florida Land Development
Welcome to The Bonita Bay Group

The Bonita Bay Group™ offers exceptional community living with its environmentally sound development philosophies and innovative designs. Residents enjoy traditional neighborhood gathering spots, recreational facilities and access to community parks that blend seamlessly with surrounding habitats.

Distinctive Lifestyle Experiences

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Florida Land Development
Oakland Park
Florida Land Development
Oakland Avenue Lot

FRONT YARD
Trees .......... minimum of 2 canopy trees and 2 accent trees
Shrubs ........ 20% minimum
Groundcover .. 15% minimum
Turf .......... 60% maximum

SIDE YARD
Trees .......... minimum of 1 canopy tree and 2 accent trees
Shrubs ........ 30% minimum
Groundcover .. 0% minimum
Turf .......... 70% maximum

ALLEY YARD
Shrubs ........ 30% minimum
Groundcover .. 0% minimum
Turf .......... 70% maximum
Florida Land Development
Conventional Practice
Florida Land Development
Conventional Practice
Florida Land Development
Pasco County
Development & Landscaping
Development & Landscaping
Conventional Practice
Development & Landscaping
Water Demand

200,000 Gallon Water Tower
BAYONET POINT — "He's in prison for God knows how long because we can't afford to sod the lawn," said his sobbing daughter, Jennifer Lehr.

Prudente has owned a home in the deed restricted community since 1998. The covenants require homeowners to keep their lawns covered with grass.

Free from jail, Joseph Prudente, 66, inspects his new lawn with pride Sunday. Prudente, who says he barely has enough to pay the mortgage, was jailed for having a brown lawn.
Swiftmud says old sod can't be replaced

Marlene Sokol, Times Staff Writer
In Print: Saturday, November 22, 2008

Homeowner, get used to that sickly looking lawn. Local water managers are saying not to resod until summer. That means no sheets of green turf off a flatbed.

"Anything that causes you to need more water is unacceptable," said Robyn Felix, Southwest Florida Water Management District spokeswoman.

The agency's order, issued more than three weeks ago, has created confusion for local government, an enforcement issue for homeowner associations, and panic among small businesses that install turf.

Baldomero Moreno, left, and Erasto Osoric, who work for Curasod, lay sod Friday at a new home in Wesley Chapel.
Get used to having a brown lawn for a while. As of this week, Tampa Bay Water has virtually drained its 15 billion-gallon reservoir.

From now until the summer rainy season, it must rely on its two remaining sources of water: its sometimes troubled desalination plant and the dwindling supply in the underground aquifer. "It's going to be a long couple of months waiting for the rainy season," Tampa Bay Water spokeswoman Michelle Robinson said Friday.
Water Supply
Water woes hit development

EDITOR’S NOTE: This is the first in a series examining how the region’s drinking water is running low.

BY SUSAN STABLEY

South Florida has run out of natural sources of drinking water and will likely experience halted development due to the problem.

Major real estate projects in the tri-county area must be curbed until alternative sources of water can be developed, according to the state. Already, it has told Miami-Dade County to reject 17 large-scale projects because of drinking water scarcity.

And the creation of alternative water sources will not happen soon. The work will cost of hundreds of millions of dollars and can take decades to complete, according to estimates from regional and local water officials.

“For us to go back into a built environment is a very expensive proposition,” said Doug Yoder, assistant director of Miami-Dade County’s water and sewer department.

Last week, Gov. Jeb Bush vowed to make South Florida confront its water issues before the state will approve any more large projects.

“It makes no sense to develop west and west and west without the adequate development of infrastructure and water supply,” Bush said at the Urban Land Institute’s Symposium on Regional Cooperation on March 17.

See WATER, Page 62
Water Supply

Florida Freshwater Withdrawals (in million gallons per day)

- Ground water
- Surface water

Source: U.S. Geological Survey

Tampa Bay Water Desalination Facility
Water Supply
TBW Annual Production by Supply Type (MGD)

- Desalinated
- Surface Water
- Groundwater

<table>
<thead>
<tr>
<th>Year</th>
<th>Desalinated</th>
<th>Surface Water</th>
<th>Groundwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>46</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>5</td>
<td>43</td>
<td>130</td>
</tr>
<tr>
<td>2008</td>
<td>19</td>
<td>42</td>
<td>113</td>
</tr>
<tr>
<td>2009</td>
<td>17</td>
<td>33</td>
<td>128</td>
</tr>
</tbody>
</table>
Water Supply

TBW Carbon Footprint by Supply Type (m.t. CO₂e)

- **Desalinated**
- **Surface Water**
- **Groundwater**

<table>
<thead>
<tr>
<th>Year</th>
<th>Desalinated</th>
<th>Surface Water</th>
<th>Groundwater</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>15,722</td>
<td>31,255</td>
<td></td>
<td>47,977</td>
</tr>
<tr>
<td>2007</td>
<td>22,494</td>
<td>30,159</td>
<td></td>
<td>52,653</td>
</tr>
<tr>
<td>2008</td>
<td>75,823</td>
<td>26,459</td>
<td></td>
<td>102,282</td>
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<tr>
<td>2009</td>
<td>70,774</td>
<td>28,812</td>
<td></td>
<td>99,586</td>
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</tbody>
</table>
Water Supply
TBW Summary 2006 to 2009

- Water supply decreased 3% (6 MGD)
- Desal water added to blend (17 MGD)
- Energy use increased 109% (93 GWh)
- Energy costs increased 138% ($9,900,000)
- GHG emissions increased 95% (74,000 metric tons CO$_2$e)
Landscaping:
GHG Emissions Impacts
Landscaping Impacts
Conventional Practices
Landscaping Impacts
Greenhouse Gas Accounting (Groundwater)

Mowing:
15 lbs CO₂e/1000ft²/yr

Fertilizer:
29 lbs CO₂e/1000ft²/yr

Pesticides:
1 lbs CO₂e/1000ft²/yr

Irrigation:
34 lbs CO₂e/1000ft²/yr (Groundwater)
Landscaping Impacts
Greenhouse Gas Accounting (Desal)

Mowing:
15 lbs CO$_2$e/1000ft$^2$/yr

Fertilizer:
29 lbs CO$_2$e/1000ft$^2$/yr

Pesticides:
1 lbs CO$_2$e/1000ft$^2$/yr

Irrigation:
579 lbs CO$_2$e/1000ft$^2$/yr (Desal)
Restoration’s Two Designs: Water & Landscaping Impacts
**Restoration Case Study**

- This 5,187-acre master plan evolved significantly over its 4-year permitting process.

- Designs were for 8,500 dwelling units.

- It was fully entitled earlier this summer based on the 2009 design.

- Restoration is entitled to create a mixed-use, transit oriented community with 3.5 million ft\(^2\) of commercial space.
**Restoration Plans Comparison**

**Summary**

- Natural lands preserved: 34% more and all contiguous
- Density increased: 2.6 to 6.0 units per acre
- Natural/developed area edges: 15 miles less
- Average internal trip length: 1.37 miles less/trip
- Trips captured on-site: 150% more
- Vehicle Miles Traveled (VMT): 41% reduction
- Impervious roadway surface: 42% less
Restoration’s Two Designs - Landscaping

Greenhouse Gas Accounting w/Desal

Annual Inputs

2006 Plan

- Landscaped Area: 988 acres
- Pesticides: 2,240 lbs a.i.
- Fertilizer: 135,000 lbs N
- Mowing: 33,000 gal
- Irrigation: 988 mgal

Associated GHG Emissions

- Pesticides: 19
- Fertilizer: 543
- Mowing: 281
- Irrigation - Desal: 10,842

Metric tons CO2e/yr: 11,684
### Restoration Plans Comparison

#### Master Plan Single-Family Units

<table>
<thead>
<tr>
<th></th>
<th>2006 Plan</th>
<th>2009 Plan</th>
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<tbody>
<tr>
<td>40'</td>
<td>200</td>
<td>700</td>
</tr>
<tr>
<td>50'</td>
<td>200</td>
<td>700</td>
</tr>
<tr>
<td>60'</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>70'</td>
<td>575</td>
<td>0</td>
</tr>
<tr>
<td>80'</td>
<td>1,016</td>
<td>0</td>
</tr>
<tr>
<td>90'</td>
<td>1,116</td>
<td>0</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>3,400</strong></td>
<td><strong>1,675</strong></td>
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Landscaping Restoration
Low Impact Design

• The largest lots are 60’ wide
• Compact homes (45’x 70’) 375 ft² landscaped area and no turf
• Less than 25% of residences with lots designed for any turf
# C&D Cottages

<table>
<thead>
<tr>
<th>Type</th>
<th>Bldg. Sq.Ft.</th>
<th>Lot Size</th>
<th>Lot Sq.Ft.</th>
<th>DU/AC (Including streets)</th>
<th>Driveway Orientation</th>
<th>Parking Spaces per Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-1</td>
<td>1,260</td>
<td>41 x 63</td>
<td>2,583</td>
<td>7.5</td>
<td>Rear</td>
<td>2</td>
</tr>
<tr>
<td>C-2</td>
<td>1,015</td>
<td>41 x 63</td>
<td>2,583</td>
<td>7.5</td>
<td>Rear</td>
<td>2</td>
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<tr>
<td>D</td>
<td>1,464</td>
<td>41 x 63</td>
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Note: Does not include on-street guest parking. *Indicates corner lot.
Landscaping Restoration
Development Order: Low Impact Practices

• “….no use of potable water in common areas…..”

• “….requirements for minimal to no added inputs of water and synthetic fertilizers and pesticides…..”
Restoration’s Two Designs - Landscaping
Greenhouse Gas Accounting w/Desal

**Annual Inputs:**

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<td>428 acres</td>
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<td>Pesticides:</td>
<td>2,240 lbs a.i.</td>
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<td>Irrigation - Desal:</td>
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**Associated GHG Emissions:**

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<td>Metric tons CO2e/yr:</td>
<td>11,685</td>
<td>798</td>
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### Restoration’s Two Designs - Landscaping

Greenhouse Gas Accounting w/Desal

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**Metric tons CO2e/yr avoided:** 10,733

**Landscaping costs/yr avoided:** $4,000,000
Summary
Water Conservation for Developers
Florida Perspective

• Florida’s intensively managed landscapes are an artifact of “conventional” development processes
• Florida’s easily accessed potable water resources are tapped out - making landscape irrigation with potable water inherently illogical
• Importing fertilizers for managed landscapes into impaired watersheds where N is a pollutant of concern is inherently illogical
• Developers can significantly reduce costs and risks by adopting resource efficient designs and practices
Our extension model for developers is based on three core observations:

• Developers (and owners) make the decisions
• Development projects are completely profit driven and highly risk averse
• Larger projects are active (and vulnerable) over very long time frames
In the context of these observations our extension programs target:

• Continuing education for engineers, landscape architects, planners, architects and builders
• Consulting directly on projects to develop meaningful case studies
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