SANITARY SEWER COLLECTION SYSTEM IMPROVEMENTS

PRELIMINARY ENGINEERING REPORT

for the

BOOTHBAY HARBOR SEWER DISTRICT

BOOTHBAY HARBOR, MAINE

MAY 2019

WRIGHT-PIERCE
Engineering a Better Environment

BOOTHBAY HARBOR SEWER DISTRICT, MAINE

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SECTION 1
PROJECT PLANNING

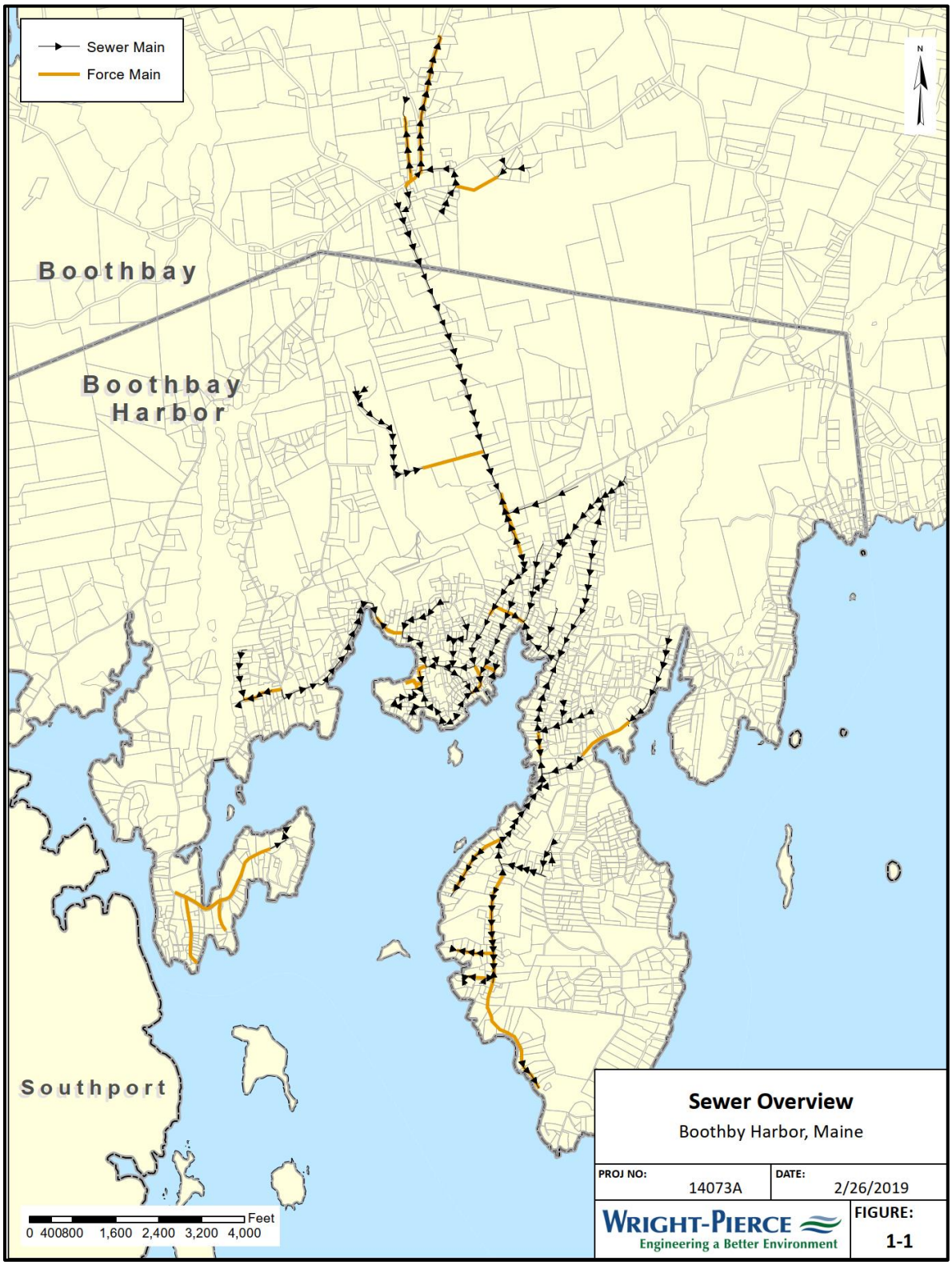
1.1 GENERAL

The Boothbay Harbor Sewer District (District) has retained Wright-Pierce to prepare a Preliminary Engineering Report (PER) to evaluate and provide recommendations on proposed improvements to select portions of the District's sanitary sewer collection system in the Town of Boothbay Harbor. This PER was written in conjunction with an Environmental Assessment Report (EA) entitled Sanitary Sewer Collection System Improvements Environmental Review Report for the Boothbay Harbor Sewer District. The EA is referenced throughout the PER to reduce redundancy and minimize repetition between the reports.

1.2 LOCATION

The Boothbay Harbor Sewer District sanitary sewer collection system serves a mix of residential and commercial sewer users in the Town of Boothbay Harbor. The sewer system is outlined in Figure 1-1.

FIGURE 1-1
SANITARY SEWER COLLECTION SYSTEM



1.3 ENVIRONMENTAL RESOURCES PRESENT

The District has prepared an Environmental Review (ER) entitled Sanitary Sewer Collection System Improvements Environmental Review Report for the Boothbay Harbor Sewer District as well as this Preliminary Engineering Report (PER). Please refer to the ER for more detailed information on environmental resources present in or adjacent to the project planning area and the impacts of the proposed project on those resources.

It should be noted, however, that the proposed project will take place entirely within the road right-of-way and existing permanent sewer easements. Therefore, little to no impact on land resources, historic sites, endangered species, or critical habitats is expected. Figures 1-2 and Figure 1-3 in Appendix A show the FEMA 100-year floodplain based on the listed Base Flood Elevations (BFE) for the area in relation to the proposed work.

Figures 1-4 and Figure 1-5 includes the soil classifications for the proposed project area. No wetlands or important farmland are expected to be impacted by the proposed project.

1.4 POPULATION TRENDS

The proposed sewer system improvements include relining existing sewers and an increasing the size (which will increase flow capacity) and extent of the sewer system on Ocean Point Road to accommodate current minimum design standards and fully projected build-out of the area. The projects are located within well-developed portions of the Town and includes residential and business property components. According to the State of Maine Office of Policy and Management census data, the population in the Town has been declining since 2000. Based upon U.S. Census date, the population in Boothbay Harbor had remained relatively constant from the 1950s through 2000, but has declined 7.2% since 2000. The Maine State Planning Office (created in 2013), projects that the 2020 population and 2030 populations will also decrease below current levels as well. See Table 1-1 below for historical and projected population trends for the Town of Boothbay Harbor.

Despite negative population trends, the District is still obligated to treat municipal wastewater in the most cost effective way possible. This entails brining exisiting sewer up to minimum design standards, and eliminating inflow and infiltration where possible to increase reliability of the entire

system. Where the potential for growth and new sewered users exist, the District also extends the sewer to serve areas that were not previously sewered .

TABLE 1-1
TOWN OF BOOTHBAY HARBOR, MAINE POPULATION TRENDS

Year	1950[1]	1990[1]	2000[1]	2010[1]	Current 2014[2]	Projection 2022[3]	Projection 2032[3]
Population	2,290	2,347	2,334	2,165	2,170	1,840	1,541
Percent Change from Previous Period (%)		+2.4	-0.6	-7.2	+0.2	-15.2[4]	-28.9[4]

(1) Source: State of Maine Office of Policy and Management. http://www.maine.gov/economist/census/index.shtml
(2) Source: Annual Estimates of the Resident Population for Incorporated Places: April 1, 2010 to July 1, 2014".
(3) Estimate. Source: State of Maine Office of Policy and Management. http://www.maine.gov/economist/projections/index.shtml
(4) Percent change based calculated based upon 2014 population estimate.

1.5 COMMUNITY ENGAGEMENT

As part of the Environmental Review process, the Boothbay Harbor Sewer District held a public hearing for the proposed projects on January 7, 2019. The public hearing will serves as a means to notify the community of the intended project and to seek input from the community. A successful project will require input and approval from the community that the project will benefit. The community's engagement is a critical component of the process. The Town Code Enforcement Officer has also issued a statement that the projects are in compliance with the Town's Comprehensive Plan. In addition, several State and local agencies have already been contacted and will provide feedback on the proposed project.

SECTION 2
EXISTING FACILITIES

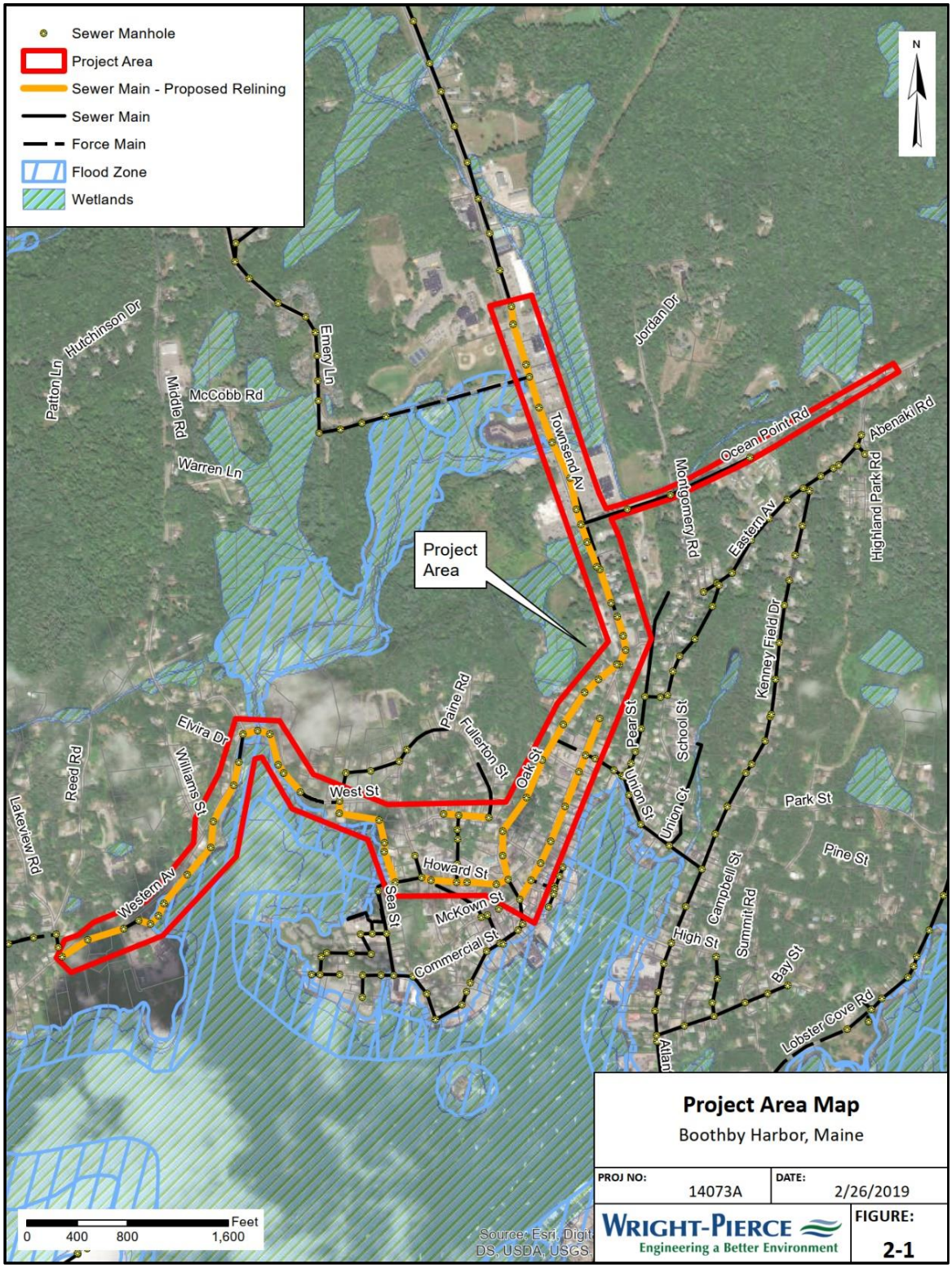
The Boothbay Harbor Sewer District owns and operates the Boothbay Harbor Sewer District WWTF at 27 Sea Street in the Town of Boothbay Harbor. The WWTF is licensed to provide secondary level treatment to a monthly average of 0.64 million gallons per day (MGD) of wastewater via activated sludge treatment process using Sequencing Batch Reactors. Treated flows are provided with chlorine disinfection before they are discharged to the Atlantic Ocean through the WWTF outfall pipe. Wastewater biosolids are separated and dewatered via centrifuge and hauled away to a privately-owned facility that composts the dewatered biosolids.

The District's 15-mile sewer collection system conveys raw wastewater to the Boothbay Harbor Sewer District WWTF via gravity flow and pressure discharge from 20 pump station throughout the collection system. The sewer system pipes consist of a mix of asbestos-cement (AC) and polyvinyl chloride (PVC) sewer pipes ranging in age from over 50 years old to less than 5 years old. Sewer manholes are a mix of brick and motor and precast concrete construction materials. The range of manhole ages corresponds to that of the sewer collection system pipes.

2.1 LOCATION MAP

Figure 2-1 includes a site location map of the proposed project areas.

FIGURE 2-1: PROJECT AREA MAP



2.2 HISTORY

The portions of the sewer collection system evaluated for upgrades in the PER were mostly constructed in the mid-1960s and early 1970s and have not undergone any major upgrades since their original installation.

2.3 CONDITION OF EXISTING FACILITIES

The identified portions of the sewer collection system have reached the end of their expected useful life. These sewer segments have experienced continued deterioration over time that is typical of sewers of this vintage. This has led to excessive I/I entering the sewer though, cracks, leaks and offset joints. Given their age, it is expected that these pipes will continue to deteriorate over time, increasing the risk of structural failures in the near future.

2.4 FINANCIAL STATUS OF EXISTING FACILITIES

The District has a total FY 2018 operating budget of $1,406,654, of which $269,665 is for annual debt service payments. Budgetary income and expenditures are described further in Section 6 of this report. A copy of the current budget is included in Appendix A of this report, along with a copy of the post-construction revenue projection.

The District income for FY 2018 was $1,563,813 in sewer user fees and other income from approximately 1,131 residential users, 458 commercial users, and 17 governmental users, and the Boothbay Region Water District (filter backwash from the water treatment plant). A copy of the current rate schedule is also included in the Appendix A.

2.5 WATER / ENERGY / WASTE AUDITS

There were no water, energy or waste audits completed as part of this project.

SECTION 3
NEED FOR PROJECT

3.1 HEALTH, SANITATION, AND SECURITY

The Town of Boothbay Harbor relies on the scenic beauty of Boothbay Harbor to attract visitors that provide a major portion of the income for local businesses during the summer season. Keeping Boothbay Harbor clean is key to the community's continued economic success and maintaining public health. The Boothbay Harbor Sewer District provides wastewater collection and treatment services that, in part, keep Boothbay Harbor clean and enjoyable for the entire community and visiting tourists. The proposed sewer system upgrades will allow the District to continue this mission into the future.

3.2 AGING INFRASTRUCTURE

As previously mentioned, the identified portions of the sewer collection system have reached the end of their expected useful life and are contributing significantly to excessive I/I in the collection system. Without providing upgrades to these sewer segments in the near future, it is expected that these pipes and manholes will continue to deteriorate, likely exacerbating the excessive I/I problem in the collection system and increasing the risk of structural failure in the near future.

3.3 REASONABLE GROWTH

The proposed sewer system improvements include an increase in the size of the sewer system on Ocean Point Road to accommodate current minimum design standards and an extension of the sewer to accommodate full projected build-out of the area. New users connected to the sewer system will also provide increased revenue for the District to help finance the additional debt service associated with the sewer extension on Ocean Point Road.

SECTION 4
ALTERNATIVES CONSIDERED

4.1 DESCRIPTION

There are two alternatives to be considered for the proposed sewer system improvements:

- Do nothing.
- Perform the recommended sewer system upgrades.

The do nothing alternative is not considered a feasible alternative as it will not address aging sewer system components or I/I-related issues resulting from deteriorating pipes and manhole structures. Without remediation work, the identified age-related sewer system deficiencies in these areas will only become worse, further jeopardizing the District's ability to continue providing safe, reliable wastewater collection and treatment services. Therefore, this alternative is eliminated from further consideration.

The recommended alternative is to perform the proposed sewer system upgrades as detailed in Section 5.3.

4.2 DESIGN CRITERIA

Portions of the New England Interstate Water Pollution Control Conference (NEIWPCC) Technical Report No. 16—Guides for the Design of Wastewater Treatment Works, 2011 Edition as Revised in 2016 (TR-16) are applicable to the preliminary project design.

For sewer pipes, the following sections of the TR-16 design standards are applicable:

2.2.2 Design Period

"In general, wastewater collection systems should be designed for a life span of 50 years, and interceptor sewers should be designed to handle the maximum 50-year build-out tributary population. Communities should plan ahead for repair or replacement after 50 years of use. Consider the maximum capacity of uses such as institutions and industrial parks."

2.3.1 Minimum Size

"No public gravity sewer should be less than 8 inches in diameter (200mm)."

2.3.2 Depth

"In general, sewers should be deep enough to drain basement fixtures and to prevent freezing. Provide insulation for sewers that cannot be placed deep enough to prevent freezing."

2.3.5.3 Slope Between Manholes

"Sewers should be laid out with a uniform slope between manholes."

2.3.8 Materials

"Sewer pipe materials include vitrified clay, cast iron, and asbestos concrete, which are typically found in older systems, but should not be used in the design of new systems…"

For sewer system manholes, the following sections of the TR-16 design standards are applicable:

2.4.1 Location

"Manholes should be installed at the end of each line; at all changes in grade, size, or alignment; and at all pipe intersections. Distances between manholes should not be greater than 400 feet (120 m) for sewers measuring 15 inches (375 mm) or less in diameter, or 500 ft (15 m) for sewers 18–30 inches (450 to 750 mm) in diameter. Distances up to 600 ft (183 m) may be approved in cases where adequate modern cleaning equipment is provided…"

2.4.2 Drop Type

"Provide a drop pipe for a sewer pipe with an invert entering a manhole more than 24 inches (61 cm) above the manhole invert…"

2.4.3 Diameter

"The minimum diameter should be 48 inches (122 cm) for standard manholes and 60 inches (153 cm) for inside drop manholes. Structure openings and manhole

frame and cover dimensions should be coordinated as appropriate for ease of access and to suit applicable regulations and/or requirements of the state in which the work is to be performed. Larger openings should be provided for manholes that house equipment."

2.4.4 Materials

"Manholes should be precast concrete with barrel sections, cones, and bases manufactured in compliance with ASTM C478, and should have gasketed joints. Manholes can also be poured-in-place concrete…"

4.3 MAP

Figure 1 in Appendix A shows the areas of the sewer system that have been identified for rehabilitation by relining and Figure 2 in Appendix A outlines the extent of the proposed sewer extension on Ocean Point Road. Figures 3 and 4 show the anticipated soil classifications for the proposed Ocean Point Road Sewer Extension area and the relining work areas, respectively.

4.4 ENVIRONMENTAL IMPACTS

No prime farmland, important farmland, or prime forest lands are present in the project area. The proposed project will be constructed within the public right-of-way or on land/easements owned by the District. No wetlands will be directly impacted as part of the project, though it was noted that national wetlands inventory mapping indicates an estuarine, intertidal and marine wetland (National Wetlands Inventory Code: E2US2N) to the south of the project site. This wetland is greater than 75-feet from the proposed project site and the Maine Department of Environmental Protection has confirmed that no wetland permits will be required for the work.

The project site is located within the Town's Shoreland Zone, and a portion of the sewer system on Western Avenue is located within the 100-yr floodplain according to the FEMA BFEs for the area. Buried sewer pipes and manholes are not considered critical assets in terms of floodproofing requirements. However, appropriate local permits and approvals will be obtained for the project and the design will meet all local Shoreland Zoning requirements. The proposed work within the 100-year floodplain zone is expected to provide further protection from flood impacts on the sewer

system by reducing I/I from leaks, cracks and offset joints in the sewer pipes and manholes. Best Management Practices will be carried out during construction to ensure that equipment and materials are not stored in the 100-year floodplain and that the duration and extent of construction activities in this area are minimized to the greatest extent practical.

4.5 LAND REQUIREMENTS

All of the proposed work is located within the existing public road right-of-way or on permanent sewer easements owned by the District.

4.6 POTENTIAL CONSTRUCTION PROBLEMS

There are no major construction problems anticipated the project. There is somewhat limited access and space on some streets within the densely urban portion of the downtown village area. Good project planning should mitigate access or constructability issues at these locations. Coordination with business owners and residents will be key during construction in order to ensure a satisfactory project outcome for all parties. Construction-related disruptions to businesses and traffic flow will be minimized to the greatest extend practical. To avoid disruptions during the busy summer periods, construction activities will be limited to the shoulder seasons, after Columbus Day in October and before Memorial Day in spring.

4.7 SUSTAINABILITY CONSIDERATIONS

4.7.1 Water and Energy Efficiency

The proposed sewer collection system work will not significantly affect water or energy efficiency, except that reducing I/I flows to the facility result in less influent and treatment pumping and disinfection chemical costs overall.

4.7.2 Green Infrastructure

Green infrastructure was not included in the scope of the proposed upgrades to the sewer collection system.

4.8 COST ESTIMATE

Cost estimates for the Ocean Point Road Sewer Extension upgrade were obtained during the preliminary design phase in 2018. Table 4-1 shows the estimated construction cost for the Ocean Point Road Sewer Extension.

TABLE 4-1
OCEAN POINT ROAD SEWER EXTENSION CONSTRUCTION COST ESTIMATE

DESCRIPTION	UNITS	UNIT TOTAL	UNIT PRICE	TOTAL COST
Mobilization/Demobilization	LS	1	$13,000	$13,000
Replacement of Unsuitable + Backfill	CY	200	$25	5,000
Excavation Below Grade + Backfill	CY	200	$35	7,000
Ledge Excavation	CY	150	$250	37,500
8-inch PVC SDR 35 pipe	LF	2,675	$110	294,250
6-inch PVC sewer service	LF	306	$80	24,480
2-inch HDPE force main	LF	25	$75	1,875
Relocate existing water main	LF	25	$200	$5,000
Pipe Insulation	LF	155	$10	$1,550
Remove/Dispose AC Pipe	LF	130	$40	$5,200
Abandon sewer pipes & structures	LS	1	$2,000	2,000
4-ft Precast Concrete Manholes	VF	113	$600	67,800
Manhole Drop Connection with Drop Bowl	VF	8	$250	2,000
Placement and Removal of Temp Pave.	TON	150	$150	22,500
Pavement Binder	TON	431	$125	54,000
Pavement Wearing	TON	108	$135	14,600
Driveway Aprons (hand placed)	TON	16	$200	3,300
Traffic Control	LS	1	$25,000	25,000
Test Pit Excavation	EA	10	$800	$8,000
Loam/Seed	LS	1	$10,000	$10,000
Construction - Subtotal				**$597,000**
Project Multiplier - Design Contingency			1.05	
Construction - Total				**$627,000**

According to Table 4-1 the Ocean Point Road Sewer Extension construction cost is estimated to be $627,000. This cost does not include land acquisition, legal, engineering or financing expenses. For a total project cost including those additional expenses, refer to Section 6.

Conceptual construction cost estimates for sewer relining on several streets throughout the collection system are summarized in Table 4-2. This cost does not include land acquisition, legal,

engineering or financing expenses. For a total project cost including those additional expenses, refer to Section 6. CIPP costs are assumed to include traffic control, reinstatement and grout sealing of services, end sealing at manholes, and contractor mobilization/demobilization.

TABLE 4-2
SEWER RELINING CONSTRUCTION COST ESTIMATE

DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	TOTAL COST
Giles Place				
CIPP Lining, 10" Pipe	LF	264	$55	$14,520
Bypass Pumping	LS	1	$2,500	$2,500
Howard Street				
CIPP Lining, 14" Pipe	LF	457	$70	$31,990
Bypass Pumping	LS	1	$2,500	$2,500
Mill Cove X-Country				
CIPP Lining, 10" Pipe	LF	733	$55	$40,315
Bypass Pumping	LS	1	$5,000	$5,000
Oak Street				
CIPP Lining, 8" Pipe	LF	961	$50	$48,050
CIPP Lining, 14" Pipe	LF	1047	$70	$73,290
Bypass Pumping	LS	1	$10,000	$10,000
Route 27				
CIPP Lining, 8" Pipe	LF	2824	$50	$141,200
CIPP Lining, 12" Pipe	LF	142	$60	$8,520
Bypass Pumping	LS	1	$15,000	$15,000
Townsend Avenue				
CIPP Lining, 8" Pipe	LF	1645	$50	$82,250
Bypass Pumping	LS	1	$7,500	$7,500
West Street				
CIPP Lining, 8" Pipe	LF	379	$50	$18,950
Bypass Pumping	LS	1	$2,500	$2,500
Western Avenue/Lakeview Road				
CIPP Lining, 8" Pipe	LF	1110	$50	$55,500
CIPP Lining, 10" Pipe	LF	2179	$55	$119,845
Bypass Pumping	LS	1	$20,000	$20,000
Subtotal Construction				**$700,000**
Project Multiplier - Design Contingency			1.15	
Estimated Construction Cost				**$805,000**

SECTION 5
SELECTION OF AN ALTERNATIVE

5.1 LIFE CYCLE COST ANALYSIS

A life-cycle cost analysis for the rehabilitation or direct replacement of the existing sewer system components was not performed as all technically feasible alternatives considered were the same or similar technology. The only significant difference between the considered alternatives was the installed cost, with rehabilitation of the existing sewers being more cost-effective than direct replacement.

5.2 NON-MONETARY FACTORS

Several non-monetary factors were considered while evaluating rehabilitation and/or replacement technologies alternatives:

- Feasibility to implement technology
- Effectiveness of technology to solve sewer system issues
- Longevity provided to sewer system by the technology
- Impacts to public/public perceptions

5.3 SELECTED ALTERNATIVE

The following describes the sewer rehabilitation and/or replacement technologies considered and the selected alternative for each sewer collection system section evaluated.

5.3.1 Ocean Point Road Sewer Replacement & Extension

Replacement of the existing 6-inch diameter gravity sewer with new 8-inch sewer along Ocean Point Road is the only feasible alternative since 6-inch diameter gravity sewer is smaller than minimum recommended design standards for new gravity sewer mains.

Extension of the gravity sewer was the selected alternative as the do nothing alternative is considered unacceptable in terms of providing sewer service to residents currently on septic

systems along Ocean Point Road and to future sewer users at the fully projected buildout for this area.

5.3.2 Proposed Sewer Rehabilitation Areas

Rehabilitation of the existing gravity sewers on Giles Place, Howard Street, Oak Street, Townsend Avenue, West Street, Western Avenue, Maine State Route 27 and a portion of cross-country sewer along Mill Cove is preferred over complete replacement because relining would be the more cost-effective means to achieve the I/I reduction goals than complete sewer replacement. Complete sewer replacement would also be much more disruptive to the Boothbay Harbor downtown commercial district and local business owners. Preliminary CCTV data indicates that relining would be technically feasible in the proposed sewer rehabilitation areas and the pipes appear to be in acceptable structural condition to allow for relining. Therefore, the selected alternative is to rehabilitate the existing sewers via cast-in-place pipe (CIPP) relining methods.

SECTION 6
PROPOSED PROJECT

The proposed project encompassed all recommended upgrades. Given the specialized nature of the proposed CIPP relining work and the District's desired project schedule, two construction contracts are recommended. One construction contract would include sewer relining and the other sewer replacement and extension work on Ocean Point Road. The Ocean Point Road sewer project is expected to occur in the fall of 2019 through the spring of 2020, and the relining projects in 2020 or 2021.

6.1 PRELIMINARY PROJECT DESIGN

Sewer System Upgrades

Sewer pipes and manholes in the identified areas will be replaced or rehabilitated in accordance with the selected alternatives in Sections 5.3.1 and 5.3.2.

Sewer Extension: Upsize existing 6-inch diameter gravity sewer on Ocean Point Road and extending sewer to intersection of Eastern Avenue.

6.2 PROJECT SCHEDULE

A preliminary project schedule for the design and construction of the proposed sewer system upgrades is summarized in Table 6-1, pending funding approval.

TABLE 6-1
PRELIMINARY WWTF & PUMP STATION PROJECT SCHEDULE

ITEM	APPROXIMATE DATE
Ocean Point Road Sewer Extension	
Preliminary Design	Summer 2018
Final Design	Fall/Winter 2019 through Winter 2019.
Bidding	May 2019
Construction	October 2019 – May 2020
Sewer System Relining	
Preliminary Design	2019
Final Design	2019
Bidding	May 2020
Construction	October – December 2020

6.3 PERMIT REQUIREMENTS

No local building permits are expected. No wetland permitting will be required and the site is greater than 75-feet from the nearest wetland.

Portions of the sewer system identified for upgrades are within the downtown business district of the shoreland zone, therefore a shoreland zoning permit for no. 21D (Other essential services) of the Town's Land Use Code Table 1 for Land Uses in the Shoreland Zone. Wright-Pierce will confirm with the Town's code enforcement officer prior to construction and submit permits as required. Shoreland zoning permits expire 12 months after the issue date.

A MEDOT road location and opening permits will be required for sewer replacement on Ocean Point Road within the road right-of-way and will be submitted prior to construction.

6.4 SUSTAINABILITY CONSIDERATIONS

6.4.1 Water and Energy Efficiency

The proposed sewer collection system work will not significantly affect water or energy efficiency, except that reducing I/I flows to the facility result in less influent and treatment pumping and disinfection chemical costs overall.

6.4.2 Green Infrastructure

Green infrastructure was not included in the scope of the proposed upgrades to the sewer collection system.

6.5 TOTAL PROJECT COST ESTIMATE (ENGINEER'S OPINION OF PROBABLE COST)

Construction cost estimates will be developed for the sewer relining work during the preliminary design phase. During final design, a more thorough construction cost estimate will be developed as well. For the purposes of this report, a planning level cost estimate for construction was included in Section 4.

A cost estimate for the Ocean Point Road Sewer Extension construction contract has been developed and is included in Section 4.

The total project cost (capital) estimates include the cost for material and equipment as well as direct and indirect labor cost. The conceptual level cost estimates include mobilization/demobilization, contractor's overhead and markup, construction contingency, technical services, materials testing, administrative costs, and financing costs. These costs may change during design depending on the negotiated scope of work included and unanticipated conditions encountered during final design. The total project cost estimate for the Ocean Point Road Sewer Extension and the sewer relining work is summarized below in Table 6-2.

TABLE 6-2
RECOMMENDED PROJECT UPGRADES COST ESTIMATE

	USDA RD Loan/Grant
Ocean Point Road Sewer Extension	
Construction Bid Price	$627,000
Construction Contingency (5%)	$32,000
Total Construction Cost	**$659,000**
Technical Services (22%)	$136,000
Materials Testing (included in Tech. Services)	-
Legal / Administrative	-
Sub-total	**$795,000**
Interim Interest (2%)	$15,900
Total Project Cost	**$810,900**
Sewer Collection System Relining	
Construction Bid Price	$805,000
Construction Contingency (5%)	$40,000
Total Construction Cost	**$845,000**
Technical Services (15%)	$120,000
Materials Testing (included in Tech. Services)	-
Legal / Administrative (District Funds)	-
Sub-total	**$965,000**
Interim Interest (2%)	$19,300
Total Project Cost	**$984,300**
Total Project Cost (both projects)	**$1,795,200**

The District has requested USDA Rural Development funds for the Ocean Point Sewer Extension at this time and expect to request funds for the Sewer Collection System Relining project at a later date.

6.6 ANNUAL OPERATING BUDGET

6.6.1 Income

The District's sewer rate schedule is $112.50/quarter for up to 900 CF. For every 100 CF above that amount, it is an additional $12.50/100 CF. Sewer usage by type, actual usage volume and usage projections are summarized in Table 6-3.

TABLE 6-3
SEWER USAGE BY TYPE

Type of User	Number of Users	Actual Usage last 4 Qtrs (cf)	Projected Users	Projected Annual Usage (cf)	Projected Annual Usage (Mgal)
Residential	861	3,084,896	867	3,213,881	24.0
Residential (Seasonal)	359	1,001,301	359	1,001,301	7.5
Commercial	452	3,828,200	452	3,828,200	28.6
Commercial (Seasonal)	33	1,103,302	33	1,103,302	8.2
Governmental	9	173,212	9	173,212	1.3
Total	1,714	9,190,911	1,720	9,319,896	69.7

Annual income is summarized in Table 6-4 below. Annual income is expected to increase by roughly $60,000 after construction of the Sanitary Sewer Collection System Improvements project, due to increased annual user fees and income from additional sewer users.

TABLE 6-4
ANNUAL OPERATING BUDGET

Income	Most Recent Audit (2018)	Projected Amount (post construction)
Annual User Fees (metered)	$1,425,118	$1,472,147
Annual User Fees (unmetered)	$37,270	$38,870
Connection/Tap Fees	$15,252	$20,000
Interest	$10,486	$13,150
Readiness to Serve / Debt Service Charge	$11,740	$13,420
Other (Septage)	$63,947	$66,057
Total Income	$1,563,813	$1,623,644

6.6.2 Annual O&M Costs

Projected O&M expenditures are summarized in Table 6-5. While the proposed sewer system upgrades project will marginally reduce maintenance costs, the changes are not expected to have a significant impact on the District's overall O&M budget.

TABLE 6-5
ANNUAL O&M EXPENSES

Annual O&M Costs	Most Recent Audit (2018)	Projected Amount (post construction)
Salaries	$305,557	$324,233
Benefits (Health Ins, Pension, Etc.)	$128,000	$142,350
Accounting / Auditing	$5,045	$5,500
Legal	$12,718	$20,000
Utilities	$78,470	$85,462
Insurance	$23,419	$24,000
Misc. Office Expenses	$20,787	$36,309
Repairs / Maintenance	$279,892	$301,500
Testing / Monitoring	$15,947	$16,000
Chemicals	$21,442	$22,100
Supplies	$24,779	$25,200
Professional / Contract Services	$47,624	$52,000
Sludge Disposal	$38,474	$50,000
Other	$2,784	$8,000
Total O&M Cost	**$1,004,938**	**$1,112,654**

6.6.3 Debt Repayment

The District's annual debt is summarized in Table 6-6. The District's existing wastewater bonds with USDA Rural Development and the Maine Municipal Bond Bank are shown in the District's 2018 Audit. The proposed funding for this project is through USDA Rural Development. The District has preliminary numbers from USDA for funding is at their current interest rate of 3.325% and term of 40 year.

TABLE 6-6
ANNUAL DEBT SERVICE AND RESERVE COSTS

Debt Service & Reserves	Most Recent Audit (2018)	Projected Amount (post construction)
Bond Reserve Account	$55,993	$74,212
Interest	$76,058	$79,142
Payment to USDA Loans	$65,328	$101,842
Payments to Other Loans	$253,092	$279,775
Total Debt Service & Reserves	**$450,471**	**$534,971**

6.6.4 Reserves

Debt Service Reserve – The District's existing loans, as well as the proposed loan, do require a debt service reserve. However, it is good financial practice to maintain an adequate debt service reserve, and the District has established just such a reserve.

Short Lived Asset Reserve – Replacement costs for short lived assets maintained by the District's sewer department are listed in Table 6-7.

TABLE 6-7
SHORT LIVED ASSETS

	Expected Useful Life (in years)	Estimated Replacement Cost	Annual Reserve
Office/Plant Computers	1 to 5	$39,000	$7,800
Gas Meters	1 to 5	$3,000	$600
Lab Equipment	1 to 5	$5,000	$1,000
Tools	1 to 5	$8,000	$1,600
		Subtotal 5-year assets	$11,000
Portable Trash Pumps	5 to 10	$4,500	$450
Chemical Feed Pumps	5 to 10	$22,000	$2,200
Software (SCADA, GIS, ACCT)	5 to 10	$15,000	$1,500
SBR Equipment	5 to 10	$39,000	$3,900
		Subtotal 10-year assets	$8,050
Compressor	10 to 15	$18,000	$1,200
Collection Sys. Pumps	10 to 15	$66,000	$4,400
Instrumentation	10 to 15	$132,000	$8,800
Vehicles	10 to 15	$164,000	$10,933
Ventilation Fans	10 to 15	$45,000	$3,000
		Subtotal 15-year assets	$28,333
Station Generator	15 to 20	$75,000	$3,750
Station Panels	15 to 20	$300,000	$15,000
		Subtotal 20-year assets	$18,750
		Total Annual Reserve	**$66,133**

SECTION 7
CONCLUSIONS AND RECOMMENDATIONS

The Boothbay Harbor Sewer District should proceed with design and procuring bids for construction of the Ocean Point Sewer project immediately, and the relining project in 2020 when funding is available.

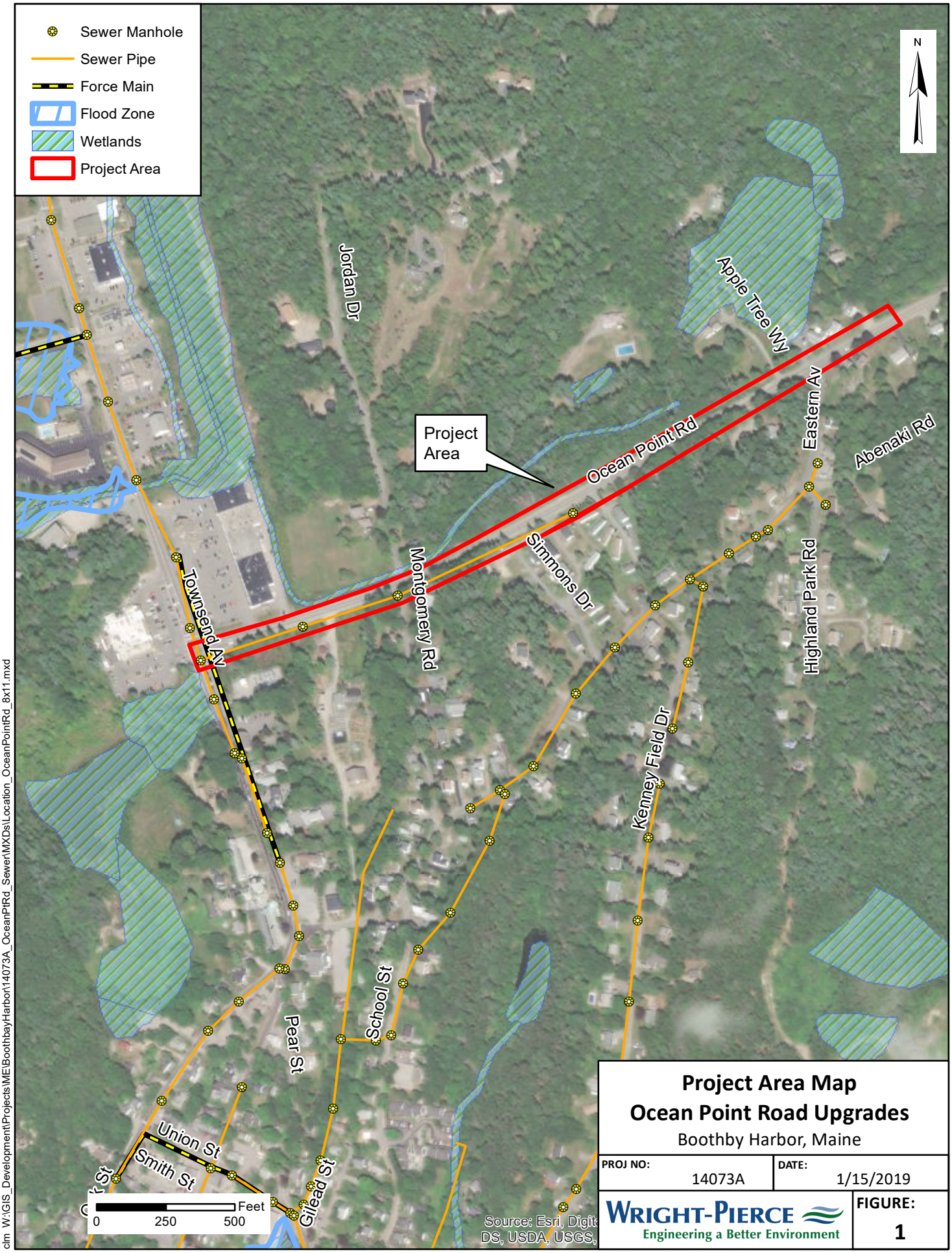
Most of the existing sewer system components in the identified locations have outlived their useful life and present an increased risk of structural failure as time goes on. As well, many of the pipes and manholes have deteriorated significantly and have become a source of excessive I/I in the sewer system.

The proposed sewer system improvements will reduce the risk of structural failure and excess I/I in the collection system over the project planning horizon. The proposed sewer system improvements will also increase the flow capacity of the sewer system on Ocean Point Road to accommodate current minimum design standards and provide an extension of the sewer to accommodate full projected build-out of the area.

This Preliminary Engineering Report (PER) has been prepared to satisfy the requirements for funding by the U.S. Department of Agriculture, Rural Development. This report was prepared in accordance with the RUS Bulletin 1780-2, April 2013. In addition, an Environmental Report (ER) has also been prepared (and submitted separately) to further satisfy the requirements for funding. That report was prepared in accordance with USDA Rural Development Instruction 1970.

APPENDIX A

FIGURES



Project Area Map
Ocean Point Road Upgrades
Boothby Harbor, Maine

PROJ NO:	DATE:
14073A	1/15/2019

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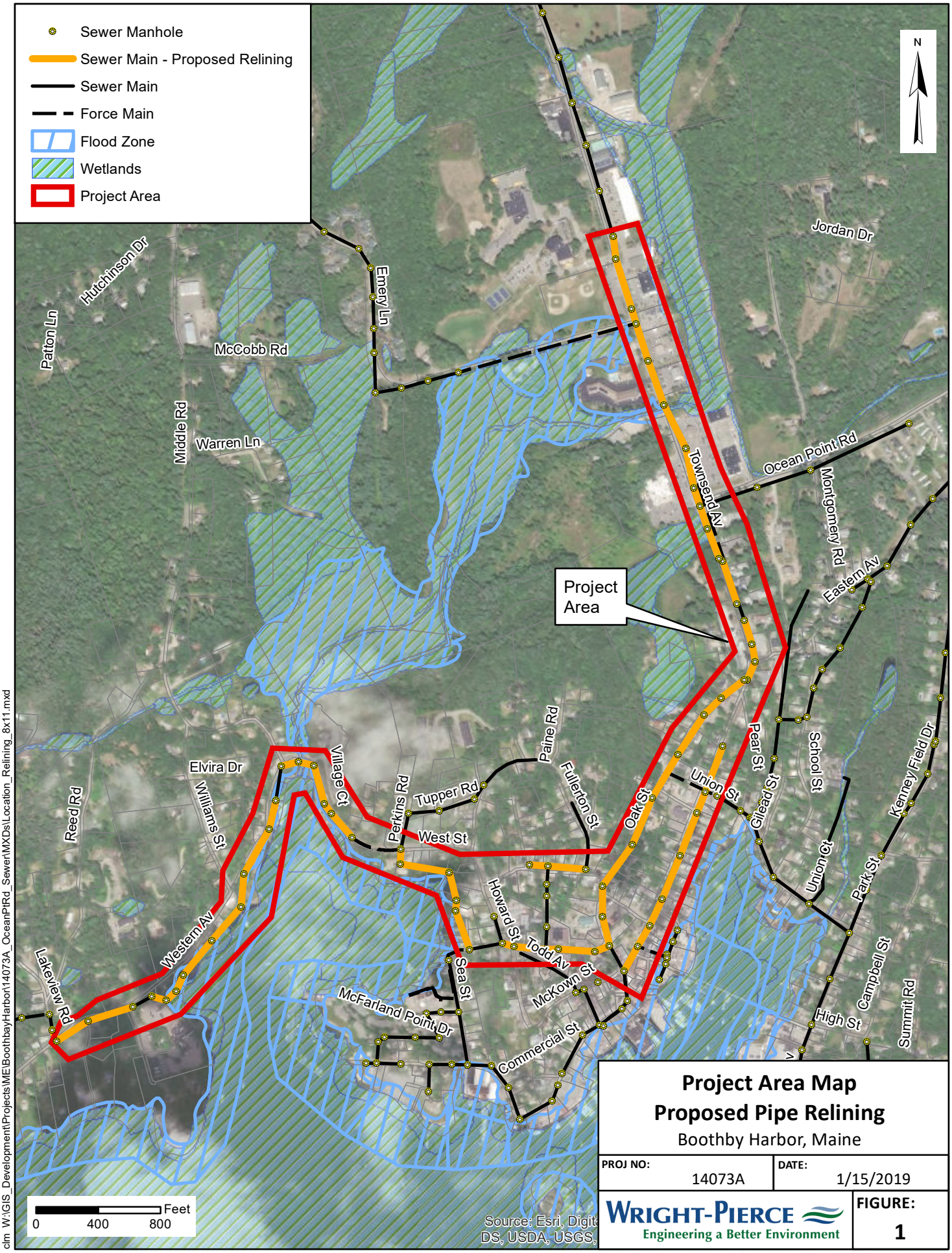
FIGURE: 1

dlm W:\GIS_Development\Projects\ME\BoothbayHarbor\14073A_OceanPtRd_Sewer\MXDs\Location_OceanPointRd_8x11.mxd



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Project Area Map
Proposed Pipe Relining
Boothby Harbor, Maine

PROJ NO:	DATE:
14073A	1/15/2019

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FIGURE: 1

Soil Map
Ocean Point Road Upgrades
Boothby Harbor, Maine

PROJ NO:	DATE:
14073A	1/15/2019

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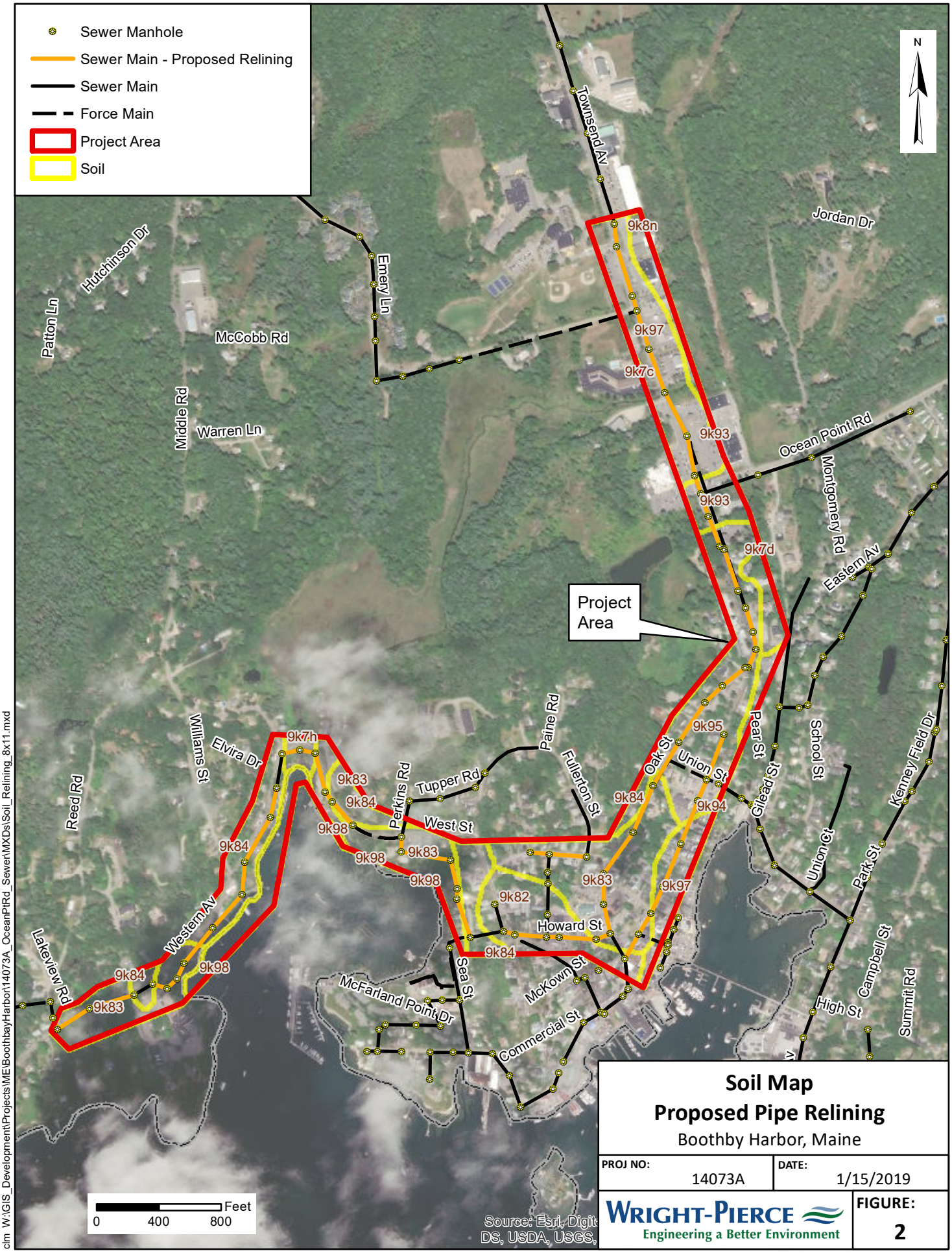
FIGURE: 2

CLM W:\GIS_Development\Projects\ME\BoothbayHarbor\14073A_OceanPtRd_Sewer\MXDs\Soil_OceanPointRd_8x11.mxd



Soil Map
Proposed Pipe Relining
Boothby Harbor, Maine

PROJ NO:	DATE:
14073A	1/15/2019

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FIGURE: 2

dlm W:\GIS_Development\Projects\ME\BoothbayHarbor\14073A_OceanPtRd_Sewer\MXDs\Soil_Relining_8x11.mxd

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
LrB	Lyman-Rock outcrop-Tunbridge complex, 0 to 8 percent slopes	0.8	13.7%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	2.1	33.7%
PbC	Peru fine sandy loam, 8 to 15 percent slopes, very stony	0.3	5.4%
Sw	Swanville silt loam, 0 to 3 percent slopes	2.2	36.6%
TrC	Tunbridge-Lyman complex, 8 to 15 percent slopes, rocky	0.6	10.6%
Totals for Area of Interest		**6.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Bg	Biddeford mucky peat, 0 to 3 percent slopes	0.0	0.0%
BoB	Boothbay silt loam, 3 to 8 percent slopes	1.9	2.2%
Bp	Borosaprists, ponded	1.0	1.1%
LrB	Lyman-Rock outcrop-Tunbridge complex, 0 to 8 percent slopes	8.9	9.9%
LrC	Lyman-Rock outcrop-Tunbridge complex, 8 to 15 percent slopes	25.8	28.7%
LrE	Lyman-Rock outcrop-Tunbridge complex, 15 to 45 percent slopes	13.1	14.5%
My	Medomak silt loam	2.1	2.4%
Sw	Swanville silt loam, 0 to 3 percent slopes	2.7	3.0%
TrB	Tunbridge-Lyman complex, 3 to 8 percent slopes, rocky	0.1	0.1%
TrC	Tunbridge-Lyman complex, 8 to 15 percent slopes, rocky	14.6	16.2%
Ud	Udorthents-Urban land complex	15.3	17.0%
W	Water bodies	4.6	5.1%
Totals for Area of Interest		**90.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

APPENDIX B

FINANCIAL INFORMATION

Boothbay Harbor Sewer District
2019 Sewer Use Rate Schedule
Effective January 1, 2019

1. Wastewater Rates	**Charges FY 2019**
Basic Facilities Charge per REU (BFC)	$112.50 per quarter
Volumetric Rates – ***900 cubic feet*** per quarter minimum	
Metered Single Family Residential	$12.50/100 ft^3/quarter
Metered Multi-Family – per REU	$12.50/100 ft^3/quarter
Unmetered Single Family Residential	$150.44/quarter
Unmetered Multi-Family – per REU	$150.44/quarter/REU
Seasonal Residential Rates Basic Charge per REU	$225.00 per season
Volumetric Rates – ***1800 cubic feet per season*** minimum	
Metered Single Family Residential	$12.50/100 ft^3/season
Metered Multi-Family Residential	$12.50/100 ft^3/season
Unmetered Single Family Residential	$300.88/season
Unmetered Multi-Family – per REU	$300.88/season/REU
Debt Retirement Fee per REU	$225.00/offseason/REU
Commercial Rates Year Round Users (BFC)	
Volumetric Rates– ***900 cubic feet*** per quarter minimum or highest annual quarterly usage multiplied by $0.0625 (50% of the residential rate per 100 ft^3) whichever is higher.	$112.50 per quarter $12.50/100 ft^3/quarter
Commercial Rates Seasonal Facilities (BFC)	
Volumetric Rates	$12.50/100 ft^3/season
Minimum Bill per Quarter: $0.0625 multiplied by the previous Year's highest quarterly usage in ft^3	

Off Season Charges When Closed for Business:
Minimum Bill/season (spring): $0.0625 multiplied by the previous season's usage in ft^3

Ready to Serve Customers	$60.00/quarter

2. Miscellaneous User Fees

Late Payment Fee (31 days or older)	$1.00 (min) or 1.5% Per Month
Water District Water Meter Reading Fee (required all users)	$4.37/qtr/meter
Account Research	$25.00/hr.
Returned Check Fee	$15.00/item
Returned Unclaimed Certified Mail Fee	$10.00/piece
Service Call (not BBHSD responsibility)	$50.00/hr.
Septage Dumping Fee	$0.14/ gal.
Bus Dump Fee (During Work Hours)	$25.00
(After Hours)	$50.00

Lien Fees	As Allowed Per Law
Water Meters (outside watering)	$100.00
(Special order at cost plus shipping)	
Grease Trap Inspection Fee (per inspection)	$50.00/Visit
(follow-up inspection)	$75.00/Visit

3. Account, Connection, and Impact Fees

Wastewater Tap Inspection Fee	$50.00/hr.
Wastewater Tap Follow-Up Inspection Fee	$75.00/hr.
Wastewater Tap Fee (Customer Paid)	Actual Cost
Impact Fees Per REU	
Town of Boothbay	$1000.00
Roads End	$1500.00
Eastern Avenue, Kennyfield Drive	$2500.00
Lobster Cove/Park Street East of Summit Road	$2000.00
Remainder of Boothbay Harbor	$1000.00
Second Structure on same Lot	$ 500.00

4. Project Administration/Inspection Fees

Letter of Intent to Develop - $200.00

Project Administration

- Single Family Residential – 2.0 % of Construction Costs[1]
- Commercial Multi-Family/REU - $100.00/REU
- Minimum Fee $200.00

[1]Based upon current construction and engineering rates

12 Month Wastewater Bond – 10% of Actual Construction Cost of wastewater system

By order of the Board of Trustees: Dated: November 19, 2018

_____ _____ _____

Deryl Kipp, Chairman James Stormont, Treasurer Sam Morris, Clerk

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