Stormwater Reuse
City of Tampa Experience

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Tampa Bay Estuary Program

BASIS 5

October 2009
GENERAL LOCATION
CONTRIBUTING DRAINAGE BASIN MAP

River Basins:
1 – Tampa Bay/Anclote River
2 – Hillsborough River
3 – Alafia River
4 – Little Manatee River
5 – Manatee River

Surface Water Facilities:
6 – David L. Tippin Water Treatment Plant and City of Tampa Dam
7 – Harney Bypass Canal
8 – C.W. Bill Young Reservoir (Tampa Bay Water)
9 – Seawater Desalination Plant (Tampa Bay Water)
Hydrologic Budget

Upper Hillsborough River Basin

- Wastewater
- Evapotranspiration
- Water Consumption
- Rainfall
- Wells
- River Flow
- Runoff
- Potable Irrigation
- Spring Recharge
- Bypass Canal Recharge
- Dam Overflow
- Percolation
- Bank Storage
TOTAL MAXIMUM DAILY LOADS (TMDLs)

- The allowed nitrogen load to Hillsborough Bay is 1,451 Tons per year.
- 836* Tons are attributed to Stormwater sources.
- 275* Tons are attributed to Wastewater sources.

* 2004-07 average loading from Tampa Bay R.A.
CITY OF TAMPA NITROGEN
LOADING TO HILLSBOROUGH BAY

- Stormwater Conveyances (tons/year)..... 59.2*
  Fossil fuel electric generation
  Automotive emissions
  Land use activities

- Wastewater Treatment (tons/year)...... 213*

**TOTAL: 272**

*2004-07 Average loading from Tampa Bay R.A.
## City of Tampa Nitrogen Reduction Scenarios in Hillsborough Bay

### City N loading: 272.2 tons/year*  

<table>
<thead>
<tr>
<th>Reduction</th>
<th>Capital Needed</th>
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<tbody>
<tr>
<td>10% Reduction</td>
<td>$5,984,000.00</td>
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<tr>
<td>15% Reduction</td>
<td>$8,976,000.00</td>
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<tr>
<td>25% Reduction</td>
<td>$14,960,000.00</td>
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<tr>
<td>100% Reduction</td>
<td>$59,840,000.00</td>
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</tbody>
</table>

* 2004-07 average loading from Tampa Bay Reasonable Assurance

** estimated is based on SWFWMD capital expense average cost of $110 per pound value is not accurate to the scale needed above.
Nitrogen Reduction with Water Resource Management

Reclaimed Wastewater Installation
Reduce 200 tons/year Nitrogen
$341,000,000

Stormwater Harvesting
Reduce 200 tons/year Nitrogen
$350,000,000
## Project Budget

Provide 1" of water to each irrigated lawn area = 3300 gal/wk/property
Annual water budget 17,468,000 gal
14.3 K gal/month @ $2.63/100cfs = $50

<table>
<thead>
<tr>
<th>Item</th>
<th>High</th>
<th>Low</th>
<th>Median Value</th>
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<tbody>
<tr>
<td>2200 ft 6&quot; transmission</td>
<td>20</td>
<td>17</td>
<td>$37,400</td>
</tr>
<tr>
<td>6000 ft 2&quot; service</td>
<td>15</td>
<td>13</td>
<td>$78,000</td>
</tr>
<tr>
<td>10 each zone control valve</td>
<td>1500</td>
<td>1300</td>
<td>$13,000</td>
</tr>
<tr>
<td>100 each connection</td>
<td>500</td>
<td>500</td>
<td>$50,000</td>
</tr>
<tr>
<td>10 each road crossing (2@= )</td>
<td>1000</td>
<td>500</td>
<td>$5,000</td>
</tr>
<tr>
<td>1 each wells w/meter, pump pond intake, pump, filter</td>
<td>20000</td>
<td>18000</td>
<td>$18,000</td>
</tr>
<tr>
<td>2 each 30000 g storage</td>
<td>15000</td>
<td>13000</td>
<td>$26,000</td>
</tr>
<tr>
<td>1 each site prep and veg</td>
<td>6000</td>
<td>6000</td>
<td>$6,000</td>
</tr>
<tr>
<td>1 each irr control systems</td>
<td>7500</td>
<td>5500</td>
<td>$6,500</td>
</tr>
<tr>
<td>1 each electrical service</td>
<td>15000</td>
<td>10000</td>
<td>$10,000</td>
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<tr>
<td>1 each irr pump</td>
<td>30000</td>
<td>30000</td>
<td>$30,000</td>
</tr>
<tr>
<td>1 each monitor well/gauge</td>
<td>3000</td>
<td>3000</td>
<td>$3,000</td>
</tr>
<tr>
<td>planning, design, permits, plans, construction inspection contingency @15%</td>
<td></td>
<td></td>
<td>$38,925</td>
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<tr>
<td></td>
<td></td>
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<td>$328,425</td>
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</table>

*$500 home owner irrigation system modifications (grant eligible)

Florida Department of Transportation
Item Average Unit Cost
From 2008/01/01 to 2008/12/31

0555 11 148 $17.90 $1,603,232.17 89,547.000 LF N DIRECTIONAL BORE, LESS THAN 6"
1080 11103 1 $530.00 $530.00 1.000 EA N UTIL FIXT, F&I, 0-1.9", TAP SADDLE/SLEEVE
1080 11304 6 $1,163.49 $115,186.00 99.000 EA N UTIL FIXT, F&I, 5-7.9", VALVE ASSEMBLY
Water Use Permits within the City of Tampa and the Hillsborough River Basin by Type and Usage

Average Permitted Withdrawal (MGD)

Groundwater
- Agricultural
- Industrial/Commercial
- Recreational/aesthetic
- Public Supply - Irrigation
- Public Supply - Non-Irrigation

Surface Water
- Agricultural
- Industrial/Commercial
- Recreational/aesthetic
- Public Supply - Irrigation
- Public Supply - Non-Irrigation
Water Resource Development Value

- Offset potable water supply value ($10 - $15 gal development cost)
- 25 MGD +/-
- Low $250,000,000
- High $375,000,000

*More potable offset with stormwater as the N concentration is 30% of WW Discharges (More volume needed to get to load reduction)*
Opportunity Cost and Value

Nitrogen

• If water supply is needed, actual cost to remove 200 tons/year Wastewater to Reclaimed Stormwater
  Harvesting Range
  
  $-90,000,000 \text{ to } +25,000,000$
  
  (budget $60,000,000)

• Cost if water supply is \textbf{Not} needed
  
  $340,000,000 \text{ to } 350,000,000$
  
  ($600 per lb capital investment for nitrogen removal)

• Average capital costs for competitive nitrogen load reduction 200 tons @ $110/lbs \textbf{\$44,000,000}
## Project Payback

### Revenue
- 100 properties
- **$35** per month irrigation charge
- $42,000 annual gross revenue collections
- $350 nitrogen remove cred ($4,400 annualized 20yr)

**Total Revenue:** $42,350

### Current Water Rate
14.3 K gal/month @ 2.63 = $49

### Expenses
- $27,700 debt service: planning, design, permits, plans, const insp, const 400K, 20 yr note @5%
- $2,100 lost revenue in collection %5
- $2,100 collection expenses %5
- $2,100 misc operating expenses %5
- $5,000 annual operating expenses

**Total Expenses:** $39,000

### Revenue
- 100 properties
- **$50** per month irrigation charge
- $58,800 annual gross revenue collections
- $350 nitrogen remove cred ($4,400 annualized 20yr)

**Total Revenue:** $59,150

### Expenses
- $27,700 debt service: planning, design, permits, plans, const insp, const 400K, 20 yr note @5%
- $2,940 lost revenue in collection %5
- $2,940 collection expenses %5
- $2,940 misc operating expenses %5
- $10,000 annual operating expenses
- $6,978 15% administrative charges

**Total Expenses:** $53,498
## Summary

- **All Indications are:** We have a healthy Tampa Bay
  
  200 tn/yr goal (14% Hillsborough Bay) = $44,000,000 capital needed

- **Incremental Strategies:**
  
  - **Invest in Urban Forests**
    
    1 @ 10” dbh Oak Urban Landscape = .1 lbs N/yr Reduction
    
    35,000 more tree canopy equivalent to 1991-1994 (.5% increase)
    
    ($10.2 per tree/year $400K = 1.75 tn/yr, 10 yrs 17.5 tn/y)

  - **Mobil NOx Sources**
    
    Higher Mileage Vehicles (Café Standards), Mass Transit, E-commuting, Light Rail, Traffic Management
    
    No Direct Costs

  - **Lower NOx Air Standards from Stationary Sources**
    
    Costs directed to consumer
Summary (Continued)

Water Resources Management Strategies:

- Current Regional Water Resource Development Plan Addresses Needs to 2025

- Reclaimed Wastewater
  - Stormwater Harvesting for Irrigation
  - Near Customer
  - Incremental Development Cost
  - Incremental Community Impact
  - Broad Development Opportunity
  - Competing Surface Water Users
  - High Degree of Customer Interaction
  - Disruptive Construction
  - Initial Capital Outlay
Questions?
(7)(a) The Legislature recognizes that lawn and landscape irrigation systems use a substantial amount of the state's potable water. The Legislature finds that smart irrigation systems that use soil moisture sensors with remote monitoring and adjustment capabilities, if properly installed and monitored, provide more efficient irrigation and save substantially more water than conventional time-controlled irrigation systems. This is because smart irrigation systems apply water to lawns and plants only as necessary to maintain required soil moisture, thus minimizing the overwatering or unnecessary watering that occurs with conventional irrigation.
Dale Mabry at Henderson and Neptune
Drew Park
# VALUE ANALYSIS

<table>
<thead>
<tr>
<th>Location</th>
<th>Construction Cost ($)</th>
<th>Irrigated Area (ac)</th>
<th>Irrigation(^1) (gal/wk)</th>
<th>Nitrogen Applied(^2) (lbs/yr)</th>
<th>Annual Nitrogen Credit(^3)</th>
<th>Annual Cost Potable Water(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spanishtown</td>
<td>$12,000,000</td>
<td>7.82</td>
<td>212,700</td>
<td>95.20</td>
<td>$753</td>
<td>$39,000</td>
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<tr>
<td>Dale Mabry</td>
<td>$29,000,000</td>
<td>3.86</td>
<td>104,860</td>
<td>46.90</td>
<td>$371</td>
<td>$19,150</td>
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<tr>
<td>Drew Park</td>
<td>$22,000,000</td>
<td>11.00</td>
<td>299,600</td>
<td>134.00</td>
<td>$753</td>
<td>$56,600</td>
</tr>
<tr>
<td>Channelside</td>
<td>$16,000,000</td>
<td>2.00</td>
<td>54,380</td>
<td>24.30</td>
<td>$193</td>
<td>$9,930</td>
</tr>
</tbody>
</table>

1. Irrigation calculated on 1" per week
2. Nitrogen loading based on 0.43 ton per 100 million gallons
3. Nitrogen Credit based on a value of $100/lb amortized over 20 years at 5%
4. Potable water cost based on $2.63 per 100 cu. ft.