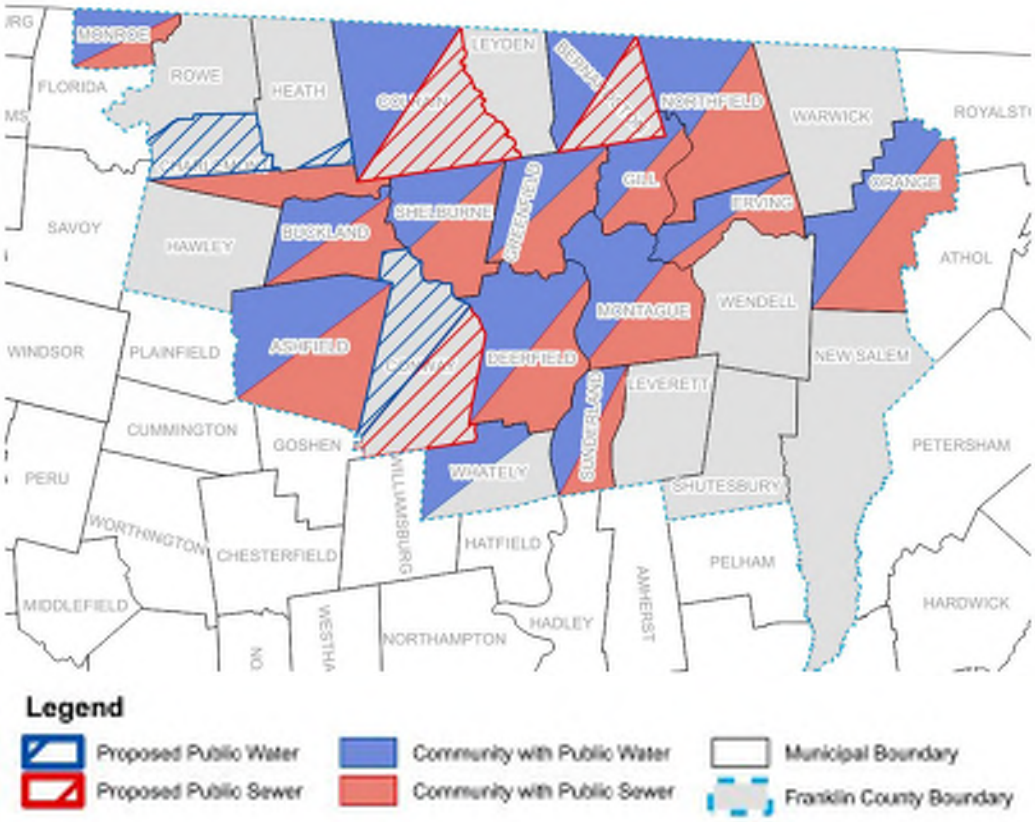

Franklin Regional Council of Governments

Franklin County Water and Wastewater Systems Study

June 2022

This report was prepared by Tighe & Bond, Inc. for the Franklin Regional Council of Governments using Federal funds under award ED20PHI3070075 from the Economic Development Administration, U.S. Department of Commerce. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the Economic Development Administration or the U.S. Department of Commerce.

Tighe&Bond

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1) USGS Hydrogeologic Investigations Atlas HA-249, Sheet 1 - Ground-Water Favorability of the Connecticut River Basin, New England States prepared by D.J. Cederstrom and Arthur L. Hodges, Jr., 1967

2) USGS Hydrogeologic Investigations Atlas HA-249, Sheet 2 - Ground-Water Favorability of the Connecticut River Basin, New England States prepared by D.J. Cederstrom and Arthur L. Hodges, Jr., 1967

3) USGS Hydrogeologic Investigations Atlas HA-506, Sheet 1 - Hydrology and Water Resources of the Deerfield River Basin, Massachusetts by F.B. Gay, L.G. Toler, and B.P. Hansen, 1974

4) USGS Hydrogeologic Investigations Atlas HA-506, Sheet 2 - Hydrology and Water Resources of the Deerfield River Basin, Massachusetts by F.B. Gay, L.G. Toler, and B.P. Hansen, 1974

5) USGS Atlas HA-563, Sheet 1 - Groundwater Availability in the Connecticut River Lowlands, Massachusetts by W.W. Wandle, Jr. and W.W. Caswell, 1977

6) USGS Atlas HA-563, Sheet 2 - Groundwater Availability in the Connecticut River Lowlands, Massachusetts by W.W. Wandle, Jr. and W.W. Caswell, 1977

7) USGS Miscellaneous Geologic Investigations Map I-1074-I - Groundwater Availability in the North Part of the Connecticut Valley Urban Area, Central New England, by M.H. Frimper, 1980

LIST OF ACRONYMS

AACE – Association for the Advancement of Cost Estimating

AC – Asbestos Cement

ACO – Administrative Consent Order

ACOP – Administrative Consent Order with Penalties

AMP – Asset Management Plan

CCTV – Closed Circuit Television

CDBG – Community Development Block Grant

CI – Cast Iron

CIP – Capital Improvements Plan

CIPPL – Cured in Place Pipe Liner

CL – Cementitious Liner

CMR – Code of Massachusetts Regulations

CUPPS – EPA's Check Up Program for Small Systems

CWSRF – Clean Water State Revolving Fund

DBP – Disinfection Byproducts

DI – Ductile Iron

DIP – Ductile Iron Pipe

EA – Each

EDB – Ethylene Dibromide

EDU – Equivalent Dwelling Units

EIR – Environmental Impact Report

ENF – Environmental Notification Form

EPA – U.S. Environmental Protection Agency

ERP – Emergency Response Plan

FIRM – Flood Insurance Rate Map

FRCOG – Franklin Regional Council of Governments

GI – Galvanized Iron

GIS – Geographic Information System

gpd – gallons per day

gpm – gallons per minute

H&H – Hydrologic and Hydraulic

HDPE – High Density Polyethylene

HGL – Hydraulic Grade Line

idm – Inch Diameter Mile

I/I – Infiltration and Inflow

IKS – In-kind Services

IMA – Inter-municipal Agreement

ISO – Insurance Service Office

IUP – Intended Use Plan

LF – Linear Feet

LS – Lump Sum

MassDEP – Massachusetts Department of Environmental Protection

NOAA – National Oceanic and Atmospheric Administration

NASSCO – National Association of Sewer Service Companies

MACP – Manhole Assessment and Certification Program

MassDEP – Massachusetts Department of Environmental Protection

MESA – Massachusetts Endangered Species Act

MG – Million Gallons

MGD – Million Gallons per Day

MH – Manhole

MSI – Multi-Sensor Inspection

MWPA – Massachusetts Wetlands Protection Act

O&M – Operations and Maintenance

OPC – Opinion of Probable Cost

OPCC – Opinion of Probable Construction Cost

PACP – Pipeline Assessment and Certification Program

PCB – Polychlorinated biphenyls

PEF – Project Evaluation Form

PFAS – Per-and Polyfluoroalkyl Substances

PFOA – Perfluorooctanoic Acid

PFOS – Perfluorooctanesulfonic acid

POTW – Publicly Owned Treatment Works

ppb – Parts per Billion

PRV – Pressure Reducing Valve

PVC – Polyvinyl Chloride

PWS – Public Water System

SCADA – Supervisory Controls & Data Acquisition System

SEARCH – Special Evaluation Assistance for Rural Communities

SRF – State Revolving Fund

SSES – Sewer System Evaluation Survey

SSO – Sanitary Sewer Overflow

STEG – Septic Tank Effluent Gravity

STEP – Septic Tank Effluent Pumping

SRF – State Revolving Fund

SWTR – Surface Water Treatment Rule

UAW – Unaccounted for Water

USDA – United Stations Department of Agriculture

USGS – United States Geological Survey

UV – Ultraviolet

VFD – Variable Frequency Drive

WIFIA – Water Infrastructure Finance and Innovation Act

WMA – Water Management Act

WPCF – Water Pollution Control Facility

WPCP – Water Pollution Control Plant

WTP – Water Treatment Plant

WWTF – Wastewater Treatment Facility

WWTP – Wastewater Treatment Plant

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Executive Summary

The purpose of this executive summary is to present the highlights of the Franklin County Water and Wastewater Systems Study.

The Franklin County Water and Wastewater Systems Study assessed existing public water and wastewater infrastructure through direct communications with public-owned districts or departments serving Franklin County communities. Within these communities, there are 15 public wastewater systems serving 13 communities and 18 public water systems serving 15 communities that were examined.

Document review and operator feedback was used to evaluate the status of each system with respect to capacity, broad physical condition, major performance issues and operational challenges, and risk and resiliency vulnerabilities against climate change hazards like flooding and drought. A broad list of system tasks and associated costs, and recommendations are provided in this report to better position Franklin County communities to plan for long term improvements to ensure sustainable systems, assess the potential for collaboration to share services and/or assets, and pursue potential funding sources for implementation.

Tasks identified in this report are divided into three categories: immediate tasks, short-range tasks and long-range tasks.

- **Immediate tasks** are those which may be required to address safety concerns, permit conditions, sanitary survey conditions, consent orders, or other reasons and are expected to be completed within 1 year.

- **Short-range tasks** are higher priority tasks that the Owner should include in budget development for the near future (typically 1-5 years).

- **Long-range tasks** are lower priority tasks where conditions do not currently warrant immediate action, but will require attention in the future (typically 6-20 years). The priority of the long-range tasks may increase if conditions worsen.

Opinion of probable costs (OPCs) were developed for the studies, analyses, construction, and other remedial measures identified in our survey of existing facilities. The probable construction costs are an approximation based on limited investigations and our experience on other similar sized projects and are not based on detailed quantity takeoffs or designs. Once further detailed investigations, capital improvement plans and asset management plans are performed, the scope of work may change, affecting the actual construction costs. The estimates include costs for engineering, permits and contingencies where applicable. Tasks that likely could be readily carried out by the Owner are noted to be "Self Performed" and no costs are carried in the tables. Additional items may also be "Self Performed" as deemed appropriate by those communities to reduce or eliminate costs carried in the tables. Items which should be carried in the Town's annual maintenance budget are specifically excluded from this evaluation.

A number of common items have been included for each community's public water and sewer system in reference to current NPDES permits (wastewater) and sanitary surveys (drinking water) provided by MassDEP. Although many systems and operators are

continuously working on the following items, it is often true that adequate resources, capacity, and support is unavailable to effectively complete them:

- Current Water or Wastewater Capital Improvement Plans and Asset Management Plans are either not developed or out-of-date
- Water or Wastewater Treatment Facility Operation and Maintenance (O&M) manual is either not developed or out-of-date
- Water distribution system or wastewater collection system O&M manual is either not developed or out-of-date
- Water and sewer mapping is either not available or out-of-date (mapping compiled as part of this study varies in data quality, from relatively complete locational data with pipe sizes, materials, etc., to basic linework representing a service area).
- Water and sewer rate evaluations needed to manage budgets
- Water storage tanks require inspection and/or have identified deficiencies
- Water conservation efforts are required and/or leak detection to reduce per capita usage or address unaccounted-for water
- Emergency Response Plans and Source Protection Plans require updates

Additionally, it is important to understand that it is the Owner's responsibility to maintain an up-to-date Capital Improvements Plan and/or Asset Management Plan and to evaluate the costs and risks of each task in those plans. As those plans are updated, the task list and estimated costs presented herein should be updated.

Budgetary conceptual level Class 5 cost estimates have been included in accordance with the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 18R-97. Additional costs were added to all estimates to account for the variability of planning level costs. Although these cost ranges may appear significant, it should be noted that current supply chain issues and bidding climate volatility have introduced further variabilities and uncertainty to the preparation of cost estimates. Costs will be evaluated further during project design and implementation to confirm that sufficient funding is budgeted to complete the proposed work.

Whether a major vertical asset such as a water or wastewater treatment facility or pump station has recently been constructed or upgraded in the past few years or the last 30 years, such assets are anticipated to require a major overhaul or replacement within the long term period (0 to 20 years) referenced in this evaluation. Probable construction costs are approximations based on limited investigations and our experience on similar sized projects and are not based on detailed quantity takeoffs or designs. Once further detailed investigations, capital improvement plans and asset management plans are performed, the scope of work may change, affecting the actual construction costs.

Horizontal assets such as water mains and sewer collection systems have a typical service life of 75 to 120 years or longer depending on a number of factors (materials, subsurface conditions etc.). For the purposes of this evaluation, it is assumed that 10% of the system piping will require replacement in the next 20 years. Replacement schedule may be adjusted in a formal CIP or asset management plan.

A breakdown of budgetary costs for the recommended work for each public wastewater and water system evaluated in this Study is broken down by task categories and tabulated below.

Public Wastewater System	Immediate Tasks	Short-term Tasks	Long-term Tasks	Total
Ashfield	$110,000	$301,000	$4,440,000	$4,851,000
Charlemont	$124,000	---	$5,160,000	$5,284,000
Deerfield	$155,000	$448,000	$18,730,000	$19,333,000
Erving	$155,000	$560,000	$32,800,000	$33,515,000
Gill	$110,000	$92,000	$440,000	$642,000
Greenfield	$155,000	$1,430,000	$22,300,000	$23,885,000
Monroe	$110,000	$10,000	$4,360,000	$4,480,000
Montague	$145,000	$1,410,000	$26,550,000	$28,105,000
Northfield	$130,000	$450,000	$11,400,000	$11,980,000
Orange	$145,000	---	$19,320,000	$19,465,000
Shelburne/Buckland	$130,000	$980,000	$9,940,000	$11,050,000
Sunderland	$130,000	$140,000	$12,710,000	$12,980,000
TOTAL	**$1,599,000**	**$5,821,000**	**$168,150,000**	**$175,570,000**

Public Water System	Immediate Tasks	Short-term Tasks	Long-term Tasks	Total
Ashfield	$110,000	$10,000	$785,000	$905,000
Bernardston	$130,000	$335,000	$5,750,000	$6,215,000
Colrain Fire District	$142,000	$111,000	$2,150,000	$2,403,000
Colrain - Griswoldville	$100,000	$47,000	$1,090,000	$1,237,000
Deerfield Fire District	$120,000	$268,000	$3,580,000	$3,968,000
Deerfield – S. Deerfield WSD	$155,000	$30,000	$9,770,000	$9,955,000

Erving	$120,000	$80,000	$2,480,000	$2,680,000
Gill	$100,000	---	$880,000	$980,000
Greenfield	$130,000	$75,000	$34,030,000	$34,235,000
Monroe	$100,000	$865,000	$1,298,000	$2,263,000
Montague - Center	$110,000	$363,000	$854,000	$1,327,000
Montague – Turners Falls	$145,000	$196,000	$15,460,000	$15,801,000
Northfield	$110,000	$5,000	$2,700,000	$2,815,000
Orange	$355,000	$3,720,000	$13,030,000	$17,105,000
Shelburne/Buckland	$60,000	$2,090,000	$6,210,000	$10,360,000
Sunderland	$145,000	$760,000	$4,410,000	$5,315,000
Whately	$120,000	$585,000	$5,290,000	$5,995,000
TOTAL	**$2,252,000**	**$9,540,000**	**$109,767,000**	**$123,559,000**

In summary, Franklin County, like other regions, requires major upgrades, ongoing maintenance, and ongoing and changing operation costs. About $123.6 million and $175.6 million dollars in recommended work, over a 20-year study period, are identified for the Franklin County Water and Wastewater Systems, respectively. Figures ES.1 and ES.2 presents an overview on water and sewer systems financial needs to address specific recommended work. Each Pie chart identifies the approximate percentages of various types of work for each system. Changing regulatory needs, environmental changes, industry changes, as well as aging infrastructure all contribute to the overall needs of Water and Wastewater Systems to be able to continue to operate effectively.

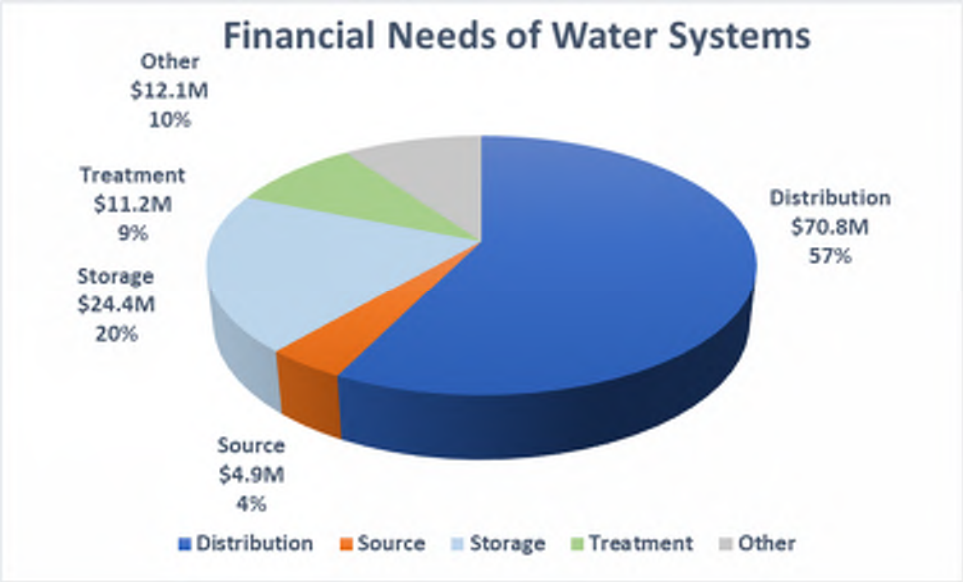

Figure ES.1 – Overview on Franklin County Water Systems Financial Needs

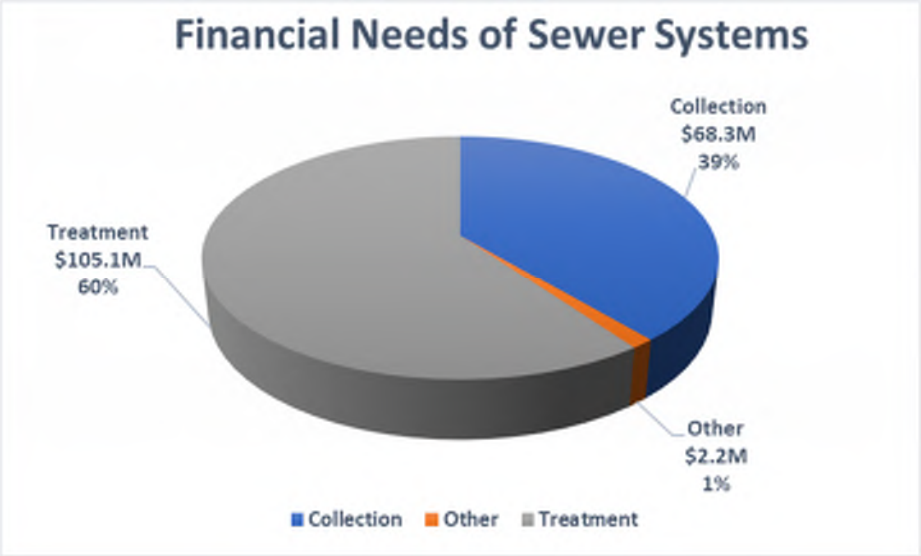

Figure ES.2 – Overview on Franklin County Sewer Systems Financial Needs

Also, for three communities (Bernardston Center Village, Colrain Village, and Conway Center) this report examines the prospect of providing a public sewer system in these specific village centers currently lacking public sewer. The feasibility for developing a public sewer system was identified, along with proposed service area mapping, required next steps, and associated costs.

The following next steps were identified for each community:

- Bernardston Center Village – A wastewater system serving Bernardston Center Village will be challenging due to poor soils proximate to the proposed service area, however, a 2009 study identified one parcel with variable soils which could be considered further. The preliminary service area identified covered 42 residential

properties and 16 commercial properties and required an average wastewater flow capacity of 45,000 gpd. Preliminary Project OPCC for the recommended approach is $10,300,000.

- Colrain Village – As previously examined in a 2014 study, a wastewater system serving Colrain Village would include a gravity collection system in the service area, a sewer pump station and force main to transfer sewage to the nearby Griswoldville Wastewater System. The preliminary service area identified covered 55 residential and commercial properties and required an average wastewater flow capacity of 17,000 gpd. Preliminary Project OPCC for the recommended approach is $9,800,000.

- Conway Center – A feasibility study was completed in 2017 for a wastewater system serving Conway Center including the identification of a suitable subsurface disposal area. In order to keep costs low, the wastewater feasibility committee considered a preliminary service area covering 30 residential and commercial properties requiring an average wastewater flow capacity of 9,900 gpd. Preliminary Project OPCC for the recommended approach is $2,300,000.

Additionally, for three communities (Erving Center, Charlemont Historic Village Center, and Conway Center) this report examines the prospect of providing a public water system in specific village centers currently lacking public water. The feasibility for developing a public water system was identified, along with proposed service area mapping, required next steps, and associated costs. Similar to the potential new sewer systems, consideration for potential new water systems was given to the possibility for regionalization, addressing common issues and challenges and potential funding sources to support next steps.

The following next steps were identified for each community:

- Erving Center – Both surface water and groundwater sources were considered along with a potential interconnection with the Town of Orange. While preliminary review of hydrogeological mapping indicates that locating an adequate groundwater source may be challenging, recommendations include further exploration work at two Town-owned parcels on Swamp Road and Mountain Road. Assuming an adequate groundwater source can be located, we identified a preliminary service area covering approximately 250 parcels with an average water flow capacity of 58,000 gpd. Preliminary Project OPCC for the recommended approach is $16,800,000.

- Charlemont Historic Village Center – Preliminary review of hydrogeologic mapping indicates that suitable groundwater supplies may be located along the Deerfield River if large enough parcels can be procured to fully contain a Zone I protection area. Recommendations include further exploration work to locate a suitable groundwater supply. Assuming an adequate groundwater source can be identified, we identified a preliminary service area covering approximately 100 parcels with an average water flow capacity of 23,000 gpd. Preliminary Project OPCC for the recommended approach is $7,300,000.

- Conway Center – Preliminary review of hydrogeologic mapping indicates that suitable groundwater supplies may be located along the South River, however there may not be any vacant parcels that can be procured to fully contain a Zone I protection area. Recommendations included further exploration work to locate a

suitable groundwater supply. Assuming an adequate groundwater source can be identified, we identified a preliminary service area covering approximately 60 parcels with an average water flow capacity of 14,000 gpd. Preliminary Project OPCC for the recommended approach is $5,300,000.

Section 1

Project Intent

1 Project Intent

Many communities throughout the United States, especially ones with a historically strong industrial sector, are struggling to fund expensive capital improvement projects designed to address aging water and wastewater infrastructure. Until recently, the lack of State and Federal funds, compared to the Clean Water Act era, has resulted in a systematic shift of infrastructure maintenance and replacement costs to local governments. The situation is exacerbated as industrial and manufacturing jobs moved abroad, since they were once the core revenue source in many industrial communities. The lack of employment opportunities resulted in communities with shrinking population size, decreasing total local tax revenue income (i.e. property tax and local sales tax), and less ability to fund local public infrastructure projects for roads, water, and wastewater systems. The increased operational and maintenance costs to meet new State and Federal regulations further strains the already burdened local water and wastewater systems. Licensed operator retention, wastewater sludge disposal, and chemical treatment are additional expenses that have significantly increased in recent years for many municipal water and wastewater systems. These are common themes occurring nationwide but is especially true in Western Massachusetts, where industries such as paper mills once dominated Franklin County.

The Franklin Regional Council of Governments (FRCOG) is a voluntary membership organization serving the twenty-six towns in Franklin County. FRCOG advocates on behalf of and provides various services for its member communities to improve municipal government functions, such as this water and wastewater system study. The intent of this study is to assess existing public water and wastewater infrastructure through direct communications with public-owned districts or departments serving Franklin County communities. Operator feedback is used to evaluate the status of each system with respect to capacity, broad physical condition, performance issues, operational challenges, and risk and resiliency vulnerabilities to climate change hazards like flooding and drought. A broad list of system tasks and associated costs, and recommendations are provided in this report to better position Franklin County communities to plan for long term improvements to ensure sustainable systems, assess the potential for collaboration to share services and/or assets, and pursue potential funding sources for implementation.

Section 2 focuses on the County's Wastewater Systems and Section 3 focuses on the County's Water Systems. Each sub section within Section 2 and 3 is specific to each system, incudes a description of existing conditions, a review of information gathered during interviews with operators, and a list of anticipated needs/associated costs.

Opinion of probable costs have been developed for the studies, analyses, construction, and other remedial measures identified in our survey of existing facilities. The probable construction costs are an approximation based on limited investigations and our experience on other similar sized projects and are not based on detailed quantity takeoffs or designs. Further detailed investigations, capital improvement plans (CIPs) and asset management plans (AMPs) need to be completed to better define needs, and the results may impact the actual construction costs. The estimates include costs for engineering, permits and contingencies where applicable. Tasks that likely could be carried out by the Owner are noted to be "Self Performed". Items which should be carried in the Town's annual maintenance budget are excluded.

Tasks listed are divided into three categories: immediate tasks, short-range tasks and long-range tasks.

- **Immediate tasks** are those which may be required to address safety concerns, permit conditions, sanitary survey conditions, consent orders, or other reasons and are expected to be completed within 1 year.

- **Short-range tasks** are higher priority tasks that the Owner should include in budget development for the near future (typically 1-5 years).

- **Long-range tasks** are lower priority tasks where conditions do not currently warrant immediate action, but will require attention in the future (typically 6-20 years). The priority of the long-range tasks may increase if conditions worsen.

It is important to understand that it is the Owner's responsibility to maintain an up-to-date Capital Improvements Plan and/or Asset Management Plan and to evaluate the costs and risks of each task in those plans.

The Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 18R-97 includes Estimate Classes with varying levels of accuracy ranging from Class 1 to Class 5, as detailed in Table 1-1 below. As a project becomes more defined, the cost estimate class decreases, along with the expected accuracy range. For purposes of this conceptual level evaluation, the cost estimates generated in this report are considered to be Class 5 (-50% to +100%). Additional costs are added to all estimates to account for the variability of planning level costs. Although these cost ranges may appear significant, it should be noted that current supply chain issues and bidding climate volatility have introduced further variabilities and uncertainty to the preparation of cost estimates. For the purpose of this report, a 40% engineering and contingency factor is applied to most recommendations to account for these variabilities. Costs will require further evaluation during project design and implementation to confirm sufficient funding is budgeted to complete the proposed work.

TABLE 1-1
AACE Estimate Classes[1]

Estimate Class	Purpose Estimate/Project Phase	Expected Accuracy Range
Class 5	Concept/Screening	-50% to +100%
Class 4	Study/Feasibility	-30% to +50%
Class 3	Budgeting	-20% to +30%
Class 2	Preliminary Bid	-15% to +20%
Class 1	Final Bid	-10% to +15%

[1] AACE International Recommended Practice No. 18R-97 Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for The Process Industries

In summary, Franklin County, like other regions, requires major upgrades, ongoing maintenance, and ongoing and changing operation costs. About $123.6 million and $175.6 million dollars in recommended work, over a 20-year study period, are identified for the Franklin County Water and Wastewater Systems, respectively. Figures 1.1 and 1.2 presents an overview on water and sewer systems financial needs and Sections 2 and 3 provides specific recommended work. Each Pie chart identifies the approximate percentages of various types of work for water and sewer systems. Changing regulatory needs, environmental changes, industry changes, as well as aging infrastructure all contribute to the overall needs of Water and Wastewater Systems to be able to continue to operate effectively.

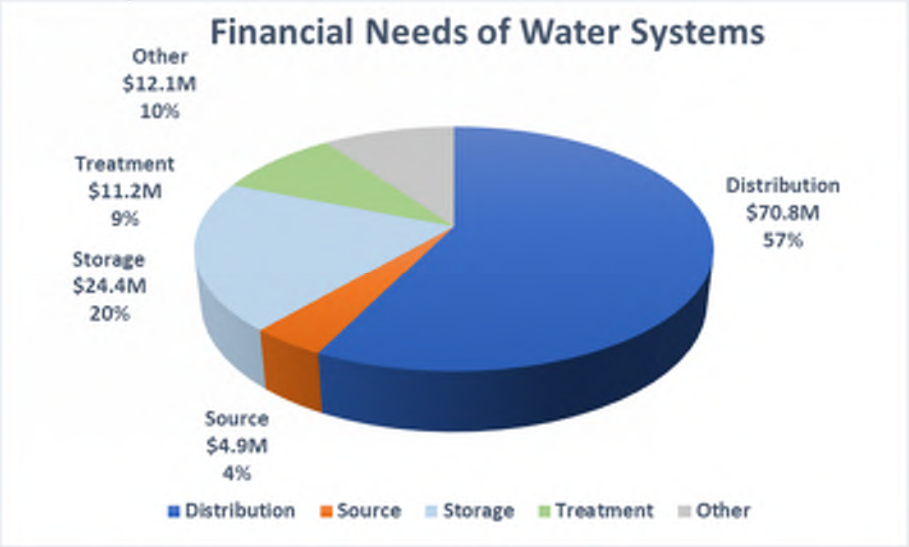

Figure 1.1 – Overview on Franklin County Water Systems Financial Needs

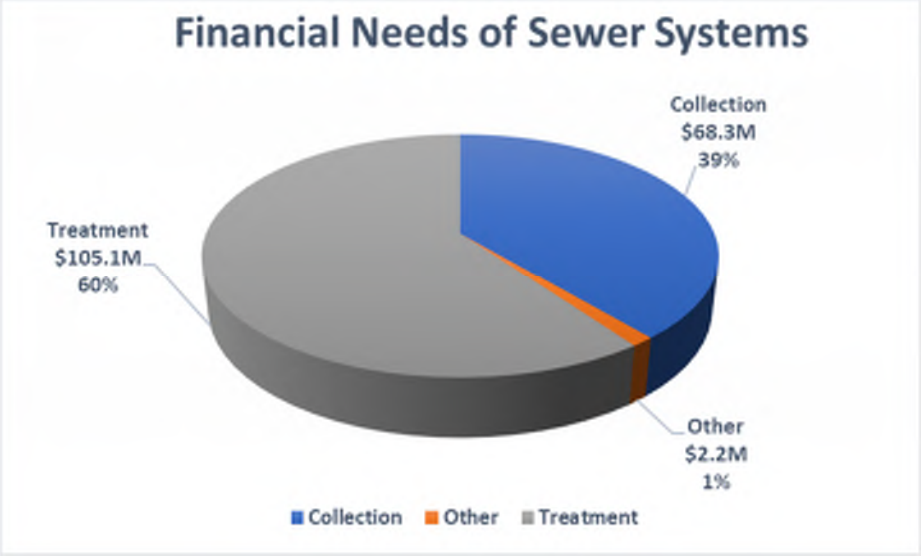

Figure 1.2 – Overview on Franklin County Sewer Systems Financial Needs

Section 6

Conclusions

6 Conclusions

6.1 Summary

Half (13) of Franklin County's twenty-six City and Towns have public sewer systems (Deerfield has two and Erving has three public wastewater systems). Shelburne Falls and Buckland share a regional wastewater system. Colrain (Griswoldville) has a private wastewater system which is not a part of this evaluation.

More than half (15) have public water systems (Colrain, Deerfield, Montague and Whately have two public water systems). Shelburne Falls and Buckland share a regional water system. Northfield has a private water system (East Northfield Water Company) which is not a part of this evaluation.

Document review and operator feedback was used to evaluate the status of each system with respect to capacity, broad physical condition, major performance issues and operational challenges, and risk and resiliency vulnerabilities against climate change hazards like flooding and drought. It is important to note that many communities have reported a lack of resources and capacity to undertake all work in addition to operating the systems, however, are continuously seeking ways to become more efficient and creative in keeping up with ongoing demands. A broad list of recommendations for improvements and associated costs were provided in this report with some common ongoing regulatory type requirements:

- System specific projects were identified through document review and operator feedback
- It may be possible for the systems to "Self Perform" (and many are) some work to reduce estimated costs or complete at a reduced cost
- Systems need to maintain up-to-date Capital Improvements Plans and/or Asset Management Plans and update periodically.
- Whether a major vertical asset such as a water or wastewater treatment facility or pump station has recently been constructed or upgraded in the past few years or the last 30 years, such assets are anticipated to require a major overhaul or replacement within the next 20 years.
- Horizontal assets such as water mains and sewer collection systems have a typical service life of 75 to 120 years or longer depending on multiple factors (materials, subsurface conditions etc.). For the purposes of this evaluation, it is assumed that 10% of the system piping will require replacement in the next 20 years.
- Water or Wastewater Treatment Facility Operation and Maintenance (O&M) manual is either not developed or out-of-date
- Water distribution system or wastewater collection system O&M manual is either not developed or out-of-date

- Water and sewer mapping is either not available or out-of-date. Available mapping generated as part of this study is included in Appendix A and B.
- Water and sewer rate evaluations should be completed and updated periodically to manage budgets
- Water storage tanks require inspection and/or have identified deficiencies
- Water conservation efforts are required and/or leak detection to reduce per capital usage or address unaccounted for water
- Emergency Response Plans and Source Protection Plans require updates
- The hiring and retaining of licensed operators is an issue identified by several water and wastewater systems. As with many industries today, the workforce is aging and retiring. As licensed, experienced operators are in demand, staff are more likely to be attracted to other communities/systems offering better salary/benefits or career opportunities. At the same time, MassDEP has minimum staffing thresholds, which can increase the pressure to attract and retain operators for small systems. Ensuring access to operator training and promotion of training to prospective workers is needed to expand the licensed labor pool to fill vacant positions and meet system staffing needs. As these positions are essential and competitive to fill, creative strategies to attract and retain operators are needed. For example: a campaign could be developed to encourage employment in this industry to high school, vocational school and community college students and to promote training options for license certification and career pathways. Better awareness of organizations such as Mass Rural Water Association, Western Massachusetts Water Works Association, Massachusetts Water Works Association, and New England Water Environment, all of which provide resources and training, might be able to help with these initiatives. Another strategy could include systems exploring different collaborative models to meet staffing needs.
- An issue identified by multiple wastewater systems is related to sludge. Sludge is the residual material from wastewater processing which requires disposal. Typically, sludge is hauled to disposal facilities that have capacity. There are few facilities that will receive sludge in southern New England and they require the material to meet certain standards. The cost of trucking and disposal is a major expense for these systems. Equipment and systems to dewater/dry sludge, or breakdown the material like an anaerobic digester, are a significant investment. Strategies to ensure that local systems can address sludge is vital. Systems should continue to explore working collaboratively to address sludge issues in the county and greater western Massachusetts region.
- The development and update of important elements for effective and efficient operations (beyond capital construction projects) were identified for many systems evaluated in this study. These include: developing or updating plans and studies (such as CIP, AMP, and rate studies); developing and/or maintaining GIS; and adopting new technology to support advanced monitoring of systems. Supporting access to grants or other financial resources is needed to increase staff capacity and/or procure professional services to accomplish these important tasks. In addition, systems should explore opportunities to share expenses or cooperatively purchase equipment (such as back-up generators or other equipment) or services to reduce costs.

- With climate change, greater frequency and severity of extreme weather patterns is expected. The creation of CIPs and similar plans and designs for facility improvements, must seriously consider climate resiliency implications when being developed. Facilities will need to withstand both high precipitation events and more severe flooding as well as increased drought in the near term and over the long term.

Some of the recommendations require systems to address issues individually, such as searching for new groundwater source or performing a capital improvements plan, and could benefit from working with non-profit groups like the Mass Rural Water Association, RCAP Solutions, or private engineering firms to complete these task. Some issues may need to utilize a more creative or regionally collaborative approach.

Budgetary conceptual level Class 5 cost estimates have been included in accordance with the Association for the Advancement of Cost Engineering (AACE) International Recommended Practice No. 18R-97. A breakdown of budgetary costs for the recommended work for each public wastewater and water system broken down by task categories is tabulated below.

Public Wastewater System	Immediate Tasks	Short-term Tasks	Long-term Tasks	Total
Ashfield	$110,000	$301,000	$4,440,000	$4,851,000
Charlemont	$124,000	---	$5,160,000	$5,284,000
Deerfield	$155,000	$448,000	$18,730,000	$19,333,000
Erving	$155,000	$560,000	$32,800,000	$33,515,000
Gill	$110,000	$92,000	$440,000	$642,000
Greenfield	$155,000	$1,430,000	$22,300,000	$23,885,000
Monroe	$110,000	$10,000	$4,360,000	$4,480,000
Montague	$145,000	$1,410,000	$26,550,000	$28,105,000
Northfield	$130,000	$450,000	$11,400,000	$11,980,000
Orange	$145,000	---	$19,320,000	$19,465,000
Shelburne/Buckland	$130,000	$980,000	$9,940,000	$11,050,000
Sunderland	$130,000	$140,000	$12,710,000	$12,980,000
TOTAL	**$1,599,000**	**$5,821,000**	**$168,150,000**	**$175,570,000**

Public Water System	Immediate Tasks	Short-term Tasks	Long-term Tasks	Total
Ashfield	$110,000	$10,000	$785,000	$905,000
Bernardston	$130,000	$335,000	$5,750,000	$6,215,000
Colrain Fire District	$142,000	$111,000	$2,150,000	$2,403,000
Colrain – Griswoldville	$100,000	$47,000	$1,090,000	$1,237,000
Deerfield Fire District	$120,000	$268,000	$3,580,000	$3,968,000
Deerfield – S. Deerfield WSD	$155,000	$30,000	$9,770,000	$9,955,000
Erving	$120,000	$80,000	$2,480,000	$2,680,000
Gill	$100,000	---	$880,000	$980,000
Greenfield	$130,000	$75,000	$34,030,000	$34,235,000
Monroe	$100,000	$865,000	$1,298,000	$2,263,000
Montague – Center	$110,000	$363,000	$854,000	$1,327,000
Montague – Turners Falls	$145,000	$196,000	$15,460,000	$15,801,000
Northfield	$110,000	$5,000	$2,700,000	$2,815,000
Orange	$355,000	$3,720,000	$13,030,000	$17,105,000
Shelburne/Buckland	$60,000	$2,090,000	$6,210,000	$8,360,000
Sunderland	$145,000	$760,000	$4,410,000	$5,315,000
Whately	$120,000	$585,000	$5,290,000	$5,995,000
TOTAL	**$2,252,000**	**$9,540,000**	**$109,767,000**	**$121,559,000**

For three communities lacking public sewer (Bernardston, Colrain and Conway) and three lacking public water (Charlemont, Conway and Erving), we have examined the prospect of developing new systems.

New Public Sewer Systems:

- Bernardston Center Village – A wastewater system serving Bernardston Center Village will be challenging due to poor soils proximate to the proposed service area, however, a 2009 study did identify one parcel with variable soils which could be considered further. A preliminary service area was identified covering 42 residential properties and 16 commercial properties requiring an average wastewater flow capacity of 45,000 gpd. Preliminary Project OPCC for the recommended approach is $10,300,000.

- Colrain Village – As previously examined in a 2014 study, a wastewater system serving Colrain Village would include a gravity collection system in the service area, a sewer pump station and force main to transfer sewage to the nearby Griswoldville Wastewater System. A preliminary service area was identified covering 55 residential and commercial properties requiring an average wastewater flow capacity of 17,000 gpd. Preliminary Project OPCC is $9,800,000.

- Conway Center – A feasibility study was completed in 2017 for a wastewater system serving Conway Center including the identification of a suitable subsurface disposal area. In order to keep costs low, the wastewater feasibility committee considered a preliminary service area covering 30 residential and commercial properties requiring an average wastewater flow capacity of 9,900 gpd. Preliminary Project OPCC is $2,300,000.

New Public Water Systems:

- Erving Center – Both surface water and groundwater sources were considered along with a potential interconnection with the Town of Orange. While locating an adequate groundwater sources may be challenging following review of hydrogeological mapping, recommendations included further exploration work at two Town-owned parcels on Swamp Road and Mountain Road. Assuming an adequate groundwater source can be identified, we identified a preliminary service area covering approximately 250 parcels requiring an average water flow capacity of 58,000 gpd. Preliminary Project OPCC for the recommended approach is $16,800,000.

- Charlemont Historic Village Center – Preliminary review of hydrogeologic mapping indicates that suitable groundwater supplies may be located along the Deerfield River if large enough parcels can be procured to fully contain a Zone 1 protection area. Recommendations included further exploration work to locate a suitable groundwater supply. Assuming an adequate groundwater source can be identified, we identified a preliminary service area covering approximately 100 parcels requiring an average water flow capacity of 23,000 gpd. Preliminary Project OPCC for the recommended approach is $7,300,000.

- Conway Center – Preliminary review of hydrogeologic mapping indicates that suitable groundwater supplies may be located along the South River, however there may not be any vacant parcels that can be procured to fully contain a Zone 1 protection area. Recommendations included further exploration work to locate a suitable groundwater supply. Assuming an adequate groundwater source can be identified, we identified a preliminary service area covering approximately 60 parcels requiring an average water flow capacity of 14,000 gpd. Preliminary Project OPCC for the recommended approach is $5,300,000.

6.2 GIS Mapping

Mapping of the water and wastewater systems is a crucial part of overall asset management. It provides the initial spatial data required in order to begin evaluating condition of piping, structures, and facilities so that capital improvement plans can be

developed, and communities can become more proactive with ongoing maintenance as opposed to reactive when problems arise. Additionally, MassDEP requires mapping updates to facilitate ongoing Infiltration and Inflow studies, lead pipe joint removal work, etc. As part of this study, Tighe & Bond has collected available data in multiple formats and assembled it in a consistent GIS format. The data varies by community with some having detailed information such as pipe size, material, vertical information, valve locations, etc., to having little detail and lines on a map showing the general extent of the pipe service area.

6.3 Project Funding

The costs identified in this study are substantial. Some of the costs may be borne by the annual department budgets or defrayed by self-performance. Some may be financed as part of the capital plan. Some funding sources that may be available for water and sewer systems include the following (as tabulated and described in greater details below):

WASTEWATER FUNDING OPPORTUNITIES

- **Massachusetts DEP**
  - Clean Water State Revolving Fund (CWSRF)
  - Asset Management Planning Grant Program
  - Community Septic Management Program
- **Massachusetts Community One Stop Program**
  - MassWorks Infrastructure Program Grant
  - Rural Development Fund
  - Massachusetts Downtown Initiative Program
- **USDA Rural Development Loans and Grants**
  - Water and Waste Disposal Loan and Grant Program
  - Special Evaluation Assistance for Rural Communities (SEARCH Grants)
  - Pre-Development Planning Grants (PPG Grants)
  - Circuit Rider Program - Technical Assistance for Rural Water Systems
- **USEPA**
  - Water Infrastructure Finance and Innovation Act (WIFIA)
  - Hardship Grants Program for Rural Communities
- **US Department of Housing and Urban Development**
  - Community Development Block Grants (CDBG)
- **Other**
  - Betterment Assessments
  - Betterment Loans to Homeowners
  - Management Districts
  - Tax Base

DRINKING WATER FUNDING OPPORTUNITIES

- **Massachusetts DEP**
  - Drinking Water State Revolving Fund (DWSRF)
  - Asset Management Planning Grant Program
- **Massachusetts Division of Conservation Services**
  - Drinking Water Supply Protection Grant Program (DWSP)
- **Massachusetts Community One Stop Program**
  - MassWorks Infrastructure Program Grant
  - Rural Development Fund
  - Massachusetts Downtown Initiative Program
- **USDA Rural Development Loans and Grants**
  - Water and Waste Disposal Loan and Grant Program
  - Special Evaluation Assistance for Rural Communities (SEARCH Grants)
  - Pre-Development Planning Grants (PPG Grants)
  - Household Water Well System Grants
  - Circuit Rider Program - Technical Assistance for Rural Water Systems
- **USEPA**
  - Water Infrastructure Finance and Innovation Act (WIFIA)
- **US Department of Housing and Urban Development**
  - Community Development Block Grants (CDBG)
- **Other**
  - Betterment Assessments
  - Management Districts
  - Tax Base

- Drinking Water State Revolving Fund (SRF) Projects - These funds are used for public drinking water projects. The Massachusetts Clean Water Trust (the Trust), in partnership with the MassDEP provides cities and towns of the Commonwealth with low interest rate loans for water infrastructure projects. These programs provide state-administered below market rate financing for the construction of publicly owned drinking water system projects. Projects to be financed are selected using a priority ranking system based upon the public health and environmental protection benefits of the proposed projects. Projects receiving financial assistance from the DWSRF will be eligible for loans at 2% interest.

- Clean Water State Revolving Fund (SRF) Projects - These funds are used for public sewer projects. The Massachusetts Clean Water Trust (the Trust), in partnership with the MassDEP provides cities and towns of the Commonwealth with low interest rate loans for wastewater infrastructure projects. These programs provide state-administered below market rate financing for the construction of publicly owned water pollution abatement facilities (e.g., a public sewer) and implementation of non-point source management projects. Projects to be financed are selected using a priority ranking system based upon the public health and environmental protection benefits of the proposed projects. Projects receiving financial assistance from the CWSRF will be eligible for loans at 2% interest.

- Asset Management Planning Grant Program - The Massachusetts Clean Water Trust (the Trust) and the Massachusetts Department of Environmental Protection (MassDEP) will provide up to $ 2 million in grant funds to qualifying applicants for

the preparation of Asset Management Plans (AMP) for existing water infrastructure that includes either one, two or all three of the following: drinking water, wastewater and stormwater systems. The Trust will provide a grant award of $150,000 or 60% of eligible project cost, whichever is less. The eligible entities will provide the remaining amount with both In-Kind Services (IKS) and a capital contribution.

- USDA Rural Development Loans and Grants USDA's Office of Rural Development has several programs that assist very small, financially distressed rural communities to extend and improve water and waste treatment facilities that serve local households and businesses.

    - Water and Waste Disposal Loan and Grant Program provides funding for clean and reliable drinking water systems, sanitary sewage disposal, sanitary solid waste disposal, and storm water drainage to households and businesses in eligible rural areas (populations of 10,000 or less).

    - Special Evaluation Assistance for Rural Communities (SEARCH Grants) may be used for predevelopment planning costs associated with construction or improvement of rural water or sanitary sewage facilities for communities with populations under 2,500 and median household income below poverty line or less than 80% of the statewide non-metropolitan median household income.

    - Pre-Development Planning Grants assists low-income communities having populations of 10,000 or less and median household income below poverty line or less than 80% of the statewide non-metropolitan median household income with initial planning and development of applications for USDA Rural Development Water and Waste Disposal direct loan/grant and loan guarantee programs.

    - Circuit Rider Program - Technical Assistance for Rural Water Systems - This program provides technical assistance to rural water systems that are experiencing day-to-day operational, financial or managerial issues. Rural water system officials may request assistance from the Rural Utilities Service, or Rural Utilities Service staff may request assistance on behalf of the system.

- Massachusetts Community One Stop Program - Designed to simplify access to 12 of the most popular integrated grant programs across several state entities with one online location, allowing applicants to be considered for multiple grant programs simultaneously.

    - MassWorks Infrastructure Program Grant –This program provides the largest and most flexible source of capital funds to municipalities and other eligible public entities primarily for public infrastructure projects that support and accelerate housing production, spur private development, and create jobs throughout the Commonwealth. Grants are typically around $1.0 million, but can be up to $8.0 million.

- Rural Development Fund – This program was established for community and infrastructure development needs in small towns and rural municipalities. Scores higher if project creates or supports housing. Eligible population <7,000 or population density <500/sq mi. Grants in this category will likely be $50,000 to $400,000.

- Massachusetts Downtown Initiative Program – This program provides technical assistance by consultant teams with expertise in effective strategies to stabilize business districts. There is no direct funding available through this program as applicants will be matched with consultant team(s).

- Water Infrastructure Finance and Innovation Act (WIFIA) - The Water Infrastructure Finance and Innovation Act of 2014 (WIFIA) established the WIFIA program, a federal credit program administered by EPA for eligible water and wastewater infrastructure projects. Minimum project size for small communities (population of 25,000 or less) is $5 million.

- Community Septic Management Program, MassDEP - This program provides funding of up to $200,000 in the form of low-cost loans to allow communities to devise a Community Inspection Plan or a Local Septic Management Plan in a designated management zone. Both plans must include provisions for financial assistance to homeowners using betterment agreements. Local inspection plans are created to protect environmentally sensitive areas from contamination, while septic management plans help identify areas that need monitoring and maintenance.

- Betterment Assessments - If the Town constructs a public water or sewer system, it could be partially funded by creating a Water or Sewer District, which would collect a special assessment tax based on the "betterment" of the site since it will have access to public water or sewer. Betterment assessments are a form of taxation, and, until paid, constitute a lien upon the land assessed. Service by a public water system is an improvement over on-site private wells. Service by a public sewer is an improvement over on-site wastewater disposal (e.g. septic systems). The betterment assessment is a one-time special tax that can be paid in one lump sum or apportioned up to a maximum of twenty years. Those property owners who did not pay in full at the time the betterment is assessed have the remainder of their assessments amortized over twenty years at a rate of 2% interest added annually to the unpaid balance.

- Betterment Loans to Homeowners can be issued after a community has adopted an inspection or management plan of its own and has been awarded the loan amount to provide financial assistance to homeowners within the community. A Betterment Agreement between the community and a homeowner may be used for all costs necessary to repair or replace a failed septic system including:

  a. renovating the existing system;

  b. hooking-up to existing sewer lines;

c. or replacing traditional septic systems with an approved Title 5 alternative system.

- Community Development Block Grants - The Massachusetts Community Development Block Grant Program is a federally funded, competitive grant program designed to help small cities and towns meet a broad range of community development needs. Assistance is provided to qualifying cities and towns for housing, community, and economic development projects that assist low and moderate-income residents. CDBG funds can be explored for septic system repairs and upgrades to income qualified homeowners.
- Hardship Grants Program for Rural Communities - Designed to complement the Clean Water State Revolving Fund, the EPA Hardship Grants Program for Rural Communities helps towns of fewer than 3,000 people plan, design, and construct publicly owned treatment works or alternative wastewater services such as on-site treatment systems. These funds can also be used to provide training, technical assistance, and educational programs on the operation and maintenance of wastewater treatment systems.
- Management districts are legal, geographic areas that are established to carry out environmental work, such as funding and building infrastructure improvements, managing infrastructure or programs, or providing other environmental protection services.
- Tax Base – Town could consider town-wide increase in property taxes to help support the project.