Appendix A
Project Scope

PROJECT SCOPE

Task No. 12: Provide assistance to the CWMP Review Committee (RC) as detailed in the final scope approved at the May 3, 2010 Board of Selectman's meeting as repeated below in the following subtasks:

12-1. Estimate and summarize capital costs for the following alternative wastewater management scenarios.

- **Scenario 3C** which includes the following components:
  - Treatment at the MMR Site (Site 3)
  - Membrane Bioreactor (MBR) and Granular Activated Carbon (GAC), and Reverse Osmosis (RO) treatment to Total Nitrogen (TN) standard of 1 mg/l on average and Total Organic Carbon (TOC) standard of less than 1 mg/l (Treatment system C)
  - Groundwater recharge through injection wells along the Route 151 ROW
  - Groundwater modelling of this recharge (Particle tracking and groundwater mounding) using the subregional model developed previously (described in the Draft CWMP/EIR on page 2-10 and Appendix 2-1)
  - Summary of these modelling evaluations in a Supplementary Investigation and Groundwater Modelling Report that would summarize the findings of these evaluations s well as the findings of investigations of the additional sites as described in subsequent Scenarios
  - Phase 1 and 2 collection system (This is the area along Route 28 and south to Vineyard Sound from the Mashpee Town line to the Falmouth Inner Harbor). Costs will be summarized for this collection system with and without the Falmouth Heights Area (Area outside the Little Pond Watershed area)
  - All Costs will be updated to January 2010 time frame (phases 1,2,3)

- **Scenario 3D ALT** which includes the following components:
  - Treatment at the MMR Site (Site 3)
  - ENR treatment system at that site to TN standard of 3 mg/l on average
  - Ocean outfall discharge at CC Canal near current Otis AFB WWTF infiltration site. (Assume new forcemain to follow existing forcemain)
  - Evaluate elevation/quantity impacts to Sagamore Lens from an ocean outfall

- Phase 1 and 2 collection system. Costs will be summarized for this collection system with and without the Falmouth Heights Area (Area outside the Little Pond Watershed area)
- Costs will be updated to January 2010 time frame

- **Scenario 2A (modified)**which includes the following components:
  - Treatment at the Falmouth Country Club (FCC) Site (Site 2)
  - Treatment technology to meet the TMDL Nutrient budget which may include MBR and GAC treatment to Total Nitrogen (TN) standard of 2 mg/l on average and TOC standard of less than 3 mg/l (Treatment system B) or ENR treatment to Total Nitrogen standard of 3 mg/l on average with no additional polishing for TOC removal (Treatment system A)
  - Groundwater recharge at various underground leaching system locations identified as follows:

  West portion of FCC within Green Pond watershed, Allen parcel (14 acres), Dupee ball field parcel (14.25 acres), AFCEE leaching trenches at Sandwich Rd.

  Preliminary analysis of these locations for suitability as discharge sites will be done prior to cost calculations and will form part of added scope of services. These evaluations will include:
    - Site visit and inspection
    - Review of As-Built drawings and sizing information on the AFCEE leaching trenches at Sandwich Road
    - Soil investigation at the sites to include:
      - Excavation of test pits and completion of percolation tests at the bottom of the test pits by a certified soil evaluator simular to the previous subsurface investigations as described in the Alternatives Screening Analysis Report page 5-24 and Appendix 5-2. (Backhoe and operator to complete the excavation to be provided by Falmouth DPW as provided previously)

    - Conceptual sizing of infiltration facilities at the sites to accommodate the treated water flows based on infiltration rates developed previously as supported by test pit data received at the sites
    - Groundwater modelling (Particle tracking and groundwater mounding) using the subregional model developed previously (described in the Draft CWMP/EIR on page 2-10 and Appendix 2-1)
    - Summary of these evaluations in a Supplementary Investigations and Groundwater Modelling Report

- Phase 1 and 2 collection system. Costs will be summarized for this collection system with and without the Falmouth Heights Area (Area outside the Little Pond Watershed area)
- All Costs will be updated to January 2010 time frame (phases 1,2&3)

- **Scenario 1A (modified)** which includes the following components:
  - Treatment at the Blacksmith Shop Road (BSR) Site (Site 1)
  - MBR and GAC treatment to Total Nitrogen (TN) standard of 2 mg/l on average and TOC standard of less than 3 mg/l (Treatment system B)
  - Groundwater recharge through injection wells along Rt. 28 north ROW, or along the westerly end of Thomas B. Landers Rd. and Rt. 28A ROWs. Other potential site for review is 7.42 acre land swap parcel from 22 Acres Realty Trust, presumably for underground discharge.

  Preliminary analysis of the feasibility of this concept will be done prior to cost calculations and will form part of added scope of services. These evaluations will include:
    - Site visit and inspection
    - Review of soil borings in this area of Falmouth as available from AFCEE or other agencies
    - Conceptual sizing and location of injection wells similar to conceptual sizing and location of injection wells as done previously and described in the Draft CWMP/EIR starting on page 4-14.
    - Groundwater modelling (Particle tracking and groundwater mounding) using the subregional model developed previously (described in the Draft CWMP/EIR on page 2-10 and Appendix 2-1)
    - Summary of these evaluations in a Supplementary Soil Investigations and Groundwater Modelling Report
    -

  - Phase 1 and 2 collection system. Costs will be summarized for this collection system with and without the Falmouth Heights Area (Area outside the Little Pond Watershed area)
  - Costs will be updated to January 2010 time frame

- **Scenario 1D** which includes the following components:
  - Treatment at the BSR Site (Site 1)
  - Expansion of the existing ENR treatment system at that site to TN standard of 3 mg/l on average
  - Ocean outfall discharge at Nobska Point at Woods Hole area
  - Evaluate elevation/quantity impacts to Sagamore Lens from an ocean outfall

- Phase 1 and 2 collection system. Costs will be summarized for this collection system with and without the Falmouth Heights Area (Area outside the Little Pond Watershed area)
    - Costs will be updated to January 2010 time frame

The Costs will be summarized in specific categories and groupings to facilitate Town municipal cost sharing and financing evaluations, and decision making. It is noted that costs for Scenario 3C and 1D have been developed and are summarized in the Draft CWMP/EIR document tables 4-3, 4-5, 4-9 and 4-10. The other Scenarios will require additional costing based on the unit costs developed for Scenarios 2A (modified), and 1A (modified).

Subtasks include:

1a. Summarize capital cost into the following categories:

- Land purchase costs
- Construction costs
- Contingency costs (25% of construction costs)
- Fiscal, legal, and engineering (FLE) (25% of construction costs)

1b. Group the capital costs into the following categories (each itemized separately) to facilitate cost sharing and funding evaluations:

- Cost elements that could be supported by 100% property taxes to include:
    - Soft costs of fiscal, legal, and engineering
    - Treatment and recharge facilities including treated water forcemain from the WWTF to the recharge facility
    - Land acquisition costs
    - Major pump stations and forcemains that lead to the WWTF
- Cost elements that could be supported by 50% property taxes and 50% betterment charges (50/50 Split) to include:
    - Peninsular main collection lines and pump stations in the following major roadways: Route 28, Seapit, Seacoast Shores Blvd., Central Avenue, Davisville Road, Acapesket Road, Maravista Avenue, and Worcester Court.
- Cost elements that could be supported by 100% betterment charges to include:
    - All other sewer laterals, collection lines, and pumping/lift stations located in the public right-of-way (ROW) serving the residential and commercial/industrial properties.
- Cost elements that would be paid by property owners (potential support from low-interest loans as allowed by the Barnstable

County Community Septic Management Program) to connect to the municipal collection facilities in the public ROW to include:

- Piping from the structure to the ROW and any needed sewage pumps to convey the sewage to the ROW.

1c. Summarize operation and maintenance (O&M) cost into the following categories:

- WWTF O&M costs of treatment systems 3C, 2A (modified), 1A (modified) and 1D
- Collection system O&M costs

1d. Summarize the number of Future Sewer Units for the 6 major sewer service areas for use in cost distribution evaluations (Currently summarized in Table 4-3 of the Draft CWMP/EIR) including:

- Estimate projected future (build out) wastewater flow for these areas
- Estimate projected future sewer connection at the buildout condition based on the future wastewater generation rate on 170 gpd/residence

1e. Summarize these costs (and their basis) into a draft technical memorandum for review by the WPRC.

12-2. Develop cost and non-monetary comparison for centralized vs. cluster-system wastewater management for a typical peninsular area (up to Route 28) to be selected by the Review Committee. Subtasks include:

2a. Summarize **centralized** capital and O&M costs for this area based on costs developed in Task 1.

- Capital and O&M costs of the treatment and recharge facilities located outside the peninsular area will be developed based on the ratio of the flow from the peninsular area to the total flow at the WWTF.
- Capital and O&M costs for the collection system in this area, and lift station and forcemain to the WWTF will be summarized from the costs developed in Task 1.
- Costs to connect to the municipal collection system in the public ROW will be summarized from the costs developed in Task 1

2b. Estimate and summarize **cluster-system** capital and O&M costs for this area based on input from the WPRC including:

- Number of cluster-systems desired.
- Treatment performance desired (Enhance Nitrogen Removal standard to 3 mg/l on average, or Biological Nitrogen Removal standard of 7 mg/l TN on average, or TOC removal to 3 mg/l or 1mg/l.
- Preferred collection system type (gravity, low pressure with grinder pumps, STEP system, STEG system, vacuum system).
- Cluster system locations and sewersheds.

Selection of cluster system location will be a group activity to review GIS maps made for this discussion and identify vacant and/or other properties for the cluster systems. Also committee preference for the treatment performance desired and collection system type desired will be decided by the committee after presentation of the key issues of the choices. Treated water recharge will be assumed to be through leaching fields and or trenches on Town properties (existing or purchased) using conventional infiltration rates. Costs will be developed with the same contingency & FLE factors as for Item 2a.

2c. Summarize cost and non-monetary factor comparison and their basis into draft technical memorandum for review by WPRC

12-3. Analyse options for project phasing for the 4 alternative scenarios identified in Task #1. Subtasks include:

3a. Identify major collection system sewershed areas as likely sewer-extension phase boundaries in a WPRC discussion.

3b. Identify typical time requirements for the following components:

- Draft CWMP revisions and submittal for MEPA review.
- MEPA review of Draft CWMP.
- Revisions and submittal of Final CWMP for MEPA review.
- Cape Cod Commission DRI approval.
- Agreement with the site Treatment Site Owner to allow Project to Proceed
- Allowance for lawsuits or other delay tactics initiated to block treatment site development
- SRF application preparation and submittal timelines.
- WWTF preliminary design and groundwater discharge permit approval.
- Collection system preliminary design.
- Detailed design of WWTF Phase 1a and production of bidding documents.
- Detailed design of Collection System Phase 1a and production of bidding documents

- Construction of Phase 1a WWTF and Collection Systems.
- Detailed design of WWTF Phase 1b and Collection System Phase 1b.
- Construction of WWTF Phase 1b and Collection System Phase 1b.
- Additional design and construction phases as needed.

A technical memorandum will be developed describing these time requirements and possible ways that they could overlap in a 20 to 40 year timeline to be distributed to the WPRC before the workshop identified in subtask 3a.

3c. Summarize the findings of this task in a draft technical memorandum for WPRC review

3d. Receive comments, finalize the technical memorandum, and issue it to the WPRC.

12-4. Assist Town in identifying federal and state grant opportunities

12-5. Administrative and project management items including:

5a. Meeting attendance at 13 Committee meetings
5b PowerPoint and handout preparation for the meetings
5c. Project management

12-6. Summarize costs for planned sewer implementation for the West Falmouth Harbor and Scranton Avenue areas as developed in the 2001 Wastewater Facility Plan and subsequent evaluations for the West Falmouth Harbor Area including: Summarize the previous evaluations in a technical memorandum with attached excerpts of the previous documents, Update the costs to a timeframe of January 2010

- Provide a brief discussion on The West Falmouth nitrogen TMDL that has been developed since the previous evaluations and identify potential next steps to proceed with implementation of the 2001 approved Facilities Plan. . The discussion will also include any needed process requirements to change the approved plan. No new technical evaluations will be conducted.

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

REVIEW COMMITTEE FINDINGS (revised, 8/31/10, 9/7/10)

PART I: DESIGN AND TECHNICAL PRINCIPLES

1. The draft "Comprehensive Wastewater Management Plan" prepared by Stearns and Wheler and submitted to the Board of Selectmen in 2009 represents an excellent compilation of a broad spectrum of data and opportunities for wastewater management in Falmouth.

2. The Committee found that several added areas of inquiry were worth exploring, including:

    - Potential discharge sites at and adjacent to the Falmouth Country Club and at the existing West Falmouth plant, as well as ocean outfall solutions
    - Innovative alternative systems of treatment and disposal, using Seacoast Shores as an example
    - Financial phasing of the project over significant time
    - Betterment assessment plan with optional amounts and time periods

3. The Committee does not share the conclusion of the first draft Comprehensive Wastewater Management Plan that the MMR site is the preferred option, with recharge in injection wells along Rt. 151. Reasons for this view are:

    - Complicated process for obtaining approvals from various governmental agencies
    - Cost of transport of untreated sewage to the MMR, capital costs of treatment system needed and subsequent high operating costs
    - Discharge of treated effluent into the Zone II water supply locations on Rt. 151, with uncertain public reaction
    - Uncertainty that negotiations with MMR and the surrounding communities will proceed in a timely manner

- Potential for significant permitting requirements and uncertainties for well injection discharge option

4. The Committee believes that the preferred option for treatment and discharge configuration of a centralized wastewater system should be based on expanded use of the existing West Falmouth Treatment Facility, with discharge at various locations outside the West Falmouth watershed. Those locations include: the "swap" parcel under negotiation with the Petersons (7.4 acres); land at the north end of the existing plant; recreation area on Sandwich Rd (14.2 acres); the town owned "Allen" parcel (14 acres); westerly portions of the Falmouth Country Club (up to 85 acres); east of the FCC "Deignan" parcel (up to 40 acres). The committee subscribes to the principle of distributing nitrogen loading to multiple watersheds to avoid unduly burdening any one watershed, with consequent further requirements for sewering that watershed.

5. The advantages of the existing treatment plant (also detailed in the Stearns and Wheler report "Alternative Screening Analysis Report" Chapter 4) are:
   - Capture the investment in unused treatment capacity already made in the treatment plant and discharge beds
   - Large available land area for expansion
   - Nearby availability of some discharge capacity (although more remote sites are needed as well)
   - Lower operating costs and complexities by managing one facility rather than two or more facilities
   - Comparable capital costs to a facility at FCC, although wastewater transport costs are higher
   - Use of this site more favorably preserves the option of ocean outfall

6. Primary planning of discharge via open sand filtration beds at the existing plant site and "swap" parcel, at the Allen parcel and at the Deignan parcel are preferred (anticipated capacity of at least 2.0 mgd). Subsurface leaching trenches are presumed for the Sandwich Rd. recreation site and the Falmouth Country Club site (1.0 mgd). Ocean outfall at Nobska should continue to be considered as an option.

7. Information has been offered to the Committee that the areas of Davis Straits and Maravista within the Little Pond watershed contain properties with high nitrogen loads. This information has helped persuade the Committee that the project should begin at the west end of the project area, moving eastward in the construction stages in 2016, 2017 and 2018 of $200M. Later construction stages would follow the funding schedule in 2025, 2030 and 2036. Moreover, further study is needed, using MEP scenario variations, to define the extent of sewers required to satisfy TMDL limits.

8. At the same time as the first construction is occurring, if not sooner, the Committee sees an important opportunity to conduct one or more substantial demonstration projects in the easterly portions of the project area, such as Seacoast Shores. With the likelihood that no construction would happen in the easterly peninsulas for another 10-20 years, a demonstration program, closely monitored, would evaluate innovative/alternative technologies and provide a setting for adaptive management practices in these portions of the projects area. Widening of the Bourne's Pond inlet, Little Pond inlet and Perch Pond dredging have all been suggested as offering promise. Other demonstrations could include use of alternative toilet designs (supported by Barnstable County financing assistance), oyster planting or limited cluster/permeable reactive barriers applications, road runoff and fertilizer control, tailing ponds, ecological wastewater treatment systems, pilot scale well injection at the Blacksmith Shop Road site.

9. The Committee does not see any urgency for constructing systems in the Falmouth Heights area outside the Little Pond watershed, or in the southerly part of Scranton Avenue. In addition, since future treated effluent will be discharged outside the West Falmouth watershed, the need for constructing sewers in West Falmouth may be deferred to a later date.

10. The easterly boundary of the Phase 2 project area should terminate at the Seapit peninsula. The remainder of the Waquoit West sewershed and the entire Waquoit East sewershed south of Rt. 28 will be added into the Phase 3 area north of Rt. 28 (see map, page 10).

11. The Committee believes that there is ample probability that so called "cluster" systems will be part of the wastewater management strategy for Phase 3 of the project, north of Rt. 28 and Waquoit East sewershed. However, the Committee does not believe that exploration of such cluster systems would be productive in the immediate Phases 1 & 2, south of Rt. 28. Information from Barnstable County, Mashpee and our cost comparison of alternatives in Seacoast Shores leads the Committee to the conclusion that the overall costs, performance capabilities and time tested systems favor centralized treatment. However, the Committee also believes that the demonstration strategy noted above could bring different information to the town. For the later stages of construction design, innovative alternatives could play a stronger role.

12. With the filing of the report to the Board of Selectmen, the Committee thinks there will be a strong community advantage to continuing monitoring and oversight of the development of this project. To that end, the Committee believes that a new standing committee would be of value to advise the town of ongoing issues related to project status, to help educate the community about this major investment and to provide input to town departments, the Board of Selectmen and Town Meeting as needed. Such a newly constituted group, either created by the Board of Selectmen, or established by vote of Town Meeting, could provide vital focus on the progress of the project.

13. A modular approach to construction of treatment and discharge facilities should be adopted. Treatment capacities at the West Falmouth treatment facility should be expanded as the flow volumes of the collection system expand. Similarly the discharge capacities at the various locations should match the demand needed. Altogether, best engineering practices and adaptive management should dictate the sequencing and priority of construction.

14. The following proposed budget for the portion of the wastewater plan south of Rt. 28 shows the hypothetical cost of the system. While much of the cost data comes from the Stearns & Wheler reports, all values under "Recharge System" are unverified estimates.

HYPOTHETICAL

CWMPRC PROJECT BUDGET ESTIMATE

AUGUST, 2010

*Collection system (Phase 1 & 2, south of Rt. 28)

Major Pumping Stations and Force Mains	$43,000,000
Peninsula Mains & Pumping Stations	$35,000,000
Right of way laterals	$123,000,000
1100 Grinder Pumps @ $10,000	$11,000,000
TOTAL COLLECTION	$212,000,000

*Treatment site (1A: Existing plant, Blacksmith Shop Rd.) & system (Type A: SBR & Denitrification filter)

Site development	$6,200,000
Treatment: SBR & Denitrification	$9,100,000
Sludge Management	$1,900,000
TOTAL TREATMENT	$16,200,000

*Recharge System (various remote sites via Thomas Landers Rd.: north of WFTP, Dupee, Allen, FCC); sand filtration beds [north of WFTP, Allen, Deignan; 2.0 mgd]; subsurface leaching [Dupee and FCC; 1.0 mgd]

Force Main transport ($1.5M/mile)	$ 13,500,000
Filtration beds (2.0 mgd)	$ 6,500,000
Subsurface leaching trenches (1.0 mgd)	$ 12,000,000
TOTAL RECHARGE	$32,000,000

GROSS TOTAL, ALL ELEMENTS	$260,200,000
Falmouth Heights (less: $19M; 300? EDU)	$241,200,000
Waquoit East (less: $35M; 450? EDU)	$206,200,000
Contingency/demo 25%	$ 52,000,000
Engineering/legal/finance 25%	$ 52,000,000
PROJECT TOTAL COST ESTIMATE	$310,200,000

7,350 EDU = $43,000@

Proposed betterment assessment principal: $20,000

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

REVIEW COMMITTEE FINDINGS

PART II: FINANCIAL PRINCIPLES

1. Estimated project costs for the phases 1 & 2 defined area (south of Rt. 28 from Davis Straits to Seapit peninsula): $310M. Note: Phase 3, north of Rt. 28 and Waquoit East, could reach an additional $200-285M, subject to the adaptive management process.

2. All appropriation votes will be subject to Proposition 2 ½ debt exclusion ballots.

3. Optimum timetable for Phase 1 &2 project financing:

FY2012: $15M for permitting, design and demonstration projects, 4 bonds, 1 year term each

FY2016-18: $200M stage 1 construction
[$100M SRF, 30 year term, 0%]
[$100M Town bond, 20 year term, 5%]

FY2026: $40M stage 2 construction, Town bond, 20 year term, 5%

FY2031: $40M stage 3 construction, Town bond, 20 year term, 5%

FY2037: $15M stage 4 SRF, 20 year term, 2%

4. Funding sources will include State Revolving Fund, property tax levy, betterment assessments. Falmouth should file SRF application by FY15.

5. Special legislation will be needed for the project, including the following elements:

   - Dissolve the link between term of borrowing and term of betterment assessment (established by Chapter 312, Acts of 2008)
   - Permit Falmouth the option to adopt a fixed annual sewer betterment payment schedule
   - Allow Falmouth to equally divide annual betterment assessment payments on property tax bills
   - Set the sewer betterment assessment interest rate at 2.5%, effective on January 1, 2015

6. The committee is convinced that the town needs to find a more equitable way of assessing betterments, through an extended process of public deliberation.

7. For planning purposes, betterment assessments should be calculated on a unit basis, with a total principal payment of $20,000 per unit, spread over a 50 year term.
8. Town Meeting actions:

   Petition for Special Act (November, 2010)

Adopt nutrient management bylaw to gain 0% SRF funding eligibility (November, 2010)

Accept provisions of MGL Chapter 80, Section 13B, allowing eligible elderly to defer sewer betterment payments (November, 2010)

Accept MGL Chapter 83, Section 16B allowing eligible elderly to defer sewer use charges (future meeting prior to committing any betterments)

Establish Sewer Revenue Fund for debt service payments, authorized under MGL Chapter 83, Section 15B (April, 2011)

Accept Section 10, Chapter 312, Acts of 2008 (April, 2013)

9. Board of Selectmen should consider adopting implementation policies similar to those for New Silver Beach sewer area

10. When the wastewater system is designed, the town should request 50 year certification of useful life from DEP for project elements subject to betterments.

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

REVIEW COMMITTEE FINDINGS

PART III: PROPOSED ACTION TIMELINE

The chart presented below represents a proposed action plan, with milestones noted for Town Meeting action, administrative initiatives, and design activities. These actions will require close coordination by the Board of Selectmen and Town Manager to insure that the various elements of the Comprehensive Wastewater Management Plan are implemented in a timely manner.

PROPOSED ACTION TIMELINE (PF Boyer)

Action Item	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Committee completes review	X										
TM approval of Nutrient Management Bylaw	X										
Town Meeting Petition Special Act	X										
Draft CWMP/DEIR submittal		X									
$15M design, town votes		X									
Address comments and WQ Modeling											
Final CWMP/FEIR submittal			X								
Execute contract, selected engineering firm				X							
TM vote, accept Ch. 312, Acts of 2008, Sec. 10				X							
Preliminary design of whole system											
SRF PEF Application submittal					X						
$100M Town votes, SRF contingent					X						
SRF IUP Listing					X						
SRF full application submitted					X						
Detailed design of construction (SRF $100M)											
$100M Town votes						X					
SRF construction project NTP						X					
SRFconstruction project ($100M)											
Detailed design of construction (town $100M)											
Town construction project ($100M)											
$40M town votes (Spring 2025)											
Town construction ($40M)											
$40M town votes (Spring 2030)											
Town construction ($40M)											
$15M SRF, town votes (Spring 2035)											
SRF construction ($15M)											

Notes:

TM: Town Meeting

CWMP/DEIR: Comprehensive wastewater Management Plan/Draft Environmental Impact Report

WQ: Water Quality

SRF PEF: State Revolving Fund Project Evaluation Form

SRF IUP: State Revolving Fund Intended Use Plan

NTP: Notice to Proceed

Proposed area to be shifted to CWMP Phase III in red