2009

Project Update: Taunton River Watershed Plan (May 12, 2009 Meeting)

Horsley Witten Group, Inc.

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Taunton River Watershed Management Plan

Project Update
Tuesday, May 12, 2009
Lakeville Public Library
Tonight’s Agenda

7:00  Introductions
7:10  Overview of Watershed Management Plan Project
      Ellie Baker, Project Manager, Horsley Witten Group
7:45  Question and Answer
8:00  Potential Demonstration Projects - What are we trying to demonstrate?
      Rich Claytor, P.E., Principal for Engineering, Horsley Witten Group
8:30  Question and Answer
8:45  Wrap-up Discussion
9:00  Adjourn
Phase I Overview
Taunton River Watershed Management Plan

**Timeline:**
March 2007 to December 2008
Final Report, December 2008

**Phase I Project included:**
6 Public Meetings, Outdoor Watershed Day
Data Collection
Water Balance Assessment
Ecological Assessment
Smart Growth Case Study (Easton)
Top Five Watershed Issues identified by public meeting participants

1. The amount of public education (training) for municipal staff, boards, commissions
2. The amount of public education and outreach about environmental issues
3. The amount of habitat, wetlands and open space being protected
4. The extent of inappropriate development
5. Quantity of flow and availability of critical habitat in rivers, stream and lakes
Water Balance Analysis
The Hydrologic Cycle

- Rain Clouds: Precipitation
- Evaporation: From Vegetation, From Streams, From Soil, From Ocean
- Lake Storage
- Surface Runoff: Infiltration, Percolation, Deep Percolation
- Ocean

Adapted from: Stream Corridor Restoration
**Water Budget**

- **What is it?** A budget of the water incoming (e.g., rainfall, runoff, wastewater, stormwater) and outgoing (e.g., wells) from an aquifer.

- **Why do we need to know?** It helps prioritize specific subwatersheds for restoration and protection of vital water resources, identify and address water surpluses and deficits, and assess remedial options.
What Goes Into a Water Budget?

**Water Budget**

\[ = \]

**Water recharge:**
- Natural recharge (precipitation - evapotranspiration),
- Wastewater disposal (septic systems, groundwater discharge permit).

**Water withdrawals:**
- Private / Irrigation wells (e.g., cranberries),
- Public Water Supplies.
Data Collection

- Parcel Data
- Water and Sewer Service Areas
- Water Management Act Data
- Groundwater Discharge Permit Data
- NPDES Discharge Permit Data

All data collection efforts are described in the final report. All raw data are provided.
Horsley Witten Group

2-Step Model:

1. Data Pre-Processing

2. Script to Perform the Water Budget Calculations

Output:

---

**WATER BUDGET CALCULATIONS**

```vba
For i = 0 To 107
    Set pRow = pSubsTable.GetRow(i) 'Calculating Existing Recharge
    pRow.Value(3) = SubsArray(i, 1) + SubsArray(i, 2) + SubsArray(i, 3) _
        - SubsArray(i, 4) - SubsArray(i, 5) - SubsArray(i, 6)
    pRow.Value(4) = SubsArray(i, 7) 'Putting in Natural Recharge
    pRow.Value(5) = (pRow.Value(3) - SubsArray(i, 7)) / SubsArray(i, 7) * 100
    'Calculating Natural Recharge
    pRow.Store
Next i
End Sub
```
Water Balance Results

Figure 4-11 Taunton Water Budget - Excluding Surface Water Withdrawals and NPDES Effluent

Figure 4-13 Taunton Water Budget - Including Surface Water Withdrawals and NPDES Effluent

Legend
- Taunton River Watershed
- Town Boundaries
- SUD-Basins
- Taunton River
- Rivers, Streams
- Surface Water

Water Balance
- <10% (withdrawals > recharge)
- -10% to -5%
- -6% to 0%
- 0% to 5%
- >5% (recharge > withdrawals)
Taunton River Watershed
Water Balance = -6.1%
Water Balance Results for Resource Watersheds (including NPDES discharge and surface water withdrawals)

Taunton River Watershed Water Balance = -0.3%
Water Balance Results

Taunton Watershed, Including Surface Withdrawals & NPDES
(Natural Recharge = 131 BGY, Water Balance = -0.3%)

<table>
<thead>
<tr>
<th>Element</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWTP Effluent</td>
<td>18,883</td>
</tr>
<tr>
<td>Septic Effluent</td>
<td>5,680</td>
</tr>
<tr>
<td>Public Water Withdrawals</td>
<td>-15,714</td>
</tr>
<tr>
<td>Private Well Withdrawals</td>
<td>-2,424</td>
</tr>
<tr>
<td>Inflow and Infiltration</td>
<td>-1,735</td>
</tr>
<tr>
<td>Impervious Runoff</td>
<td>-5,026</td>
</tr>
<tr>
<td>Net Impact</td>
<td>-336</td>
</tr>
</tbody>
</table>

Groundwater Elements
Only

Taunton Watershed, Excluding Surface Withdrawals & NPDES
(Natural Recharge = 131 BGY, Water Balance = -6.1%)

<table>
<thead>
<tr>
<th>Element</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWTP Effluent</td>
<td>78</td>
</tr>
<tr>
<td>Septic Effluent</td>
<td>5,680</td>
</tr>
<tr>
<td>Public Water Withdrawals</td>
<td>-4,539</td>
</tr>
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</tr>
<tr>
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<td>Net Impact</td>
<td>-7,966</td>
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</table>

Surface Water Elements
Included
Water Balance Results

6.1%  The recharge deficit of the Taunton River Watershed compared to natural conditions.
   27% of subwatersheds have a water surplus
   73% of subwatersheds have a water deficit

0.3%  The deficit of the Taunton River Watershed compared to natural conditions when surface water discharges and withdrawals are accounted for.
   31% of subwatersheds have a water surplus
   69% of subwatersheds have a water deficit

Conclusion: Human development is clearly altering the availability of water in the Taunton. Work should focus on policies, mechanisms and techniques to “keep water local” within the watershed. This Water Balance Tool can help drive this effort.
Water Balance Management Objectives

- **Increase localized recharge from wastewater systems**
  - Neighborhood and village scale systems
  - Groundwater discharge and wastewater reuse

- **Reduce runoff from impervious cover**
  - Low Impact Development techniques

- **Reduce water withdrawals**
  - Water conservation
Water Balance Management Objectives

Taunton Watershed, Excluding Surface Withdrawals & NPDES
(Natural Recharge = 131 BGY, Water Balance = -6.1 %)

<table>
<thead>
<tr>
<th>Water Balance Elements</th>
<th>Million Gallons per Year</th>
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<tbody>
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Net Impact: -7,966

Goal: -10,000

Innovative Wastewater Management

Water Conservation

LID

Horsley Witten Group
Ecological Data Analysis

Legend
- Highly developed buffer
- Minimally developed buffer

Notes
- Subbasin boundaries from MassGIS (2005)
- Impervious cover from MassGIS (2005)
Ecological Data Analysis

Legend:
- Poorly protected buffer
- Well protected buffer
“Provide a comprehensive review of how the adoption of smart growth practices in the municipality will enhance the quality of life of the citizens as well as the environmental health of that community.”

Case Study Town: Easton
Easton Case Study Results

Water balance result = Overall water surplus
                      30% deficit in Coweesett Subwatershed
Coweesett most developed (18% effective impervious cover)
  • 10-15% of stream buffer is impervious
  • 10-25% of stream buffer is protected land
Water supply: 7 gravel packed wells
Wastewater: On-Site Systems, 4 small wastewater treatment plants
Reviewed Wastewater, Open Space and Stormwater plans in town

Recommendations:
• Encourage/require LID and recharge in stormwater bylaw
• Encourage compact development near village centers, use overlay districts
• Reduce parking requirements and eliminate parking lot curbing requirements
• Allow LID area to count as open space/ landscaped area
• Consider TDR program to conserve open space
• Shared wastewater systems
Phase II – Scope of Services

1. Comprehensive Management Plan
   Introductory Text
2. Detailed Presentation of Phase I Results
3. Demonstration Projects (6 sites)
4. Local Code Reform Projects (2 communities)
5. Education and Outreach (6 workshops)
6. Preparation of Phase II Final Report
7. Progress Meetings
Code Reform Projects

- Promote Smart Growth / Smart Energy Reforms
- Reduce impacts of new development on water resources and habitat through code changes
- Use Green Communities Act concepts
- Provide an example for other communities
- 2 Communities:
  - Norton – wetland bylaw and regulations
  - Lakeville – scope under consideration
Demonstration Projects

Goals:
- “Keep Water Local”
- Restore natural water balance and associated habitats
- Demonstrate technology and techniques locally

6 projects to address:
1. Low Impact Design – recharge water locally
2. Wetland/Habitat Restoration
3. Alternative Wastewater Management – recharge water locally

Plus… water conservation – withdraw less water
Factors in Project Selection

- In no particular order:
  - Project addresses a water budget deficit identified in the water budget analysis
  - Project addresses a stream buffer or other habitat problem identified in the ecological analysis
  - Project is visible or open to the public for observation
  - Project has a reasonable likelihood of being constructed
  - There is a willing partner who agrees to actively participate in the project.
Phase II Timeline

- 18 Month Project: Jan 2009 – June 2010
- Public Meetings:
  - Spring 2009
  - Fall 2009
  - Summer 2010
- Demonstration Projects:
  - March 2010 completion goal
- Final Report:
  - June 2010
Questions/Open Discussion

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Ellie Baker, Project Manager

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