COMPARISON OF COSTS FOR WASTEWATER SYSTEMS APPLICABLE TO CAPE COD

Presentation to Cape Cod Water Protection Collaborative
April 20, 2010

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Wastewater Costs Report

- Goals
  - Determine what has already been spent for wastewater systems of all sizes (use local data wherever possible)
  - Establish a uniform basis for evaluation
  - Conduct an "apples-to-apples" comparison
  - Perform sensitivity analysis and identify key cost factors
  - Guide towns in CWMP preparation

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Wastewater Costs Report

- Task Force Members
  - Tom Cambareri, Cape Cod Commission
  - Brian Dudley, DEP
  - Mike Giggey, Wright-Pierce
  - George Heufelder, Barnstable County
  - Sue Rask, Barnstable County

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Wastewater Costs Report

- Sponsors
  - Association to Preserve Cape Cod
    - Cape Cod 5 Charitable Trust Foundation
    - Horizon Foundation
  - Cape Cod Business Roundtable
  - Cape Cod Water Protection Collaborative

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Types of Wastewater Systems

- Individual nitrogen-removing systems
  - serving one home or business
- Cluster systems
  - multiple lots—flow < 10,000 gpd
  - no Groundwater Discharge Permit
- Satellite systems
  - flows of 10,000 to 300,000 gpd
- Centralized systems

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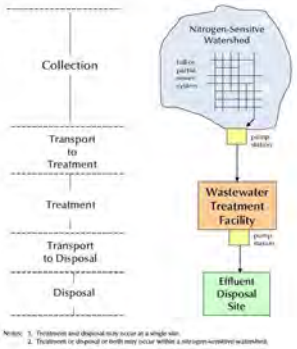
Elements of a Wastewater System



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Wastewater Costs Report

- Survey of construction costs
  - –24 plants
  - –15,000 gpd to 3.2 mgd
- Survey of O&M costs
  - –21 plants
  - –17,000 gpd to 4.2 mgd

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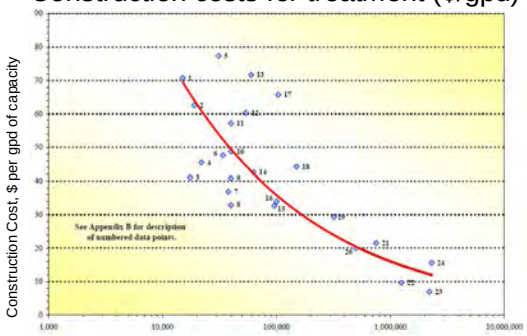
Construction costs for treatment ($/gpd)



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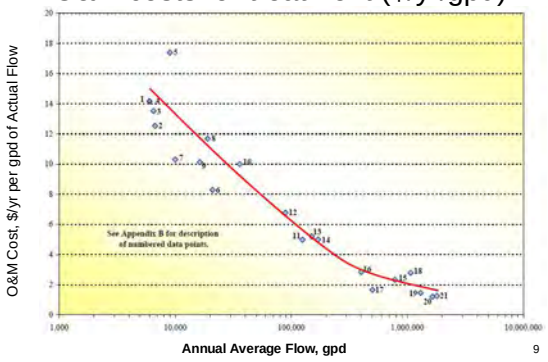
O&M costs for treatment ($/yr/gpd)



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Economies of Scale

- Construction costs
  - – 10,000 gpd $70 / gpd
  - – 100,000 gpd $35 / gpd
  - – 1,000,000 gpd $17 / gpd
- O&M costs
  - – 10,000 gpd $13 /yr / gpd
  - – 100,000 gpd $ 5 /yr / gpd
  - – 1,000,000 gpd $ 2 /yr / gpd

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Wastewater Costs Report

Cost measures

1. Capital costs (design, permitting, construction, land, etc)
2. O&M (labor, power, chemicals, etc.)
3. Equivalent annual costs (EAC)
   - Amortized capital cost, plus
   - O&M cost
4. EAC per pound of nitrogen removed from sensitive watershed

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Measure of Cost-Effectiveness

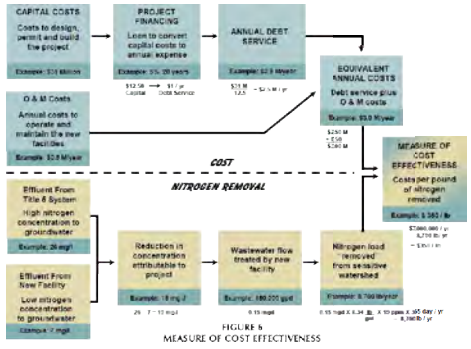

FIGURE 5
MEASURE OF COST EFFECTIVENESS

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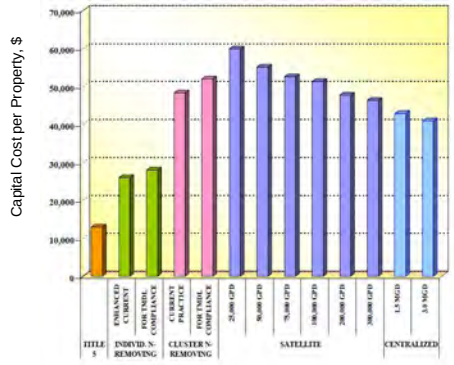
Predicted Costs—Capital ($/property)



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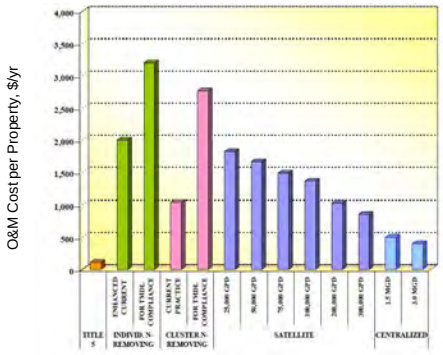
Predicted Costs—O&M ($/yr/property)



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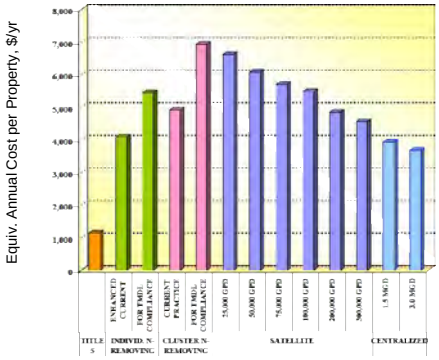
Predicted Costs—EAC ($/yr/property)



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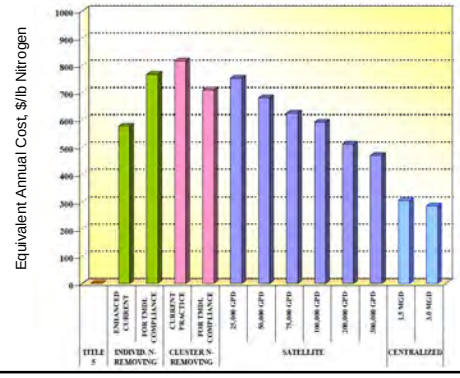
Predicted Costs—EAC ($/lb-N)



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Predicted Costs—EAC ($/lb-N)

- Individual $770/lb *+170%*
- Cluster $710 *+150%*
- Satellite—50,000 gpd $680 *+140%*
- Satellite—200,000 gpd $510 *+ 80%*
- Central—1.5 mgd $305 *+ 7%*
- Central—3.0 mgd $295 ------

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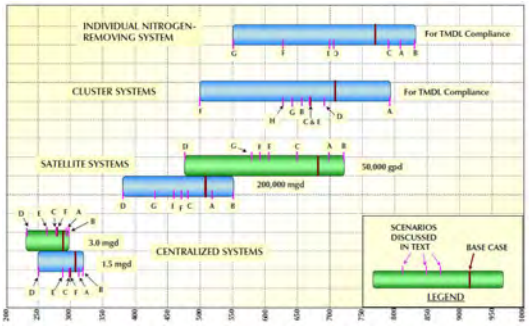
Sensitivity Analysis (EAC/lb-N)



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Example Costs—EAC/lb-N

- Chatham—2.3 mgd $250 / lb *($265)*
- Provincetown—0.575 mgd $300 *($330)*
- Tisbury—104,000 gpd $560
- Mashpee Commons $340 *($750)*
  --80,000 gpd
- Brackett Landing $455 *($550/$720)*
  --8,230 gpd

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Wastewater Costs Report

- Best case for individual N-removing systems:
  – Average collection density > 200 ft/conn
  – TMDL < 50% septic N removal
  – Nearest sewer > 5 miles

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Wastewater Costs Report

- Best case for cluster systems:
  – Small-lot developments remote from sewers with public land available
  – New cluster developments—developer later turns over to town
  – Near-shore areas of small poorly-flushed embayments where larger-scale system is not planned for some time.

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Wastewater Costs Report

- Best case for satellite systems:
  – Remote areas (>4 to 5 miles) with public land available
  – New commercial/residential developments—developer later turns over to town
  – Existing satellite systems that can be expanded to serve nearby un-sewered areas

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Wastewater Costs Report

- Best case for centralized systems:
  – Dense development in watersheds with high septic N removal requirements
  – Town-owned treatment/disposal sites within 3 miles
  – Disposal site outside sensitive watersheds
  – Opportunities for regionalization

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Wastewater Costs Report

- Most significant cost drivers
  – Economies of scale
  – Density of development—minimize sewer length per pound of N collected
  – Location of effluent disposal—avoid N-sensitive watersheds and Zone IIs
  – Land costs—seek town-owned land or dual use of appropriate sites (e.g. golf courses and ball fields)

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Wastewater Costs Report

What is the best wastewater system for a given community?

There is ***no one answer***……this report:

– Establishes a uniform basis for analysis
– Presents a detailed comparison based on one set of typical Cape Cod circumstances
– Shows example projects from the region
– Identifies the factors that most influence the costs, so towns can readily adapt this approach to their specific circumstances

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