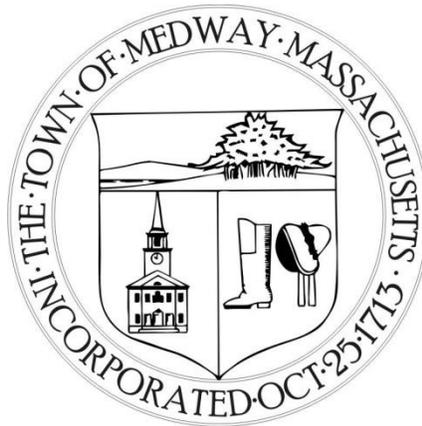


**TOWN OF MEDWAY  
DEPARTMENT OF PUBLIC SERVICES  
INTEGRATED WATER RESOURCES  
MANAGEMENT PLAN  
MEDWAY, MASSACHUSETTS  
KLEINFELDER PROJECT #20110090.003A**

**DECEMBER 2018  
Updated FEBRUARY 2019**



**DRAFT**

**Copyright 2018 Kleinfelder  
All Rights Reserved**

**ONLY THE CLIENT OR ITS DESIGNATED REPRESENTATIVES MAY USE THIS DOCUMENT AND  
ONLY FOR THE SPECIFIC PROJECT FOR WHICH THIS REPORT WAS PREPARED.**

A Report Prepared for:

Mr. David D'Amico  
Director  
Department of Public Services  
155 Village Street  
Medway MA 02053

**TOWN OF MEDWAY  
DEPARTMENT OF PUBLIC SERVICES  
DRAFT INTEGRATED WATER RESOURCES MANAGEMENT PLAN  
MEDWAY, MASSACHUSETTS**

Prepared by:

---

Laura A. Nolan, PE  
Project Manager

Reviewed by:

---

Kirsten Ryan, PG  
Principal Professional

**KLEINFELDER**  
One Beacon Street, Suite 8100  
Boston, MA 02108  
Phone: 617.497.7800  
Fax: 617.498.4630

Kleinfelder Project No 20110900.003A

## TABLE OF CONTENTS

---

<b>EXECUTIVE SUMMARY .....</b>	<b>XI</b>
<b>1. INTRODUCTION.....</b>	<b>1</b>
1.1 ORGANIZATION OF THE REPORT.....	2
1.2 PROGRAM BACKGROUND AND DEVELOPMENT.....	3
1.2.1 <i>Regulatory Considerations</i> .....	4
1.2.2 <i>Past Reports and Studies</i> .....	5
1.3 PROGRAM GOALS AND IMPLEMENTATION STRATEGIES .....	6
<b>2. PUBLIC PARTICIPATION .....</b>	<b>8</b>
2.1 PUBLIC PARTICIPATION PLAN AND EFFORTS .....	8
2.2 COMMUNICATION PLAN.....	8
2.3 STAKEHOLDER AND PARTNER OUTREACH.....	10
2.4 PUBLIC PARTICIPATION.....	11
2.5 PUBLIC INPUT AND CONCLUSIONS .....	12
<b>3. BUILT AND NATURAL ENVIRONMENT.....</b>	<b>13</b>
3.1 BUILT ENVIRONMENT.....	13
3.1.1 <i>Land Use and Zoning</i> .....	13
3.1.2 <i>Buildout Analysis</i> .....	17
3.1.3 <i>Population</i> .....	18
3.1.3.1 <i>Population Growth Projections</i> .....	18
3.2 NATURAL ENVIRONMENT .....	20
3.2.1 <i>Climate</i> .....	20
3.2.2 <i>Geology and Hydrogeology</i> .....	20
3.2.3 <i>Soils</i> .....	21
3.2.4 <i>Topography and Depth to Groundwater</i> .....	23
3.2.5 <i>Water Resources</i> .....	23
3.2.5.1 <i>Flood Plains</i> .....	23
3.2.5.2 <i>Wetlands</i> .....	25
3.2.5.3 <i>Water Supply Protection</i> .....	25

3.2.5.4	Dams .....	27
3.2.5.5	Surface Water Quality and Impairments.....	27
3.2.6	<i>Wildlife Habitat and Endangered Species</i> .....	29
3.2.7	<i>Hazardous Waste Sites</i> .....	32
<b>4.</b>	<b>EXISTING WASTEWATER SYSTEM .....</b>	<b>33</b>
4.1	WASTEWATER COLLECTION SYSTEM.....	33
4.1.1	<i>Past Studies</i> .....	35
4.3	SYSTEM PERFORMANCE .....	37
4.3.1	<i>Existing Flows</i> .....	37
4.3.2	<i>Hydraulic Capacity</i> .....	39
4.3.3	<i>Infiltration and Inflow (I/I)</i> .....	40
4.4	WASTEWATER SYSTEM OPERATIONS AND MAINTENANCE .....	43
4.4.1	<i>Wastewater Collection System Improvements</i> .....	43
4.4.2	<i>Rules and Regulations</i> .....	44
4.4.3	<i>Rates</i> .....	44
4.5	ON-SITE WASTEWATER MANAGEMENT SYSTEMS .....	44
4.5.1	<i>Site Suitability</i> .....	45
4.5.2	<i>Regulatory</i> .....	45
4.5.3	<i>Operations and Maintenance</i> .....	46
<b>5.</b>	<b>EXISTING DOMESTIC WATER SYSTEM .....</b>	<b>47</b>
5.1	PUBLIC WATER SUPPLY.....	47
5.1.1	<i>Water Withdrawal Limits</i> .....	49
5.1.2	<i>Water Supply Treatment and Limitations</i> .....	50
5.1.3	<i>Private Water Supply</i> .....	51
5.1.4	<i>Intermunicipal Water System Connections</i> .....	52
5.2	WATER DISTRIBUTION SYSTEM .....	52
5.2.1	<i>Water Distribution Storage</i> .....	53
5.2.2	<i>Past Studies</i> .....	53
5.3	WATER CONSUMPTION .....	54
5.3.1	<i>Residential</i> .....	56
5.3.2	<i>Commercial/Business</i> .....	57

5.3.3	<i>Residential Institutional</i> .....	57
5.3.4	<i>Agricultural/Industrial</i> .....	58
5.3.5	<i>Municipal</i> .....	58
5.3.6	<i>Unaccounted-for Water</i> .....	59
5.3.7	<i>Average Daily Demand</i> .....	61
5.3.8	<i>Maximum Daily Demand</i> .....	61
5.3.9	<i>Peak Hour Demand</i> .....	62
5.4	<b>WATER SYSTEM OPERATIONS AND MAINTENANCE</b> .....	63
5.4.1	<i>Bylaws</i> .....	64
5.4.2	<i>Water Conservation</i> .....	64
5.4.3	<i>Water Rates</i> .....	65
<b>6.</b>	<b>EXISTING STORMWATER SYSTEM</b> .....	<b>66</b>
6.1	<b>SURFACE WATERS</b> .....	66
6.2	<b>MUNICIPAL STORMWATER INFRASTRUCTURE</b> .....	67
6.3	<b>SYSTEM PERFORMANCE</b> .....	68
6.4	<b>REGULATORY</b> .....	70
6.4.1	<i>NPDES MS4 Permit</i> .....	70
6.4.2	<i>Bylaws</i> .....	72
6.5	<b>OPERATIONS AND MAINTENANCE</b> .....	73
6.6	<b>FUNDING</b> .....	74
<b>7.</b>	<b>NEEDS ASSESSMENT</b> .....	<b>75</b>
7.1	<b>WASTEWATER SYSTEM NEEDS ASSESSMENT</b> .....	75
7.1.1	<i>Sewered Area Needs</i> .....	75
7.1.1.1	Flow Metering .....	75
7.1.1.2	Projected Flows .....	76
7.1.1.3	CRPCD Capacity .....	76
7.1.1.4	Infiltration and Inflow .....	79
7.1.1.5	Sewer Operations .....	79
7.1.2	<i>Unsewered Area Needs</i> .....	79
7.1.2.1	Record Keeping .....	80

7.1.2.2	Public Education .....	80
7.1.2.3	Targeted Sewer Extensions .....	82
7.1.3	<i>Summary of Wastewater Needs</i> .....	82
7.2	DOMESTIC WATER SYSTEM NEEDS .....	83
7.2.1	<i>Existing Limits on Water Supply</i> .....	83
7.2.2	<i>Supply Needs for Current and Future Demands</i> .....	84
7.2.2.1	Redundancy .....	90
7.2.2.2	Resiliency .....	90
7.2.2.3	Increasing System Production Capacity .....	91
7.2.2.4	Managing Demand from Future Development .....	91
7.2.3	<i>Increasing WMA Authorized Withdrawal Volume</i> .....	92
7.2.4	<i>Reducing UAW and Promoting Conservation</i> .....	92
7.2.5	<i>Improving Documentation Procedures</i> .....	93
7.2.6	<i>Improvements to Distribution System Infrastructure</i> .....	95
7.2.7	<i>Reclaimed Water Reuse Potential</i> .....	95
7.2.8	<i>Summary of Domestic Water Needs</i> .....	96
7.3	STORMWATER SYSTEM NEEDS ASSESSMENT .....	98
7.3.1	<i>Water Quality Needs</i> .....	98
7.3.2	<i>MS4 Program Permit Compliance Needs</i> .....	99
7.3.2.1	Stormwater System Mapping .....	101
7.3.3	<i>Drainage (Hydraulic) Improvement Needs</i> .....	102
7.3.4	<i>Summary of Stormwater Needs</i> .....	104
<b>8.</b>	<b>IDENTIFICATION AND SCREENING OF ALTERNATIVES .....</b>	<b>106</b>
8.1	SYSTEM INTERCONNECTIONS.....	106
8.2	ALTERNATIVES.....	108
8.3	INTEGRATED MODELING OF ALTERNATIVES.....	110
8.3.1	<i>Overview of STELLA and its Application in Medway</i> .....	111
8.3.2	<i>Inputs</i> .....	111
8.3.3	<i>Validation</i> .....	114
8.3.4	<i>Evaluating Individual Alternatives</i> .....	116
8.4	EVALUATING SCENARIOS .....	118

8.5	RESULTS .....	120
<b>9.</b>	<b>INTEGRATED WATER RESOURCES MANAGEMENT PLAN.....</b>	<b>122</b>
9.1	OVERVIEW .....	122
9.2	INTEGRATED PLAN .....	122
9.2.1	<i>Overall Recommendations.....</i>	<i>123</i>
9.2.2	<i>Wastewater System Recommendations.....</i>	<i>124</i>
9.2.3	<i>Drinking Water System Recommendations.....</i>	<i>125</i>
9.2.4	<i>Stormwater System Recommendations .....</i>	<i>129</i>
9.3	ASSESSMENT OF IWRMP IMPACTS AND BENEFITS .....	131
9.3.1	<i>Environmental Impacts and MEPA Thresholds .....</i>	<i>131</i>
9.3.2	<i>Benefits of the Integrated Plan.....</i>	<i>136</i>
9.4	IMPLEMENTATION PLAN .....	137
9.5	FINANCIAL CONSTRAINTS.....	141
	<b>REFERENCES .....</b>	<b>142</b>

**LIST OF TABLES**

TABLE 2-1:	COMMUNICATION PLAN .....	9
TABLE 2-2:	SUMMARY OF CITIZENS ADVISORY TASK FORCE EVENTS .....	10
TABLE 3-1:	ASSESSOR’S OFFICE LAND USE CLASSIFICATION .....	14
TABLE 3-2:	MEDWAY’S ZONING DISTRICTS .....	14
TABLE 3-3:	HISTORIC POPULATION (SOURCE: US CENSUS) .....	18
TABLE 3-4:	UMDI POPULATION PROJECTIONS.....	19
TABLE 3-5:	SOILS IN MEDWAY .....	21
TABLE 3-6:	IMPAIRED WATERS, TOWN OF MEDWAY MA .....	28
TABLE 3-7:	MEDWAY RARE AND ENDANGERED SPECIES .....	30
TABLE 4-1:	WASTEWATER COLLECTION SYSTEM GRAVITY SEWER INFORMATION .....	33
TABLE 4-2:	MEDWAY SEWER EXTENSIONS .....	35
TABLE 4-3:	CRPCD WASTEWATER FLOW VS CAPACITY .....	36
TABLE 4-4:	SANITARY SEWER OVERFLOW HISTORY.....	40
TABLE 4-5:	MEDWAY’S FY18 SEWER RATES .....	44
TABLE 4-6:	SOIL SURVEY CLASSIFICATION .....	45
TABLE 5-1:	GROUNDWATER WELLS SUMMARY .....	47
TABLE 5-2:	SOURCE SAFE YIELD AND AVAILABLE WATER SUPPLY .....	50

TABLE 5-3: DRINKING WATER TREATMENT PROCESSES IN MEDWAY, MA.....	50
TABLE 5-4: DISTRIBUTION SYSTEM PIPE SIZES.....	52
TABLE 5-5: MEDWAY HISTORIC WATER USAGE, ANNUAL.....	54
TABLE 5-6: WATER USAGE BY CONSUMER TYPE, 2016 ASR.....	55
TABLE 5-7: MEDWAY HISTORIC RESIDENTIAL WATER USAGE.....	56
TABLE 5-8: MEDWAY HISTORIC COMMERCIAL WATER USAGE.....	57
TABLE 5-9: MEDWAY HISTORIC RESIDENTIAL INSTITUTIONAL WATER USAGE.....	57
TABLE 5-10: MEDWAY HISTORIC AGRICULTURAL/INDUSTRIAL WATER USAGE.....	58
TABLE 5-11: MEDWAY HISTORIC MUNICIPAL WATER USAGE.....	58
TABLE 5-12: MEDWAY HISTORIC UNACCOUNTED FOR WATER.....	59
TABLE 5-13: MEDWAY’S FY18 WATER RATES.....	65
TABLE 6-1. CATEGORIZATION OF STORMWATER OUTFALLS.....	68
TABLE 6-2: AVAILABLE FUNDING FOR STORMWATER ACTIVITIES.....	74
TABLE 7-1: WASTEWATER PROJECTIONS.....	76
TABLE 7-2: WASTEWATER NEEDS.....	82
TABLE 7-3: MEDWAY HISTORIC WATER DEMANDS.....	84
TABLE 7-4: DEMAND PROJECTION SCENARIOS.....	85
TABLE 7-5: DRINKING WATER NEEDS.....	97
TABLE 7-6: MINIMUM CONTROL MEASURE NEEDS.....	100
TABLE 7-7: 2016 MS4 PERMIT MAPPING REQUIREMENTS.....	101
TABLE 7-8: STORMWATER DRAINAGE ISSUES.....	104
TABLE 7-9: STORMWATER NEEDS.....	104
TABLE 8-1: IMPACTS OF ALTERNATIVES THROUGHOUT MEDWAY’S WATER SYSTEMS.....	110
TABLE 9-1: SUMMARY OF POTENTIAL ENVIRONMENTAL AND PUBLIC HEALTH OR SAFETY IMPACT AND BENEFITS.....	133
TABLE 9-2: IWRMP CURRENT SPENDING IMPLEMENTATION PLAN YEARS 11-20 (2018 DOLLARS)	139
TABLE 9-3: IWRMP CURRENT SPENDING IMPLEMENTATION PLAN YEARS 11-20 (2018 DOLLARS)	139
TABLE 9-4: IWRMP IMPLEMENTATION PLAN YEARS 0-10 (2018 DOLLARS).....	140
TABLE 9-5: IWRMP IMPLEMENTATION PLAN YEARS 11-20 (2018 DOLLARS).....	140

**LIST OF FIGURES**

FIGURE 3-1: TOWN OF MEDWAY ZONING MAP, 2017.....	16
FIGURE 3-2: MEDWAY’S POPULATION DATA AND PROJECTIONS (2000 – 2035).....	20

FIGURE 3-3: SURFICIAL GEOLOGY AND AQUIFERS .....	22
FIGURE 3-4: USGS QUADRANGLE MAP .....	24
FIGURE 3-5: WATER RESOURCES AND WETLANDS.....	26
FIGURE 4-1: WASTEWATER COLLECTION SYSTEM IN MEDWAY, MA .....	34
FIGURE 4-2: METERED AND UNMETERED WASTEWATER FLOW .....	38
FIGURE 4-3: WASTEWATER FLOWS VS. CRPCD CAPACITY .....	39
FIGURE 4-4: SEWER SUBAREAS.....	42
FIGURE 5-1: TOWN OF MEDWAY DRINKING WATER SUPPLY/DISTRIBUTION SYSTEM .....	48
FIGURE 5-2: UNACCOUNTED FOR WATER 2012-2016 .....	60
FIGURE 5-3: AVERAGE DAILY DEMAND 2012-2016 .....	61
FIGURE 5-4: MAXIMUM DAILY DEMAND 2012-2016 .....	62
FIGURE 5-5: ESTIMATED PEAK HOUR DEMAND 2012-2016 .....	63
FIGURE 6-1: STORMWATER OUTFALLS .....	69
FIGURE 7-1: WASTEWATER PROJECTIONS VS. CRPCD CAPACITY .....	77
FIGURE 7-2: PLANNED DEVELOPMENT (SOURCE: MEDWAY PLANNING DEPARTMENT, 2018) .....	78
FIGURE 7-3: SEPTIC SYSTEM FAILURES .....	81
FIGURE 7-4: AVERAGE DAILY DEMAND, HISTORIC AND PROJECTED .....	88
FIGURE 7-5. MAXIMUM DAILY HISTORIC AND PROJECTED DEMAND .....	89
FIGURE 7-6: REPORTED TOTAL POPULATION AND POPULATION SERVED (2009-2016).....	94
FIGURE 7-7: REPORTED RGPCD (2009-2016) .....	94
FIGURE 7-8: REPORTED UAW (2009-2016) .....	95
FIGURE 7-9: MEDWAY PROBLEM DRAINAGE AREAS .....	103
FIGURE 8-1: MEDWAY WATER SYSTEM INTERCONNECTIONS .....	107
FIGURE 8-2: MEDWAY WATER RESOURCES SYSTEM INTERCONNECTIONS WITH STRATEGIC ALTERNATIVES .....	109
FIGURE 8-3: STELLA MODEL LAYOUT FOR MEDWAY’S INTEGRATED SYSTEM .....	112
FIGURE 8-4: STELLA MODEL LAYOUT FOR MEDWAY’S DRINKING WATER SYSTEM.....	113
FIGURE 8-5: DRINKING WATER DEMAND PROJECTIONS AND CURRENT DEMAND LEVEL .....	114
FIGURE 8-6: PRECIPITATION VS. TOTAL FLOW INTO CRPCD .....	115
FIGURE 8-7: MODEL VALIDATION FOR STORMWATER INFLUENCE ON FLOW TO CRPCD .....	116
FIGURE 8-8: SCREENING RESULTS FOR THREE MODEL ALTERNATIVES .....	118
FIGURE 8-9: MODEL SCENARIO RESULTS.....	120

## **LIST OF APPENDICES**

Appendix A: IWRMP Brochure & Task Force Meeting Summaries

Appendix B: Flow Metering Assessment Technical Memorandum

Appendix C: Preliminary Outfall Catchment Delineation Analysis

## **Executive Summary**

This Integrated Water Resources Management Plan (IWRMP) for the Town of Medway, Massachusetts is formulated in response to the needs of the Town and designed to protect the environmental resources both within Medway and within the broader region surrounding the Town. The purpose is to provide a plan to meet the Town's water resources needs, establishing a sustainable approach that responds to today's challenges while supporting future growth and development. To fully realize the potential of integrated solutions to Medway's water resource challenges, local interactions amongst the water resources systems must be understood.

As with most municipalities, Medway's public infrastructure needs continue to grow and create competing demands for limited Town resources. The Department of Public Services (DPS) operates and maintains the Town's domestic water system, wastewater collection system, and stormwater system. Each of these systems requires continual management and improvement to meet the changing needs of the Town while maintaining compliance with various state and federal regulations. This IWRMP documents existing conditions within these three municipal infrastructure systems, identifies and prioritizes system needs to support community goals, and presents a management plan that meets system needs within a sustainable operational framework to proactively manage Town infrastructure now and into the future.

### **Regulatory Drivers**

Medway's DPS operates and maintains municipal infrastructure systems that are subject to local, state and federal regulations. These regulations contribute to the definition of "need" insofar as operating standards and regulatory compliance represent a minimum threshold of investment. The primary permits and associated operating regulations under which the Town manages water resource infrastructures include:

- Water Management Act (WMA) Permit (potable water)
- Municipal separate storm sewer system (MS4) National Pollution Discharge Elimination System (NPDES) General Permit (stormwater)
- Charles River Pollution Control District (CRPCD) NPDES Permit (wastewater Co-Permittee)

## **Goals/Strategies**

The IWRMP continues the Town's efforts to achieve goals established in the 2009 Master Plan, as well as goals specifically tied to the performance of the water resources systems. These include:

1. Improve and protect water quality and quantity.
2. Protect water supply sources through local land use mechanisms.
3. Implement comprehensive water conservation measures, including leak detection, metering, conservation-oriented water rates, drought contingency plans, and public education.
4. Take an active role in maintaining and/or increasing Medway's allocated capacity at the CRPCD.
5. Mitigate environmental impacts of stormwater-driven water quality impairments through local and regional implementation of best management practices (BMPs), both structural and non-structural.
6. Establish an implementation plan for long term sustainability that is affordable, effective and achievable.
7. Improve Town processes to eliminate barriers and streamline effective management of water resources.

This IWRMP includes the following implementation strategies for needed improvements to the water resources systems:

- Support operations and maintenance (O&M) efforts of the DPS, including funding annual infrastructure management needs such as I/I removal, leak detection, catch basin cleaning and street sweeping.
- Modify local site design or development standards to encourage creative approaches to water resources management, including incorporating low impact development, green infrastructure, and enhanced water conservation, where appropriate.
- Engage the public in understanding the water resources systems to encourage voluntary behaviors that improve conservation efforts, manage wastewater flows and improve stormwater runoff quality.

## **Public Participation**

The Town solicited and encouraged public participation in the IWRMP effort through three primary sources:

1. Public Communication – Through execution of a detailed Communication Plan (outlined in Section 2.2) the Town provided an overview of the IWRMP process and regular updates on the planning process. Outreach through a variety of media was critical to successfully reach residents and business owners.
2. Citizens Advisory Task Force (CATF) Representation – The CATF was initiated to invite knowledgeable stakeholders and partners, who in turn act as an extension of the public. Each participant provided insight into the key issues that concerned their constituents and brought updates on the IWRMP process back to the broader stakeholders whom they represented.
3. Public Participation – Through scheduled presentations, the public reviewed the details of the draft IWRMP and provided feedback for incorporation into the final IWRMP.

The details of the public participation process through the IWRMP development is described in Chapter 2.

### **Built and Natural Environment**

Medway's water resources systems interact with both the built and natural environment in a variety of ways. Most of the Town (60.7%) is zoned residential, which contributes to a high demand on municipal water and wastewater services, as well as contributing stormwater runoff . The Town's buildout analysis shows that over 2000 new homes and more that 4.1 million square feet of commercial and industrial space would contribute to increased water demands. While the Town currently has a moratorium on sewer extensions, supporting this future development is in the best interest of the Town, however careful planning is needed to minimize impacts on the environment. Population growth projections allow for planning for future needs. The Town benefits from a variety of natural resources, including the Charles River and a robust groundwater supply, however continued protection of these resources is required for long term sustainability.

### **Water Resources Systems and Needs**

The DPS manages the three municipal water resources systems: wastewater, domestic water and stormwater. The wastewater system was first developed in 1977 and serves the central and southern areas of Town. Wastewater is transported to the Charles River Pollution Control District, of which Medway is a co-permittee. Medway contributes approximately 0.8 million gallons per day to the treatment plant, currently using approximately 83% of its allocated capacity. As such, the Town has suspended the extension of the sewer system through a moratorium, although residents located along the current sewer alignment can connect as their capacity is reserved

through betterment previously assessed. Infiltration and inflow represent extraneous flows in some portions of the system, contributing to reduced wet weather capacity and inflating the wastewater discharge to the plant. The remaining portion of the Town utilizes on-site wastewater management systems (septic), although there are many challenges related to the suitability of soils within the Town. A summary of the wastewater needs discussed in Chapter 7 are summarized below:

**Table ES-1: Wastewater Needs**

Near Term Needs	Address I/I	Managing wastewater flows to the CRPCD requires identification and removal of extraneous flows from the wastewater collection system.
	Improve Sewer System Operations	Support I/I mitigation and identify structural defects in aging infrastructure.
	Install permanent flow meters	Provide actual measured flows to CRPCD and remove the uncertainty of calculating flow contributions based on assumptions.
	Improve record keeping of septic failures	Allow septic data to be queried real-time and provide the Board of Health more reliable information.
	Provide public education for septic owners	Help homeowners
	Purchase Available Wastewater Capacity at CRPCD from Franklin	Allow the Town to continue with planned development and provide sustainable wastewater collection into the future. Allow the Town to lift the sewer moratorium.
Long Term Needs	Limited Sewer Extensions	Connect failed septic systems to the collection system if capacity becomes available.

***Medway is facing an ongoing challenge as it nears its allocated capacity for wastewater treatment at the CRPCD. Planned developments will push the Town past its capacity in the next 15 years, which limits future development potential in Town, as well as the opportunity to extend sewers to current septic users.***

The domestic drinking water system is supplied through groundwater wells with an annual maximum raw water withdrawal limit of 0.92 MGD on an average basis. Regular treatment is provided for the domestic water system to control naturally occurring iron and manganese, as well as to provide corrosion control, disinfection and fluoridation. Ongoing challenges with treatment at the Oakland Street well have limited its use, and effectively reduced the available water supply for the Town. While the DPS is still able to meet the daily water demand, long term stability of the

supply depends on reinstating the full capacity of the groundwater wells through additional treatment. In addition, with population projected to increase, this effort is especially critical to support growth within Town. The water system is also at risk if the largest supply well, Populatic, were to be taken offline for repairs or emergency. The lack of redundancy and limited intermunicipal water system connections further threaten the system. In addition, reducing the volume of unaccounted for water (UAW) can help to offset supply limitation. A summary of the drinking water needs discussed in Chapter 7 are summarized below:

**Table ES-2: Drinking Water Needs**

Near Term Needs	Resiliency and Redundancy; System Capacity	Currently, extended periods of high demand cannot be satisfied without the Populatic Well or a source of emergency supply. Sources of emergency supply, equipment and protocols are not well established. Water treatment improvement / expansion is needed to supply near and long-term demand. The Town is close to exceeding its supply.
	Reducing UAW; Increasing WMA Permit Limit	UAW has exceeded the State Performance Standard in all seven of the last reporting periods. This needs to be addressed so that Medway can request an increase in its WMA Permit to withdraw water.
	Improving Documentation	Better documentation procedures are needed to project Medway's drinking water demands and measure system performance more accurately.
Long Term Needs	Infrastructure Improvements	Updates to the Town's hydraulic model can help inform strategic decisions regarding the appropriate phasing of infrastructure replacement projects.
	Promoting Conservation	Reducing demand through conservation efforts can reduce stress on the drinking water system infrastructure.
	Managing Demand from Future Developments	The Town currently does not have a water use review policy to determine if the domestic water system can accommodate the needs of proposed developments.
	Increasing System Capacity	The Town can use the Oakland Street well more regularly if the well's water is treated for Iron and Manganese.
	Increasing WMA Permitted Volume	Projections show demand exceeding the WMA authorized withdrawal limit in most scenarios by 2025.
	Evaluate Reclaimed/Grey Water for Industrial and Agricultural Use	Reclaimed water is used directly in non-potable applications such as irrigation.

	Evaluate Reclaimed Water from CRPCD for Indirect Potable Reuse	Reclaimed water from CRPCD is used to recharge the underlying aquifer, indirectly supplying the Town's GW Wells.
--	--	--

***Medway's drinking water supply is at immediate risk due to a lack of redundancy and reliability. Challenges with water quality continue to drive the Town's infrastructure priorities, and distribution system upgrades are overdue. Management of unaccounted for water through leak and break detection is critical to meeting demand and allowing for future growth.***

The stormwater system serves to provide drainage throughout the Town, discharging into the various water bodies, including the Charles River. The MS4 NPDES permit governs the quality of these discharges and drives most of the needs for the stormwater system. While flooding related to insufficient capacity and beaver dam construction does occur, the DPS efforts focus on mapping of the stormwater system, as well as sampling. Further regulatory driven activities are needed as the new permit is enacted.

**Table ES-3: Stormwater Needs**

Regulatory Requirements	Reduce TMDLs in Charles River	Develop and implement Phosphorus Control Plan
	MS4 Permit Compliance	Town must continue with the activities outline in the MS4 permit including public education and involvement, their IDDE program, construction site stormwater runoff management, stormwater management in development, and housekeeping/O&M procedures.
Near Term Needs	Address Localized Flooding	The Town should address the hydraulic inadequacies in stormwater drainage system
	Manage Impervious Cover of Proposed Developments	Impervious coverage from commercial development may contribute to increased stormwater runoff
	Promote Public Education and Engagement	Proper education of the public may help to address residential stormwater issues and develop support for future programs
Long Term Needs	Promote Stormwater Capture and Infiltration	Stormwater runoff from future development may contribute to drainage/flooding issues; Groundwater infiltration will support existing streams and drinking water supply
	Improve Town's Stormwater Inspection and Maintenance Procedures	Town must address the inconsistencies in rules and regulations related to managing stormwater assets and BMPs

***Regulatory requirements drive most of the Town's stormwater system needs, however overall site development and public education are critical to protect this system as the Town continues to grow. Managing water quantity and quality are equally important.***

### **Evaluation of Alternatives**

Using an integrated planning model, called Stella (see Chapter 8), the IWRMP analyzed the Town's water resources system needs to identify alternatives that had the greatest impact on each system individually as well as on multiple systems. These results informed the final plan which sought to prioritize alternatives and recommendations based on their impacts, the needs of the Town and the criticality of implementation. In terms of criticality, recommendations are broken-down into three categories:

- High Priority - represents activities that require the Town's immediate attention in the first few years of the IWRMP implementation plan. These recommendations may be required by permits, critical needs for the water resource systems, or influential towards the implementation of future recommendations.
- Medium Priority – reflects some of the ongoing and proposed activities that that the Town undertakes to maintain and/or improve the water resource systems. This includes assessments of system performance, targeted system infrastructure rehabilitation and improvements, yearly system maintenance, and the implementation of tools to assist with system management.
- Low Priority – less critical activities that will help to optimize system performance and/or management. These recommendations provide support to other IWRMP recommendations and are spread throughout the first 10 years of the implementation plan.

### **Integrated Water Resources Management Plan (IWRMP)**

Medway's IWRMP provides a long-term (20-year) plan which prioritizes needs from the three water resources systems: wastewater, domestic water, stormwater. This plan provides a roadmap for the DPS to manage its resources in an integrated manner, by tackling the most critical issues through solutions that provide multiple benefits throughout the systems. This approach provides a thoughtful approach to allow for long term sustainability of the systems, as well as cost-effective alternatives. The recommended implementation plan for the IWRMP is shown in Table ES-4 through ES-7. Tables ES-4 and ES-5 document the Town's existing programs which will continue under the IWRMP. Medway has already begun to implement this IWRMP, including making

changes to its operations and maintenance efforts to identify and reduce unaccounted for water, as well as initiating capital projects. In addition, the MS4 program has previously been planned with the implementation of the new permit in 2018. Many of the programs identified as high and medium priorities have been initiated by the Town and are included herein to further support the good work that is already underway.

This plan requires targeted spending early in the implementation period to address critical weaknesses, specifically in the water supply system. Roughly 66% of the IWRMP total cost is associated with improvements to the drinking water system. As the Town continues to implement this long-term plan, there are various sources of funding for the components of the IWRMP that include those from within Medway (such as taxes, betterments and bonds), those from state and federal agencies (such as the State Revolving Fund (SRF) and other grants/loans) and those from private parties.

The Town will continue to use this IWRMP framework as a planning tool, creating a living document for its infrastructure needs. As new studies and projects are identified, they will be included in the plan. As such, the later years of this 20-year plan will continue to be modified, especially as the Town completes its upcoming Water System Master Plan update, and other studies which will further inform capital needs. Changes in State or Federal regulations, or environmental conditions may also initiate new projects for inclusion in the IWRMP.

**Table ES-4: IWRMP Current Spending Implementation Plan Years 0-10 (2018 Dollars)**

	Water Resource	Current Program	Current Estimated Value	Y0 2019	Y1 2020	Y2 2021	Y3 2022	Y4 2023	Y5 2024	Y6 2025	Y7 2026	Y8 2027	Y9 2028	Y10 2029
High	SW	MS4 Program Implementation	\$4,856,000	\$468,500	\$444,500	\$405,500	\$424,000	\$412,500	\$480,000	\$455,500	\$415,500	\$435,000	\$423,000	\$492,000
		<b>Subtotal High Priority Cost:</b>	<b>\$ 4,856,000</b>	<b>\$468,500</b>	<b>\$444,500</b>	<b>\$405,500</b>	<b>\$424,000</b>	<b>\$412,500</b>	<b>\$480,000</b>	<b>\$455,500</b>	<b>\$415,500</b>	<b>\$435,000</b>	<b>\$423,000</b>	<b>\$492,000</b>
Medium Priority	WW	Permanent Sewer System Metering	\$247,000	\$27,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000
	WW	SSES Investigations and Rehabilitation	\$1,000,000		\$200,000		\$200,000		\$200,000		\$200,000		\$200,000	
	WW	Temporary Sewer System Metering	\$50,000	\$50,000										
	DW	Unaccounted for Water Activities	\$110,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	DW	Update Town-wide Drinking Water Hydraulic Model	\$50,000	\$50,000										
	DW	Annual Water Distribution System Maintenance	\$1,100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
	DW	Highland and Loring Tank Painting/Cleaning	\$1,000,000				\$500,000					\$500,000		
	DW	Indoor and Outdoor Water Conservation	\$165,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	ALL	Public Education and Engagement	\$11,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
			<b>Subtotal Medium Priority Cost:</b>	<b>\$3,722,000</b>	<b>\$126,000</b>	<b>\$348,000</b>	<b>\$148,000</b>	<b>\$848,000</b>	<b>\$148,000</b>	<b>\$348,000</b>	<b>\$148,000</b>	<b>\$348,000</b>	<b>\$648,000</b>	<b>\$148,000</b>
		<b>Total IWRMP Current Spending Years 0-10 Cost:</b>	<b>\$8,578,000</b>	<b>\$594,500</b>	<b>\$792,500</b>	<b>\$553,500</b>	<b>\$1,272,000</b>	<b>\$560,500</b>	<b>\$828,000</b>	<b>\$603,500</b>	<b>\$763,500</b>	<b>\$1,083,000</b>	<b>\$771,000</b>	<b>\$640,000</b>

**Table ES-5: IWRMP Current Spending Implementation Plan Years 11-20 (2018 Dollars)**

	Water Resource	Current Program	Current Estimated Value	Y11 2030	Y12 2031	Y13 2032	Y14 2033	Y15 2034	Y16 2035	Y17 2036	Y18 2037	Y19 2038	Y20 2039
High	SW	MS4 Program Implementation	\$4,609,000	\$467,000	\$426,000	\$446,000	\$433,000	\$504,000	\$478,500	\$436,500	\$457,000	\$444,000	\$517,000
		<b>Subtotal High Priority Cost:</b>	<b>\$4,609,000</b>	<b>\$467,000</b>	<b>\$426,000</b>	<b>\$446,000</b>	<b>\$433,000</b>	<b>\$504,000</b>	<b>\$478,500</b>	<b>\$436,500</b>	<b>\$457,000</b>	<b>\$444,000</b>	<b>\$517,000</b>
Medium Priority	WW	Permanent Sewer System Metering	\$220,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000	\$22,000
	WW	SSES Investigations and Rehabilitation	\$1,000,000	\$200,000		\$200,000		\$200,000		\$200,000		\$200,000	
	WW	Temporary Sewer System Metering	\$50,000	\$50,000									
	DW	Unaccounted for Water Activities	\$100,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	DW	Update Town-wide Drinking Water Hydraulic Model	\$50,000	\$50,000									
	DW	Annual Water Distribution System Maintenance	\$1,000,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000	\$100,000
	DW	Highland and Loring Tank Painting/Cleaning	\$1,000,000				\$500,000					\$500,000	
	DW	Indoor and Outdoor Water Conservation	\$150,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	ALL	Public Education and Engagement	\$20,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
			<b>Subtotal Medium Priority Cost:</b>	<b>\$3,590,000</b>	<b>\$448,000</b>	<b>\$148,000</b>	<b>\$348,000</b>	<b>\$648,000</b>	<b>\$348,000</b>	<b>\$148,000</b>	<b>\$348,000</b>	<b>\$148,000</b>	<b>\$848,000</b>
		<b>Total IWRMP Current Spending Years 11-20 Cost:</b>	<b>\$8,199,000</b>	<b>\$915,000</b>	<b>\$574,000</b>	<b>\$794,000</b>	<b>\$1,081,000</b>	<b>\$852,000</b>	<b>\$626,500</b>	<b>\$784,500</b>	<b>\$605,000</b>	<b>\$1,292,000</b>	<b>\$665,000</b>

Note:

- High, medium and low priorities represent relative importance of projects with respect to meeting regulations, maintaining operation of the water resources systems, and providing long-term service.

**Table ES-6: IWRMP Implementation Plan Years 0-10 (2018 Dollars)**

	Water Resource	Recommendation	Opinion of Probable Cost	Y0 2019	Y1 2020	Y2 2021	Y3 2022	Y4 2023	Y5 2024	Y6 2025	Y7 2026	Y8 2027	Y9 2028	Y10 2029
High Priority	WW	Purchase Available Wastewater Capacity at CRPCD	\$950,000	\$950,000										
	DW	Drinking Water Quality - Treatment Improvements	\$15,000,000	\$1,000,000	\$6,000,000	\$3,000,000	\$3,000,000	\$2,000,000						
	DW	Drinking Water Supply Capacity Redundancy/Reliability	\$2,191,000		\$467,000		\$1,347,000	\$377,000						
	DW	Update Emergency Drinking Water Supply Plan	\$65,000			\$65,000								
	DW	Pursue WMA Permit Withdrawal Limit Increase	\$15,000			\$15,000								
			<b>Subtotal High Priority Cost:</b>	<b>\$18,221,000</b>	<b>\$1,950,000</b>	<b>\$6,467,000</b>	<b>\$3,065,000</b>	<b>\$4,347,000</b>	<b>\$2,377,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
Medium Priority	DW	Water Distribution System Improvements	\$9,915,000	\$2,990,000	\$2,425,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000
	SW	Drainage Improvements	\$320,000					\$320,000						
	SW	Stormwater Structural BMPs	\$137,500							\$33,500	\$46,000		\$52,000	
	SW	Stormwater Infiltration Analysis	\$24,000								\$6,000	\$6,000	\$6,000	\$6,000
	ALL	Asset Management Program	\$475,000	\$75,000	\$75,000	\$75,000	\$75,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
			<b>Subtotal Medium Priority Cost:</b>	<b>\$10,871,500</b>	<b>\$3,065,000</b>	<b>\$2,500,000</b>	<b>\$575,000</b>	<b>\$575,000</b>	<b>\$845,000</b>	<b>\$525,000</b>	<b>\$558,500</b>	<b>\$577,000</b>	<b>\$531,000</b>	<b>\$583,000</b>
Low Priority	WW	Purchase CCTV Equipment to Support WW Operations	\$150,000					\$150,000						
	WW	Limited Sewer Extensions <sup>1</sup>	\$920,000									\$175,000	\$350,000	\$400,000
	DW	Redevelop Water Supply Impact Mitigation Fee	\$20,000			\$10,000	\$10,000							
	SW	Promote Impervious Cover Management	\$50,000					\$30,000	\$20,000					
	ALL	Review Interdepartmental Workflow for Development	N/A											
			<b>Subtotal Low Priority Cost:</b>	<b>\$1,140,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$10,000</b>	<b>\$10,000</b>	<b>\$180,000</b>	<b>\$20,000</b>	<b>\$0</b>	<b>\$0</b>	<b>\$175,000</b>	<b>\$350,000</b>
		<b>Total Opinion of Probable IWRMP Cost:</b>	<b>\$30,232,500</b>	<b>\$5,015,000</b>	<b>\$8,967,000</b>	<b>\$3,650,000</b>	<b>\$4,932,000</b>	<b>\$3,402,000</b>	<b>\$545,000</b>	<b>\$558,500</b>	<b>\$577,000</b>	<b>\$706,000</b>	<b>\$933,000</b>	<b>\$931,000</b>

**Table ES-7: IWRMP Implementation Plan Years 11-20 (2018 Dollars)**

	Water Resource	Recommendation	Opinion of Probable Cost	Y11 2030	Y12 2031	Y13 2032	Y14 2033	Y15 2034	Y16 2035	Y17 2036	Y18 2037	Y19 2038	Y20 2039	
Medium	DW	Water Distribution System Improvements	\$5,000,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	
	SW	Install Stormwater Structural BMPs	\$60,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	
	ALL	Asset Management Program	\$250,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	
			<b>Subtotal Medium Priority Cost:</b>	<b>\$5,256,000</b>	<b>\$531,000</b>									
			<b>Total Opinion of Probable IWRMP Cost:</b>	<b>\$5,256,000</b>	<b>\$531,000</b>									

**Notes:**

- High, medium and low priorities represent relative importance of projects with respect to meeting regulations, maintaining operation of the water resources systems, and providing long-term service.
- IWRMP projections include current projects and programs identified within the planning period. Additional projects are expected to be identified as the Town implements its Asset Management program and updates its Water Master Plan. Changes to State and Federal regulations, environmental conditions as well as local development and growth may also drive additional spending not currently part of this plan.

<sup>1</sup> Sewer extension costs may be offset through betterment assessments. Costs represented herein do not include betterment offsets.