

South Coastal Basins Watershed Pilot Project

Executive Summary

Introduction

This project is designed to provide information and analyses on growth, development, and land use planning to the communities of the South Coastal Watershed in order to help them better plan for the future and manage and protect critical natural resources within the watershed. The project was an outgrowth of an earlier project conducted by MAPC, the South Shore Non-Point Source Management Plan (MAPC, 1998). That project assessed the problem of non-point source pollution and concluded among other things that better land use planning and management of future growth is needed to protect the resources of the South Coastal Basins watershed. The present project provides that kind of assistance for land use planning and growth management to the communities.

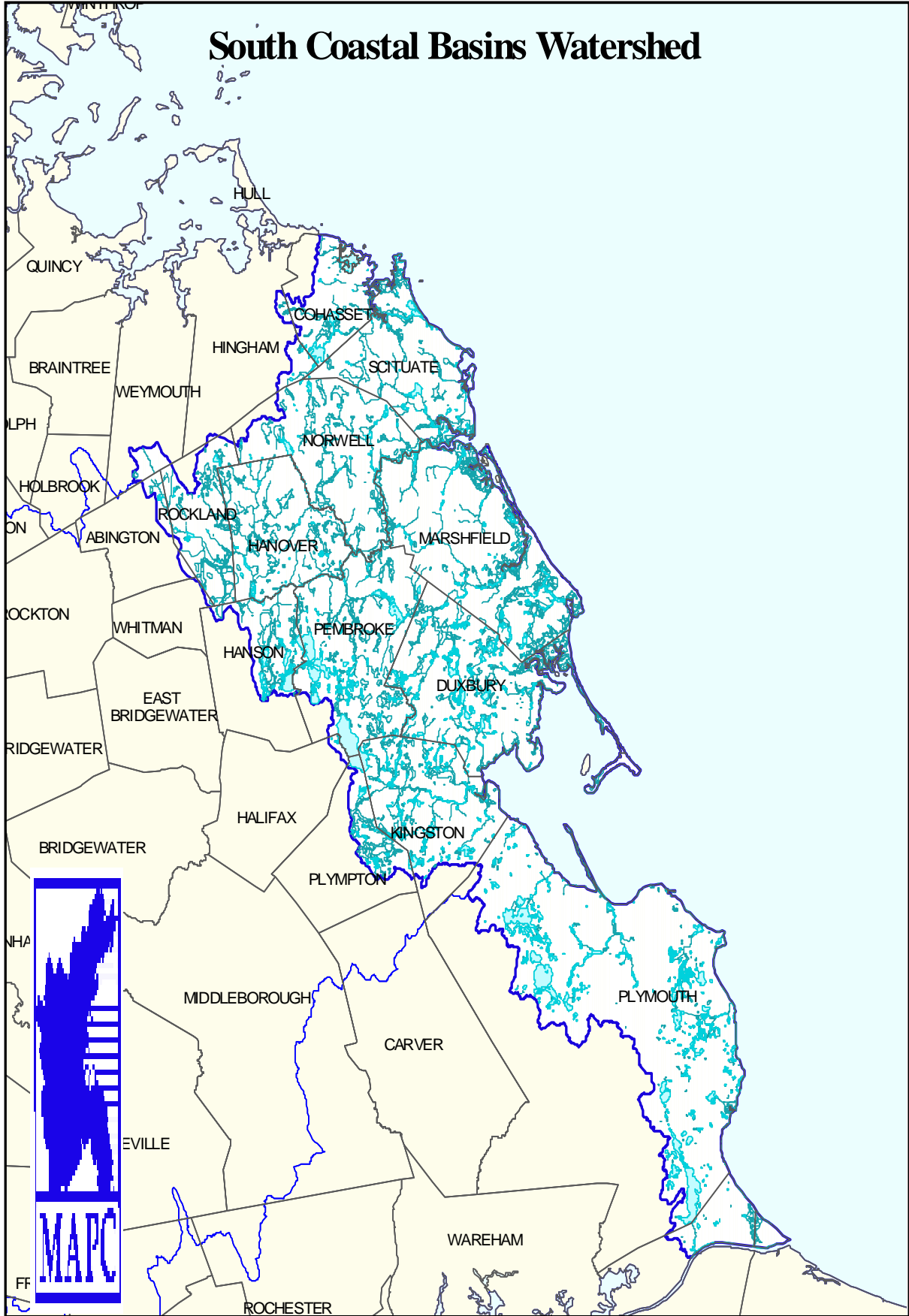
This project was jointly produced by the Metropolitan Area Planning Council (MAPC) and the Old Colony Planning Council (OCPC), each of which have communities in the watershed. MAPC conducted several tasks (described below) for Cohasset, Duxbury, Hanover, Marshfield, Norwell, Pembroke, Rockland, and Scituate. OCPC provided technical assistance to Kingston, Pembroke, and Plymouth (Pembroke belongs to both Regional Planning Agencies). A map of the communities in the South Coastal Basins is on the following page.

Summary of Activities and Tasks Undertaken

MAPC conducted reviews of the Master Plans, Comprehensive Plans, Source Water Protection Plans, and Open Space Plans for each of the communities which have adopted such plans. The reviews provide a summary of findings for the watershed and individual evaluations and recommendations for each town. These are presented in Technical Memoranda No. 1 and 2.

Using information recently made available from a series of buildout analyses for the eight MAPC communities in the watershed, several growth management analyses were conducted. These include an analysis of future water supply demands for the year 2025 and at full buildout, presented in Technical Memorandum No. 3. A pilot application of DEP's Nitrogen Loading Model to buildout conditions for wells in Marshfield and Scituate was conducted, and the results are presented in Technical Memorandum No. 4. The buildout analyses for all eight towns were aggregated for the region into a single map, and the statistical data on buildout were also aggregated for the watershed and are presented in Technical Memorandum No. 5. Finally, an aggregate buildout map with a digital land parcel overlay was produced for four communities, Cohasset, Scituate, Marshfield, and Duxbury. Both buildout maps are attached to the report in the back cover pocket, and larger scale maps are also available. Old Colony Planning Council produced a component of the project for the towns of Kingston, Pembroke, and Plymouth. This is an assessment of water resources protection regulations and practices in those communities, with proposed amendments and new provisions for the towns to consider adopting.

South Coastal Basins Watershed



Summary of Findings and Recommendations

Section 1: Technical Assistance on Planning and Growth Impacts for Cohasset, Duxbury, Hanover, Marshfield, Norwell, Pembroke, Rockland, and Scituate (conducted by MAPC)

1. Master Plans and Comprehensive Plans (Technical Memorandum #1)

A review of Master Plans and Comprehensive Plans was conducted for the towns which have such plans available. These include the towns of Duxbury, Hanover, Marshfield, Rockland, and Scituate. Some of the major findings of the analysis are:

- Watersheds are recognized but not as an organizing concept - Although most of the comprehensive plans recognize watersheds and their important resources, not one of the plans is organized around the watershed concept.
- Sewer expansion plans tend to be small scale - All of the communities are cautious about the idea of expanding sewers because of the impacts of the growth that could occur.
- Build-out and growth impacts are a major concern - All of the plans recognize that growth can have serious negative impacts. The build-out analysis is a useful tool that helps to create a sense of urgency for making wise land use choices.
- Master plans need to better integrate the recommendations of open space plans - In most instances, recommendations on areas to be protected are not well integrated into the recommendations on housing, transportation, zoning, economic development and other areas.
- Regional water quality solutions are not being implemented - Several of the plans acknowledge that zoning and regulatory control of aquifer recharge areas requires inter-community solutions but that not much is being done in this area.

The project's recommendations on Master Plans and Comprehensive Plans are summarized as follows:

- The towns' planning programs should prioritize actions to address water quality in areas identified by DEP as failing their water quality goals. Most of these waterbodies are negatively impacted by non-point sources of pollution, such as stormwater runoff, which can only be controlled by local measures to regulate land use and new development.
- Master plans need to make more extensive use of mapping - The weak point of most master plans is integration of the data and of the recommendations. More could be done by mapping the resources and recommendations so that overlaps and conflicts become more apparent.
- All maps should include watershed boundaries - All maps should be revised to include watershed boundaries and tabulations of critical information, such as buildout, by watershed.

- Master plans need to recognize the link between transportation and water quality - Only one plan mentions the impact of town and state use of road salt on the water supply. The environmental impact of transportation needs to be made more visible.
- Select Appropriate Tools for Managing Growth – The appendix contains information on a wide variety of growth management/smart growth tools whose application can have positive impacts on the location and type of growth which in turn can affect nonpoint source pollution. Each town should review these tools to see if there are any that should be considered that will have positive overall impacts.

Technical Memorandum #1 also contains individual findings and recommendations for each of the towns' Master Plans and Comprehensive Plans

2. Open Space Plans (Technical Memorandum #2)

A review of Open Space Plans was conducted for the towns of Cohasset, Duxbury, Hanover, Marshfield, Norwell, Pembroke, and Scituate. Some of the major findings of the analysis are:

- Most open space plans have Five - Year Action Plans that are very ambitious but not focused enough to be doable. The plans should include an implementation strategy which prioritizes the most important actions, identifies responsible parties, and potential funding sources.
- Water quality is a major focus and concern of most open space plans. However, most plans do not provide guidance on implementing measures to address water quality issues.
- Funding is a major constraint to protecting the critical resources in a community.

The recommendations on Open Space Plans are summarized as follows:

- All open space plans should be developed with the active participation of at least one individual who represents water quality issues.
- The towns should take a more proactive approach to land acquisition. While most towns have gone through the process to identify the land that they would like to protect, most towns react when parcels come on the market rather than approaching property owners to discuss their plans.
- The towns should consider undertaking a collaborative effort to produce educational materials about the water quality impacts of activities by property-owners. This collaborative effort could also serve as a catalyst to bring communities together to discuss subregional efforts to protect water quality.
- The communities should meet together to share recommended strategies for preventing non-point source pollution and to determine areas where collaborative efforts might be useful. Both the Massachusetts Bays Program's South Shore Local Governance Committee and the South Shore Coalition (a subregion of MAPC) could serve as a regional forum for this purpose.

3. Water Supply Impacts of Regional Growth (Technical Memorandum #3)

- **Summary of Growth Trends:** Over the last 20 years the region has experienced significant growth in population (14%) and much higher growth of employment (57%). Over the next 25 years, the growth rate for each is projected to roughly double that of the last two decades, with population increasing by 28% and employment by 119 % by the year 2025. By 2025 the region is projected to have an increase of 14,500 residents and 11,500 employees. However, at full buildout, the rate of population growth would double yet again (57%), while employment could increase by an astronomical 904 percent. At full buildout, over 45,000 more residents and 370,000 employees would be located in the region, increasing the impacts on water supplies three-fold even over the year 2025 growth projection. Those potential impacts of this growth on water supplies are summarized below.
- **Potential Water Supply Impacts:** The analysis shows that 1994-98 average day water demand in three of the eight communities was already greater than their Water Management Act allowable withdrawals. For the region as a whole, total water demand is within the limit of total allowable withdrawals by a factor of only 1.44 mgd.

Projections for year 2025 average day demand indicate that six of the eight communities will have a deficit by the year 2025, based on their currently allowable withdrawals under the Water Management Act. The greatest deficit is projected for the Rockland/Abington system (0.69 mgd), followed by Pembroke (0.27 mgd) and Scituate (0.21 mgd). Cohasset, Duxbury, and Hanover will have small deficits (less than 0.1 mgd), while only Marshfield and Norwell are projected to have demands lower than their allowable withdrawals under the Water Management Act in 2025.

At full buildout, all eight communities would have a deficit relative to their current WMA allowable withdrawals. The largest deficits at buildout would be in Rockland and Marshfield, both of which would be over 4 mgd, followed by Hanover at 1.8 mgd. Cohasset and Scituate, and Pembroke would all have a deficit of nearly 1 mgd, while only Duxbury and Norwell would have deficits of less than 0.5 mgd.

Aggregating allowable WMA withdrawals and projected demand for the eight-town region as a whole shows a total regional deficit of 0.42 mgd in 2025. This deficit would increase to 13.9 mgd at full buildout, representing a total water demand nearly double the current total WMA withdrawals for the region.

4. Nitrogen Loading for wells in Marshfield and Scituate (Technical Memorandum #4)

A nitrogen loading analysis was conducted on two public water supply wells using the projections for growth from the buildout analyses. Two municipal wells were selected for analysis: Well No. 17 in Scituate and the Mt. Skirgo wellfield in Marshfield. A nitrogen loading model was run for existing conditions and for full buildout in both Zone II areas. Using these parameters, the nitrogen loading model estimates that at buildout, nitrogen concentrations in Scituate's Well No. 17 would increase from 1.27 mg/l to 1.5 mg/l. The nitrogen load in Marshfield's Mt. Skirgo wellfield would increase from 3.32 mg/l to 6.95 mg/l. Both of these are below the drinking water standard of 10 mg/l. However, at 6.96 mg/l at buildout, Marshfield's Mt Skirgo wells would be higher than DEP's planning threshold of 5 mgd, the level at which DEP requires quarterly sampling to more closely monitor a source. This analysis serves as an early warning of that potential impact.

5. Regional Buildout Summary and Map (Technical Memorandum #5)

This section of the report presents an aggregate buildout map for eight towns as well as a statistical summary of the buildout analysis results for eight towns in the watershed. The analysis shows that there are over 20,500 acres of developable land in the region. Marshfield has the greatest amount, at 4,134 acres, followed by Norwell, Duxbury, and Pembroke, each of which have nearly 3,000 acres of developable land.

The summary also presents the number of additional housing that could be built on the developable land in each town. The regional total is 18,468 housing units. Marshfield leads the region in potential additional housing units at 4134, while Duxbury and Cohasset each could accommodate nearly 3,000 housing units.

Additional commercial and industrial floor area varies widely by town. The total for the region is over 16.6 million square feet, but the range is from 6.7 million square feet in Marshfield to only 30,500 square feet in Duxbury. Three of the towns dominate in the amount of potential additional floor area—Marshfield, Rockland, and Hanover. These three towns contain a combined 13.7 million square feet, which is 83 percent of the total for the region.

Based on the development potential identified in the eight towns, the region could be home to additional population of over 50,000 people at full buildout. This would result in an additional water demand of 1.2 million gallons per day, and the generation of an additional 26,000 tons of solid waste each year, of which 18,000 would not be recycled. The region's growth would also mean nearly 9500 new students in local schools, and the construction of 278 miles of new roads in the watershed.

The final step in the regional buildout analysis is a summary of how much of the developable land is located within environmentally sensitive areas. Overall for the region, about 6 percent of the residential land and 10 percent of the commercial / industrial land is located within the river protection zone of the River Protection Act.

The buildout analyses also consider local water resources protection overlay zoning districts in cases where the bylaw presents a constraint to the amount of development. This is the case for Cohasset, Duxbury, Hanover, Marshfield, and Pembroke. In those five towns, a total of 1964 developable lots are located within the water resources districts. Only three of the towns have developable commercial / industrial land in a water resources protection district: Cohasset, Hanover, and Pembroke. The total amount of buildable commercial / industrial floor space within the water resources protection districts of these three towns is approximately 2.5 million square feet.

Outreach and Implementation

After this draft report has been finalized, MAPC will conduct meetings with local officials in the watershed to review the findings and recommendations and offer assistance with implementing the recommendations. MAPC will conduct outreach to regional south shore organizations, such as the South Shore Coalition (a coalition of selectmen and planning boards) and the Mass. Bays Program's South Shore Local Governance Committee, and watershed associations in the region.

SECTION 2: Assessment of Water Resource Protection Regulations and Practices in Kingston, Pembroke, and Plymouth (conducted by OCPC)

An inventory of Water Supply protection measures was compiled, the various measures were reviewed and evaluated by Old Colony Planning Council. These included the following measures: Chapter 40a Conservancy Districts (under the Zoning Act), Chapter 40a Floodplain Overlay Districts, Chapter 40a Water Resources, Groundwater, and Aquifer Protection Overlay Zoning Districts, Earth Removal Bylaws, Non-Zoning Wetlands Protection Bylaws, Building Moratoria, Floor Drain General Bylaws, Road Salting Regulations, Board of Health Regulations, Subdivision Regulations, Water use Restriction General Bylaws, and Erosion and Sedimentation controls, use of oil/gas trapping catch basins, Best Management Practices, regulation of Underground Storage Tanks, aquifer acquisition activities.

These protection measures in the three towns were compared to the standards contained in DEP's New Source Regulations (310CMR22.21), and those measures which do not meet DEP standards were identified. In general, the report concludes that the three communities have comprehensive water quality protection measures in place which meet most of the overall standards of the DEP regulations.

Based on the evaluation of local measures and comparison to state standards, a series of specific recommendations was developed for each of the three towns. These include various amendments to zoning and general bylaws which will strengthen the protection of water resources from potential pollution threats associated with development and land uses. These recommendations were then formulated into draft bylaw amendment language with the towns can use to implement the recommendations of the study. Recommended amendments for each of the three towns are summarized below:

Kingston

- Water Resources Protection District amendments
- Board of Health Regulations on nitrogen removal
- Highway Department De-icing Policies
- Subdivision Regulations on catch basin standards

Pembroke

- Water Resource and Groundwater Protection District amendments
- Subdivision Regulations on catch basin standards
- Earth Removal Regulations on depth to groundwater table
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Plymouth

- Aquifer Protection District recodification
- General Bylaw on Floor Drains
- Subdivision Regulations on detention ponds
- Board of Health Regulations on minimum percolation rates