Water Resource Management Planning

About this Document

This guidance was designed to explain the types of water management planning reports towns and communities can use when approaching their particular wastewater, drinking water and stormwater issues. This document is not intended as policy and only offers suggestions to communities on managing their resources.

This Guidance is intended to:

- Explain the types of management planning reports available to communities
- Describe each plan and what needs to be considered and included in the reports
- Give communities support throughout the planning and report process

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Introduction

The Benefits Of Water Resource Management Planning

Water is a finite resource that must be managed to meet current and future human needs and protect the natural environment. Healthy water systems require water that is plentiful, clean and free of harmful contaminants. Water quality and quantity are critical for drinking water, fishing and swimming, and wildlife habitat.

Sixty per cent of the lakes, streams, rivers, and marine waters that have been in assessed in Massachusetts are impaired by a wide variety of pollutant sources including wastewater treatment plant discharges, sanitary sewer overflows, combined sewer overflows, septic systems, physical alterations, and stormwater discharges. Communities with aging infrastructure may have inadequate treatment plants, leaky sewer pipes, hydraulic deficiencies in their collection system, illicit connections of stormwater conveyances to the sanitary sewer system and illicit connections of sanitary discharges to the stormwater system. Inadequate staffing and poor operation and maintenance of the sanitary sewer and municipal storm drain systems can exacerbate these problems.

Although Massachusetts receives approximately 44 inches of precipitation each year, many rivers and streams throughout the Commonwealth have inadequate flow to support all their designated uses as areas for active and passive recreation, sources of drinking water supply and habitat for aquatic life. This problem is caused by a variety of factors including high summer water use, water withdrawals located close to streams, an increase in impervious surface as a result of growth, impoundments, and the interbasin transport of wastewater and infiltration and inflow. By “keeping water local”, the return of clean water to the rivers and aquifers is maximized and ensures a balanced system that is sustainable for human use.

Inadequate stormwater management also contributes to the water quality and water quantity problems of the Commonwealth. Storm drains act as a transport mechanism for sediments and other pollutants. Inventories of Massachusetts’s rivers and streams indicate that nearly half of the water quality problems in those streams are attributable to stormwater. Long-term monitoring of stream flows indicates that urban and suburban development that covers pervious earth materials with impervious building and pavement has reduced recharge to aquifers that supply vital base flow to rivers during dry weather.

Communities facing some or all of these problems can benefit from Water Resource Management Planning. Water Resource Management Planning enables cities and towns to select the most environmentally appropriate and cost effective means of meeting their wastewater, drinking water and stormwater management needs.

The Massachusetts Water Policy and the Guide to Water Resource Management Planning

In 2004, the Executive Office of Environmental Affairs, now the Executive Office of Energy and Environmental Affairs (EOEEA), published the Massachusetts Water Policy. The Water Policy is intended to promote four environmental principles.

- Keep water local and seek to have municipalities live within their water budgets by addressing issues from a watershed perspective
- Protect clean water and restore impaired waters
- Protect and restore fish and wildlife habitat
- Promote development strategies consistent with sustainable water resource management.

To further these principles, the Water Policy issued specific recommendations and actions including the completion of new Guide to Water Resource Management Planning that evaluates a wide range of issues including drinking water, ground water recharge, and stream flow. This Guide is intended to implement that recommendation.

For many years, MassDEP had issued policies and guidance on wastewater management planning aimed at identifying wastewater infrastructure projects that would protect the quality of the Commonwealth's waters so that they may sustain all their designated uses including habitat for fish and wildlife. Often, these plans led to the construction of centralized sewer systems. In recent years, MassDEP revised its planning guidance to include consideration of water quantity issues. To keep water local and minimize the impact on surface waters experiencing low flows, communities were asked to consider a broader range of wastewater management options including on-site septic systems and package treatment plants with ground water discharges.

As called for in the Water Policy, this Guide goes beyond the most recent wastewater management planning guidance. This Guide provides information on planning to address the full spectrum of issues that arise in water resource management including drinking water and stormwater issues. In furtherance of the Water Policy, the Guide continues to stress the need to consider solutions that keep water local and minimize the impact on the overall water budget, the inflow and outflow of water to the community. The Guide also promotes sustainable water resource management strategies. To this end, the Guide encourages communities to consider a wider range of strategies for managing water resources including wastewater reuse, water conservation, optimization of existing drinking water sources, increased ground water recharge of stormwater and wastewater as well as the implementation of low impact development techniques and sustainable development principles.

Planning Varies with the Nature of the Community and its Water Resource Management Problems.

The issues that should be examined in a Water Resource Management Plan necessarily vary with the nature of the community and its water resource management problems. For example in densely populated urban

areas served by public water and sewer systems, Water Resource Management Plans should focus on the age, capacity and condition of the existing infrastructure, since these issues would ordinarily have the greatest bearing on operation and maintenance costs and the ability of the community to meet its present and future needs. In densely populated areas with space constraints, the Stormwater Management Plan should consider low impact development techniques for managing stormwater in urban areas such as green roofs, the planting of urban forests, permeable pavement, and rain gardens. In rural and suburban areas with less extensive infrastructure, Stormwater and Wastewater Management Plans should evaluate decentralized wastewater and stormwater systems that keep water local and do not adversely impact the overall water balance. When a community finds it difficult to solve all its water resource management needs within the municipal boundaries, the Water Resource Management Plans should consider regional solutions in addition to decentralized solutions.

Plans to construct wastewater infrastructure in coastal communities raise unique issues. Proponents of such projects should examine impacts on coastal wetland resource areas and the ability of these resource areas to prevent storm damage and control flooding. Such plans should also consider whether the proposed projects meets the wetland performance standards, is vulnerable to damage as a result of coastal storms, or promotes growth in hazard prone areas.

Three Levels of Planning

Because the specific topics covered in a Water Resource Management Plan and the level of detail included on any one topic necessarily reflect the unique nature and complexity of the community's individual water resource management problems, it is essential that communities take great care in the appropriate scope of work. To help with this effort, this Guide presents information on three different levels of planning: the Integrated Water Resource Management Plan, the Comprehensive Water Resource Management Plan, and the Engineering Report. This Guide also provides detailed information on the topics that are typically included in each type of plan. For information on when each level of plan is appropriate, communities should consult the matrix on page 25.

The Integrated Water Resource Management Plan

An Integrated Water Resource Management Plan is a plan that evaluates alternative means for addressing a community's current and future wastewater, drinking water, and stormwater needs and identifies the most economical and environmentally appropriate means of meeting those needs. Integrated Water Resource Management Planning is an integral component of municipal planning. Many municipalities engage in planning to determine future land use patterns, provide educational and economic opportunities for residents, ensure an adequate stock of affordable housing and in general improve the quality of life. The viability of these plans relies on a reliable source of safe drinking water and environmentally protective systems for managing wastewater and stormwater. Preparation of an Integrated Water Resource Management Plan that examines the overall ability of the water resource infrastructure to accommodate anticipated growth is an essential element of any planning effort aimed at shaping the nature and extent of future development.

Many communities also engage in planning in response to the state's environmental laws and regulations. Pursuant to the Massachusetts Clean Waters Act, MassDEP has required many communities to develop infiltration and inflow control plans or long term combined sewer overflow control plans to reduce the discharge of untreated or inadequately treated sewage into the Commonwealth's inland and coastal waters. MassDEP has establishing Total Maximum Daily Load (TMDL) for surface waters that do not meet the state water quality standards. Many communities are developing plans for coming into compliance with these TMDLs. Communities that regularly experience water shortages and repeatedly request Declarations

of Emergency may be required to find a long- term remedy for meeting its drinking water needs. Through the National Pollutant Discharge Elimination System (NPDES) permitting program, MassDEP and EPA have jointly issued general permits (the MS4 Permits) requiring communities to develop plans to remove illicit discharges from the storm drain system, to control stormwater runoff from development and redevelopment sites both during and after construction, and to improve the management of stormwater at all municipal facilities.

Communities facing all these requirements simultaneously may benefit from preparation of an Integrated Water Resource Management Plan. Preparing one document in response to a number of different regulatory requirements not only saves time and money, but also promotes cooperation and coordination among municipal departments. Indeed, the preparation of an Integrated Water Resource Management Plan requires the participation of the Water Department, Sewer Department, Board Of Health, Department of Public Works, Conservation Commission and Planning Department. With municipal departments working together, the community has the opportunity to prepare one plan that prioritizes all its water resource management needs in a manner that provides the greatest benefit to the public health and the environment. Bringing these departments together can save money. As roads are repaved, communities can inspect the water pipes, sewer pipes and storm drains under those roads, remove illicit connections to the sewers and storm drains, repair leaks. and make any other necessary repairs. Bringing departments together can also foster solutions that address multiple problems. For example, rain barrels can be distributed to reduce the discharge of stormwater to a combined sewer system and to promote water conservation. By disconnecting roof leaders and driveway drains from the sewer system and directing the runoff to rain gardens and vegetated swales, a community can reduce the frequency and duration of sanitary sewer flows and recharge the ground water. In light of these multiple benefits, this Guide is intended to encourage communities to prepare Integrated Water Resource Management Plans.

Comprehensive Water Resource Management Plans

Despite these benefits, not all cities and towns can afford to engage in Integrated Water Resource Management Planning. Given limited finances, a community may choose to focus its attention on the one component of its water resource infrastructure that presents the greatest and most immediate challenge, whether it is wastewater, drinking water, or stormwater.

For cities and towns with severe wastewater management problems, a Comprehensive Wastewater Management Plan is an excellent tool for finding a town-wide solution. A Comprehensive Wastewater Management Plan allows the community to consider decentralized alternatives to sewering including wastewater reuse, package treatment plants, and on-site septic systems. Communities evaluating alternative remedies for abating Combined Sewer Overflows should also prepare a Long-Term CSO Control Plan, a highly specialized type of Comprehensive Wastewater Management Plan.

For many communities wastewater management is not the most pressing water resource management problem. For some cities and towns in the Commonwealth, the highest priority water resource issue is the community's ability to meet current and or future water supply needs. Those communities may choose to prepare a Comprehensive Water Supply Plan to identify the most environmentally appropriate and economical means of providing residents and businesses with a reliable source of drinking water now and in the future. Communities faced with the challenge of fulfilling all the requirements of the MS4 Permit may find it helpful to prepare a Comprehensive Stormwater Management Plan. This Guide is intended to assist communities interested in preparing Comprehensive Plans aimed at resolving their most challenging water resource management problem.

Engineering Reports

There are cities and towns that have well-known, long-standing problems in a particular area of their water resource infrastructure that are crying for attention. It may be leaky sewer or water pipes, sanitary sewer overflows, constant sewer backups into basements, water storage tanks and pump stations that do not provide adequate pressure, frequent Boil Orders, or beach closures caused by stormwater runoff. Communities experiencing such problems should prepare an Engineering Report, a report that describes the remedy and details how it should be built in accordance with all environmental laws and regulations. Not a substitute for a Comprehensive Management Plan or an Integrated Water Resource Management Plan, the Engineering Report is often prepared after a Comprehensive Management Plan or an Integrated Water Resource Management Plan has identified a need for a particular infrastructure or mitigation project. For example an Engineering Report can identify particular stormwater retrofit projects that can increase recharge and mitigate the water quantity impacts of an increased water withdrawal or an expansion of the sewer system recommended in an earlier Comprehensive or Integrated Plan.

Planning and the Massachusetts Environmental Policy Act

In the Commonwealth, Comprehensive Water Resource Management Planning and Integrated Water Resource Management Planning often requires compliance with the Massachusetts Environmental Policy Act MGL c. 30 §60, §61 (MEPA) and the implementing regulations, 301 CMR 11.00. MEPA establishes thresholds, procedures, and timetables for public review of the environmental impacts of activities permitted by state agencies. The goal of the MEPA process is to elicit public comment on the direct and indirect environmental impacts of water resource management alternatives, select the alternatives that avoid or minimize environmental impacts, and identify strategies for mitigating those impacts that are unavoidable.

Projects subject to MEPA begin the environmental review process with the submittal of an Environmental Notification Form (ENF) that provides an overview of the environmental impacts of the proposed project. Major projects with a potential to create significant environmental impacts require an Environmental Impact Report (EIR), a more detailed assessment of environmental impacts and appropriate mitigation.

A Comprehensive Water Resource Management Plan or an Integrated Water Resource Management Plan should be prepared for any water resource projects requiring an EIR. Examples of such projects include the construction of ten miles or more of sewers or water mains, the construction of new major wastewater treatment plants, projects that involve significant interbasin transfers of water or wastewater and the development of large surface water or ground water drinking water supplies.

Planning and the State Revolving Fund

Communities frequently prepare a Water Resource Management Plan so that they may become eligible for financial assistance from the State Revolving Fund (SRF) for the construction of water resource infrastructure projects. SRF financial assistance is available for the preparation of Integrated Water Resource Management Plans, Comprehensive Plans and Engineering Reports. The scope of work for plans receiving such assistance must be prepared in accordance with this Guide and approved by MassDEP. If a community intends to apply for financial assistance for projects that result from planning, the plan must also be prepared in accordance with this Guide and approved by MassDEP

Completion of an approved Water Resource Management Plan does not guarantee that a community will receive SRF financial assistance for the construction of the projects recommended in the plan. Depending on the availability of SRF financial assistance and the nature and the number of the other projects seeking

financial assistance in a particular year, it is possible that a project that results from an approved plan may not receive financial assistance from the SRF. Moreover, the SRF is intended to provide financial assistance only for projects that abate existing water pollution problems or existing threats to the public health. Projects intended to extend infrastructure to undeveloped areas or to accommodate future growth, even those that result from an approved plan are not eligible for SRF financial assistance for construction. Other sources of financial assistance may be available for the construction of such projects.

Public Participation in Planning

Because it is very important to solicit participation from all stakeholders during the planning process, both MEPA and the SRF mandate public participation including public meetings and/or public hearings. Additional means of communication such as newsletters, workshops, local TV programs, and websites are recommended. Formation of a citizen advisory committee and/or a technical advisory committee may be useful for planning involving highly controversial and complex issues.

Planning Should Be Coordinated

To avoid duplication of effort and to ease review, comment and participation by the public and regulatory agencies, communities are encouraged to consolidate the SRF planning process with the MEPA environmental review process and other planning requirements. Prior to finalizing the scope of work for any Water Resource Management Plan required by or financed by MassDEP, communities should request a preplanning meeting that includes representatives from all agencies and programs that may have an interest in the planning process. This preplanning meeting gives the community an opportunity to determine how it should tailor the scope of work so that it may prepare one document that addresses the water resource management needs of the community and meets all applicable regulatory requirements. An effective preplanning meeting can help a community save both time and money, by minimizing the need for change orders during the planning process. For projects subject to the MEPA environmental review process, the preplanning meeting can also identify when the proponent should file an ENF.

The Scope of Work

In accordance with the Massachusetts Water Policy and the Commonwealth's Sustainable Development Principles, the Scope of Work for all Water Resource Management Plans should consider fix-it first projects that optimize existing infrastructure. Examples of fix -it –first projects include leak detection, repair of water supply systems, removal of infiltration and inflow from sewer systems, removal of illicit sanitary connections to storm drain systems, sewer rehabilitation projects, and stormwater retrofit projects. Such projects allow communities to optimize their existing infrastructure, eliminate, reduce or postpone capital improvement projects, save energy, avoid environmental impacts, and reap substantial cost-saving. In light of all these benefits, full consideration of fix-it first projects is an essential component of all Water Resource Management Planning.

In 2007, EOEEA issued the Greenhouse Gas Emission Policy that applies to proponents that receive financial assistance from the Commonwealth or a state agency and propose projects that require an EIR. Under this policy, the proponent must quantify the greenhouse gas emissions generated by the proposed project and identify efficiency improvements, layout of the site and building to make best use of natural light, heating and cooling and solar energy potential, incorporation of low impact development techniques including green roofs, use of clean and alternative fuels, establishment of systems for on-site reuse and

recycling of construction and demolition materials and occupant waste materials. Comprehensive and Integrated Water Resource Management Plans are often done in conjunction with projects that require an EIR. Communities preparing such plans are required to include an evaluation of alternatives for reducing greenhouse gas emissions in their scope of work. Because of the importance of energy conservation, the scope of work for all Water Resource Management Plans should include an evaluation of alternatives for reducing greenhouse gas emissions.

The Scope of Work for Comprehensive and Integrated Water Resource Management Plans

As more fully set forth below, the Scope of Work for Comprehensive and Integrated Water Resource Management Plans typically includes an assessment of the man-made and natural environment, an evaluation of the existing infrastructure and identification of future needs, an evaluation of alternative strategies for addressing those needs, and a recommended plan and schedule. An *Integrated Water Resource Management Plan* looks at these issues for all three sectors: wastewater, drinking water/water supply, and stormwater. A *Comprehensive Plan* focuses on only one of these sectors. Both types of plans require mitigation of the impacts of the recommended plan including secondary growth impacts and impacts on the water balance in the watershed or sub watershed.

Assessment of Existing and Future Conditions

Assessment of Man-Made and Natural Environment: Integrated and Comprehensive Plans begin with an accurate description of existing conditions within the planning area. A combination of narratives, data bases and maps are generally used to provide the necessary information on the natural and man-made environment including the study area boundaries/political jurisdictions, physical characteristics, demographics, land use patterns and trends, development data and environmental conditions. In most cases, the analysis includes the information described below.

Description of the Man-Made Environment: This section includes a discussion of current land use patterns and land use controls, prior planning efforts and future growth projections. Projected land use and open space patterns, regulations and policies are identified by reviewing previously developed land use and open space plans and by consulting with planning agencies, zoning commissions, and public officials. This section also identifies known environmental or public health problems.

Description of the Natural Environment: General information on climate, soils, hydrology, water bodies and wetlands, ground water flow, water table depths, surface water and ground water quality, habitats, including habitats for rare and endangered species, and unique natural resources, such as cold-water fisheries, migratory fish runs, vernal pools, Atlantic white cedar swamps, or large wetland complexes should be included. It identifies the basin in which the plan is being done and specifies whether it is under high, medium or low stress, or is unassessed or whether there is any other evidence that streams and/or stream segments are experiencing low flow. The description should consider information from the Massachusetts Geographic Information System (GIS), the Water Resource Commission Stressed Basin Report, EOEEA water asset and water balance studies, studies done by the United States Geological Survey, maps and reports developed by the Natural Resource Conservation Service, shoreline change maps prepared by the Office of Coastal Zone Management, together with wetland maps, basin assessment reports, the Integrated List of Impaired Waters, and TMDL reports prepared by MassDEP. If possible,

information on the water balance in the watershed should be provided on a sub watershed scale (equivalent to the USGS 12 digit Hydrologic Unit Classes which have about 15-65 square mile watersheds).

Description of Anticipated Growth: This section projects anticipated population and economic growth through the 20-year planning period. Data from the Massachusetts Institute for Social and Economic Research (MISER), regional planning agencies, and other sources can be used to develop economic and population projections. Any master plans or open space plans done by the community should be considered in developing growth projections.

Assessment of Existing Infrastructure and Identification of Future Needs

In keeping with the "Fix-it-First" concept, Integrated and Comprehensive Plans typically assess the existing infrastructure and assess future needs by providing the information set forth below. Integrated plans provide this information for the infrastructure in all three water resource management sectors—wastewater, drinking water and stormwater. Comprehensive Plans limit this information to one of these sectors.

Assessment of Existing Wastewater Infrastructure and Identification of Future Needs

Description of Existing On-Site Systems: This section determines the nature and extent of failing and non-complying Title 5 systems and identifies the work needed to bring these systems into compliance. This determination relies on available information on tight tanks, conventional, mounded, and innovative/ alternative systems from Board of Health Records on Title 5 variances, violations, septic system failures, sewage breakouts, septic tank pumping records, and Title 5 inspections. Survey questionnaires and information on costs of upgrades may also be used.

Because Board of Health Records may not be sufficient to assess whether a particular section of the community has conditions that are suitable for on-site systems, the scope of work should also include a breakdown of unsewered areas into units with reasonably consistent characteristics (i.e. lot size, age of development, soil types, percolation rates, depth to groundwater) to identify any sections of the community where it would be difficult to site septic systems in accordance with Title 5 of the State Sanitary Code, 310 CMR 15.000 (Title 5). To assess the importance of bringing failing and noncomplying systems into compliance, this section should consider surface water quality reports and TMDL assessments. As part of this analysis, this assessment should examine the location of failing and noncomplying systems in relation to sensitive receptors such as public water supply wells, private wells, wetlands, surface waters, bathing beaches, estuaries, shellfish growing areas, cold -water fisheries, and habitat identified in the Natural Heritage and Endangered Species Program's Living Waters Document.

Where complying septic systems are contributing to excessive concentrations of nutrients such as phosphorous in lakes and ponds or nitrogen in coastal embayments or ground water, this section should also evaluate the impacts of continued or expanded use of complying on-site systems. There should also be consideration of whether there are certain areas that, because of contamination problems or existing and/or future land uses, are not suitable locations for on-site systems. Information on any privately owned treatment plants with ground water discharge permits should also be provided.

Wastewater Treatment Plants: Information on the type, age, design, capacity and condition of unit processes, back-up power, energy efficiency, peak and average wastewater flows, present and anticipated effluent limits, and the compliance history of the existing wastewater treatment plant are described here. Procedures and equipment used to monitor the quantity and quality of plant influent and effluent are identified. Information should be provided on how the treatment plant performance is affected by dry and

wet weather flows and by wastewater characteristics and waste loads including industrial wastewater discharges.

Wastewater Collection Systems: The type of sewage system (separate or combined) should be described as well as drainage patterns. It includes the age and condition of sewers and pump stations and the existing program to meter flows. Sewer descriptions should include pipe sizes and materials. Pump station descriptions should identify sources of back-up power and energy efficiency. This section should also identify the locations of Sanitary Sewer Overflows (SSOs) Combined Sewer Overflows (CSOs), infiltration and inflow conditions, surcharges, sewer backups and hydraulic deficiencies.

This section should identify the cause of any SSOs, backups or surcharges. It should describe the amount of infiltration and inflow in various segments of the system on an annual average basis, during periods of high ground water, and during storm events, and discuss the specific problems that may be caused by excessive infiltration and inflow including the impact of infiltration and inflow on the overall water balance of the watershed or subwatershed. The analysis of infiltration and inflow should be consistent with MassDEP's Guidelines for Performing Infiltration Inflow Analyses and Sewer System Evaluation Surveys. The status of any existing and ongoing infiltration and inflow studies and removal efforts should be presented. Information sources for this section include engineering studies, maps of the storm sewer system, the wastewater collection system, interviews with officials familiar with the system, maintenance reports, treatment plant flow records, and pump station flow records. Any incidence of high per capita flows, bypassing of pumping or treatment facilities, surcharged manholes or basement flooding should be detailed. Procedures for notifying the public and appropriate state and federal agencies should be included. A discussion of the procedures including legal authority used to remove private inflow sources should also be presented. This discussion should also evaluate whether these procedures should include the redirection of roof leaders and driveway drains to low impact development techniques such as vegetated swales and rain gardens to increase stormwater recharge and improve the quality of stormwater runoff.

If the existing facilities include combined sewer overflows, any documented, related water quality violations, administrative orders, or other enforcement actions should be discussed. This section should detail the frequency and type of discharge (dry or wet weather) that occurs and include a map showing the location of the overflow. This discussion should include a description of the uses of and impacts to the receiving waters. This is especially important for receiving waters with uses such as shellfish harvesting, bathing beaches, recreational areas, or public water supply sources. This task may require water quality sampling as well as monitoring, and modeling of the flows in the combined sewer system. Communities with combined systems that result in combined sewer overflows are required to complete a Long-Term CSO Control Plan that complies with EPA and MassDEP policies for control of combined sewer overflows. Both MassDEP and EPA Region I require the use of the demonstration approach described in the EPA CSO policy and guidance. Proponents should discuss the scope of work early on in the process to ensure that it complies with these requirements.

Residuals Treatment, Handling and Disposal: Wastewater residuals include septage, holding tank waste, sludge, scum, grit, and screenings. MassDEP requires all wastewater treatment plants to have a primary and back-up method for residuals management. A wastewater treatment plant can fulfill this requirement by having its own management facilities at the site of the wastewater treatment plant or at another location and/ or by contracting with a private firm or another facility that is licensed to manage wastewater residuals. Whether a wastewater treatment plant operates its own residuals management facilities or enters into a contract with a third party, MassDEP encourages the beneficial reuse of wastewater residuals or products made with wastewater residuals. Any proposal for the beneficial reuse of wastewater residuals requires sampling and analysis, an approval of suitability, and a land application certificate from MassDEP. EPA also regulates the beneficial reuse of wastewater residuals. This section projects the volume of residuals that

will be produced by the plant through the 20- year planning period, the primary and secondary methods for residuals management including methods for dewatering, storage, disposal, and beneficial reuse, and determines whether the methods comply with MassDEP regulations, policies and guidance and any applicable EPA regulations.

Operation and Maintenance of Existing Treatment Works: This section describes staffing, procedures for predictive, preventive, corrective and emergency maintenance, capacity management policies, and the implementation of programs to address fats, oil and grease, and to ensure adequate pretreatment. Predictive and preventive maintenance includes policies for maintaining spare parts and for regular cleanings and inspections. The description of capacity management policies should detail existing legal and institutional mechanisms for controlling sewer connections and extensions to ensure that the long-term capacities of the wastewater collection, treatment and disposal systems are not exceeded as a result of unanticipated development. This section should identify any problems with privately owned sewers that discharge to the publicly owned wastewater collection system.

This section sets forth standard operating procedures for responding to emergencies such as sanitary sewer overflows, dry weather discharges from combined sewer overflow points, power interruptions, sewer main breaks, and pump station failure and looks at the impact of emergency response procedures on the operation and maintenance of the existing facilities. Emergency procedures include protocols for notifying MassDEP, EPA and other appropriate federal, state and local agencies as well as the public. Emergency procedures may also include procedures for sampling sanitary sewer overflows or dry weather discharges from sanitary sewer overflow points.
The methods used to finance the publicly owned treatment system including rates, fees for extensions and connections, general tax revenues and betterments should also be included. The description includes the per household cost of discharging wastewater to the municipal system and explain the community's budgeting practices including any use of enterprise accounts and capital improvement plans.

Identification of Future Needs: Anticipated growth characteristics through the 20-year planning period and their effects on the wastewater flows and infrastructure should be assessed. The analysis of projected flows begins with a breakdown of existing flows into domestic, industrial, institutional, commercial and septage inputs. Flows projected at the startup of the recommended facilities and at the end of the planning period should also be presented. Any anticipated industrial flows that may require special treatment or pretreatment should be identified. It may also be advisable to break down flows geographically within the planning area to determine whether a decentralized approach would be appropriate for certain sub watersheds.

If wastewater flows are expected to increase, the analysis should identify the sources of water that will contribute to this additional flow. This section should examine whether anticipated flows can be reduced through water conservation, wastewater reuse, or increased use of low impact development techniques to handle stormwater on-site. The impact on the overall water balance and the water supply infrastructure of any projected increase in wastewater flows or water withdrawals should be identified.

The analysis of projected future wastewater flows should consider the rate, duration, pollutant content and location of any overflows in the existing system during storms of different magnitude, and should determine the impact of anticipated growth on these overflows. This analysis should include an evaluation of the future contribution from the drainage areas tributary to any combined sewer system. Projected land use and open space patterns, regulations policies and plans including plans to promote increased use of environmentally sensitive site design and low impact development techniques should be considered in projecting the future contribution from each drainage area tributary to a combined sewer system.

The need for improved operation and maintenance should be evaluated. Implementation of a capacity management operation and maintenance program (CMOM) should be considered as a means of optimizing existing facilities and postponing or avoiding the need to construct additional facilities.

Assessment of Existing Water Supply Infrastructure and Identification of Future Needs

Description of Existing Sources: This includes the following information:

- a list of all groundwater and surface water sources, and their location,
- water quality,
- safe/firm yield, and authorized volumes under the Water Management Act whether registered or permitted,
- approved pumping rates for groundwater sources,
- usable storage capacity for surface water sources,
- and the condition and operating capacity of existing groundwater wells.

This section also includes a description of the Zone I and Zone II for groundwater sources and Zone A for surface water sources, the uses allowed in those areas, any potential contamination sources, the problems identified by the MassDEP's Source Water Assessment Program (SWAP) and the steps taken to implement the SWAP recommendations. An evaluation of the impact of existing sources on surface water bodies, wetland resource areas, aquifers, other private and public water supplies, and the overall water balance in the watershed and sub watershed should also be described.

This section identifies the river basin in which each source is located and whether it is classified as under high, medium or low stress or unassessed. It should also present any information indicating whether any water bodies or any segments of water bodies that may be affected by the source are impaired by low flow. This section describes whether any sources have been taken off line, and if so, describes the reasons why these sources are not in service and whether these sources can be brought back into service (fully or partially) in compliance with the Drinking Water Regulations, 310 CMR 22.00, the Water Management Act, and other applicable regulations, without creating water quality or water quantity problems.

Description of Treatment Facilities: This section describes the purpose for the facility (i.e. iron manganese removal, corrosion control, surface water treatment rule, removal of volatile organic compounds etc), technology, age, chemicals used, facilities for receiving and storing chemicals, condition, ability of the facility to provide water that meets the existing and anticipated future standards of the Drinking Water Regulations, back-up power, energy efficiency and residuals handling. The section evaluates whether the facilities meet existing guidelines and regulatory requirements.

Description of Distribution and Storage System: This section describes the distribution system, its age, condition, pipe sizes, materials, hydrants, storage tanks, ability to meet pressure requirements of the Drinking Water Regulations as well as any interconnections with other public water systems. This section determines whether any lead service lines exist within the system. This section describes the cross connection control program including the program for surveying industrial and commercial users and provisions for tracking and testing backflow prevention devices.

Description of Residuals Treatment and Disposal Practices: This section describes how backwash water and sludge are handled. This section assesses compliance with all regulatory requirements including NPDES permitting requirements and regulations governing land application for sludge.

Description of Emergency Procedures: Mechanical failures, supply source contamination, power failures, mishandling of chemicals, and drought may be the basis for Boil Orders or Declarations of Water Supply Emergency. This section evaluates the current standard operating procedures for handling these situations and determines whether they should be modified or improved. This section describes the location and nature of all emergency interconnections, the volume of water that can be supplied through each interconnection, and the standard operating procedure for exercising and activating these interconnections. This section specifies the procedure for notifying the public of Boil Orders or Emergency Declarations. This section also describes how the water supplier provides adequate fire flows in these situations. This section assesses the risk of long-term and short-term water shortages and details the water supplier's plans for protecting against this risk.

Description of Water Use Patterns: This section should describe historical water use patterns for residential, commercial, industrial and institutional users. This section also details seasonal water use and unaccounted for water. Annual Statistical Reports filed with MassDEP for the last five years should be consulted. This section describes recent conservation efforts and assesses the ability of these or additional measures to reduce demand. At a minimum, systems should plan to be in compliance with the performance standards developed by MassDEP pursuant to the Water Management Act and the Water Conservation Standards developed by the Massachusetts Water Resources Commission.

This section examines the percentage of unaccounted for water and details past efforts at leak detection and repair. It describes the age, type and condition of all meters including master meters, service meters, and meters on individual sources, the existing programs for meter calibration, meter repair and replacement, meter reading, and billing programs along with current rates.

Identification of Future Needs: This section evaluates projections of future water demand through the planning period along with the basis for those projections, assesses the ability of existing sources to meet projected future demand, and determines whether, despite meaningful water conservation, additional water sources are needed to meet future water demand. In making this determination, the sensitivity of demand to measures such as increased water conservation, wastewater reuse, higher water rates, low impact development bylaws, or other land use controls should be evaluated. EOEEA build out demand should be presented as a worst-case scenario only and should not be used for planning purposes.

This section looks at previously prepared demand projections including any projections previously approved by the Department of Conservation and Recreation (formerly the Department of Environmental Management), and if appropriate, proposes new demand projections assuming compliance with the Water Resource Commission's Conservation Standards and the MassDEP's Water Management Act Performance Standards. Projections used to apply for new or amended Water Management Act Permits must be developed by the Department of Conservation and Recreation in accordance with the methodology established by the Water Resources Commission. The Water Resources Commission must also approve the projections. If it is determined that more water is needed, the impact of this additional water on the existing wastewater system and the overall water balance should be examined.
This section determines whether additional water facilities are needed for redundancy, to ensure the continued delivery of safe drinking water in compliance with the Drinking Water Regulations and MassDEP Drinking Water Policies and Guidelines, or to ensure environmental protection. This section determines whether improvements or changes are needed in any of the following areas: the distribution system, the residuals management program, the standard operating procedures for emergencies, the water conservation program, the leak detection and repair program, the meter calibration, repair and replacement program, meter reading and billing practices, and water rates.

This section examines relevant portions of Master Plans, Growth Management Plans or Open Space Plans to identify areas and patterns of desired growth and those areas where growth should be limited to preserve and protect existing and/or potential water sources. If possible, future needs should be identified by sub-basin to enable sub-watershed water budgets to be developed and used to rank the environmental impacts of each alternative.

Assessment of Stormwater Management Program and Identification of Future Needs
Conservation Commissions are required to issue wetland permits that reflect the Stormwater Management Standards The assessment of the existing stormwater management program evaluates local implementation of the Stormwater Management Standards and determines whether any improvements are needed.

Since 2003, many municipal storm drain systems have been subject to the NPDES Phase II Stormwater Permit requirements. Many communities have applied for coverage under a general permit jointly issued by the United States Environmental Protection Agency and MassDEP (the MS4 Permit). Under the MS 4 Permit, communities are required to implement six minimum control measures aimed at reducing the pollutants discharged from the municipal storm drain system. These six minimum controls measures are:

(1) public education and outreach,
(2) public participation and involvement,
(3) illicit discharge detection and elimination,
(4) construction site runoff control,
(5) post-construction site runoff control, and
(6) pollution prevention and good housekeeping.

Communities subject to the MS 4 Permit are required to develop measurable goals for assessing their progress in implementing each of the six minimum control measures and report on their progress each year. Specific stormwater control measures and measurable goals are supposed to reflect the specific characteristics of the municipality, including population density, land use, age, soil type, topography, condition of the municipal storm drain system, and condition of the receiving waters. Priorities should be established to protect sensitive environmental receptors and to address specific pollution problems that have been previously identified or that may arise in connection with certain land uses. Communities preparing a Comprehensive Stormwater Management Plan or an Integrated Water Resource Management Plan should evaluate the community's existing program for implementing the six minimum control measures and determine whether that program addresses the water quality and quantity problems of the community and is meeting the established measurable goals.

Identification of Priority Stormwater Problems: This section collects existing information on the waters that receive stormwater discharges from the municipal storm drain system and other nonpoint sources and determines whether these waters are failing to meet the State's water quality standards, and if so, whether stormwater discharges or nonpoint sources are contributing to their impairment. This section identifies areas in the community with potential to generate stormwater with higher than average pollutant loads, such as industrial sites, auto salvage yards, auto fueling facilities, fleet storage areas, vehicle service maintenance and equipment cleaning areas, commercial parking lots with high intensity uses such as the parking lots for fast food restaurants, shopping centers and supermarkets, road salt storage and loading areas, commercial nurseries, outdoor storage and loading/unloading areas of hazardous materials, SARA 312 generators, marinas, confined disposal facilities, disposal sites, solid waste landfills and wastewater residuals landfills,. This section also identifies any critical areas that may be impacted by stormwater discharges such as outstanding resource waters, shellfish growing areas, bathing beaches, cold -water fisheries and recharge areas for public water supplies. This section indicates any water bodies that have been classified by the Water Resource Commission as being under high or medium stress or that have localized low flow or flooding problems.

Assessment of Public Education and Outreach Program: This section should determine whether the Public Education and Outreach Program is:

(a) informing the public of the major stormwater problems in the community,
(b) educating the owners and operators of the sites that have the potential to generate stormwater with higher pollutant loadings on source control measures,
(c) presenting steps the general public can take to reduce stormwater pollution through the implementation of best management practices involving water conservation, landscaping and lawn care, management of household hazardous waste, car care, boating practices, pet waste management, trash disposal, the maintenance of riparian and pond buffers, and septic system management,
(d) educating the public, businesses, and the general public on the hazards associated with illicit sanitary connections to the storm drain system, and
(e) educating contractors on proper erosion control techniques for construction sites.

Assessment of Public Participation Program: This section describes existing efforts to involve stakeholders in the implementation of measures aimed at reducing stormwater pollution. This section determines whether the municipality is complying with all applicable public notice requirements and evaluates whether the community is taking advantage of opportunities to work with existing non-governmental organizations including environmental and watershed groups, schools, civic organizations, and trade associations. As part of this evaluation, this section should consider whether it is appropriate to create a stormwater steering committee to provide continued input on the implementation and improvement of the stormwater program.

Assessment of Illicit Connection Detection and Elimination Program: At a minimum, an illicit connection detection and elimination program is required to include the following:
(a) creation of a storm drain system map showing the location of all stormwater outfalls, and names and locations of all receiving waters,
(b) development of an ordinance or other regulatory mechanism prohibiting illicit discharges into the storm drain system, creation of enforcement mechanisms, and implementation of these regulatory and enforcement mechanisms,
(c) development and implementation of a plan to detect and address illicit discharges including illegal dumping to the storm drain system, and
(d) development and implementation of a program describing the hazards associated with illegal discharges and improper disposal to public employees, businesses and the general public (This requirement can be satisfied through the public education and outreach program).

This section determines whether the existing illicit connection detection and elimination program meets the requirements set forth above. This section should also consider whether the community has or would benefit from a more detailed map of the entire storm drain system including a GIS map. This section assesses the adequacy of the community's illicit connection detection program to determine whether it is sufficient to
(a) address areas with known water quality problems,
(b) identify locations where there may be dry weather discharges from storm drains,
(c) discover evidence of illicit connections in manholes and catch basins,
(d) identify illicit connections from areas with high potential pollutant loadings, and
(e) identify illicit connections that may impact critical areas.

This section also evaluates the effectiveness of the illicit connection removal program by determining through post rehabilitation inspections and monitoring whether the program has succeeded in redirecting all the illicit connections from the storm drain system. Finally, this section examines whether the illicit

detection and removal program includes adequate measures aimed at keeping the storm drain system free of illicit connections in the future.

Assessment of Construction Site Runoff Program: A Construction Site Runoff Control Program is required to include the following: an ordinance or other regulatory mechanism that requires erosion and sediment controls, requirements for construction site operators to implement appropriate erosion control and sediment control Best Management Practices (BMPs), procedures for site plan review that incorporate consideration of water quality impacts, requirements to control wastes such as discarded building materials, concrete truck washout, chemical litter, and sanitary waste, procedures for inspection of construction sites, procedures for enforcement of site runoff control measures, and sanctions for the failure to implement appropriate control measures or other violations of the site runoff control program.

This section evaluates the community's construction site runoff control program to determine whether the program includes all the items listed above. In conducting this evaluation, this section considers whether the community's erosion control program promotes the use of the BMPs advocated in the Massachusetts Erosion and Sediment Control Guidelines prepared by the EOEEA, MassDEP, the U.S. EPA Region I and the Natural Resources Conservation Service, reprinted in May 2003. This section also examines the adequacy of the actions taken by the municipality to bring construction sites into compliance with the construction site runoff program including technical assistance, outreach, public education, inspections, and enforcement.

Since 2003, owners/operators of construction sites of one acre or more have had to apply for and obtain coverage under the NPDES Construction General Permit issued by the US EPA. This section should consider whether it is appropriate to extend all or some of the requirements of the Construction General Permit to smaller projects i.e. projects that involve 5,000 square feet or more. This section should also consider how to achieve consistency between the local construction site runoff control program, the Stormwater Management Standards applied under the Wetlands Protection Act, and the Construction General Permit so that the owners and operators of construction sites are not subject to conflicting requirements.

Assessment of Post Construction Stormwater Management Program: A Post Construction Stormwater Management Program relies on BMPs to control runoff from development and redevelopment sites after construction is complete. A Post Construction Stormwater Management Program is required to have an ordinance or other regulatory mechanism that mandates implementation of BMPs and ensures their long-term operation and maintenance.
This section evaluates the existing Post-Construction Stormwater Management Program and determines whether it reflects specific water quality and water quantity problems of the community and existing soil conditions. In conducting this evaluation, this section should consider the Stormwater Management Standards, the Massachusetts Stormwater Handbook, and the Low Impact Development Techniques included in the Smart Growth Toolkit developed by the EOEEA

This section should evaluate the long -term operation and maintenance of BMPs by private parties and by the municipality. As part of this evaluation, this section should include an inventory of structural runoff controls and a map showing their location. This section should evaluate the condition of these BMPs and current operation and maintenance practices and identify any deficiencies that should be addressed.

Assessment of Good Housekeeping/Pollution Prevention Practices for Municipal Facilities: A Good Housekeeping/Pollution Prevention Program is required to provide for the operation and maintenance of the BMPs that the municipality has the responsibility to maintain, including the stormwater controls for streets, roads, highways, municipal parking lots, and DPW facilities. A Good Housing/ Pollution Prevention Program is required to include a training program, maintenance schedules and inspection

procedures for all structural and non-structural BMPs, source control and pollution prevention measures, and measures for the proper disposal of waste removed from the storm drain system including street sweepings and catch basin cleanings.

The existing program should be evaluated by looking at municipal practices and policies governing:

- street sweeping,
- snow removal and deicing of roads,
- automobile and fleet maintenance,
- catch basin maintenance and cleaning,
- storm drain cleaning,
- landscaping and lawn care,
- tree planting and maintenance,
- pet waste collection,
- illegal dumping control,
- management of oil and other hazardous materials including pesticides and fertilizers,
- spill prevention and response, and
- residuals disposal including residuals from street sweeping and catch basin cleaning.

Identification of Future Needs: This section looks at the nature, extent, location, and types of development and redevelopment projects that are anticipated to occur over the twenty year period and the impact that development is likely to have on the quality and quantity of peak and total runoff, and the overall water balance in the basin. Projections estimating the increase in impervious area anticipated to occur over the planning period should be prepared. This section should determine whether the stormwater program should be modified to impose additional stormwater management requirements for future development and redevelopment. This section should also identify locations where stormwater BMPs need to be repaired or replaced or where new stormwater practices should be installed.

Development and Screening of Alternatives

Once the relevant needs are identified, a detailed assessment of alternative strategies for meeting those needs is required. At a minimum, this assessment should include an evaluation of the no-action alternative and the Fix-it-First alternative. The Fix-it-First alternative would include continued use of existing facilities while optimizing performance by repairing and/or upgrading the existing facilities, improving operation and maintenance, increasing water conservation, or implementing best management practices. If, as a result of this evaluation, it is determined that some new water resource infrastructure is needed, innovative approaches such as wastewater reuse, low impact development techniques, and decentralized systems should be considered, and strategies for mitigating the adverse impacts of the new infrastructure should be identified. Where appropriate, regional solutions that eliminate the need for many separate duplicative small facilities and reduce operation and maintenance costs should be evaluated. The screening of alternatives should include the factors described below.

Environmental Benefits and Impacts of Selected Alternatives: Once the full range of possible alternative remedies is identified, the most environmentally appropriate and cost-effective solutions should be fully evaluated. A thorough analysis of each alternative selected for further evaluation includes an analysis of all the environmental impacts and benefits of each alternative including direct and indirect benefits and impacts, construction and operational impacts, secondary growth impacts and impacts on and benefits to the natural water cycle, water quality and public health. Particular attention should be paid to impacts on stream flow and sub-watershed water budgets in high and medium stressed basins or any streams or stream segments that are evidencing low flow problems. Opportunities to conserve energy and water should be identified and evaluated. The ability to meet applicable regulatory requirements should be considered. The consistency of each alternative with the Commonwealth's Sustainable Development Principles, the Water Policy, the Water Conservation Standards, and the Greenhouse Gas Reduction Policy should be evaluated.

Impacts on Sensitive Environmental Receptors: Impacts on sensitive environmental receptors should be thoroughly evaluated including:

- impacts on the zones of contribution of existing and potential drinking water sources, sole source aquifers, and outstanding resource waters;
- impacts on beaches and other recreational areas;
- impacts on rare and endangered species habitat;
- impacts on surface water bodies such as lakes, ponds, streams especially headwater streams,
- impacts on wetland resources, floodplains, and vernal pools;
- impacts to agricultural land and shellfish beds; and
- impacts to areas of critical environmental concern.

In assessing the environmental impacts on sensitive receptors, reliability should be considered.

Cost-effectiveness Evaluation: A cost effectiveness evaluation should be performed on all alternatives advanced for a detailed evaluation so that the most cost-effective alternatives can be identified. This analysis should be done in accordance with accepted engineering and economic principles and include a calculation of the direct monetary costs of each alternative using present worth or equivalent annual cost as a basis. This analysis should include consideration of all project costs over the 20-year planning period. The cost-effectiveness of each alternative selected for further study should be evaluated by describing all costs associated with construction and operation and maintenance including:

- Capital Costs- costs for design and construction of any new water resource infrastructure and any costs associated with lease, easement or right of way acquisition and permitting. The capital cost estimate should utilize and reference the appropriate construction cost index from Engineering News Record.
- Operation and Maintenance Costs- costs for labor, utilities, materials, contractual services, expenses, replacement of equipment and parts to ensure effective and dependable operation during the planning period. The operation and maintenance costs should be adjusted to reflect any revenues received from the sale or distribution of any facility products or by-products such as residuals or the sale of water to satellite systems.
- Salvage Value- the value of any new facilities at the end of the planning period. This value is normally based on a straight-line depreciation from the initial cost at the time of analysis to the end of the planning period.

The capital and operation and maintenance costs of each alternative should be identified and the average cost per household and the effect on rates should be examined.

The cost-effectiveness evaluation should consider phasing projects that provide additional capacity. In conducting this evaluation, the following factors should be considered; the relative cost of providing excess capacity initially compared with the present worth of deferred costs for providing capacity when needed and the uncertainties involved in projecting long-term needs given the possibility of technical advances or other changes that may eliminate or reduce the need for additional capacity. Modular facilities that can be expanded later should be considered in areas where high growth is projected or where existing facilities are to remain in operation initially but phased out later.

Institutional Arrangements: The ability to implement each alternative including the ability to obtain the required permits and enter into any necessary institutional arrangements such as intermunicipal agreements or purchase and sale agreements should be evaluated. The analysis of institutional arrangements should include a comparison of existing arrangements with the arrangements needed to implement each option.

Any potential legal or political obstacle, physical constraint, or permitting issue should be identified. For regional alternatives, the ability to obtain agreement among the necessary state, regional, and local governmental units or management agencies must be examined carefully. If necessary institutions do not exist, the ability to create new entities to carry out the plan must be examined assuming that each local governmental unit is willing and able to contribute its share of the capital and operational costs of the project.

Special Considerations for Evaluating Wastewater Alternatives

Baseline Conditions: The level of treatment with optimum performance of the existing facilities should serve as the baseline against which other alternatives are compared. For communities with centralized facilities, this alternative includes optimization of the operation and maintenance of the existing wastewater treatment, collection and disposal facilities. For communities where on-site systems are used, this baseline assumes optimizing the use of septic systems by improving maintenance, repair, upgrade, management and inspection of systems. The option of optimizing the use of on-site systems should receive special consideration in areas where it is important to minimize the loss of groundwater recharge such as basins under high or medium stress or other streams or stream segments evidencing low flow problems.

Wastewater Alternatives: Wastewater alternatives that may be evaluated include centralized treatment and disposal, centralized treatment and distributed disposal including the use of treated wastewater for water balance improvements, decentralized wastewater treatment and disposal, on-site systems including: the use of innovative/alternative technologies to control or eliminate pollutants before discharge, shared Title 5 systems, small scale plants, and alternative collection systems such as pressure sewers, vacuum sewers, STEP systems or a combination of these alternatives. In evaluating new or expanded wastewater collection systems, the impact of these systems on ground water recharge should be analyzed and methods to mitigate or reduce this impact should be examined such as wastewater reuse. Grey water and wastewater that has received advanced treatment may be used for a variety of applications including spray irrigation on golf courses, landscape irrigation, toilet water flushing, and indirect groundwater recharge.

Meeting Regulatory Standards and Water Quality Goals: Wastewater disposal following treatment is accomplished by discharging effluent to the groundwater, to a surface water body, or a combination of the two. Surface water discharges require an NPDES Permit jointly issued by the U.S. EPA and MassDEP. Discharges to the ground above 10,000 gallons per day require a Ground Water Discharge Permit from MassDEP. Either type of permit will contain effluent limits. In evaluating wastewater alternatives, the ability to meet current and anticipated future permit requirements should be analyzed. The effect of the proposed facilities on the ability to meet water quality goals established in watershed basin reports or TMDL assessments should be evaluated.

Facilities Requiring a Ground Water Discharge Permit: The alternative of disposing treated wastewater to the ground water requires a hydrogeological evaluation to determine the feasibility and capacity of the proposed disposal site(s). A scope of work should be developed and submitted to MassDEP for review and approval prior to initiating the fieldwork for this evaluation. Appropriate modeling of ground water mounding and disposal capacities is required. MassDEP should be consulted on the particular model(s) used.

Evaluation of Wastewater Collection System Alternatives: Alternative arrangements of interceptors and trunk lines should be compared to determine the most cost-effective and environmentally appropriate configuration and to evaluate anticipated changes in land use and growth. Interceptor sizes should be based on projected flows and a cost-effectiveness analysis of pipe sizes. This analysis should reflect the age, condition, and the expected useful life of the pipe and the costs related to future pipe installations. The cost effectiveness evaluation for collector sewers should compare conventional gravity sewers with alternative

systems such as pressure sewers, vacuum sewers, and STEP sewers. Preliminary routing should be done on a map that delineates the areas proposed for sewering over the life of the project. Wetland impacts including temporary construction impacts should be identified.

Evaluation of Residuals Management Alternatives: Since all wastewater treatment facilities generate residuals such as grit, grease, scum, screenings, and sludge, the alternatives analysis should examine alternative means of managing these residuals. Alternative technologies that provide for the recycling of wastewater constituents or recover energy should be considered. Such technologies include the drying and composting of sludge prior to land application, the land application of effluent and sludge, self sustaining incineration, methane recovery and the co-disposal of solid waste and sludge.

Evaluation of Regional Solutions: Where a community is finding it difficult to solve its wastewater problems within its municipal boundaries, regional solutions including interconnections of facilities, construction of one or more large facilities and joint management of facilities should be considered. Because regional alternatives may promote sprawl, and reduce ground water recharge, methods of mitigating these impacts should be described. Physical and institutional constraints arising out of the implementation of a regional alternative such as potential limits on the future expansion of capacity, the ability of the receiving water to accept additional pollutants, or the need for intermunicipal agreements should be discussed.

Special Considerations for Evaluating the Need for Additional Drinking Water Sources and Facilities

Evaluation of the Need for Additional Withdrawal Volumes: In high and medium stressed basins or other areas showing evidence of low flow problems, before new sources or increased withdrawals are considered, water conservation must be fully evaluated as a means of meeting additional demand. At a minimum, water conservation should be used to bring water use patterns into compliance with the performance standards established by MassDEP under the Water Management Act and the Water Resource Commission's Water Conservation Standards. If, despite adequate water conservation, additional sources or increased withdrawals are needed to meet anticipated future growth, strategies to mitigate the impact of this added withdrawal on stream flow must be explored. Mitigation strategies may include increased stormwater recharge from existing development, the return of wastewater to the basin, wastewater reuse, infiltration and inflow removal from the sewer system, and the imposition of restrictions on non-essential outside water use by owners of private wells not permitted by MassDEP under the Water Management Act.

Evaluation of Source Management: In high and medium stressed basins or other areas showing evidence of low flow problems or adverse impacts to a water resource such as a wetland, alternative means of operating existing and proposed sources to minimize the impacts on already stressed water resources should be explored. One such alternative operational plan may allow the maximum use of riverside groundwater sources in the winter and prohibit or limit the use of those sources in the summer, when stream flow is typically low. Such an operational plan may also provide for the maximum use of surface water reservoirs when stream flow is below acceptable levels.

Evaluation of Need for Additional Sources Without Increasing the Authorized Withdrawal:
In some cases, new sources may be desirable even though they are not needed to meet anticipated future growth. In those cases, the development of new sources should be evaluated as a means of providing redundancy and operational flexibility, of enhancing the ability to operate and maintain existing sources, or to replace existing sources that have been degraded by overuse or contamination. If new sources are needed, the ability to meet the requirements of the new source approval process should be examined including the requirement of ownership and control of the Zone I.

Evaluation of Sources Outside the Basin: In high and medium stressed basins or other areas experiencing low flow problems, where after meeting the water conservation standards established by the Water Resources Commission and MassDEP, additional water is needed to meet demand, a variety of alternatives should be considered. Where necessary or appropriate, import of water from outside the basin and the use of desalination plants may be considered. Any proposal to import water from another basin must comply with the standards and regulations established by the Water Resource Commission under the Interbasin Transfer Act. At a minimum, the proponent must demonstrate that it has maximized/optimized local sources and conservation and show that there will be no adverse impacts to the donor basin.

Evaluation of Proposals to Create New Public Water System: If a community is considering the establishment of a new public water supply, this section should include an evaluation of the technical, financial and managerial capacity of the proposed system. At a minimum, this evaluation should describe the legal authority establishing the public water system including:

- legislation, ordinances and bylaws;
- the organizational structure including staffing plan, staff qualifications, duties and responsibilities and personnel policies;
- consumer policies including billing, service shut-off and restoration policies, and policies for connections and extensions of water service;
- capital improvement plan;
- financial plan identifying all revenue sources and expenses including rates, fees, accounts receivable and payable, enterprise accounts, Chapter 70 annual assessments, state revolving fund loans, and bonds, etc.

Special Considerations for Stormwater

Additional Actions to Control Stormwater: In high and medium stressed basins, the NPDES Phase II General Stormwater Permits require the permittees to apply the recharge standards of the Stormwater Management Standards outside of wetlands jurisdiction. In addition, many communities inside and outside of Massachusetts have implemented stormwater management programs that go beyond the requirements of the NPDES Phase II General Stormwater Permit and the Stormwater Management Standards. These programs include zoning ordinances and bylaws that reflect low impact development principles, design requirements and stormwater management bylaws. Where there is information in basin assessment reports, or the TMDLs prepared by MassDEP, the Stressed Basin Report developed by the Water Resource Commission or other studies that there are significant water quality problems caused at least in part by stormwater or a need to increase stormwater recharge, the stormwater analysis should include a review of the actions taken by other comparable communities to determine whether similar programs should be implemented locally.

Comparison and Ranking of Alternatives and Development of Recommended Plan.

The alternatives selected for further evaluation in a Comprehensive or Integrated Water Resource Management Plan should be compared and ranked based on the analysis of the environmental impacts and benefits as well as the economic costs of implementing the plan. Where possible, the ranking should be expressed in quantitative terms. If that is not possible, the ranking should be presented by narrative description. However presented, the ranking process should result in a recommended plan that sets forth the most environmentally beneficial and cost effective means of addressing the identified needs.

Public Participation: It is important that public meetings of stakeholders be held during the comparison and ranking process so that the final ranking of alternatives and the resulting recommended plan reflect the priorities of the community and the segments of the population most affected by the plan. In comparing

alternatives, all direct and indirect environmental impacts and benefits should be weighted to arrive at a ranking that reflects a value judgment on the net overall impact of each alternative. The ability of each alternative to meet applicable regulatory requirements and/or design reliability criteria should be considered during the ranking process. Other factors should be considered such as the ability to go beyond regulatory requirements, flexibility, ease of use, energy and water efficiency, and public acceptance. Alternatives with a high potential for violating an environmental or land use statute, regulation or policy or that conflict with the Commonwealth's Sustainable Development Principles should receive a low ranking.

Discussion of the Recommended Plan: A discussion of the environmental, public health, and socioeconomic benefits and impacts of the recommended plan should be presented in detail.
Mitigation of Impacts of the Recommended Plan: The impacts of the recommended plan on economic development, land use and the water balance in the watershed should be identified. Measures necessary to mitigate adverse impacts including secondary growth impacts should be described. For comprehensive plans that focus on the needs of only one sector of the community's water resource infrastructure, the mitigation should address any impacts on the other two sectors. The proposed mitigation should be sufficient to ensure that the recommended plan is consistent with the Commonwealth's Sustainable Development Principles. A public hearing should be held on the recommended plan and its environmental benefits and impacts.

Discussion of Necessary Institutional Arrangements: The discussion of the recommended plan should include a description of any institutional arrangements required for implementing the recommended plan including intermunicipal agreements, the establishment of districts, the need for special legislation or local regulatory action. Any legal or institutional mechanisms needed to ensure proper operation and maintenance of the facilities proposed in the plan throughout the planning period should be presented.

Discussion of Preliminary Design Plans and Schedule for Implementing the Recommended Plan: The discussion of the recommended plan should also include preliminary engineering designs for the proposed facilities and an implementation schedule. A description of the site shall be included and methods to minimize local impacts such as odors, aesthetic problems and wetland impacts should be described. The schedule should include dates for the design and construction of proposed facilities. Projects essential to the protection of the public health and the environment and to achieve compliance with existing environmental regulations should be scheduled first. Critical path items necessary to facilitate reasonable progress in initiating design, construction and operation of proposed facilities should be identified.

Discussion of Financial Arrangements for Implementing the Recommended Plan. The financial requirements necessary for implementation of the recommendations of the Comprehensive or Integrated Water Resource Management Plan should be presented including capital and operation and maintenance costs, rate impacts as well as the average costs per household. The method for apportioning capital and operation and maintenance costs among different classes of users— residential, commercial, industrial, and institutional—should be presented. Where appropriate, the use of fees and rates should be described. Creation of new financial arrangements or funding mechanisms such as enterprise funds, stormwater utilities, impact fees should be considered. The method of financing the recommended plan including the availability of any federal, state or private financial assistance should be presented. MassDEP encourages all communities or districts to apply for financial assistance through the State Revolving Fund for development and implementation of the projects recommended in Comprehensive and Integrated Plans.

The Engineering Report

Instead of a Comprehensive or Integrated Water Resource Management Plan, communities with previously documented wastewater, drinking water or stormwater problems can fulfill the planning requirements of the SRF with an Engineering Report. An Engineering Report may be prepared for a fix-it-first project

intended to optimize existing infrastructure, a remedial project intended to address long-standing environmental or public health problems, or a mitigation project intended to eliminate or reduce known environmental impacts. A complete list of projects for which an Engineering Report may be prepared is presented in the matrix set forth in Appendix a.

The Wastewater Engineering Report

Formally known as the Project Evaluation Report, the Wastewater Engineering Report is suitable for infiltration and inflow removal projects and projects to upgrade existing wastewater treatment plants or pump stations or to rehabilitate the existing sewer system.

The Water Supply Engineering Report.

Water supply projects may also be the subject of an Engineering Report. If there is a demonstrated need for a water supply project that will abate an existing public health threat, an Engineering Report is sufficient to satisfy the planning requirements of the SRF. An Engineering Report is appropriate for the construction of water supply facilities to bring the public water system into compliance with new Drinking Water Regulations, to implement the recommendations made by MassDEP in Sanitary Surveys or SWAP Reports or for fix-it-first projects that optimize existing infrastructure. Examples of water supply projects that are suitable subjects of an Engineering Report include the rehabilitation of existing water mains, leak detection and repair, lead service replacement and repair, construction of new or upgraded pump stations and/or water treatment plants, the addition of treatment to existing sources, the construction of additional sources to provide redundancy while reducing the impact on sensitive receptors, the construction of satellite or replacement wells, minor expansions (less than 10 miles of water mains) of the public water system, and the construction of additional facilities for residuals management.

Beginning with the 2008 fiscal year, a community may obtain SRF financial assistance for the preparation of a Water Supply Engineering Report. If a community receives SRF financial assistance, the Water Supply Engineering Report must be prepared in accordance with this Guide and a scope of work approved by MassDEP. Some communities may not apply for and/or obtain SRF financial assistance for an Engineering Report but still seek SRF financial for the construction of a project to improve the public water system. Such communities may fulfill the SRF planning requirements and become eligible for financial assistance for the construction of the proposed water supply project by satisfying all applicable environmental permitting requirements. In that event, no additional plan or report is required.

The Stormwater Engineering Report

Stormwater projects may also be the subject of an Engineering Report. A Stormwater Engineering Report is suitable for projects aimed at addressing well-documented stormwater management problems. For example, a Stormwater Engineering Report may be prepared, if there is an approved TMDL that documents that stormwater discharges are contributing to the impairment of a particular water body. In that case, the Engineering Report can be used to identify specific stormwater projects that can reduce the contribution of pollutants from stormwater runoff by reducing the volume of stormwater runoff and/or by adequately treating stormwater discharges. Similarly, if there is evidence that a particular water body is experiencing low flow, a Stormwater Engineering Report can be used to identify specific stormwater retrofit projects that will increase the volume of stormwater recharge.

Beginning in fiscal year 2008, communities can obtain SRF financial assistance for completing a Stormwater Engineering Report. Communities receiving such financial assistance must prepare an Engineering Report. Such communities may satisfy the SRF planning requirements and become eligible for financial assistance for the construction of the proposed stormwater retrofit project simply by satisfying

all applicable environmental requirements. In that event, no additional plan or report is required by the SRF program.

The Scope of Work for the Engineering Report

The Scope of Work for the Engineering Report should provide for a description of the following:

Proposed project,
An analysis of the cost-effectiveness of the project and the other alternatives considered,
The relevant design parameters of the project,
The estimated capital construction and operation and maintenance costs,
The method of financing,
The cost impacts on system users, system non-users, and local government, and
The institutional, financial, legal, and management arrangements needed to implement the project.

The Scope of Work for the Engineering Report shall require the proponent to explain how the project will be built and operated in accordance with all applicable environmental laws and regulations including without limitation the Wetlands protection Act, the Interbasin Transfer Act, Chapter 91, the Hazardous Waste Management Act, and the Clean Air Act. Sufficient information on environmental impacts must be included to demonstrate that the project can obtain all required permits and approvals. For example, an Engineering Report for a sewer rehabilitation project that involves some work in wetland resource areas and thus is a limited project under the Wetlands Protection Act Regulations must document that the project as proposed will avoid, minimize and mitigate impacts to wetland resource areas. If the project is proposed for a coastal wetland resource area vulnerable to coastal erosion and storm damage, the Engineering Report shall demonstrate that the project meets the wetland performance standards and is designed to survive hurricanes and northeasters. All Engineering Reports shall consider whether there are ways to reduce the capital and/or operation and maintenance costs of the project implementing strategies that optimize the existing and proposed infrastructure, increase energy efficiency and keep water local.

The Scope of Work for the Wastewater Engineering Report.

Ordinarily a Wastewater Engineering Report will have to consider the impacts of the project on wastewater flows and loads and the ability of the project to meet the requirements of the Clean Waters Act and the regulations promulgated thereunder. The Wastewater Engineering Report shall also demonstrate that the proposed project will not cause or contribute to a violation of water quality standards. If the proposed project will increase the volume of residuals produced by a wastewater treatment plant, the Engineering Report shall describe how these additional residuals will be managed in accordance with all applicable environmental laws and regulations. The Wastewater Engineering Report shall also consider whether there are opportunities to reduce the economic and environmental
costs of the project by implementing strategies that optimize the existing and proposed infrastructure and/or keep water local such as increased water conservation, incorporation of wastewater reuse, and infiltration and inflow removal.

The Scope of Work for the Water Supply Engineering Report

The Water Supply Engineering Report shall document that the proposed facilities meet all applicable requirements of the Drinking Water Regulations and the Drinking Water Program's Guidelines and Policies. If an Engineering Report is prepared for a project that involves the development of new sources regulated under the Water Management Act, the Engineering Report shall document that the proposed source is permittable under the Act. The Water Supply Engineering Report shall also consider whether

there are ways to reduce the environmental and economic costs of the proposed project and keep water local through increased water conservation, leak detection and wastewater reuse.

The Scope of Work for the Stormwater Engineering Report

The Stormwater Engineering Report shall document that all stormwater best management practices are designed in accordance with the Stormwater Management Standards and the Massachusetts Stormwater Handbook. The Stormwater Engineering Report shall consider whether there are ways to reduce the economic and environmental costs of the project by increased use of environmentally sensitive site design and low impact development techniques.