westonandsampson.com

55 Walkers Brook Drive, Suite 100
Reading, MA 01867
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REPORT

January 2023

TOWN OF
Marion
MASSACHUSETTS

Comprehensive Wastewater Management Plan (CWMP)
DRAFT APPENDICES

DRAFT

APPENDIX A

Additional Mapping

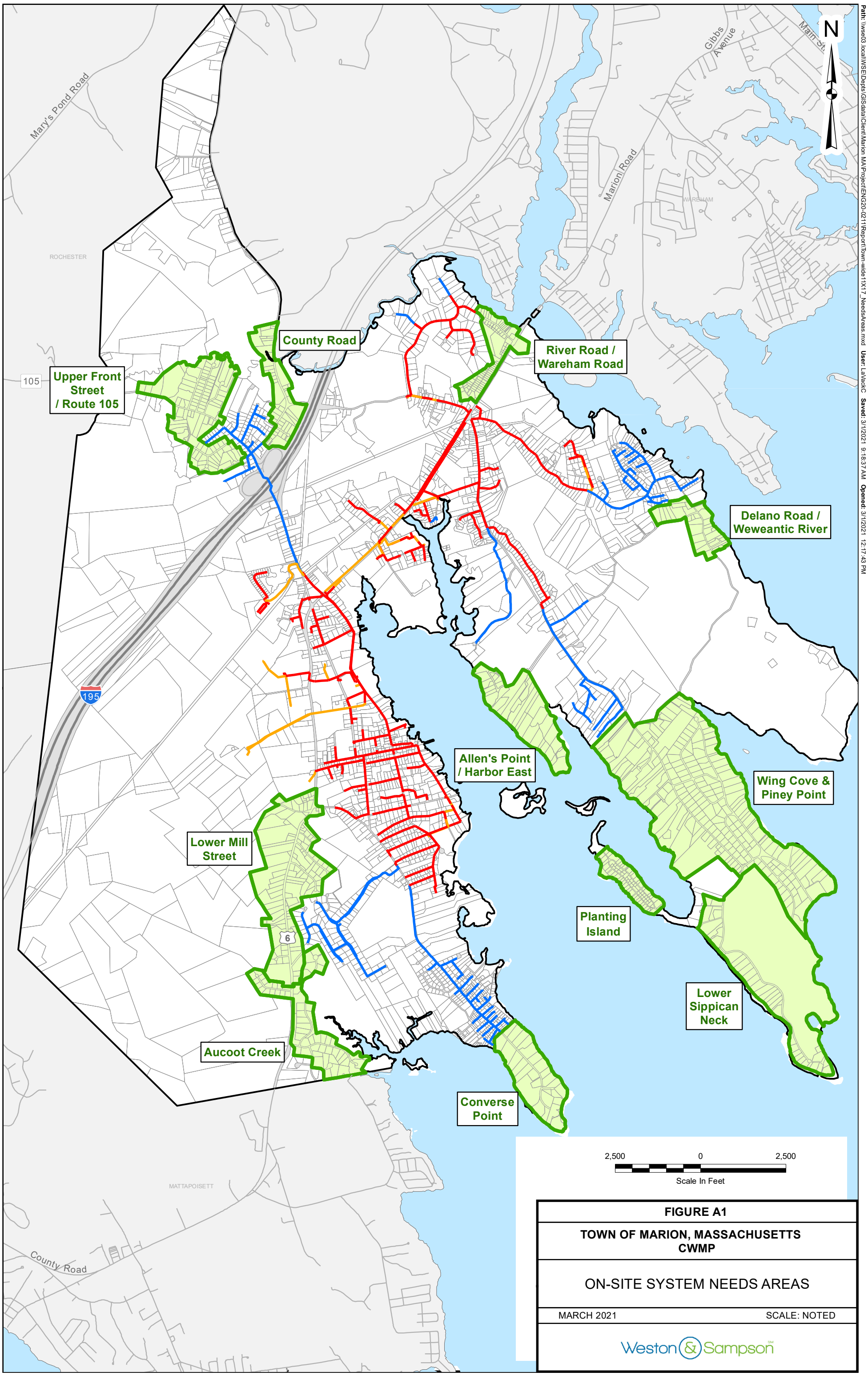

FIGURE A1

TOWN OF MARION, MASSACHUSETTS
CWMP

ON-SITE SYSTEM NEEDS AREAS

MARCH 2021 SCALE: NOTED

Weston & Sampson

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APPENDIX B

Annual Report – Year 2 Sewer Investigation Report

Weston & Sampson

westonandsampson.com

55 Walkers Brook Drive, Suite 100
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REPORT

December 2020

TOWN OF
Marion
MASSACHUSETTS

Year Two – Sewer Investigation

55 Walkers Brook Drive, Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Town of Marion, Massachusetts
Weston & Sampson Job No. ENG20-0477

December 14, 2020

Mr. David Willett, MBA, PE
Director of Public Works
50 Benson Brook Road
Marion, Massachusetts 02738

Re: Year Two – Sewer Investigation Report

Dear Mr. Willett:

Weston & Sampson is pleased to submit this report on the results of the investigation for the Annual Town-Wide Sewer Investigation & Improvement Program. The report presents our findings for work completed under this agreement, including television inspection of sewer lines, topside manhole inspections, a cost-effectiveness analysis, project information updates to the comprehensive sewer database, and continued development of the town's current Geographic Information System (GIS). The report also includes recommendations for sewer system improvements and rehabilitations. Work related to this project was performed in accordance with Department of Environmental Protection (DEP) *Guidelines for Performing Infiltration/Inflow Analyses and Sewer System Evaluation Survey, revised May 2017* (DEP Guidelines).

Project Background

The municipal sewer system in the Town of Marion is comprised of approximately 18 miles of gravity sewer ranging in size from 4-inches to 18-inches in diameter. There is also an additional 16 miles of force mains and low-pressure sewers. In order to protect its substantial investment in sewer infrastructure, the Town of Marion is taking a proactive approach towards operating and maintaining the sewer system and has retained Weston & Sampson to conduct this Sewer System Evaluation Survey (SSES).

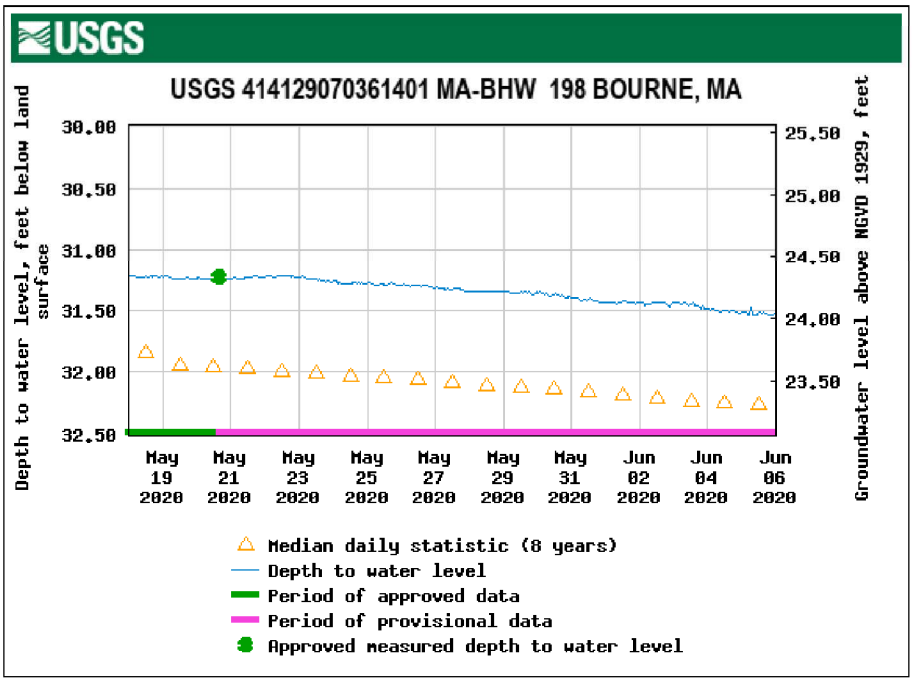
The Year Two Sewer Investigation consists of approximately 10,042 linear feet (lf) of sewers and approximately 51 manholes within subareas F-1, F-2, F-3, F-4, F-5, and F-8 as shown in Figure 1, *Inspection Area Locus Map*. This report presents a cost-effectiveness analysis and preliminary design for the rehabilitation of I/I sources and structural defects that were identified during the investigation. The breakdown of pipe within the project area by length and material is as follows:

Pipe Material	Length (lf)	% of Project Area
Asbestos Cement	1,079	10.7%
Cast Iron	400	4.0%
CIPP Liner	574	5.7%
PVC	3,229	32.2%
Reinforced Concrete	348	3.5%
Vitrified Clay	4,412	43.9%
TOTAL:	10,042	100%

By inspecting every line segment and manhole individually, a record of the condition of the sewers and manholes within the project area can be determined. Over time, a comprehensive record of the entire collection system can be developed. This is a results-driven approach which seeks to maximize the effectiveness of the investigation through not only I/I removal, but total system maintenance and improvement.

Groundwater Levels

According to the USGS groundwater gauge located in Bourne, Massachusetts, groundwater levels during the investigation (May 26 to June 1, 2020) were higher than season averages, as shown below. This data is from a groundwater gauge located outside of Marion and only serves to indicate the general groundwater trends of the region, not the immediate study area. The figure below shows actual groundwater elevations, measured continuously, during the period of investigation (blue trend line) compared to the historical average comprised of median daily statistic levels recorded over the past 8 years (orange triangles).



Given the general groundwater conditions during the majority of the inspections as indicated by the graph above, the Year Two Sewer Investigation was conducted during a period which would allow for the observation of most normally-occurring I/I issues.

Television Inspection

Television inspection is conducted to locate and document defects within the sewer system and to make direct observations of infiltration rates. A closed-circuit "pan and tilt" television camera is used to record the interior condition of each line segment. Wastewater flow is regulated to a depth that allows pipe defects and leaks to easily be observed. Television inspection reports are completed for each segment documenting the location and condition of all pipeline features. The observations recorded in the inspection reports are entered into the project database. This information is used to design the appropriate rehabilitation technique and to determine the cost-effectiveness of rehabilitating the defect.

Under the direction of Weston & Sampson, Truax Corporation performed 9,743 lf of television inspection within the project area. Prior to television inspection, each sewer segment was cleaned by a high-pressure hydraulic sewer cleaner. The television inspections were conducted from May 26 through June 1, 2020.

Observations for each line segment are provided in Table 1, *Television Inspection Summary*. The summary includes an estimated amount of observed infiltration and a list of the specific defects recorded during the inspection. Each sewer segment listed in the *Television Inspection Summary* has been assigned an overall pipe rating of 1 to 5 based on the conditions observed during the inspection. A rating of 1 represents a sewer segment in excellent condition. This rating is typically reserved for recently constructed PVC or lined pipe. A rating of 5 indicates a pipe in very poor condition. This rating system may be used as a quick reference when assessing the overall integrity of a given sewer segment. For this project, however, the preliminary design and recommendations for rehabilitation presented are based solely on the results of the cost-effectiveness analysis.

Approximately 22,176 gallons per day (gpd) of peak infiltration was observed during television inspection. An additional 2,736 gpd of unidentified tap flow was observed as shown in Table 1. Unidentified tap flow is any flow originating from a tap that appears to be infiltration (i.e., clear, continuous flow), but for which a specific defect cannot be observed during the inspection. Probable sources of unidentified tap flow may include but are not limited to: infiltration through cracked or broken lateral pipe, faulty plumbing fixtures, or stormwater or groundwater from illegally connection foundation drains or sump pumps.

Approximately 299 lf of sewers were only partially inspected during the investigation due to the push camera's limited length for inspection and pipeline geometry. These sewer segments that were only partially inspected are listed in Table 2, *Television Inspection Not Completed*. In Figure 2, *Inspection Status*, inspected pipelines are highlighted green, partially inspected pipelines are highlighted yellow, and uninspected pipelines are highlighted red.

Topside Manhole Inspection

Manhole inspections consist of a topside visual inspection of sanitary sewer manholes. Location, diameter, depth, material, casting and cover size, flow estimate, and source of any observed infiltration is recorded for each manhole. The inspections are ideally completed during periods of high groundwater in order to identify all active I/I. The inspection also provides information on structural defects in manholes that should be repaired as part of the town's regular maintenance activities.

Weston & Sampson inspected 47 sewer manholes within the project area on May 26, 2020. An estimated 2,736 gpd of peak infiltration was observed in five manholes and an estimated 3,000 gpd of peak design storm inflow was identified in three manholes. The results of the manhole inspections are summarized in Table 3, *Manhole Inspection Summary*.

Non-infiltration related structural defects were identified in six manholes. Defects include cracked frames and covers and missing benches and inverts. Recommendations for rehabilitation and estimated costs are listed in Table 4, *Manhole Structural Defects.*

Inspections were not performed at four manholes because they could not be located or opened at the time of inspection. These manholes are listed in Table 5, *Manholes Not Inspected.* These uninspected manholes should be located, opened, and inspected. Any necessary rehabilitation could then be added to the scope of the current construction phase. In Figure 2, *Inspection Status,* inspected manholes are highlighted green, manholes that could not be opened are highlighted yellow, and manholes that could not be located are highlighted red.

Database Development and GIS

Weston & Sampson maintains a database in Microsoft Access designed specifically for the management of pipeline and manhole data. The database was developed so that data collected during subsequent investigations can be added and a single, comprehensive sewer system database would be created over the duration of the program. The database contains data fields for sewer system information such as pipe lengths and diameters, street names, and manhole locations, as well as a summary of sewer and manhole inspection results, such as pipe/manhole defects and recommended rehabilitation methods.

Data collected during the Year Two Investigation has been entered into a database and mapping features, such as structure location, structural connectivity, flow direction, pipe length, new manholes, and non-existent manholes, were updated during field investigations as inconsistencies were identified. Updates have been incorporated into Weston & Sampson's GIS. We are available at your convenience to coordinate the edits and provide the updated database. A digital copy of the database is available to the town upon request.

Cost-Effectiveness Analysis

A cost-effectiveness analysis (CEA) was performed for all pipeline and manhole defects to determine the merit of performing a given rehabilitation. The CEA compares the estimated cost for removing I/I to the estimated savings in transportation and treatment (T&T) costs resulting from I/I removal. T&T costs consist of capital expenditures required to expand and upgrade the wastewater system, plus annual operation and maintenance (O&M) costs. O&M costs are directly related to the quantity of flow being discharged to pump stations and treatment facilities.

The present worth of the T&T cost for the Town of Marion was calculated using the town's FY20 O&M and capital costs. In accordance with DEP Guidelines, the present worth of this T&T cost must be extended over the life of the rehabilitation method, estimated at 20 years. The present worth of the T&T costs for the Town of Marion, assuming a 20-year rehabilitation life cycle, is $36.70/gpd. The T&T calculation is provided in Appendix A.

T&T costs can change annually. Therefore, if the recommended rehabilitation program included in this report is not conducted within one-year, Weston & Sampson recommends that the T&T costs be recalculated, and cost-effectiveness of repairs be reevaluated. Typically, when T&T costs increase, the scope of recommended rehabilitations will also increase.

The calculation of T&T costs for a particular I/I source considers only the portion of I/I that can be eliminated through rehabilitation. The percentage of I/I that can be removed depends on both the individual source and the specified repair method. Due to the potential for infiltration to migrate from a repaired defect to a nearby defect that may not have warranted rehabilitation or could not be identified during the inspection, the percentage of removable I/I is typically estimated to be 50 percent. This percentage of I/I reduction is identified in the CEA as "removable" infiltration.

The rehabilitation cost used in the CEA is an estimated value for the construction cost of a given rehabilitation method. Estimated rehabilitation costs are based on prices from recent contracts awarded in this region. The rehabilitation costs listed in this report do not include the cost of additional investigative work or engineering services during design and construction. A list of rehabilitation unit costs used in the CEA is included in Appendix A, *Estimated Unit Costs for Rehabilitation*.

The CEA tables shows the T&T cost associated with the observed infiltration as well as recommended rehabilitation methods and estimated costs. The CEA results in one of four conclusions:

- *Excessive* indicates the cost to rehabilitate the source is less than the associated T&T cost and that the rehabilitation is recommended.
- *Value-Effective* indicates the cost to rehabilitate the source is more than the associated T&T cost, but rehabilitation is still recommended because of the relative value of the repair.
- *Non-Excessive Recommended* indicates the cost to rehabilitate the source is more than the associated T&T cost, but rehabilitation is recommended due to the severity of the defect. These defects are in need of structural repairs and could become sources of infiltration or result in emergency repairs as the condition of the defect continues to degrade.
- *Non-Excessive* indicates the cost to rehabilitate the source is more than the associated T&T cost and rehabilitation is not recommended.

The CEA results for sewer lines and a summary of the recommended rehabilitation costs are provided in Table 6, *Television Inspection CEA.* The CEA results for manholes and a summary of the recommended rehabilitation costs are included as Table 7, *Manhole Infiltration CEA* and Table 8, *Manhole Inflow CEA.* Figure 3, *CEA Results*, show all pipeline and manhole CEA conclusions. Excessive rehabilitations are highlighted green, value-effective rehabilitations are highlighted yellow, and non-excessive recommended repairs are highlighted orange. A summary of the results of the CEA is as follows:

The CEA for sewer pipeline infiltration identified:

- 8,568 gpd of excessive removable infiltration at an estimated rehabilitation cost of $200,070. The associated T&T cost is $314,446.
- 720 gpd of value-effective removable infiltration at an estimated rehabilitation cost of $29,120. The associated T&T cost is $26,424.
- 792 gpd of non-excessive recommended removable infiltration at an estimated rehabilitation cost of $70,650. The associated T&T cost is $29,066.

The CEA for sewer manhole infiltration identified:

- 1,368 gpd of excessive removable infiltration at an estimated rehabilitation cost of $4,440. The associated T&T cost is $50,206.
- 0 gpd of non-excessive recommended removable infiltration at an estimated rehabilitation cost of $855. The associated T&T cost is $0.

The CEA for sewer manhole inflow identified:

- 3,000 gpd of excessive removable peak design storm inflow at an estimated rehabilitation cost of $450.

The above figures total 11,448 gpd of removable peak infiltration and 3,000 gpd of removable peak design storm inflow at an estimated rehabilitation cost of $305,585. The associated T&T cost is $420,142.

In addition, the following maintenance activities and structural repairs are not cost-effective but are recommended and included in the Recommended Rehabilitation Program:

- $400 for topside manhole inspection of four manholes
- $7,800 for structural defects in six manholes

Fat, Oil and Grease Program

During television inspection, evidence of grease was observed in five sewer segments. Line segments observed to contain grease are detailed in Table 9, *Fat, Oil, and Grease Summary*. Significant blockages in lines due to grease diminish the capacity of the line, potentially resulting in sewer system backups and overflows.

The establishment of a Fat, Oil, and Grease (FOG) Management Program will help to prevent discharge of excessive amounts of FOG to the sanitary sewer system, reducing potential risk of sewer backups and overflows. Establishment of a FOG management program includes mandated grease traps/interceptors at all food service facilities, bedded care facilities, hospitals, apartment complexes, and other facilities where significant amounts of FOG are generated. The program would also include inspections of grease traps and interceptors as well as an inspection tracking database. Weston & Sampson is available to discuss the development and establishment of a FOG program at your convenience.

Conclusions

Based on the observations documented during the Year Two – Sewer Investigation, Weston & Sampson has developed a Recommended Rehabilitation Program for identified defects and sources of I/I within the inspected sewer pipelines and manholes. The recommended rehabilitation for each sewer pipeline and manhole is provided in Tables 6, 7, and 8, respectively.

Figure 3, *CEA Results,* show recommended sewer pipeline and manhole rehabilitations. Excessive rehabilitations are highlighted in green, value-effective rehabilitations are highlighted in yellow, and non-excessive recommended repairs are highlighted in orange.

Recommended Rehabilitation Program:

Install cured-in-place pipe (CIPP) in approximately 4,680 linear feet of sewer.

Estimated cost of cured-in-place pipe:	$ 266,840

Install lateral liners at five locations.

Estimated cost of lateral liners:	$ 25,000

Cut seven intruding taps at their connection to the main line.

Estimated cost to cut intruding taps:	$ 5,600

Install a structural short liner in one location.

Estimated cost to install one structural short liner:	$ 2,400

Cementitious lining of six manholes.

Estimated cost for cementitious lining:	$ 5,295

Install inflow dishes in three manholes.
Estimated cost of inflow dishes: $ 450

Replace two manhole frames and covers.
Estimated cost to replace frames and covers: $ 3,000

Build four manhole bench/inverts.
Estimated cost to repair bench/invert: $ 4,800

Perform visual inspection of four manholes not inspected during the investigation.
Estimated cost of manhole inspection: $ 400

Total Estimated Construction Cost:	$ 313,785
Contingency (10% of Construction)	$ 31,379
Total Estimated Project Cost:	**$ 345,164**

The rehabilitation unit prices used to develop these costs are provided in Appendix A. Actual as-bid costs may vary. It is also important to note that pipe condition may degrade between the time of inspection and the time of rehabilitation. Generally, the more time elapses, the greater the chance of pipe degradation.

Funding for this I/I program requires us to tailor the recommended rehabilitations to meet the $133,000 construction budget the town has available in FY2021. We reviewed the above recommended rehabilitations and prioritized it based on severity and the amount of I/I that will be removed from the sewer system. Below are two tables summarizing our recommendations. The first table is the segments to be lined (CIPP) that we recommend moving forward with under the town's existing budget. The second table is the recommended inflow dishes to remove inflow. The remaining repairs will remain in a backlog until funding becomes available.

Cured-in-Place Pipe (CIPP)						
Subarea	Start MH	End MH	Street	Length (LF)	Cost	I/I Removed (GPD)
F-1	015	014	SOUTH STREET	353	$17,650	1,008
F-1	015	017	SOUTH STREET	396	$19,800	720
F-1	143	113	PITCHER STREET	328	$16,400	648
F-2	038	039	FRONT STREET	405	$28,350	936
F-2	039	040	FRONT STREET	250	$17,500	648
F-2	504	038	FRONT STREET	379	$26,530	2,304
			TOTAL:	2,111	$126,230	6,264

Furnish and Install Inflow Dish				
Subarea	MH	Street	Cost	I/I Removed (GPD)
F-1	113	SOUTH STREET	$150	1,000
F-1	277	SOUTH STREET	$150	1,000
F-2	035	PITCHER STREET	$150	1,000
		TOTAL:	$450	3,000

If the town chooses to move forward with the design and construction of the recommended repairs, below is an estimated schedule through construction and final retesting.

Rehabilitation Program Schedule

Design of I/I Rehabilitations	October 2020
Bid and Award	November 2020 through January 2021
Construction	February through March 2021
Retesting and Final Paving	October 2021

Future Work

It is recommended that the town continue with its proactive approach towards inspection and rehabilitation of its sewer system. Annual sewer and manhole inspections ensure that necessary sewer rehabilitation work is identified and implemented on a regular and timely basis to reduce I/I and prevent serious problems requiring costly emergency repairs.

The next phase of investigations could begin with Year Three investigations in the Spring of 2021. The areas to be investigated will be based on the Town-Wide Sewer Investigation & Improvement Program and will include approximately 10,000 linear feet of sanitary sewer and approximately 80 sewer manholes.

We wish to thank you and members of the Public Works Department for the assistance provided to us while completing this project. We are available to meet with you at your earliest convenience to discuss this report. Please do not hesitate to contact me at (978) 532-1900 with any questions or comments you may have.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.

Nathan E. Michael, PE
Team Leader

cc: Frank Cooper, WPCF Manager
Meghan Davis, Engineering Manager

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FIGURES

FIGURE 1 – INSPECTION AREA LOCUS MAP

FIGURE 2 – INSPECTION STATUS

FIGURE 3 – CEA RESULTS

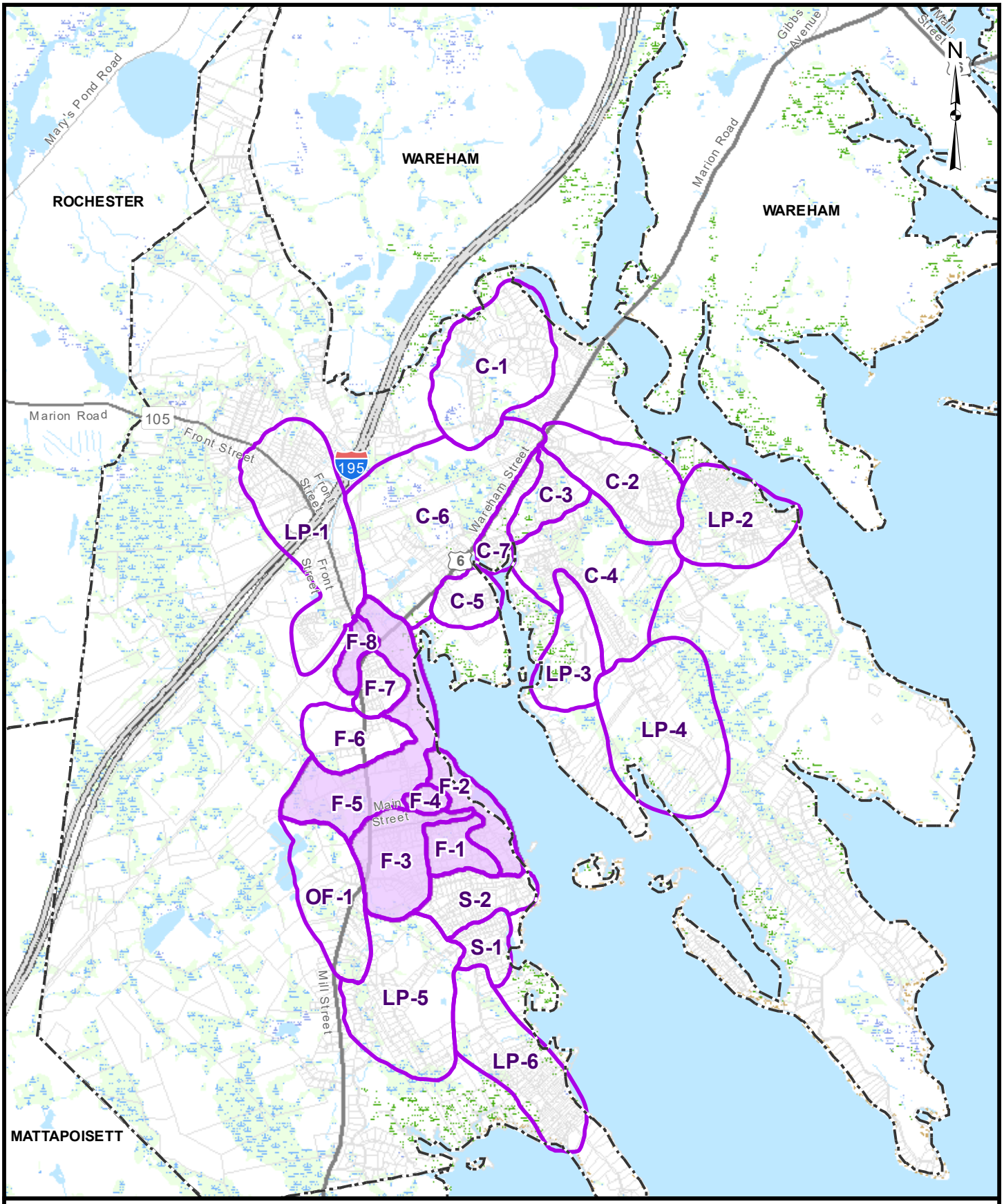

FIGURE 1
TOWN OF MARION, MASSACHUSETTS

INSPECTION AREA LOCUS MAP

Inspection Area

3,500 0 3,500
Feet

Weston & Sampson

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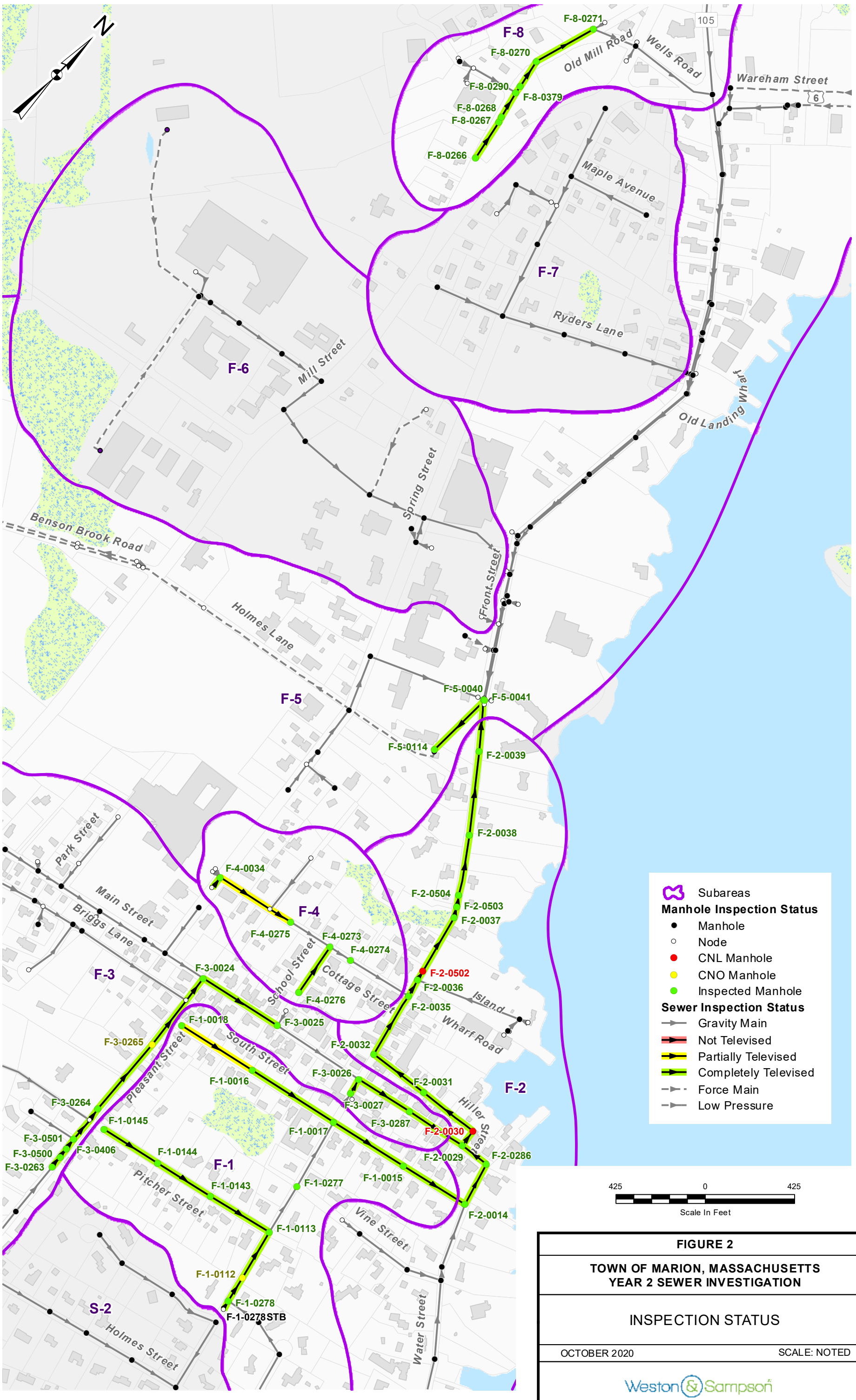

FIGURE 2

TOWN OF MARION, MASSACHUSETTS
YEAR 2 SEWER INVESTIGATION

INSPECTION STATUS

OCTOBER 2020 SCALE: NOTED

Weston & Sampson

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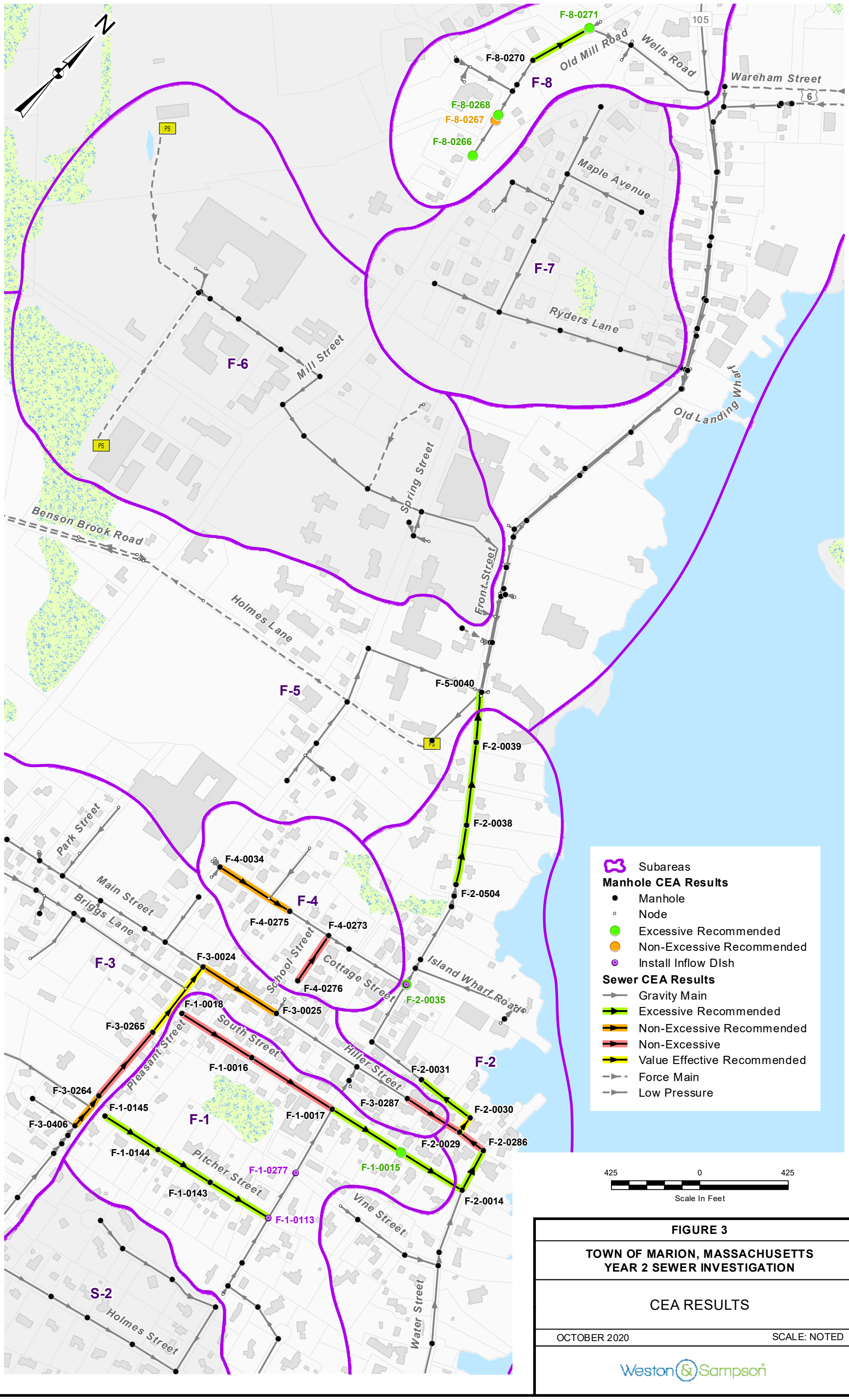

FIGURE 3

TOWN OF MARION, MASSACHUSETTS
YEAR 2 SEWER INVESTIGATION

CEA RESULTS

OCTOBER 2020 SCALE: NOTED

Weston & Sampson

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TABLES

TABLE 1 – TELEVISION INSPECTION SUMMARY

TABLE 2 – TELEVISION INSPECTION NOT COMPLETED

TABLE 3 – MANHOLE INSPECTION SUMMARY

TABLE 4 – MANHOLE STRUCTURAL DEFECTS

TABLE 5 – MANHOLES NOT INSPECTED

TABLE 6 – TELEVISION INSPECTION CEA

TABLE 7 – MANHOLE INFILTRATION CEA

TABLE 8 – MANHOLE INFLOW CEA

TABLE 9 – FAT, OIL, AND GREASE SUMMARY

TABLE 1
TELEVISION INSPECTION SUMMARY

YEAR TWO - SEWER INVESTIGATION

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
SOUTH STREET	F-1	15	17	VC	8	396	396	3	1,440	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-015
000	MATERIAL CHANGE		0	0	STARTS AS PVC
006	TAP - FACTORY MADE - ACTIVE	09	0	0	
016	MATERIAL CHANGE		0	0	PVC TO VC
022	ROOTS - FINE		144	0	
036	TAP - FACTORY MADE - CAPPED	12	0	0	
051	MATERIAL CHANGE		0	0	VC TO PVC
054	TAP - FACTORY MADE - ACTIVE	02	0	0	
058	TAP - FACTORY MADE - ACTIVE	12	0	0	
065	CRACK - MULTIPLE		0	0	
065	MATERIAL CHANGE		0	0	PVC TO VC
098	TAP - FACTORY MADE - CAPPED	12	0	0	
121	MATERIAL CHANGE		0	0	VC TO PVC
121	WATER LEVEL - SAG		0	0	START, MODERATE
125	TAP - FACTORY MADE - ACTIVE	12	0	0	
135	POINT REPAIR - LINER		0	0	START
135	WATER LEVEL - SAG		0	0	END, MODERATE
141	POINT REPAIR - LINER		0	0	END
145	TAP - FACTORY MADE - ACTIVE	11	0	432	
150	MATERIAL CHANGE		0	0	PVC TO VC
166	TAP - FACTORY MADE - ACTIVE	01	0	0	
215	MINERAL DEPOSITS		576	0	START
257	TAP - FACTORY MADE - ACTIVE	12	0	0	
259	TAP - FACTORY MADE - ACTIVE	12	0	576	
289	TAP - FACTORY MADE - CAPPED	12	0	0	
296	MINERAL DEPOSITS			0	END

307	CRACK - SPIRAL		0	0	
316	TAP - FACTORY MADE - CAPPED	12	0	0	
321	TAP - FACTORY MADE - CAPPED	12	0	0	
341	TAP - FACTORY MADE - CAPPED	12	0	0	
352	JOINT - INFILTRATION		576	0	
374	WATER LEVEL - SAG		0	0	START, MODERATE
382	MINERAL DEPOSITS		144	0	
390	MATERIAL CHANGE		0	0	VC TO PVC
390	WATER LEVEL - SAG		0	0	END, MODERATE
396	MANHOLE		0	0	F-1-017

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
SOUTH STREET	F-1	15	14	PVC	8	353	353	3	2,016	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-015
005	MATERIAL CHANGE		0	0	PVC TO VC
025	GREASE		0	0	
040	CRACK - MULTIPLE		0	0	
041	TAP - FACTORY MADE - ACTIVE	10	0	0	
046	CRACK - LONGITUDINAL		0	0	
070	GREASE		0	0	
070	ROOTS - BALL		288	0	
073	ROOTS - MEDIUM		144	0	START
079	BROKEN		0	0	
082	ROOTS - BALL		0	0	
082	TAP - FACTORY MADE - ACTIVE	03	288	0	DID NOT PAN UP LATERAL
109	FRACTURE - MULTIPLE		0	0	
122	TAP - FACTORY MADE - ACTIVE	10	144	0	FINE ROOTS
151	BROKEN		0	0	
154	FRACTURE - LONGITUDINAL		144	0	
195	TAP - FACTORY MADE - CAPPED	03	0	0	FINE ROOTS
197	TAP - FACTORY MADE - ACTIVE	09	0	0	
208	CRACK - LONGITUDINAL		0	0	
238	CRACK - MULTIPLE		144	0	
242	TAP - BREAK IN - ACTIVE	10	144	0	
253	CRACK - LONGITUDINAL		144	0	
255	MATERIAL CHANGE		0	0	VC TO PVC
264	TAP - FACTORY MADE - ACTIVE	02	0	0	
268	MATERIAL CHANGE		0	0	PVC TO VC
270	CRACK - MULTIPLE		0	0	
286	JOINT - INFILTRATION		144	0	
293	TAP - FACTORY MADE - CAPPED	03	144	0	MINERAL DEPOSITS
295	TAP - FACTORY MADE - CAPPED	09	144	0	MINERAL DEPOSITS
302	MATERIAL CHANGE		0	0	VC TO PVC
302	WATER LEVEL - SAG		0	0	START, MODERATE
318	MATERIAL CHANGE		0	0	PVC TO VC

343	WATER LEVEL - SAG	0	0	END, MODERATE
345	CRACK - MULTIPLE	144	0	
351	FRACTURE - LONGITUDINAL	0	0	
353	MANHOLE	0	0	F-2-014

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
SOUTH STREET	F-1	16	17	PVC	8	468	468	13	144	2

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-016
035	TAP - FACTORY MADE - ACTIVE	09	0	0	
057	TAP - FACTORY MADE - ACTIVE	10	0	0	
063	TAP - FACTORY MADE - ACTIVE	02	0	0	
127	TAP - FACTORY MADE - ACTIVE	10	0	0	
188	TAP - FACTORY MADE - ACTIVE	02	0	0	
243	TAP - FACTORY MADE - ACTIVE	01	0	0	
285	TAP - FACTORY MADE - ACTIVE	11	0	0	
287	TAP - FACTORY MADE - ACTIVE	01	0	432	
311	TAP - FACTORY MADE - ACTIVE	02	144	288	
322	MATERIAL CHANGE		0	0	PVC TO AC
330	MATERIAL CHANGE		0	0	AC TO PVC
352	TAP - FACTORY MADE - ACTIVE	10	0	0	
414	TAP - FACTORY MADE - ACTIVE	11	0	0	
468	MANHOLE		0	0	F-1-017

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
SOUTH STREET	F-1	18	16	CI	6	400	335	5	720	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-018
002	MATERIAL CHANGE		0	0	CI TO VC
007	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
011	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
036	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
038	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
050	TAP - BREAK IN - ACTIVE	03	0	0	
068	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
070	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
098	MINERAL DEPOSITS		432	0	START
126	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
131	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
136	MINERAL DEPOSITS		0	0	END
146	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
154	SURVEY ABANDONED		0	0	PUSH CAMERA UNABLE TO GO FURTHER
219	SURVEY ABANDONED		0	0	PUSH CAMERA UNABLE TO GO FURTHER
220	MINERAL DEPOSITS		288	0	START
237	TAP - FACTORY MADE - ACTIVE	09	0	0	
239	TAP - FACTORY MADE - ACTIVE	03	0	0	
278	TAP - FACTORY MADE - CAPPED	09	0	0	
280	TAP - FACTORY MADE - CAPPED	03	0	0	
288	MATERIAL CHANGE		0	0	VC TO PVC
292	TAP - FACTORY MADE - ACTIVE	03	0	0	
297	MATERIAL CHANGE		0	0	PVC TO VC
308	TAP - BREAK IN - ACTIVE	09	0	0	
324	TAP - FACTORY MADE - CAPPED	09	0	0	
329	TAP - FACTORY MADE - CAPPED	03	0	0	
336	MATERIAL CHANGE		0	0	VC TO PVC
353	TAP - FACTORY MADE - ACTIVE	03	0	0	
357	MATERIAL CHANGE		0	0	PVC TO VC
381	TAP - FACTORY MADE - CAPPED	03	0	0	
385	TAP - FACTORY MADE - CAPPED	09	0	0	

393	MATERIAL CHANGE	0	0	VC TO PVC
398	MINERAL DEPOSITS	0	0	END
400	MANHOLE	0	0	F-1-016; REVERSAL BEGINS

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-1	112	113	AC	8	243	243	13	0	2

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-112
243	MANHOLE		0	0	F-1-113

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PITCHER STREET	F-1	143	113	AC	8	328	328	13	1,296	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-143
033	TAP - FACTORY MADE - ACTIVE	03	0	0	
035	TAP - BREAK IN - ACTIVE	09	432	0	
107	TAP - BREAK IN - ACTIVE	03	288	0	MINERAL DEPOSITS
124	MINERAL DEPOSITS		144	0	
160	TAP - BREAK IN - ACTIVE	09	0	0	
176	MINERAL DEPOSITS		144	0	
188	TAP - BREAK IN - INTRUDING	02	0	0	1-INCH
282	MINERAL DEPOSITS		144	0	
321	MINERAL DEPOSITS		144	0	
328	MANHOLE		0	0	F-1-113

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PITCHER STREET	F-1	144	143	VC	8	304	304	3	1,008	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-144
005	MINERAL DEPOSITS		432	0	START
032	TAP - FACTORY MADE - CAPPED	09	0	0	
034	TAP - FACTORY MADE - ACTIVE	03	0	0	
050	ROOTS - FINE		288	0	START
068	MINERAL DEPOSITS		0	0	END
090	TAP - FACTORY MADE - ACTIVE	03	0	0	
109	ROOTS - FINE		0	0	END
129	TAP - FACTORY MADE - CAPPED	09	0	0	
131	TAP - FACTORY MADE - CAPPED	03	0	0	
136	TAP - BREAK IN - ACTIVE	09	0	0	
146	TAP - BREAK IN - INTRUDING	12	288	0	<1-INCH
175	TAP - FACTORY MADE - CAPPED	09	0	0	
177	TAP - FACTORY MADE - CAPPED	03	0	0	
186	ROOTS - FINE		0	0	
246	TAP - FACTORY MADE - ACTIVE	03	0	0	
258	TAP - BREAK IN - ACTIVE	09	0	0	
270	TAP - FACTORY MADE - CAPPED	09	0	0	
304	MANHOLE		0	0	F-1-143

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PITCHER STREET	F-1	144	145	VC	8	253	253	3	1,152	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-144
006	MINERAL DEPOSITS		432	0	START
009	ROOTS - FINE		144	0	START
034	TAP - FACTORY MADE - ACTIVE	10		0	
035	TAP - FACTORY MADE - CAPPED	02	0	0	
075	TAP - BREAK IN - INTRUDING	03	0	0	1-INCH
101	ROOTS - FINE		0	0	END
105	TAP - FACTORY MADE - CAPPED	02	0	0	
106	TAP - FACTORY MADE - CAPPED	10	0	0	
118	MINERAL DEPOSITS		0	0	END
151	TAP - BREAK IN - ACTIVE	12	432	0	
152	MINERAL DEPOSITS		144	0	START
169	TAP - FACTORY MADE - CAPPED	02	0	0	
171	TAP - FACTORY MADE - ACTIVE	09	0	0	
221	MINERAL DEPOSITS		0	0	END
228	TAP - FACTORY MADE - CAPPED	03	0	0	
230	TAP - FACTORY MADE - CAPPED	09	0	0	
251	MATERIAL CHANGE		0	0	VC TO CI
253	MANHOLE		0	0	F-1-145

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-1	278	112	AC	8	144	144	13	0	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-278
019	TAP - BREAK IN - ACTIVE	02	0	0	
019	WATER LEVEL - SAG		0	0	START, MODERATE
032	TAP - BREAK IN - ACTIVE	09	0	0	
038	WATER LEVEL - SAG		0	0	END, MODERATE
144	MANHOLE		0	0	F-1-112

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-1	278	278 STB	VC	8	6	6	3	0	2

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-1-278
006	MANHOLE		0	0	F-1-278-STUB

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
WATER STREET	F-2	14	286	VC	12	221	221	5	864	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-014
006	CRACK - SPIRAL		0	0	
011	MATERIAL CHANGE		0	0	VC TO PVC
011	WATER LEVEL - SAG		144	0	START, MODERATE
033	TAP - FACTORY MADE - ACTIVE	03	0	0	
062	JOINT - SEPARATED		0	0	
062	MATERIAL CHANGE		0	0	PVC TO VC
062	WATER LEVEL - SAG		0	0	END, MODERATE
096	ROOTS - FINE		144	0	START
106	ROOTS - FINE		0	0	END
106	ROOTS - MEDIUM			0	
106	TAP - FACTORY MADE - ACTIVE	09	144	0	
141	ROOTS - FINE		0	0	
160	BROKEN		0	0	
167	ROOTS - MEDIUM		144	0	
167	TAP - FACTORY MADE - CAPPED	09	0	0	
172	CRACK - LONGITUDINAL	10	0	0	
172	ROOTS - FINE		144	0	
178	CRACK - LONGITUDINAL	03	0	0	
188	GREASE		0	0	
188	ROOTS - MEDIUM		144	0	
188	TAP - FACTORY MADE - ACTIVE	03	0	0	
198	ROOTS - FINE		0	0	
221	MANHOLE		0	0	F-2-286

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
HILLER STREET	F-2	29	30	VC	12	91	91	3	288	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-029
006	CRACK - SPIRAL		0	0	
006	GREASE		0	0	START
006	ROOTS - MEDIUM		288	0	START
009	CRACK - LONGITUDINAL		0	0	
057	GREASE		0	0	END
057	ROOTS - MEDIUM		0	0	END
069	TAP - FACTORY MADE - ACTIVE	12	0	0	
080	TAP - FACTORY MADE - CAPPED	12	0	0	
083	ROOTS - FINE		0	0	
091	MANHOLE		0	0	F-2-030

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MAIN STREET	F-2	29	286	VC	12	145	145	3	144	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-029
005	ROOTS - FINE		144	0	START
052	TAP - FACTORY MADE - ACTIVE	03	0	0	
064	TAP - FACTORY MADE - CAPPED	09	0	0	
106	TAP - FACTORY MADE - ACTIVE	09	0	0	
108	ROOTS - FINE		0	0	END
140	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
141	TAP - FACTORY MADE - CAPPED	09	0	0	
145	MANHOLE		0	0	F-2-286

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MAIN STREET	F-2	29	287	VC	8	304	304	3	0	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-029
005	ROOTS - FINE		0	0	START
020	ROOTS - FINE		0	0	END
043	TAP - FACTORY MADE - CAPPED	09	0	0	
048	TAP - FACTORY MADE - CAPPED	03	0	0	
050	WATER LEVEL - SAG		0	0	START, MODERATE
061	BROKEN		0	0	
070	WATER LEVEL - SAG		0	0	END, MODERATE
088	TAP - BREAK IN - INTRUDING	10	0	0	1-INCH
107	FRACTURE - LONGITUDINAL		0	0	
108	TAP - FACTORY MADE - ACTIVE	09	0	0	
110	TAP - FACTORY MADE - ACTIVE	03	0	0	
130	CRACK - LONGITUDINAL		0	0	
142	FRACTURE - MULTIPLE		0	0	
148	TAP - BREAK IN - ACTIVE	10	0	0	
150	CRACK - LONGITUDINAL		0	0	
162	TAP - FACTORY MADE - CAPPED	03	0	0	
164	TAP - FACTORY MADE - CAPPED	09	0	0	
167	ROOTS - FINE		0	0	START
203	HOLE - VOID VISIBLE		0	0	
231	TAP - FACTORY MADE - CAPPED	03	0	0	
233	TAP - FACTORY MADE - CAPPED	09	0	0	
239	TAP - BREAK IN - ACTIVE	12	0	144	
258	CRACK - LONGITUDINAL		0	0	
304	MANHOLE		0	0	F-3-287
304	ROOTS - FINE		0	0	END

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
HILLER STREET	F-2	31	30	PVC	12	296	296	5	1,296	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-031
007	MATERIAL CHANGE		0	0	PVC TO VC
011	JOINT - INFILTRATION		144	0	
013	JOINT - INFILTRATION		576	0	
030	TAP - FACTORY MADE - ACTIVE	12	0	288	
032	TAP - FACTORY MADE - CAPPED	09	0	0	
057	MATERIAL CHANGE		0	0	VC TO PVC
058	TAP - FACTORY MADE - ACTIVE	10	0	0	
065	MATERIAL CHANGE		0	0	PVC TO VC
072	TAP - FACTORY MADE - ACTIVE	12	0	0	
073	ROOTS - FINE		144	0	
074	TAP - FACTORY MADE - CAPPED	12	0	0	
092	ROOTS - FINE		144	0	START
100	ROOTS - FINE		0	0	END
115	TAP - FACTORY MADE - ACTIVE	12	0	144	
118	TAP - FACTORY MADE - CAPPED	12	0	0	
154	TAP - FACTORY MADE - CAPPED	11	0	0	
160	TAP - FACTORY MADE - CAPPED	01	0	0	
188	ROOTS - FINE		144	0	
191	MATERIAL CHANGE		0	0	VC TO PVC
193	TAP - FACTORY MADE - ACTIVE	09	0	0	
198	MATERIAL CHANGE		0	0	PVC TO VC
200	ROOTS - FINE		144	0	START
227	TAP - FACTORY MADE - ACTIVE	12	0	0	
228	TAP - FACTORY MADE - CAPPED	12	0	0	
230	ROOTS - FINE		0	0	END
277	TAP - FACTORY MADE - CAPPED	11	0	0	
279	TAP - FACTORY MADE - CAPPED	11	0	0	
296	MANHOLE		0	0	F-2-030

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
HILLER STREET	F-2	32	31	PVC	15	301	301	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-032
072	TAP - FACTORY MADE - ACTIVE	12	0	0	
149	TAP - FACTORY MADE - ACTIVE	11	0	0	
151	TAP - FACTORY MADE - ACTIVE	12	0	0	
226	TAP - FACTORY MADE - ACTIVE	10	0	0	
244	TAP - FACTORY MADE - ACTIVE	02	0	0	
301	MANHOLE		0	0	F-2-031

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	32	35	PVC	15	324	324	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-032
025	TAP - FACTORY MADE - ACTIVE	12	0	0	
028	TAP - FACTORY MADE - ACTIVE	12	0	0	
059	TAP - FACTORY MADE - ACTIVE	12	0	0	
061	TAP - FACTORY MADE - ACTIVE	12	0	0	
068	TAP - FACTORY MADE - ACTIVE	12	0	0	
111	TAP - FACTORY MADE - ACTIVE	12	0	0	
133	TAP - FACTORY MADE - ACTIVE	12	0	0	
143	TAP - FACTORY MADE - ACTIVE	01	0	0	
171	TAP - FACTORY MADE - CAPPED	01	0	0	
175	TAP - FACTORY MADE - ACTIVE	11	0	0	
202	TAP - FACTORY MADE - ACTIVE	01	0	0	
255	TAP - FACTORY MADE - ACTIVE	02	0	0	
324	MANHOLE		0	0	F-2-035

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	36	35	PVC	15	88	88	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-036
070	TAP - FACTORY MADE - ACTIVE	12	0	288	
088	MANHOLE		0	0	F-2-035

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	37	502	PVC	15	253	253	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-037
045	TAP - FACTORY MADE - ACTIVE	03	0	0	
115	TAP - FACTORY MADE - ACTIVE	02	0	0	
123	TAP - FACTORY MADE - ACTIVE	10	0	0	
172	TAP - FACTORY MADE - ACTIVE	02	0	0	
228	TAP - FACTORY MADE - ACTIVE	03	0	0	
253	MANHOLE		0	0	F-2-502

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	38	39	VC	12	405	405	3	1,872	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-038
002	FRACTURE - MULTIPLE		0	0	
004	BROKEN		0	0	
012	TAP - FACTORY MADE - CAPPED	12	0	0	
014	TAP - FACTORY MADE - CAPPED	12	0	0	
028	CRACK - LONGITUDINAL		0	0	
031	TAP - FACTORY MADE - CAPPED	12	0	0	
051	CRACK - CIRCUMFERENTIAL		288	0	
052	MATERIAL CHANGE		0	0	VC TO PVC
066	TAP - FACTORY MADE - ACTIVE	12	0	0	
073	MATERIAL CHANGE		0	0	PVC TO VC
075	CRACK - MULTIPLE		0	0	
101	TAP - FACTORY MADE - CAPPED	12	0	0	
114	CRACK - MULTIPLE		0	0	
118	FRACTURE - MULTIPLE		0	0	
120	MATERIAL CHANGE		0	0	VC TO PVC
124	TAP - FACTORY MADE - ACTIVE	11	0	0	
134	TAP - FACTORY MADE - ACTIVE	02	0	0	
141	MATERIAL CHANGE		0	0	PVC TO VC
154	ROOTS - FINE		0	0	
169	CRACK - LONGITUDINAL		0	0	
173	TAP - FACTORY MADE - CAPPED	02	0	0	
181	CRACK - SPIRAL		0	0	
191	ROOTS - FINE		144	0	
191	TAP - FACTORY MADE - ACTIVE	09	0	0	
217	CRACK - LONGITUDINAL		0	0	
229	JOINT - INFILTRATION		720	0	
235	CRACK - LONGITUDINAL		0	0	
241	CRACK - MULTIPLE		0	0	
245	TAP - FACTORY MADE - CAPPED	03	0	0	
249	CRACK - MULTIPLE		0	0	
251	MATERIAL CHANGE		0	0	VC TO PVC

260	TAP - FACTORY MADE - ACTIVE	09	0	0	
264	MATERIAL CHANGE		0	0	PVC TO VC
275	TAP - FACTORY MADE - CAPPED	12	0	0	
282	MATERIAL CHANGE		0	0	VC TO PVC
288	TAP - FACTORY MADE - ACTIVE	09	0	0	
289	WATER LEVEL - SAG		0	0	START, MODERATE
298	MATERIAL CHANGE		0	0	PVC TO VC
298	WATER LEVEL - SAG		0	0	END, MODERATE
305	CRACK - MULTIPLE		0	0	
305	MINERAL DEPOSITS		144	0	
307	MATERIAL CHANGE		0	0	VC TO PVC
313	TAP - FACTORY MADE - ACTIVE	03	0	0	
320	MATERIAL CHANGE		0	0	PVC TO VC
336	TAP - FACTORY MADE - CAPPED	09	0	0	
338	TAP - FACTORY MADE - CAPPED	03	0	0	
355	CRACK - LONGITUDINAL		0	0	
371	MATERIAL CHANGE		0	0	VC TO PVC
376	TAP - FACTORY MADE - ACTIVE	02	0	0	
382	MATERIAL CHANGE		0	0	PVC TO VC
384	TAP - FACTORY MADE - CAPPED	03	0	0	
398	CRACK - MULTIPLE		576	0	
399	MATERIAL CHANGE		0	0	VC TO PVC
405	MANHOLE		0	0	F-2-039

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	39	40	PVC	12	250	250	13	1,296	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-039
042	WATER LEVEL - SAG		0	0	START, MODERATE
072	WATER LEVEL - SAG		0	0	END, MODERATE
074	MATERIAL CHANGE		0	0	PVC TO VC
102	TAP - FACTORY MADE - CAPPED	12	0	0	
198	MATERIAL CHANGE		0	0	VC TO PVC
207	TAP - FACTORY MADE - ACTIVE	10	0	0	
211	MATERIAL CHANGE		0	0	PVC TO VC
221	MATERIAL CHANGE		0	0	VC TO PVC
221	WATER LEVEL - SAG		0	0	START, MODERATE
230	TAP - FACTORY MADE - ACTIVE	02	0	0	
237	MATERIAL CHANGE		0	0	PVC TO VC
240	JOINT - INFILTRATION		288	0	
243	JOINT - INFILTRATION		1,008	0	
246	WATER LEVEL - SAG		0	0	END, MODERATE
250	MANHOLE		0	0	F-5-040

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	502	36	PVC	15	52	52	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-502
052	MANHOLE	12	0		F-2-036

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	503	37	PVC	15	25	25	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-503
011	TAP - FACTORY MADE - CAPPED	03	0	0	
018	TAP - FACTORY MADE - ACTIVE	10	0	0	
025	MANHOLE		0	0	F-2-037

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	504	38	PVC	12	379	379	13	4,608	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-504
008	MATERIAL CHANGE		0	0	PVC TO VC
013	JOINT - INFILTRATION		144	0	
015	MINERAL DEPOSITS		144	0	
029	MATERIAL CHANGE		0	0	VC TO PVC
037	TAP - FACTORY MADE - ACTIVE	09	0	0	
045	MATERIAL CHANGE		0	0	PVC TO VC
061	TAP - FACTORY MADE - CAPPED	12	0	0	
062	TAP - FACTORY MADE - CAPPED	03	0	0	
070	CRACK - SPIRAL		0	0	
072	CRACK - LONGITUDINAL		0	0	
084	CRACK - MULTIPLE		0	0	
085	JOINT - INFILTRATION		720	0	
088	CRACK - SPIRAL		0	0	
091	JOINT - INFILTRATION		864	0	
095	CRACK - LONGITUDINAL		0	0	
100	FRACTURE - MULTIPLE		0	0	
104	TAP - FACTORY MADE - ACTIVE	12	0	0	
109	JOINT - INFILTRATION		288	0	
118	CRACK - MULTIPLE		0	0	
126	CRACK - MULTIPLE		0	0	
133	CRACK - LONGITUDINAL		432	0	
140	JOINT - INFILTRATION		720	0	
150	TAP - FACTORY MADE - ACTIVE	12	0	0	
154	CRACK - SPIRAL		0	0	
182	CRACK - SPIRAL		0	0	
194	CRACK - SPIRAL		144	0	
200	CRACK - LONGITUDINAL		0	0	
227	MINERAL DEPOSITS		144	0	
231	JOINT - INFILTRATION		288	0	
265	MINERAL DEPOSITS		144	0	
266	TAP - FACTORY MADE - CAPPED	12	0	0	

268	TAP - FACTORY MADE - ACTIVE	12	432	0			
288	CRACK - LONGITUDINAL		0	0			
325	CRACK - SPIRAL		0	0			
335	CRACK - MULTIPLE		144	0			
338	TAP - FACTORY MADE - CAPPED	12	0	0			
340	TAP - FACTORY MADE - CAPPED	12	0	0			
344	CRACK - LONGITUDINAL		0	0			
363	CRACK - LONGITUDINAL		0	0			
379	MANHOLE		0	0	F-2-038		

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-2	504	503	PVC	15	48	48	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-2-504
048	MANHOLE		0	0	F-2-503

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MAIN STREET	F-3	24	25	VC	8	423	423	3	864	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-024
017	CRACK - MULTIPLE		0	0	
039	ROOTS - FINE		144	0	START
046	TAP - FACTORY MADE - ACTIVE	09	0	0	
068	FRACTURE - MULTIPLE		0	0	
080	ROOTS - FINE		0	0	END
100	TAP - FACTORY MADE - CAPPED	03	0	0	
107	CRACK - LONGITUDINAL		0	0	
125	ROOTS - FINE		0	0	START
132	CRACK - SPIRAL		0	0	
133	ROOTS - MEDIUM		0	0	
133	TAP - FACTORY MADE - ACTIVE	03	144	0	
141	ROOTS - MEDIUM		0	0	
141	TAP - FACTORY MADE - ACTIVE	09	144	0	
151	ROOTS - FINE		0	0	END
166	TAP - BREAK IN - ACTIVE	03	0	0	
170	CRACK - SPIRAL		0	0	
189	TAP - FACTORY MADE - CAPPED	09	0	0	
190	BROKEN		0	0	
224	CRACK - CIRCUMFERENTIAL		0	0	
230	CRACK - CIRCUMFERENTIAL		0	0	
231	ROOTS - MEDIUM		0	0	
231	TAP - FACTORY MADE - ACTIVE	03	144	0	
245	TAP - FACTORY MADE - CAPPED	09	0	0	
247	TAP - BREAK IN - ACTIVE	09	0	0	
274	ROOTS - FINE		0	0	START
274	TAP - BREAK IN - INTRUDING	10	0	0	1-INCH
291	FRACTURE - MULTIPLE		0	0	
329	ROOTS - MEDIUM		0	0	
329	TAP - FACTORY MADE - ACTIVE	09	0	0	
352	ROOTS - FINE		0	0	
352	TAP - FACTORY MADE - ACTIVE	03	0	0	

392	ROOTS - MEDIUM		0	0		
392	TAP - FACTORY MADE - CAPPED	03	0	0		
394	ROOTS - BALL		0	0		
394	TAP - BREAK IN - ACTIVE	03	288	0		
394	TAP - FACTORY MADE - ACTIVE	09	0	0		
423	MANHOLE		0	0	F-3-025	

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-3	27	26	VC	6	83	83	3	0	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-027
031	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
064	ROOTS - FINE		0	0	
076	WATER LEVEL - SAG		0	0	START, MODERATE
078	ROOTS - FINE		0	0	
081	WATER LEVEL - SAG		0	0	END, MODERATE
083	MANHOLE		0	0	F-3-026

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PLEASANT STREET	F-3	264	265	VC	8	405	405	3	576	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-264
007	TAP - BREAK IN - ACTIVE	03	0	0	
010	ROOTS - FINE		0	0	START
043	ROOTS - MEDIUM		144	0	
043	TAP - FACTORY MADE - CAPPED	03	0	0	
045	ROOTS - MEDIUM		0	0	
045	TAP - FACTORY MADE - CAPPED	09	0	0	
060	ROOTS - FINE		0	0	END
066	TAP - BREAK IN - ACTIVE	12	144	0	
102	ROOTS - MEDIUM		0	0	
102	TAP - FACTORY MADE - CAPPED	03	0	0	
104	ROOTS - MEDIUM		0	0	
104	TAP - FACTORY MADE - CAPPED	09	0	0	
113	FRACTURE - SPIRAL		0	0	
176	FRACTURE - SPIRAL		0	0	
177	TAP - FACTORY MADE - CAPPED	03	0	0	
201	TAP - BREAK IN - ACTIVE	09	0	0	
230	TAP - FACTORY MADE - CAPPED	03	0	0	
232	TAP - FACTORY MADE - CAPPED	09	0	0	
281	TAP - BREAK IN - ACTIVE	12	144	0	
301	TAP - BREAK IN - ACTIVE	12	0	144	
320	TAP - FACTORY MADE - CAPPED	03	0	0	
322	TAP - FACTORY MADE - CAPPED	09	0	0	
365	ROOTS - FINE		144	0	
365	TAP - BREAK IN - ACTIVE	12	0	0	
374	TAP - FACTORY MADE - CAPPED	03	0	0	
376	TAP - FACTORY MADE - CAPPED	09	0	0	
405	MANHOLE		0	0	F-3-265

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PLEASANT STREET	F-3	264	406	VC	8	184	184	3	0	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-264
018	ROOTS - MEDIUM		0	0	START
020	ROOTS - BALL		0	0	
020	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
026	ROOTS - BALL		0	0	
026	TAP - BREAK IN - ACTIVE		0	0	
028	ROOTS - MEDIUM		0	0	END
061	MATERIAL CHANGE		0	0	VC TO PVC
064	MATERIAL CHANGE		0	0	PVC TO VC
072	ROOTS - BALL		0	0	
072	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
089	HOLE - VOID VISIBLE		0	0	
136	TAP - BREAK IN - ACTIVE	09	0	0	
168	TAP - FACTORY MADE - ACTIVE	03	0	0	
181	MATERIAL CHANGE		0	0	VC TO PVC
184	MANHOLE		0	0	F-3-406

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PLEASANT STREET	F-3	265	24	VC	8	407	407	3	1,152	4

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-265
007	ROOTS - FINE		0	0	
022	MINERAL DEPOSITS		144	0	
034	ROOTS - FINE		0	0	
034	TAP - BREAK IN - INTRUDING	09	144	0	1-INCH
042	TAP - FACTORY MADE - CAPPED	09	0	0	
056	ROOTS - FINE		0	0	
056	TAP - FACTORY MADE - ACTIVE	03	144	0	
058	GENERAL OBSERVATION		0	0	REVERSAL REQUIRED
058	HOLE - SOIL VISIBLE		0	0	
058	ROOTS - MEDIUM		0	0	
058	SURVEY ABANDONED		0	0	ROOTS FROM VOID
065	MINERAL DEPOSITS		0	0	START
084	MINERAL DEPOSITS		144	0	END
084	ROOTS - FINE		0	0	
096	TAP - FACTORY MADE - CAPPED	03	0	0	
098	TAP - FACTORY MADE - CAPPED	09	0	0	
115	CRACK - LONGITUDINAL		0	0	
134	CRACK - LONGITUDINAL		0	0	
158	ROOTS - FINE		0	0	
173	TAP - FACTORY MADE - ACTIVE	09	0	0	
234	ROOTS - FINE		144	0	
234	TAP - FACTORY MADE - CAPPED	03	0	0	
235	ROOTS - FINE		144	0	
235	TAP - FACTORY MADE - CAPPED	09	0	0	
239	TAP - BREAK IN - ACTIVE	09	0	0	
269	TAP - BREAK IN - INTRUDING	09	0	0	<1-INCH
273	POINT REPAIR - PATCH		0	0	START
276	POINT REPAIR - PATCH		0	0	END
281	TAP - FACTORY MADE - CAPPED	09	0	0	
325	TAP - FACTORY MADE - ACTIVE	09	0	0	
334	TAP - FACTORY MADE - ACTIVE	03	0	0	

339	TAP - BREAK IN - INTRUDING	11	288	0	<1-INCH
351	ROOTS - FINE		0	0	
351	TAP - FACTORY MADE - CAPPED	09	0	0	
375	WATER LEVEL - SAG		0	0	START, MODERATE
396	JOINT - OFFSET		0	0	MODERATE
396	MATERIAL CHANGE		0	0	VC TO PVC
399	MATERIAL CHANGE		0	0	PVC TO VC
399	WATER LEVEL - SAG		0	0	END, MODERATE
401	BROKEN		0	0	
401	FRACTURE - MULTIPLE		0	0	
407	MANHOLE		0	0	F-3-024

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MAIN STREET	F-3	287	26	LINED	8	288	288	3	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-287
041	TAP - BREAK IN - ACTIVE	03	0	0	
124	TAP - BREAK IN - ACTIVE	09	0	0	
224	TAP - BREAK IN - ACTIVE	09	0	0	
235	TAP - BREAK IN - ACTIVE	12	0	0	
260	TAP - BREAK IN - ACTIVE	02	0	0	
272	TAP - FACTORY MADE - CAPPED	09	0	0	
288	MANHOLE		0	0	F-3-026

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PLEASANT STREET	F-3	500	406	PVC	8	25	25	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-500
022	TAP - FACTORY MADE - CAPPED	09	0	0	
025	MANHOLE		0	0	F-3-406

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PLEASANT STREET	F-3	500	501	PVC	8	122	122	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-500
016	TAP - FACTORY MADE - ACTIVE	09	0	0	
115	TAP - FACTORY MADE - ACTIVE	03	0	0	
122	MANHOLE		0	0	F-3-501

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
PLEASANT STREET	F-3	501	263	PVC	8	22	22	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-3-501
016	TAP - FACTORY MADE - ACTIVE	10	0	0	
022	MANHOLE		0	0	F-3-263

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
COTTAGE STREET	F-4	34	275	VC	6	390	162	3	720	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-4-034
005	TAP - BREAK IN - ACTIVE	09	0	0	
023	ROOTS - FINE		432	0	START
083	TAP - FACTORY MADE - ACTIVE	09	0	0	
106	TAP - BREAK IN - ACTIVE	03	0	0	
115	ROOTS - MEDIUM		144	0	
115	TAP - FACTORY MADE - ACTIVE	03	0	0	
123	TAP - FACTORY MADE - ACTIVE	09	0	0	
136	ROOTS - BALL		144	0	
150	ROOTS - FINE		0	0	END
155	TAP - BREAK IN - ACTIVE	09	0	0	
162	SURVEY ABANDONED		0	0	PUSH CAMERA UNABLE TO GO FURTHER

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
SPRING STREET	F-4	34	696	VC	6	96	96	3	0	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-4-034
002	ROOTS - FINE		0	0	START
057	ROOTS - MEDIUM		0	0	START
058	ROOTS - FINE		0	0	END
086	MATERIAL CHANGE		0	0	VC TO PVC
086	ROOTS - MEDIUM		0	0	END
096	MANHOLE		0	0	NODE-0696

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
SCHOOL STREET	F-4	276	273	VC	6	289	289	3	144	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-4-276
003	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
020	TAP - FACTORY MADE - ACTIVE	03	0	0	
026	ROOTS - FINE		0	0	
027	ROOTS - BALL		0	0	
027	TAP - FACTORY MADE - ACTIVE	09	0	0	DID NOT PAN UP LATERAL
051	TAP - FACTORY MADE - ACTIVE	03	0	0	DID NOT PAN UP LATERAL
098	TAP - BREAK IN - ACTIVE	03	0	0	
105	GENERAL OBSERVATION		0	0	END REVERSAL
130	ROOTS - FINE		0	0	
130	TAP - BREAK IN - ACTIVE	03	0	0	
140	ROOTS - FINE		0	0	
143	TAP - FACTORY MADE - CAPPED	03	0	0	
282	ROOTS - FINE		0	0	START
287	ROOTS - FINE		144	0	END
289	MANHOLE		0	0	F-4-273

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-5	40	41	VC	12	10	4	3	0	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-5-040
003	GENERAL OBSERVATION		0	0	ALIGNMENT RIGHT
004	SURVEY ABANDONED		0	0	CANNOT PASS ALIGNMENT

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
FRONT STREET	F-5	41	114	RC	18	348	348	13	0	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-5-041
002	SURFACE DAMAGE - SPALLING		0	0	START
346	SURFACE DAMAGE - SPALLING		0	0	END
348	MANHOLE		0	0	F-5-114

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MILL STREET	F-8	267	266	AC	6	204	204	13	0	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-8-267
020	WATER LEVEL - SAG		0	0	START, MODERATE
040	WATER LEVEL - SAG		0	0	END, MODERATE
062	JOINT - OFFSET		0	0	MODERATE
096	JOINT - OFFSET		0	0	MODERATE
157	SURVEY ABANDONED		0	0	PUSH CAMERA UNABLE TO GO FURTHER
166	GENERAL OBSERVATION		0	0	INTRUDING SEAL
204	MANHOLE		0	0	F-8-266

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MILL STREET	F-8	267	268	AC	6	27	27	13	0	2

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-8-267
027	MANHOLE		0	0	F-8-268

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MILL STREET	F-8	268	290	AC	8	133	133	13	288	3

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-8-268
015	WATER LEVEL - SAG		0	0	START, MODERATE
019	JOINT - SEPARATED		0	0	
019	MINERAL DEPOSITS		144	0	
030	MINERAL DEPOSITS		144	0	
035	WATER LEVEL - SAG		0	0	END, MODERATE
130	MATERIAL CHANGE		0	0	AC TO PVC
133	MANHOLE		0	0	F-8-290

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MILL STREET	F-8	270	271	LINED	8	286	286	0	288	2

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-8-270
225	HOLE - VOID VISIBLE		288	0	
267	GREASE		0	0	
286	MANHOLE		0	0	F-8-271

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MILL STREET	F-8	270	379	PVC	8	185	185	13	0	2

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-8-270
026	WATER LEVEL - SAG		0	0	START, MODERATE
031	TAP - FACTORY MADE - ACTIVE	09	0	0	
032	GREASE		0	0	
036	WATER LEVEL - SAG		0	0	END, MODERATE
080	WATER LEVEL - SAG		0	0	START, MODERATE
096	WATER LEVEL - SAG		0	0	END, MODERATE
185	MANHOLE		0	0	F-8-379

Street	Start Subarea	Start Manhole	End Manhole	Pipe Material	Pipe Diameter (in)	Pipe Length (ft)	TV Pipe Length (ft)	Joint Spacing (ft)	Total Infiltration (gpd)	Overall Pipe Rating
MILL STREET	F-8	379	290	PVC	8	38	38	13	0	1

Footage	Defect Code	Clock Position	Infil. Rate (gpd)	Uniden. Tap Flow (gpd)	Defect Comments[1]
000	MANHOLE		0	0	F-8-379
038	MANHOLE		0	0	F-8-290

TOTAL INFILTRATION	22,176	2,736
TOTAL PIPE LENGTH	10,042	
TOTAL INSPECTED PIPE LENGTH	9,743	

TABLE 2
TELEVISION INSPECTION NOT COMPLETED

YEAR TWO - SEWER INVESTIGATION

Start Subarea	Start Manhole	End Manhole	Street	Pipe Diameter	Pipe Length[2]	TV'd Pipe	Activity Required
F-1	18	16	SOUTH STREET	6	400	335	REHABILITATION
F-4	34	275	COTTAGE STREET	6	390	162	REHABILITATION
F-5	40	41	FRONT STREET	12	10	4	NONE

TOTAL PIPE LENGTH[2]:	800
TOTAL UNTELEVISED PIPE LENGTH:	299
TOTAL FOOTAGE FOR LIGHT CLEAN & TELEVISION INSPECTION:	0
TOTAL FOOTAGE FOR HEAVY CLEAN & TELEVISION INSPECTION:	0
TOTAL FOOTAGE FOR REHABILITATION:	790
TOTAL FOOTAGE NOT REQUIRING FURTHER ATTENTION:	10

NOTES:
1. Pipe diameters based upon town-provided information and completed manhole inspections.
2. Total Pipe Length assumes re-televising of full pipe length for partial inspection.

TABLE 3
MANHOLE INSPECTION SUMMARY

YEAR TWO - SEWER INVESTIGATION

Sewer Basin	Manhole	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
F-1	015	SOUTH STREET	PRECAST	8.6	0	0
F-1	016	SOUTH STREET	PRECAST	6.1	0	0
F-1	017	FRONT STREET	PRECAST	10.4	0	0
F-1	018	SOUTH STREET	BRICK	6.8	0	0
F-1	112	FRONT STREET	CNO			
F-1	113	FRONT STREET	BRICK	6.7	0	1,000
F-1	143	PITCHER STREET	BRICK	4.6	0	0
F-1	144	PITCHER STREET	BRICK	6.2	0	0
F-1	145	PITCHER STREET	BRICK	6.2	0	0
F-1	277	FRONT STREET	BRICK	9	0	1,000
F-1	278	FRONT STREET	BRICK	5.9	0	0
F-2	014	WATER STREET	BRICK	5.6	0	0
F-2	029	MAIN STREET	BRICK	9.9	0	0
F-2	030	HILLER STREET	CNL			
F-2	031	HILLER STREET	PRECAST	8.7	0	0
F-2	032	FRONT STREET	PRECAST	13.9	0	0
F-2	035	FRONT STREET	PRECAST	8.5	0	1,000
F-2	036	FRONT STREET	PRECAST	7.9	0	0
F-2	037	FRONT STREET	PRECAST	7.5	0	0
F-2	038	FRONT STREET	BRICK	8.7	0	0
F-2	039	FRONT STREET	PRECAST	6.6	0	0
F-2	286	MAIN STREET	BRICK	7.4	0	0
F-2	502	FRONT STREET	CNL			
F-2	503	FRONT STREET	PRECAST	7.6	0	0
F-2	504	FRONT STREET	PRECAST	7.7	0	0
F-3	024	MAIN STREET	BRICK	7.1	0	0
F-3	025	MAIN STREET	BRICK	6.2	0	0
F-3	026	FRONT STREET	BRICK	7	0	0
F-3	027	FRONT STREET	BRICK	5	0	0
F-3	263	PLEASANT STREET	PRECAST	6.6	144	0
F-3	264	PLEASANT STREET	LINED	6.1	0	0
F-3	265	PLEASANT STREET	CNO			
F-3	287	MAIN STREET	BRICK	7.2	0	0

Sewer Basin	Manhole	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
F-3	406	PLEASANT STREET	PRECAST	5.4	0	0
F-3	500	PLEASANT STREET	PRECAST	6.5	0	0
F-3	501	PLEASANT STREET	PRECAST	5.4	0	0
F-4	034	SPRING STREET	BRICK	6.1	720	0
F-4	273	COTTAGE STREET	BRICK	5.1	0	0
F-4	274	COTTAGE STREET	BRICK	5.2	0	0
F-4	275	COTTAGE STREET	BRICK	4.9	0	0
F-4	276	SCHOOL STREET	BRICK	3.1	0	0
F-5	040	FRONT STREET	BRICK	8.5	0	0
F-5	041	FRONT STREET	PRECAST	10.7	0	0
F-5	114	FRONT STREET EASEMENT	BRICK	11.9	0	0
F-8	266	OLD MILL ROAD	BLOCK	4.7	288	0
F-8	267	OLD MILL ROAD	BLOCK	5.7	0	0
F-8	268	OLD MILL ROAD	PRECAST	6.1	720	0
F-8	270	OLD MILL ROAD	PRECAST	4.4	0	0
F-8	271	OLD MILL ROAD	BRICK	6.1	864	0
F-8	290	OLD MILL ROAD	PRECAST	4.7	0	0
F-8	379	OLD MILL ROAD	PRECAST	4.7	0	0
TOTAL MANHOLE INFILTRATION/INFLOW					**2,736**	**3,000**
TOTAL NUMBER OF MANHOLES					**51**	
TOTAL NUMBER OF MANHOLES INSPECTED					**47**	

NOTE:

CNL = CANNOT LOCATE
CNO = CANNOT OPEN

TABLE 4
MANHOLE STRUCTURAL DEFECTS

YEAR TWO - SEWER INVESTIGATION

Subarea	Manhole	Street	Recommended Rehabilitatio	Rehabilitation Cost
F-1	018	SOUTH STREET	BUILD BENCH AND INVERT	$1,200
F-1	112	FRONT STREET	REPLACE FRAME AND COVER	$1,500
F-1	145	PITCHER STREET	BUILD BENCH AND INVERT	$1,200
F-2	038	FRONT STREET	REPLACE FRAME AND COVER	$1,500
F-4	276	SCHOOL STREET	BUILD BENCH AND INVERT	$1,200
F-8	267	OLD MILL ROAD	BUILD BENCH AND INVERT	$1,200
		TOTAL REHABILITATION COST		$7,800
		TOTAL NUMBER OF MANHOLES		6

TABLE 5
MANHOLES NOT INSPECTED

YEAR TWO - SEWER INVESTIGATION

Subarea	Manhole	Street	Inspection Status	Comments[1]
F-1	112	FRONT STREET	CNO	CRACKED COVER
F-2	030	HILLER STREET	CNL	BURIED
F-2	502	FRONT STREET	CNL	NOT ON ORIGINAL MAP
F-3	265	PLEASANT STREET	CNO	WELDED SHUT
	TOTAL NUMBER OF MANHOLES		4	

NOTES:
1. NOT ON ORIGINAL MAP - Manholes were not inspected because they were not known to be in the original project area and were not included in the field map that was provided.

TABLE 6
TELEVISION INSPECTION CEA

YEAR TWO - SEWER INVESTIGATION

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
SOUTH STREET	F-1	15	17	396	1,440	720	$26,424			
								CIPP	$19,800	
								Total Rehabilitation Cost	$19,800	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
SOUTH STREET	F-1	15	14	353	2,016	1,008	$36,994			
								CIPP	$17,650	
								Lateral Liner	$5,000	
								Total Rehabilitation Cost	$22,650	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
SOUTH STREET	F-1	16	17	468	144	72	$2,642			
								Lateral Liner	$5,000	
								Total Rehabilitation Cost	$5,000	NON-EXCESSIVE

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
SOUTH STREET	F-1	18	16	400	720	360	$13,212			
								CIPP	$20,000	
								Total Rehabilitation Cost	$20,000	NON-EXCESSIVE

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
PITCHER STREET	F-1	143	113	328	1,296	648	$23,782			
								CIPP	$16,400	
								Cut Intruding Lateral	$800	
								Total Rehabilitation Cost	$17,200	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
PITCHER STREET	F-1	144	143	304	1,008	504	$18,497			
								CIPP	$15,200	
								Cut Intruding Lateral	$800	
								Total Rehabilitation Cost	$16,000	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
PITCHER STREET	F-1	144	145	253	1,152	576	$21,139			
								CIPP	$12,650	
								Cut Intruding Lateral	$800	
								Total Rehabilitation Cost	$13,450	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
WATER STREET	F-2	14	286	221	864	432	$15,854			
								CIPP	$15,470	
								Total Rehabilitation Cost	$15,470	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
HILLER STREET	F-2	29	30	91	288	144	$5,285			
								CIPP	$6,370	
								Total Rehabilitation Cost	$6,370	VALUE EFFECTIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
MAIN STREET	F-2	29	286	145	144	72	$2,642			
								CIPP	$10,150	
								Total Rehabilitation Cost	$10,150	NON-EXCESSIVE

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
MAIN STREET	F-2	29	287	304	0	0	$0			
								CIPP	$15,200	
								Cut Intruding Lateral	$800	
								Total Rehabilitation Cost	$16,000	NON-EXCESSIVE

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
HILLER STREET	F-2	31	30	296	1,296	648	$23,782			
								CIPP	$20,720	
								Total Rehabilitation Cost	$20,720	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
FRONT STREET	F-2	38	39	405	1,872	936	$34,351			
								CIPP	$28,350	
								Total Rehabilitation Cost	$28,350	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
FRONT STREET	F-2	39	40	250	1,296	648	$23,782			
								CIPP	$17,500	
								Total Rehabilitation Cost	$17,500	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
FRONT STREET	F-2	504	38	379	4,608	2,304	$84,557			
								CIPP	$26,530	
								Total Rehabilitation Cost	$26,530	EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
MAIN STREET	F-3	24	25	423	864	432	$15,854			
								CIPP	$21,150	
								Cut Intruding Lateral	$800	
								Lateral Liner	$5,000	
								Total Rehabilitation Cost	$26,950	NON-EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
PLEASANT STREET	F-3	264	265	405	576	288	$10,570			
								CIPP	$20,250	
								Total Rehabilitation Cost	$20,250	NON-EXCESSIVE

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
PLEASANT STREET	F-3	264	406	184	0	0	$0			
								CIPP	$9,200	
								Lateral Liner	$5,000	
								Lateral Liner	$5,000	
								Lateral Liner	$5,000	
								Total Rehabilitation Cost	**$24,200**	NON-EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
PLEASANT STREET	F-3	265	24	407	1,152	576	$21,139			
								CIPP	$20,350	
								Cut Intruding Lateral	$800	
								Cut Intruding Lateral	$800	
								Cut Intruding Lateral	$800	
								Total Rehabilitation Cost	**$22,750**	VALUE EFFECTIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
COTTAGE STREET	F-4	34	275	390	720	360	$13,212			
								CIPP	$19,500	
								Total Rehabilitation Cost	**$19,500**	NON-EXCESSIVE RECOMMENDED

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
SCHOOL STREET	F-4	276	273	289	144	72	$2,642			
								CIPP	$14,450	
								Total Rehabilitation Cost	**$14,450**	NON-EXCESSIVE

Street	Start Subarea	Start Manhole	End Manhole	Length (ft)	Total Infil. (gpd)	Removable Infil. (gpd)	T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
MILL STREET	F-8	270	271	286	288	144	$5,285			
								Structural Short Liner	$2,400	
								Total Rehabilitation Cost	$2,400	EXCESSIVE RECOMMENDED
TOTAL				6,977	21,888	10,944	$401,645		$385,690	
TOTAL NON-EXCESSIVE				2,011	1,728	864	$31,709		$85,850	
TOTAL EXCESSIVE RECOMMENDED				3,471	17,136	8,568	$314,446		$200,070	
TOTAL VALUE EFFECTIVE RECOMMENDED				498	1,440	720	$26,424		$29,120	
TOTAL NON-EXCESSIVE RECOMMENDED				997	1,584	792	$29,066		$70,650	
TOTAL RECOMMENDED				4,966	20,160	10,080	$369,936		$299,840	

TABLE 7
MANHOLE INFILTRATION CEA
YEAR TWO - SEWER INVESTIGATION

Sewer Basin	MH	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	T+T Cost	Rehabilitation	Rehab. Cost	Cost-Effectiveness
F-3	263	PLEASANT STREET	6.6	144	72	$2,642	Cementitious Lining	$990	EXCESSIVE RECOMMENDED
F-4	034	SPRING STREET	6.1	720	360	$13,212	Cementitious Lining	$915	EXCESSIVE RECOMMENDED
F-8	266	OLD MILL ROAD	4.7	288	144	$5,285	Cementitious Lining	$705	EXCESSIVE RECOMMENDED
F-8	267	OLD MILL ROAD	5.7	0	0	$0	Cementitious Lining	$855	NON-EXCESSIVE RECOMMENDED
F-8	268	OLD MILL ROAD	6.1	720	360	$13,212	Cementitious Lining	$915	EXCESSIVE RECOMMENDED
F-8	271	OLD MILL ROAD	6.1	864	432	$15,854	Cementitious Lining	$915	EXCESSIVE RECOMMENDED
TOTAL				**2,736**	**1,368**	**$50,206**		**$5,295**	
TOTAL NON-EXCESSIVE				**0**	**0**	**$0**		**$0**	
TOTAL EXCESSIVE RECOMMENDED				**2,736**	**1,368**	**$50,206**		**$4,440**	
TOTAL VALUE-EFFECTIVE RECOMMENDED				**0**	**0**	**$0**		**$0**	
TOTAL NON-EXCESSIVE RECOMMENDED				**0**	**0**	**$0**		**$855**	
TOTAL RECOMMENDED				**2,736**	**1,368**	**$50,206**		**$5,295**	

TABLE 8
MANHOLE INFLOW CEA

YEAR TWO - SEWER INVESTIGATION

Subarea	MH #	Street Name	Inflow (gpd)	Rehabilitation
F-1	113	FRONT STREET	1,000	Install Inflow Dish
F-1	277	FRONT STREET	1,000	Install Inflow Dish
F-2	035	FRONT STREET	1,000	Install Inflow Dish
TOTAL INFLOW			3,000	
TOTAL NUMBER OF MANHOLES			3	
TOTAL ESTIMATED COST			$450	

TABLE 9
FAT, OIL, AND GREASE SUMMARY

YEAR TWO - SEWER INVESTIGATION

Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length (ft)
SOUTH STREET	F-1	15	F-2	14	PVC	8	353
	Footage	Defect Code		Clock Position	Defect Comments		
	025	GREASE					
	070	GREASE					
Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length (ft)
WATER STREET	F-2	14	F-2	286	VC	12	221
	Footage	Defect Code		Clock Position	Defect Comments		
	188	GREASE					
Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length (ft)
HILLER STREET	F-2	29	F-2	30	VC	12	91
	Footage	Defect Code		Clock Position	Defect Comments		
	006	GREASE			START		
	057	GREASE			END		
Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length (ft)
MILL STREET	F-8	270	F-8	271	LINED	8	286
	Footage	Defect Code		Clock Position	Defect Comments		
	267	GREASE					
Street	Start Subarea	Start Manhole	End Subarea	End Manhole	Pipe Material	Pipe Diameter	Pipe Length (ft)
MILL STREET	F-8	270	F-8	379	PVC	8	185
	Footage	Defect Code		Clock Position	Defect Comments		
	032	GREASE					

DRAFT

APPENDIX C

2017 NPDES Permit

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §§1251 et seq.; the "CWA"), and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§ 26-53),

Town of Marion
Department of Public Works

is authorized to discharge from the facility located at

Marion Water Pollution Control Facility (WPCF)
50 Benson Brook Road
Marion, MA 02738

to receiving water named

Unnamed Brook to Aucoot Cove

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on **the first day of the calendar month immediately following 60 days after signature.**

This permit expires at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on September 29, 2006 and modified on May 22, 2007.

This permit consists of 15 pages in Part I including effluent limitations and monitoring requirements, 25 pages in Part II including NPDES Part II Standard Conditions, Attachment A (USEPA Region 1 Freshwater Chronic Toxicity Test Procedure and Protocol, March 2013, 7 pages), and Attachment B (USEPA Region 1 Freshwater Acute Toxicity Test Procedure and Protocol, February 2011, 8 pages).

Signed this 13th day of April, 2017

Arthur V. Johnson, III, Acting Director
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

Douglas E. Fine, Assistant Commissioner
Bureau of Water Resources
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

PART I

A.1. During the period beginning on the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to Aucoot Cove. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTIC			**EFFLUENT LIMITS**			**MONITORING REQUIREMENTS [3]**	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**AVERAGE MONTHLY**	**AVERAGE WEEKLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE' TYPE**
FLOW[2]	*********	*********	0.588 MGD	*********	Report MGD	CONTINUOUS	RECORDER
FLOW[2]	*********	*********	Report MGD	*********	*********	CONTINUOUS	RECORDER
BOD_5 [4]	42 lbs/Day	63 lbs/Day	9 mg/L	13 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE[5]
TSS [4]	42 lbs/Day	63 lbs/Day	9 mg/L	13 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE
pH RANGE[1]	6.5 - 8.3 SU (SEE PERMIT PARAGRAPH I.A.1.b.)					1/DAY	GRAB
FECAL COLIFORM [1,6]	*********	**********	14 cfu/100 mL	*********	28 cfu/100 mL	2/WEEK	GRAB
ENTEROCOCCI [1,6]			35 cfu/100 mL		276 cfu/100 mL	2/WEEK	GRAB
DISSOLVED OXYGEN (June 1st - October 31st)	NOT LESS THAN 5.0 mg/l					1/WEEK	GRAB
WHOLE EFFLUENT TOXICITY [11, 12, 13, 14]	Acute $LC_{50} \geq 100\%$ Chronic C-NOEC $\geq 100\%$					4/YEAR	24-HOUR COMPOSITE
Total Cadmium	Report maximum daily, µg/L						
Total Lead	Report maximum daily, µg/L						
Total Copper	Report maximum daily, µg/L						
Total Zinc	Report maximum daily, µg/L						
Total Nickel	Report maximum daily, µg/L						
Total Aluminum	Report maximum daily, µg/L						

CONTINUED FROM PREVIOUS PAGE

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS			MONITORING REQUIREMENTS[3]	
PARAMETER	**AVERAGE MONTHLY**	**AVERAGE MONTHLY**	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
AMMONIA-NITROGEN (May 1 – May 31)	12.75 lbs/day	2.6 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE
AMMONIA-NITROGEN (June 1 – October 31)	8.53 lbs/day	1.74 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE
AMMONIA-NITROGEN (November 1 – April 30)	Report lbs/day	Report mg/L	Report mg/L	1/MONTH	24-HOUR COMPOSITE
TOTAL NITROGEN[7] (April 1 – October 31) TOTAL KJELDAHL NITROGEN TOTAL NITRITE + NITRATE	19.6 lbs/day Report lbs/day Report lbs/day	4.0 mg/L Report mg/L Report mg/L	Report mg/L Report mg/L Report mg/L	3/WEEK	24-HOUR COMPOSITE
TOTAL NITROGEN[8] (November 1 – March 31) TOTAL KJELDAHL NITROGEN TOTAL NITRITE + NITRATE	Report lbs/day Report lbs/day Report lbs/day	Report lbs/day Report lbs/day Report lbs/day	Report mg/L Report lbs/day Report lbs/day	1/MONTH	24-HOUR COMPOSITE
TOTAL PHOSPHORUS[9] (April 1 – October 31) (November 1 – March 31)	0.98 lbs/day Report lbs/day	200 µg/L Report mg/L	Report µg/L Report mg/L	1/WEEK 1/MONTH	24-HOUR COMPOSITE
TOTAL COPPER[10]	******	7.7 µg/L	11.3 µg/L	1/WEEK	24-HOUR COMPOSITE

Sampling Location: Effluent samples are required to be collected following disinfection by the UV unit.

Footnotes:

1. Required for State Certification.

2. Report annual average, monthly average, and the maximum daily flow. The limit is an annual average, which shall be reported as a rolling average. The value will be calculated as the arithmetic mean of the monthly average flow for the reporting month and the monthly average flows of the previous eleven months.

3. Effluent sampling shall be of the discharge and shall be collected at the point specified on page 3. Any change in sampling location must be reviewed and approved in writing by EPA and MassDEP.

   A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of the week each month. Occasional deviations from the routine sampling program are allowed, but the reason for the deviation shall be documented in correspondence appended to the applicable discharge monitoring report.

   All samples shall be tested using the analytical methods found in 40 CFR §136, or alternative methods approved by EPA in accordance with the procedures in 40 CFR §136.

4. Sampling required for influent and effluent.

5. 24-hour composite samples will consist of at least twenty-four (24) grab samples taken during one consecutive 24-hour period, either collected at equal intervals and combined proportional to flow or continuously collected proportionally to flow.

6. The monthly average limits for fecal coliform and Enterococci are expressed as a geometric mean. The permittee shall comply with the fecal coliform and Enterococci limits in accordance with the schedule contained in Section I. F. Between the effective date of the permit and 12 months following the effective date, the permittee shall comply with an average monthly limitation for fecal coliform of 14 cfu/100 ml and a maximum daily limitation for fecal coliform of 43 cfu/100 ml.

7. The first value for the seasonal average will be reported after an entire May – October period has elapsed following the effective date of the permit (results do not have to be from the same year). For example, if the permit becomes effective on December 1, 2016, the permittee will calculate the first seasonal average from samples collected during the months of May through October 2017, and report this average on the October 2017 DMR. For each subsequent month that the seasonal limit is in effect, the seasonal average shall be calculated using samples from that month and the previous five months that the limit was in effect

8. The permittee shall operate the treatment facility to reduce the discharge of total nitrogen during the months of November to March to the maximum extent possible. All available treatment equipment in place at the facility shall be operated unless equal or better performance can be achieved in a reduced operational mode. The addition of a carbon source that may be necessary to meet the total nitrogen limit during the months of April to October is not required during the months of November to March.

9. The permittee shall comply with the 200 µg/L total phosphorus limit or move the outfall to Aucoot Cove in accordance with the schedule contained in Section I. F. Between the effective date of the permit and 42 months following the effective date, the permittee must report total phosphorus.

10. The minimum level (ML) for copper is defined as 3 µg/L. This value is the minimum level for copper using the Furnace Atomic Absorption analytical method (EPA Method 220.2). This method or other EPA-approved method with an equivalent or lower ML shall be used for effluent limitations less than 3 µg/L. Compliance/non-compliance will be determined based on the ML. Sampling results of 3 µg/L or less shall be reported as zero on the Discharge Monitoring Report.

11. The permittee shall conduct chronic (and modified acute) toxicity tests *four* times per year. The chronic test may be used to calculate the acute LC_{50} at the 48-hour exposure interval. The permittee shall test the daphnid, *Ceriodaphnia dubia.* Toxicity test samples shall be collected during a designated week in the months of February, May, August, and November. The week of sampling (e.g. 1st week of the month) must be the same for all WET tests. The test results shall be submitted by the last day of the month following the completion of the test. The results are due March 31st, June 30th, September 30th, and December 31st, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachment A** of this permit.

Test Dates during	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**	**Chronic Limit C-NOEC**
February May August November	March 31st June 30th September 30th December 31st	Ceriodaphnia dubia (daphnid)	≥ 100%	≥ 100%

12. The LC_{50} is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limit means that a sample of 100% effluent (no dilution) shall cause no more than a 50% mortality rate.

13. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction, based on a statistically significant difference from dilution control, at a specific time of observation as determined from hypothesis testing. As described in the EPA WET Method Manual EPA 821-R-02-013, Section 10.2.6.2, all test results are to be reviewed and reported in accordance with EPA guidance on the evaluation of the concentration-response relationship. The 100% or greater" limit is defined as a sample which is composed of 100% (or greater) effluent, the remainder being dilution water.

14. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall either follow procedures outlined in **Attachment A (Toxicity Test**

Procedure and Protocol) **Section IV., DILUTION WATER** in order to obtain an individual approval for use of an alternate dilution water, or the permittee shall follow the Self-Implementing Alternative Dilution Water Guidance, which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. This guidance is found in Attachment G of *NPDES Program Instructions for the Discharge Monitoring Report Forms (DMRs)*, which may be found on the EPA Region I web site at http://www.epa.gov/Region1/enforcementandassistance/dmr.html. If this guidance is revoked, the permittee shall revert to obtaining individual approval as outlined in **Attachment A**. Any modification or revocation to this guidance will be transmitted to the permittees. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined in **Attachment A**.

Part I.A.1. (Continued)

a. The discharge shall not cause a violation of the water quality standards of the receiving waters.

b. The pH of the effluent shall not be less than 6.5 or greater than 8.3 at any time.

c. The discharge shall not cause objectionable discoloration of the receiving waters.

d. The effluent shall not contain a visible oil sheen, foam, or floating solids at any time.

e. The permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand. The percent removal shall be based on monthly average values.

f. The results of sampling for any parameter done in accordance with EPA approved methods above its required frequency must also be reported.

g. Use of chlorine is prohibited for disinfection. Any chlorine solutions used to clean disc filters or other treatment components must be dechlorinated to nontoxic levels and fully treated by the WPCF.

h. If the average annual flow in any calendar year exceeds 80 percent of the facility's design flow [1.2 MGD], the permittee will submit a report to MassDEP by **March 31st** of the following calendar year describing its plans for further flow increases and describing how it will maintain compliance with the flow limit and all other effluent limitations and conditions. The permittee is not required to submit this report to EPA.

2. All POTWs must provide adequate notice to the Director of the following:

a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the

permit.

c. For purposes of this paragraph, adequate notice shall include information on:

(1) The quantity and quality of effluent introduced into the POTW; and

(2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

3. Prohibitions Concerning Interference and Pass Through:

Pollutants introduced into POTW's by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.

4. Toxics Control

a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.

b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

5. Numerical Effluent Limitations for Toxicants

EPA or MassDEP may use the results of the toxicity tests and chemical analyses conducted pursuant to this permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants, including but not limited to those pollutants listed in Appendix D of 40 CFR Part 122.

B. UNAUTHORIZED DISCHARGES

The permittee is authorized to discharge only in accordance with the terms and conditions of this permit and only from the outfall(s) listed in Part I A.1.of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs), are not authorized by this permit and shall be reported to EPA and MassDEP in accordance with Section D.1.e. (1) of the General Requirements of this permit (Twenty-four hour reporting).

Notification of SSOs to MassDEP shall be made on its SSO Reporting Form (which includes DEP Regional Office telephone numbers). The reporting form and instruction for its completion may be found on-line at http://www.mass.gov/eea/agencies/massdep/service/approvals/sanitary-sewer-overflow-bypass-backup-notification.html.

C. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

Operation and maintenance of the sewer system shall follow the General Requirements of Part II and the

following terms and conditions. The permittee is required to complete the following activities for the collection system which it owns:

1. Maintenance Staff

   The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. Provisions to meet this requirement shall be described in the Collection System O & M Plan required pursuant to Section C.5. below.

2. Preventive Maintenance Program

   The permittee shall maintain an ongoing preventive maintenance program to prevent overflows and bypasses caused by malfunctions or failures of the sewer system infrastructure. The program shall include an inspection program designed to identify all potential and actual unauthorized discharges. Plans and programs to meet this requirement shall be described in the Collection System O & M Plan required pursuant to Section C.5. below.

3. Infiltration/Inflow

   The permittee shall control infiltration and inflow (I/I) into the sewer system as necessary to prevent high flow related unauthorized discharges from their collection systems and high flow related violations of the wastewater treatment plant's effluent limitations. In addition to being required by federal regulations, this is also a state certification requirement. Plans and programs to control I/I shall be described in the Collection System O & M Plan required pursuant to Section C.5. below.

4. Collection System Mapping

   Within 30 months of the effective date of this permit, the permittee shall prepare a map of the sewer collection system it owns (see page 1 of this permit for the effective date). The map shall be on a street map of the community, with sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up to date and available for review by federal, state, or local agencies. Such map(s) shall include, but not be limited to the following:

   a. All sanitary sewer lines and related manholes;
   b. All combined sewer lines, related manholes, and catch basins;
   c. All combined sewer regulators and any known or suspected connections between the sanitary sewer and storm drain systems (e.g. combination manholes);
   d. All outfalls, including the treatment plant outfall(s), CSOs, and any known or suspected SSOs, including stormwater outfalls that are connected to combination manholes;
   e. All pump stations and force mains;
   f. The wastewater treatment facility(ies);
   g. All surface waters (labeled);
   h. Other major appurtenances such as inverted siphons and air release valves;
   i. A numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;

j. The scale and a north arrow; and
k. The pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow.

5. Collection System Operation and Maintenance Plan

The permittee shall develop and implement a Collection System Operation and Maintenance Plan.

a. **Within six (6) months of the effective date of the permit**, the permittee shall submit to EPA and MassDEP

(1) A description of the collection system management goals, staffing, information management, and legal authorities;
(2) A description of the collection system and the overall condition of the collection system including a list of all pump stations and a description of recent studies and construction activities; and
(3) A schedule for the development and implementation of the full Collection System O & M Plan including the elements in paragraphs b.1. through b.8. below.

b. The full Collection System O & M Plan shall be completed, implemented and submitted to EPA and MassDEP **within twenty-four (24) months from the effective date of this permit**. The Plan shall include:

(1) The required submittal from paragraph 5.a. above, updated to reflect current information;
(2) A preventive maintenance and monitoring program for the collection system;
(3) Description of sufficient staffing necessary to properly operate and maintain the sanitary sewer collection system and how the operation and maintenance program is staffed;
(4) Description of funding, the source(s) of funding and provisions for funding sufficient for implementing the plan;
(5) Identification of known and suspected overflows and back-ups, including manholes. A description of the cause of the identified overflows and back-ups, corrective actions taken, and a plan for addressing the overflows and back-ups consistent with the requirements of this permit;
(6) A description of the permittee's programs for preventing I/I related effluent violations and all unauthorized discharges of wastewater, including overflows and by-passes and the ongoing program to identify and remove sources of I/I. The program shall include an inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts; and
(7) An educational public outreach program for all aspects of I/I control, particularly private inflow.
(8) An <u>Overflow Emergency Response Plan</u> to protect public health from overflows and unanticipated bypasses or upsets that exceed any effluent limitation in the permit.

6. Annual Reporting Requirement

The permittee shall submit a summary report of activities related to the implementation of its Collection System O & M Plan during the previous calendar year. The report shall be submitted to EPA and MassDEP annually by **April 15**. The summary report shall, at a minimum, include:

a. A description of the staffing levels maintained during the year;
b. A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year;
c. Expenditures for any collection system maintenance activities and corrective actions taken during the previous year;
d. A map with areas identified for investigation/action in the coming year;
e. If treatment plant flow has reached 80% of its design flow [0.47 MGD] based on the annual average flow during the reporting year, or there have been capacity related overflows, submit a calculation of the maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year; and
f. A summary of unauthorized discharges during the past year and their causes and a report of any corrective actions taken as a result of the unauthorized discharges reported pursuant to the Unauthorized Discharges section of this permit.

7. Alternate Power Source

In order to maintain compliance with the terms and conditions of this permit, the permittee shall provide an alternative power source(s) sufficient to operate the portion of the publicly owned treatment works[1] it owns and operates.

D. SLUDGE CONDITIONS

1. The permittee shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices, including EPA regulations promulgated at 40 CFR Part 503, which prescribe "Standards for the Use or Disposal of Sewage Sludge" pursuant to Section 405(d) of the CWA, 33 U.S.C. § 1345(d).

2. If both state and federal requirements apply to the permittee's sludge use and/or disposal practices, the permittee shall comply with the more stringent of the applicable requirements.

3. The requirements and technical standards of 40 CFR Part 503 apply to the following sludge use or disposal practices.

a. Land application - the use of sewage sludge to condition or fertilize the soil

b. Surface disposal - the placement of sewage sludge in a sludge only landfill

c. Sewage sludge incineration in a sludge only incinerator

1 As defined at 40 CFR §122.2, which references the definition at 40 CFR §403.3

4. The requirements of 40 CFR Part 503 do not apply to facilities which dispose of sludge in a municipal solid waste landfill. 40 CFR § 503.4. These requirements also do not apply to facilities which do not use or dispose of sewage sludge during the life of the permit but rather treat the sludge (e.g. lagoons, reed beds), or are otherwise excluded under 40 CFR § 503.6.

5. For the purposes of this permit, the placement of sludge in unlined lagoons constitutes sludge disposal and is therefore subject to the requirements of Part 503 for sludge disposal.

6. The 40 CFR § 503 requirements including the following elements:

   a. General requirements
   b. Pollutant limitations
   c. Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
   d. Management practices
   e. Record keeping
   f. Monitoring
   g. Reporting

   Which of the 40 C.F.R. § 503 requirements apply to the permittee will depend upon the use or disposal practice followed and upon the quality of material produced by a facility. The EPA Region 1 Guidance document, "EPA Region 1 - NPDES Permit Sludge Compliance Guidance" (November 4, 1999), may be used by the permittee to assist it in determining the applicable requirements.[2]

7. The sludge shall be monitored for pollutant concentrations (all Part 503 methods) and pathogen reduction and vector attraction reduction (land application and surface disposal) at the following frequency. This frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year

less than 290	1/ year
290 to less than 1,500	1 /quarter
1,500 to less than 15,000	6 /year
15,000 +	1 /month

   Sampling of the sewage sludge shall use the procedures detailed in 40 CFR 503.8.

8. Under 40 CFR § 503.9(r), the permittee is a "person who prepares sewage sludge" because it "is … the person who generates sewage sludge during the treatment of domestic sewage in a treatment works …." If the permittee contracts with *another* "person who prepares sewage sludge" under 40 CFR § 503.9(r) – i.e., with "a person who derives a material from sewage sludge" – for use or disposal of the sludge, then compliance with Part 503 requirements is the responsibility of the contractor engaged for that purpose. If the permittee does not engage a "person who prepares sewage sludge," as defined in 40 CFR § 503.9(r), for use or disposal, then the permittee remains responsible to ensure that the applicable requirements in Part 503 are met.

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2 This guidance document is available upon request from EPA Region 1 and may also be found at: http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf

40 CFR §503.7. If the ultimate use or disposal method is land application, the permittee is responsible for providing the person receiving the sludge with notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

9. The permittee shall submit an annual report containing the information specified in the 40 CFR Part § 503 requirements (§ 503.18 (land application), § 503.28 (surface disposal), or § 503.48 (incineration)) by **February 19** (*see also* "EPA Region 1 - NPDES Permit Sludge Compliance Guidance"). Reports shall be submitted electronically using EPA's Electronic Reporting tool ("NeT") (see "Monitoring and Reporting" section below).

E. SPECIAL CONDITIONS RELATED TO LAGOON OPERATIONS

The following requirements pertain to the use and operation of the three unlined facultative sewage lagoons on the site for sludge disposal and storage of wastewater.

In accordance with federal regulations, the permittee shall cease the placement, storage, and disposal of sludge and other treatment related solids in unlined lagoons, cease the use of the unlined lagoons for storage of wastewater, and remove sludge solids currently in the lagoons, in accordance with state and federal regulations. These requirements shall be met in accordance with the schedule in Section F below.

F. COMPLIANCE SCHEDULE

To comply with the fecal coliform, Enterococci, and total phosphorus permit limits and the Operation and Maintenance requirements relative to the unlined lagoons, as well as to ensure that the discharge from outfall 001 does not cause or contribute to exceedances of surface water quality standards, the Permittee shall take the following actions:

1. Within twelve (12) months of the effective date of the permit, the Permittee shall comply with the fecal coliform and Enterococci limits. In the interim, the permittee shall comply with an average monthly limitation for fecal coliform of 14 cfu/100 ml and a maximum daily limitation for fecal coliform of 43 cfu/100 ml.

2. Within twelve (12) months of the effective date of the permit, the Permittee shall submit a plan for achieving compliance with the lagoon related permit requirements. The plan shall include specific tasks to be completed, including time frames for completing the tasks, which is consistent with achieving full compliance with the lagoon related permit requirements as soon as possible but no later than forty-eight (48) months from the effective date of the permit.

3. Within twelve (12) months of the effective date of the permit, the Permittee shall submit an alternatives analysis/facility plan to EPA for the treatment and/or pollution prevention improvements required to achieve the total phosphorus limit of 200 µg/L or relocation of the outfall to Aucoot Cove.

4. Within twenty-four (24) months of the effective date of the permit, the Permittee shall complete design and initiate construction of improvements necessary for complying with the total phosphorus limit of 200 µg/L or relocation of the outfall to Aucoot Cove.

5. Within twenty-four (24) months and thirty-six (36) months of the effective date of the permit, the Permittee shall submit progress reports relative to achieving compliance with the lagoon related requirements of the permit.

6. Within forty-two (42) months of the effective date of the permit, the Permittee shall comply with the total phosphorus limit of 200 µg/L or relocation of the outfall to Aucoot Cove.

7. Within forty-eight (48) months of the effective date of the permit, the Permittee shall cease the disposal of wastewater, sludge and other treatment related solids in unlined lagoons, and shall remove sludge solids currently in the lagoons, in compliance with state and federal regulations.

G. MONITORING AND REPORTING

The monitoring program in the permit specifies sampling and analysis, which will provide continuous information on compliance and the reliability and effectiveness of the installed pollution abatement equipment. The approved analytical procedures found in 40 CFR Part 136 are required unless other procedures are explicitly required in the permit. The Permittee is obligated to monitor and report sampling results to EPA and the MassDEP within the time specified within the permit.

Unless otherwise specified in this permit, the permittee shall submit reports, requests, and information and provide notices in the manner described in this section.

1. Submittal of DMRs Using NetDMR

The permittee shall continue to submit its monthly monitoring data in discharge monitoring reports (DMRs) to EPA and MassDEP no later than the 15th day of the month electronically using NetDMR. When the permittee submits DMRs using NetDMR, it is not required to submit hard copies of DMRs to EPA or MassDEP.

2. Submittal of Reports as NetDMR Attachments

Unless otherwise specified in this permit, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies. Permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. (See Part I.G.5. for more information on state reporting.) Because the due dates for reports described in this permit may not coincide with the due date for submitting DMRs (which is no later than the 15th day of the month), a report submitted electronically as a NetDMR attachment shall be considered timely if it is electronically submitted to EPA using NetDMR with the next DMR due following the particular report due date specified in this permit.

3. Submittal of Biosolids/Sewage Sludge Reports

By February 19 of each year, the permittee must electronically report their annual Biosolids/Sewage Sludge Report for the previous calendar year using EPA's NPDES Electronic Reporting Tool ("NeT") found on the internet at https://www.epa.gov/compliance/npdes-ereporting.

4. Submittal of Requests and Reports to EPA/OEP

The following requests, reports, and information described in this permit shall be submitted to the EPA/OEP NPDES Applications Coordinator in the EPA Office Ecosystem Protection (OEP).

A. Transfer of Permit notice
B. Request for changes in sampling location
C. Request for reduction in testing frequency
D. Request for Reduction in WET Testing Requirement
E. Report on unacceptable dilution water / request for alternative dilution water for WET testing
F. Notification of proposal to add or replace chemicals and bio-remedial agents including microbes

These reports, information, and requests shall be submitted to EPA/OEP electronically at R1NPDES.Notices.OEP@epa.gov or by hard copy mail to the following address:

U.S. Environmental Protection Agency
Office of Ecosystem Protection
EPA/OEP NPDES Applications Coordinator
5 Post Office Square - Suite 100 (OEP06-03)
Boston, MA 02109-3912

5. Submittal of Reports in Hard Copy Form

The following notifications and reports shall be submitted as hard copy with a cover letter describing the submission. These reports shall be signed and dated originals submitted to EPA.

A. Written notifications required under Part II
B. Notice of unauthorized discharges, including Sanitary Sewer Overflow (SSO) reporting

This information shall be submitted to EPA/OES at the following address:

U.S. Environmental Protection Agency
Office or Environmental Stewardship (OES)
Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

6. State Reporting

Unless otherwise specified in this permit, duplicate signed copies of all reports, information, requests or notifications described in this permit, including the reports, information, requests or notifications described in Parts I.G.3 and I.G.4 also shall be submitted to the State at the following addresses:

MassDEP – Southeast Region
Bureau of Water Resources
20 Riverside Drive
Lakeville, MA 02347

Copies of toxicity tests only shall be submitted to:

Massachusetts Department of Environmental Protection
Watershed Planning Program
8 New Bond Street
Worcester, Massachusetts 01606

7. Verbal Reports and Verbal Notifications

Any verbal reports or verbal notifications, if required in Parts I and/or II of this permit, shall be made to both EPA and to MassDEP. This includes verbal reports and notifications which require reporting within 24 hours. (As examples, see Part II.B.4.c. (2), Part II.B.5.c. (3), and Part II.D.1.e.) Verbal reports and verbal notifications shall be made to EPA's Office of Environmental Stewardship at:

U.S. Environmental Protection Agency
Office of Environmental Stewardship
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912
617-918-1510

H. STATE PERMIT CONDITIONS

1. This authorization to discharge includes two separate and independent permit authorizations. The two permit authorizations are (i) a federal National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (EPA) pursuant to the Federal Clean Water Act, 33 U.S.C. §§1251 et seq.; and (ii) an identical state surface water discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.

2. This authorization also incorporates the state water quality certification issued by MassDEP under § 401(a) of the Federal Clean Water Act, 40 C.F.R. 124.53, M.G.L. c. 21, § 27 and 314 CMR 3.07. All of the requirements (if any) contained in MassDEP's water quality certification for the permit are hereby incorporated by reference into this state surface water discharge permit as special conditions pursuant to 314 CMR 3.11.

3. Each agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the agency taking such action, and shall not affect the validity or status of this permit as issued by the other agency, unless and until each agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared invalid, illegal or otherwise issued in violation of state law such permit shall remain in full force and effect under federal law as a NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of federal law, this permit shall remain in full force and effect under state law as a permit issued by the Commonwealth of Massachusetts.

DRAFT

APPENDIX D

Consent Orders and Agreements

United States Environmental Protection Agency
Region I - New England

IN THE MATTER OF	)	DOCKET NO. 08-002
	)	
Town of Marion, Massachusetts	)	
NPDES Permit No. MA0100030	)	FINDINGS OF VIOLATION
	)	
	)	AND
	)	
Proceedings under Section 309(a)(3)	)	ORDER FOR COMPLIANCE
of the Clean Water Act, as amended,	)	
33 U.S.C. §1319(a)(3)	)	

I. STATUTORY AUTHORITY

The following Findings are made and ORDER issued pursuant to Section 309(a)(3) of the Clean Water Act, as amended (the "Act"), 33 U.S.C. §1319(a)(3), which grants to the Administrator of the U.S. Environmental Protection Agency ("EPA") the authority to issue orders requiring persons to comply with Sections 301, 302, 306, 307, 308, 318 and 405 of the Act and any permit condition or limitation implementing any of such sections in a National Pollutant Discharge Elimination System ("NPDES") permit issued under Section 402 of the Act, 33 U.S.C. §1342. This authority has been delegated to EPA Region I's Regional Administrator, and in turn to the Director of the Office of Environmental Stewardship.

The Order herein is based on findings of violations of Section 301 of the Act, 33 U.S.C. §1311, and the conditions of NPDES Permit No. MA0100030. Pursuant to Section 309(a)(5)(A) of the Act, 33 U.S.C. §1319(a)(5)(A), the Order provides a schedule for compliance which the Director of the Office of Environmental Stewardship has determined to be reasonable.

II. DEFINITIONS

Unless otherwise defined herein, terms used in this Order shall have the meaning given to those terms in the Clean Water Act, 33 U.S.C. § 1251 et. seq., the regulations

promulgated thereunder, and any applicable NPDES permit. For the purposes of this Order, "NPDES Permit" means the Town of Marion's (the " Town" or the "Permittee") NPDES Permit No. MA0100030, and all amendments or modifications thereto and renewals thereof as are applicable, and in effect at the time.

III. FINDINGS

The Director of the Office of Environmental Stewardship makes the following findings of fact:

I. The Town of Marion, Massachusetts is a municipality, as defined in Section 502(4) of the Act, 33 U.S.C. §1362(4), established under the laws of the Commonwealth of Massachusetts.

2. The Town is a person under Section 502(5) of the Act, 33 U.S.C §1362(5). The Town is the owner of a publicly-owned wastewater treatment works (the "POTW") from which it discharges pollutants, as defined in Section 502(6) and (12) of the Act, 33 U.S.C. §1362(6) and (12), from a point source, as defined in Section 502(14) of the Act, 33 U.S.C. §1362(14), to an unnamed brook to Aucoot Cove. Aucoot Cove flows into Sippican Harbor which in turn empties into Buzzards Bay. All are waters of the United States as defined in 40 C.F.R. § 122.2 and, therefore navigable waters under Section 502(7) of the Act, 33 U.S.C.§1362(7).

3. On September 29, 2006, the Town was issued NPDES Permit No. MA0100030 (the "Permit") by the Director of the Office of Ecosystem Protection of EPA, Region I, under the authority given to the Administrator of EPA by Section 402 of the Clean Water Act, 33 U.S.C. §1342. The Permit, including the effluent limitations, became effective on December 1, 2006. On May 22, 2007, certain conditions of the Permit, but not the effluent limits, were modified. All terms and conditions of the modified Permit became effective on August 1, 2007.

4. The NPDES Permit authorizes the Permittee to discharge pollutants from the POTW to the unnamed brook to Aucoot Cove, subject to the effluent limitations, monitoring requirements and other conditions specified in its NPDES Permit.

5. Section 301(a) of the Act, 33 U.S.C. §1311(a), makes unlawful the discharge of pollutants to waters of the United States except in compliance with, among other things, the terms and conditions of a NPDES permit issued pursuant to Section 402 of the Act, 33 U.S.C. §1342.
6. Part I.A.1 of the NPDES Permit establishes effluent limitations and monitoring requirements for the discharge of treated effluent from outfall serial number 001.
7. The Permittee has routinely discharged wastewater containing total copper in concentrations greater than the effluent limitations contained in its NPDES Permit.
8. The Permittee's discharge of pollutants from the POTW to the unnamed brook to Aucoot Cove in excess of the limits contained in its NPDES Permit, violates Section 301(a) of the Act, 33 U.S.C. §1311(a).

IV. ORDER

Accordingly, pursuant to Section 309(a)(3) of the Clean Water Act, it is hereby ordered that the Permittee shall:

1. Until further notice, beginning January 31, 2008, and each January 31st annually thereafter, submit a report (the "Annual Copper Optimization Report") to EPA and the Massachusetts Department of Environmental Protection ("MADEP") detailing the actions taken during the prior calendar year by the Permittee, or known by the Permittee to have been taken by other parties, including industrial users and water suppliers, to identify sources of copper entering the POTW and to further optimize the removal of copper from the POTW effluent. The report shall address all of the items specified in Attachment 1 and must specifically include trend analyses of both influent and effluent copper loadings. The report shall include a summary of the Permittee's monitoring data for total copper for the previous twelve months as well as a tabulation of the average and median total copper loading levels for each month. It must also include a calculation of the total copper loading discharged from the POTW during the prior calendar year.

Interim Effluent Limits

2. Upon the effective date of this Order, the Permittee shall, at a minimum, comply with the interim effluent limitation for total copper set forth in Attachment 2 of this Order. The Permittee shall also comply with all other effluent limitations, monitoring requirements and other conditions specified in its NPDES Permit for parameters not addressed in Attachment 2.
3. If the Permittee violates the interim limit for total copper contained in Attachment 2 of this Order for two consecutive months, or for three months within a twelve-month period, it shall submit a detailed engineering report (the "Copper Optimization Engineering Report") to EPA and the MADEP for achieving full compliance with its NPDES Permit's copper limits. The Copper Optimization Engineering Report shall be developed in accordance with the Copper Optimization Scope of Work included as Attachment 3 within 365 calendar days of the end of the month in which the reporting requirement contained in this paragraph is triggered. The Copper Optimization Engineering Report shall also include a schedule (the "Implementation Schedule") for implementing the recommendations of the Copper Optimization Engineering Report.
4. The Implementation Schedule submitted pursuant to Paragraph IV.3. of this Order shall be incorporated and enforceable hereunder upon the Implementation Schedule's approval by, and as amended by, EPA.
5. The Permittee shall provide EPA and the MADEP written notification within fourteen calendar days of the end of the month in which the reporting requirement contained in Paragraph IV.3. of this Order is triggered.

V. NOTIFICATION PROCEDURES

I. Where this Order requires a specific action to be performed within a certain time frame, the Permittee shall submit a written notice of compliance or noncompliance with each deadline. Notification must be mailed within fourteen (14) calendar days after each required deadline. The timely submission of a

required report shall satisfy the requirement that a notice of compliance be submitted.

2. If noncompliance is reported, notification should include the following information:
   a. A description of the noncompliance;
   b. A description of any actions taken or proposed by the Permittee to comply with the lapsed schedule requirements;
   c. A description of any factors that explain or mitigate the noncompliance; and
   d. An approximate date by which the Permittee will perform the required action.
3. After a notification of noncompliance has been filed, compliance with the past-due requirement shall be reported by submitting any required documents or providing EPA with a written report indicating that the required action has been achieved. Submissions required by this Order shall be in writing and shall be mailed to the following addresses:

USEPA - New England
Office of Environmental Stewardship
1 Congress Street
Suite 1100 (SEW)
Boston, MA 02114-2023
Attn: Steven Couto

MADEP
20 Riverside Drive
Lakeville, MA 02347
Attn: Jonathan Hobill

VI. GENERAL PROVISIONS

1. This Order does not constitute a waiver or a modification of the terms and conditions of the NPDES Permit. The NPDES Permit remains in full force and effect. EPA reserves the right to seek any and all remedies available under Section 309 of the Act, 33 U.S.C. § 1319, as amended, for any violation cited in

this Order.

2. This Order shall become effective upon receipt by the Permittee.

10/22/07 Susan Studlien

Date

Susan Studlien, Director
Office of Environmental Stewardship

ATTACHMENT 1

1. Summarize the current corrosion control program being implemented by the local water supplier(s) including the pH level maintained and any corrosion inhibitors used by the supplier(s).
2. Summarize those measures that have been taken to reduce the contribution of copper from household domestic wastes, non-significant industrial users, institutions and commercial businesses.
3. Summarize those public outreach efforts and public education programs that have been conducted to inform the public of the level of copper in household and commercial products, their impact on the publicly-owned treatment works (POTW), and the existence of alternative products.
4. Summarize the specific measures that have been taken by the Permittee, septage haulers, industrial sewer users, or the local water supplier(s) to reduce the level of copper entering, and ultimately discharged from, the POTW including:
    a. septage and side-stream treatment, or reduction or elimination of the introduction of septage to the POTW;
    b. further reduction of copper in the water supply through additional or modified corrosion control treatment;
    c. additional or modified chemical treatment at the POTW, including the use of different treatment chemicals, increased chemical dosing, and multiple chemical addition points at the POTW, for further copper removal; and
    d. further evaluation of industrial user local limits and industrial user compliance with those local limits.
5. Assess the annual copper reduction that has resulted from the implementation of the above measures.

ATTACHMENT 2

Interim Limits

Parameter	Average Monthly Concentration ug/l	Maximum Day ug/l	Measurement Frequency	Sample Type
Total Copper	20	Report Only	once/month	24 hour composite

ATTACHMENT 3

COPPER OPTIMIZATION SCOPE OF WORK

The report shall include:

I. BACKGROUND AND PROBLEM STATEMENT

A. A description of the nature and extent of the NPDES Permit effluent violations for copper and other metals and a description of the equipment used to sample the final effluent noting any metal components (i.e. copper tubing).

B. An analysis of historical influent monitoring data including the results of the monitoring required under Paragraph III of this Attachment to locate and quantify the sources of the influent copper loadings to the Publicly-Owned Treatment Works (POTW) and to account for influent copper variability.

C. An inventory of each discrete category of copper sources and an estimate of each category's annual mass contribution relative to the total POTW loading. The analysis shall included both short-term (daily, weekly) and long-term (seasonal) fluctuations from each source. Where monitoring data are not available, estimates and the source of each estimate shall be provided. At a minimum, the following potential sources of copper shall be evaluated:

1. Public and private water supply(ies) that provide water to the users of the Permittee's collection system including any private sources that supply water to industrial users of the Permittee's collection system;
2. Significant Industrial Users (SIUs) of the Permittee's collection system;
3. Industrial/commercial sources that are known to, or are suspected of, discharging copper. These shall include, but not be limited to, industries that do not meet the definition of a SIU, medical facilities, printers, schools, laboratories, photo processing operations, laundry and dry cleaning operations, and other institutions that may discharge wastewater to the POTW;
4. Domestic, commercial, and industrial septage, hauled wastewater, or liquid sludge received from other POTWs as well as landfill leachate that is treated at the POTW;
5. Household domestic wastewater that includes chemical additives, particularly copper-based root control additives; and,
6. Side-stream flows from sludge dewatering, compost area runoff, or any other internal plant flow or treatment chemical process.

As part of these evaluations, the Permittee shall assess the impact of copper on the POTW influent and effluent, sludge quality, sludge processing, activated sludge (concerns/inhibition), the receiving water and aquatic life.

D. A mass balance delineating the sources of copper entering the POTW and the fate of copper within the POTW;

E. A determination of the projected maximum allowable POTW headworks loading for each discrete category of copper discharged to the POTW, a description of the specific treatment technologies and source reduction initiatives that will be implemented to meet the projected maximum allowable POTW headworks loadings, schedules for the implementation of the selected treatment technologies and source reduction measures, and an estimate of the expected copper reductions associated with the implementation of the selected treatment technologies and source reduction measures.

II. DISCRETE COPPER SOURCE INVESTIGATIONS

A. WATER SUPPLY

1. The evaluation of the domestic drinking and industrial water supply(ies) that serve(s) the users of the POTW shall, at a minimum, include:
   a. A determination of the quantity and percent of the total copper loading in the POTW influent that can be attributed to the copper found in the raw water supply(ies) as well as the copper that has leached from homeowner distribution systems;
   b. An evaluation of the feasibility (consisting of a desktop and/or demonstration study) and status of implementation of various corrosion control technologies, including, but not limited to, each of the following, applied separately, and where appropriate in combination with one another, to achieve optimal corrosion control for that particular water system:
      (1) Alkalinity and pH adjustment;
      (2) Calcium hardness adjustment; and,
      (3) Phosphate or silicate-based corrosion inhibitors (The evaluation of phosphorus-based additive alternatives must also consider the impacts of the additional phosphorus on receiving water quality).
   c. An assessment of the impact of the additional treatment options on other drinking water quality parameters (e.g. lead, alkalinity, pH, bacteria, calcium, disinfection byproducts formation, taste, odor, color, etc...) within the water supply system;
   d. An evaluation of the materials that comprise the water distribution system;
   e. Identification of chemical, physical, and other constraints that may affect the implementation of a particular treatment option for the drinking water supply;

f. A description of each water supply's management, its relation to the POTW authority and the water supply's compliance status with the requirements of EPA's Lead and Copper Rule. Identify any barriers to a coordinated, cost-effective joint approach to copper reduction in the water supply(ies) beyond the minimum requirements of the Lead and Copper Rule. Identify what actions can be taken to overcome the identified barriers.

B. EVALUATION OF INDUSTRIAL USERS

An evaluation of the copper contributions from the industrial users to the POTW that shall include:

1. INVENTORY

Identification, listing, and evaluation of all industrial and commercial users that discharge copper to the POTW. These sources may include, but are not limited to, significant industrial users[1], such as electroplaters, metal finishers, metal fabrication and machine shops, leather tanning and textile mills. Other potential industrial/commercial copper sources may include medical facilities, printers, schools, laboratories, photo processing operations, laundry and dry cleaning operations, or other institutions that may contribute wastewater to the POTW where dyes or other products used in these operations may contain copper. The amount of copper annually discharged from these sources to the POTW shall be expressed in pounds and as a percent of the total amount of copper being introduced to the POTW from all sources.

2. LOCAL LIMITS EVALUATION

a. An evaluation of the adequacy of any existing local limit for copper (or other metal of concern) developed by the POTW. The evaluation shall include a comprehensive headworks analysis that quantifies the total amount of copper being introduced to the POTW from all categories of sources and the maximum allowable headworks loading from all categories of sources.

b. Based upon the headworks analysis, and the other evaluations included in the Scope of Work, determine the need to:
   (1). develop a local limit for copper;
   (2). revise any existing local limit(s) for copper; and,
   (3). expand the applicability of the limit(s) to include new industrial/commercial users if the evaluations conducted in this

[1] Under 40 C.F.R. § 403.3(t), the term Significant Industrial User means any industrial user subject to Categorical Pretreatment Standards under 40 C.F.R. 403.6 and 40 C.F.R chapter I, subchapter N, or any other industrial user that discharges an average of 25,000 gallons per day or more of process waste water to the POTW or contributes a process waste stream which makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant.

scope of work reveal that more stringent controls are necessary.

c. The local limits evaluation shall be performed in accordance with EPA's Guidance Manual for the Development and Implementation of Local Discharge Limitations Under the Pretreatment Program (Dec.,1987). In the event that the Copper Optimization Engineering Report and headworks analysis determines that the treatment modifications and source reduction measures selected by the Permittee under Paragraph IV.D. of this Scope of Work are not expected to result in the POTW's compliance with its NPDES Permit copper limits, and that the local domestic/background copper loadings will continue to be greater than the maximum allowable headworks loading allowing no allocation for any pollutant loadings from industrial users, a local limit for copper must be established in accordance with Paragraph II.B.2.d. In the event that the treatment modifications and source reduction measures selected by the Permittee under Paragraph IV.D. of this Scope of Work are expected to result in the POTW's compliance with its NPDES Permit copper limits, the local limits established for copper must be consistent with the maximum allowable industrial headworks loading.

d. Under those circumstances where the headworks loading analysis determines that there is no allocation for any pollutant loadings from industrial users due to contributions from other sources, the copper local limit must be developed at a level equal to the POTW's NPDES copper limit, adjusted to reflect the POTW's removal efficiency for copper. For example, if the POTW's NPDES permit monthly average copper limit is 15 micrograms/liter (ug/l) and the POTW is capable of removing 80% of the copper discharged to the POTW, the monthly average local limit for copper would be established at 15 ug/l/0.2 or 75 ug/l.

e. The development of the local limit for copper or revisions to the local limit for copper under this paragraph shall be included as a separate section of the engineering report that must be submitted pursuant to Paragraph IV.1. of this Order for EPA's review and concurrence.

3. TECHNOLOGY/PRETREATMENT EVALUATION

An evaluation of industry-specific treatment technologies or operational modifications that must be implemented to ensure compliance with the local limits calculated for copper in Paragraph II.B.2. above. The evaluation can be conducted by the Permitee or can be delegated to the industrial/commercial user. The evaluation of facility-specific treatment technologies or operational modifications necessary to comply with any local limits established under this Order shall include, but shall not be

limited to, the following:

a. The name and location of the industrial/commercial facility (the "facility");
b. A description of the operations conducted and major products produced at the facility with a specific emphasis on those activities and operations that contribute copper to the facility's wastewater;
c. An evaluation of the characteristics of the wastewater discharged to the POTW, including additional representative sampling necessary to quantify the copper contribution from the facility;
d. A description of the wastewater treatment unit operations and processes employed at the facility including an estimate of the annual mass copper removal efficiency of the treatment facilities with specific emphasis on those operations and processes that remove copper;
e. A detailed description of all treatment technologies and operational modifications that may potentially reduce the quantity of copper discharged from the facility, including an estimate of the expected annual copper reduction and capital and operation and maintenance cost associated with the implementation of each alternative; and,
f. Prioritization of the alternatives based upon their expected effectiveness, technical and economic feasibility.

4. POLLUTION PREVENTION EVALUATION

In addition to the technology/pretreatment evaluation required in Paragraph II.B.3. above, the POTW shall develop, or require each of the commercial/industrial users that discharge copper to the POTW to develop, a Waste Minimization Plan for the purpose of further reducing the copper loadings from each industrial/commercial user through pollution prevention/source reduction alternatives. At a minimum, the Waste Minimization Plan for each significant source of copper, shall include, but shall not be limited to, the following information:

a. The name of the industrial/commercial facility and location of the site;
b. A general description of the major products manufactured and produced at the facility;
c. A process flow diagram of the unit operations highlighting those activities and operations that contribute copper to the facility's wastewater;
d. An evaluation of source reduction approaches available to the generator that may reduce copper in the commercial/industrial wastestreams. The evaluation shall consider at least the following areas:

(1) Raw materials changes;
(2) Operational process changes;
(3) Product quality changes; and,
(4) Administrative steps taken to reduce copper including but not limited to:
    a. Inventory Control;
    b. Employee Award Programs;
    c. In-house Policies;
    d. Employee Training;
    e. Corporate or Management Commitment, and,
    f. Other Programs or Approaches;

e. An evaluation of the effects of the source reduction methods on emissions and discharges to other media;

f. The report shall prioritize each evaluated approach and shall also discuss the following:
    (1) Expected change in the amount of copper generated;
    (2) Technical and financial feasibility; and,
    (3) Employee health and safety implications;

g. A list of alternatives not selected for further evaluation as a potentially viable source reduction approach and a rationale for rejecting each alternative.

5. RECOMMENDATIONS

Evaluate combinations of both pretreatment technologies and pollution prevention approaches to determine the most effective course of metals reduction.

C. SEPTAGE, LEACHATE, AND OTHER HAULED WASTES

1. SEPTAGE

a. Report the quantity and category (homeowner, commercial, neighboring community, etc...) of septage received at the POTW and the total annual copper loading as a percentage of the total annual copper loading to the POTW. Provide the basis for the measurement or estimate. Describe any chemical monitoring, tracking, or permit system used to control the level of septage discharged to the POTW;

b. Identify the copper loading from each category of septage on an average daily and annual basis, describing whether there are seasonal changes in the amount or character of the septage.

c. If septage discharges are accepted from communities not served by the same water supplier as the POTW, these discharges must be sampled, and separately identified as part of the program outlined under Paragraph III. Describe whether the contributing

communities comply with EPA's Lead & Copper Rule and whether they have taken any additional corrosion control measures to reduce copper beyond the requirements of the Lead & Copper Rule.

2. **LEACHATE**
   a. Identify the name and location of the source, and the location of the discharge of any leachate received by the POTW; and,
   b. Report the average daily, monthly average and annual volume of leachate received by the POTW. Characterize the chemical content of the leachate and determine the total annual copper loading of the leachate as a percentage of the total annual copper loading to the POTW providing the basis for the measurement or estimate. Describe any chemical sampling, tracking, or permit system used to monitor or regulate the leachate received by the POTW.
3. **OTHER HAULED WASTEWATERS**
   a. If the Permittee accepts non-septage hauled wastewater from industrial or commercial establishments, describe the approval process for individual or contract dischargers citing any sampling protocols and the local sewer use ordinance, where applicable.
   b. Identify all non-septage wastewaters hauled to the POTW and describe the chemical monitoring and the tracking or permit system used to control such discharges.
   c. Report the amount of non-septage wastewater delivered to the POTW on an average daily and annual basis.
   d. Determine the non-septage hauled waste copper loading as a percent of the total POTW loading. Provide the basis for the measurement or estimate.
4. Identify control strategies for septage, leachate and other hauled wastes including scheduling modifications, chemical treatment at the point of injection, restrictions on, or banning of, categories of discharges, or other means of improved management controls and prioritize the alternatives based upon their expected effectiveness, technical and economic feasibility.

D. <u>HOUSEHOLD DOMESTIC WASTES</u>

1. Identify through a residential survey, by sales analyses of products commonly available in the region, or by estimate of domestic chemical product usage, the amount of copper that may be discharged to the collection system from the use of household chemical products.
2. Estimate the usage of copper-based root control products within the sewered and non-sewered septage-generating service areas. Consider homeowner and contractor use of these chemical additives.

3. Estimate the annual household domestic waste copper loading as a percent of the total annual POTW copper loading providing the basis for the measurement or estimate.
4. Propose the development and implementation of public outreach and programs that educate consumers regarding the impact of household products on the environment and the availability of alternative products.
5. Consider bans on sales or use of products associated with increased levels of copper in the POTW effluent and explain the rationale and limitations for either implementing or not implementing any bans.

E. SIDE-STREAM OR INTERNAL FLOWS

1. Describe the POTW unit operations and processes and provide a process flow diagram highlighting side-stream return flows from sludge dewatering, compost area runoff, and locations of septage introduction, chemical addition, etc.
2. Identify the quantity of all wastewater treatment chemical additives used at the POTW, chemical makeup, injection points, and seasonal or episodic usage patterns.
3. Evaluate the annual side-stream and internal copper loading as a percent of the total annual POTW copper loading providing the basis for the measurement or estimate.
4. Identify alternative POTW management or treatment options for the reduction of copper in side-streams, internal flows, or chemical usage and implementation time frames for each considered option.

III. POTW MODIFICATIONS

A. An assessment of the percent of the annual copper loading in the wastewater influent that has historically been removed by the POTW noting any seasonal variations.

B. Provisions for a sampling program that shall be initiated within 30 days of the issuance of this Order, in which weekly monitoring of the level of total and dissolved copper in the POTW influent and effluent, side-streams, and any leachate discharged to the collection system or wastewater treatment facility shall be conducted. This sampling program shall continue for three consecutive months and shall be comprised of twenty-four hour composite samples. Influent and side-stream sampling shall be coordinated with effluent copper sampling and shall be representative of all flows entering the POTW. The results of this monitoring shall be included as a separate table in the report.

C. Provisions for a sampling program that shall be initiated within 30 days following the issuance of this Order, in which weekly monitoring of the level of

total and dissolved copper in septage and any hauled wastewater discharges to the POTW shall be conducted. Representative weekly grab samples shall be taken for three consecutive months. Where possible, the grab samples shall be coordinated with the composite sampling requirements of Paragraph III.B. The results of this monitoring shall be included as a separate table in the report.

D. Provisions for a three-month sampling program that shall be initiated within 30 days of the issuance of this Order, in which weekly monitoring of the level of total and dissolved copper in the effluents from various unit processes at the POTW (i.e. primary effluent, secondary effluent, final effluent, sludge, etc...) are used to develop a mass balance that characterizes the level of copper removal through the various treatment operations. Where possible, the samples shall be coordinated with the composite sampling requirements of Paragraphs III.B and III.C. Identify gaps in this mass balance exercise explaining where copper "losses" may have occurred. The results of this monitoring shall be included as a separate table in the report.

E. A summary of the results of the monitoring required in III.B., III.C., and III.D. above, including an assessment of the magnitude and variability of the level of copper entering the POTW to determine whether all likely sources of copper have been identified and whether effluent variability correlates to influent variability or is the result of treatment variability or other factors.

F. A quality assurance/quality control program to ensure that appropriate sampling and analytical techniques and chain of custody procedures are implemented such that the monitoring results of the sampling programs are accurate at the levels required by the permit's effluent limits (i.e. clean techniques are used where required and the analytical equipment used to analyze the samples is capable of achieving the detection levels required by the NPDES permit effluent limit).

G. An evaluation of the POTW's ability to achieve greater removals of copper through operational changes, including but not limited to, single-point and multiple-point chemical addition, and/or installation of additional treatment. These evaluations shall include an assessment of the level of copper that is expected to be removed through the implementation of the evaluated treatment plant modifications.

H. Development of capital and operational costs and schedules for implementing any improvements necessary at the POTW to reduce the copper content in the effluent.

IV. RANKING OF SOURCES AND CONTROL STRATEGIES

A. Rank each category of copper sources, including side-stream sources, by

annual average quantity and percent contribution to the overall POTW loading. If important seasonal differences exist, rank the sources during the various seasons.

B. Summarize the influent and effluent copper reduction potential of each of the alternatives evaluated under Paragraphs II and III.

C. For each alternative that is likely to reduce the level of copper discharged by the POTW, evaluate the technical, political, and economic feasibility of the alternative and rank each alternative with regards to effectiveness and implementability.

D. Select the options, or mix of alternatives, that provide the greatest likelihood of achieving significant effluent copper reduction leading to compliance with the POTW effluent limits.

E. Include specific schedules for the implementation of each of the alternatives selected under Paragraph IV.D and propose a monitoring program to that will determine the effectiveness of the completed treatment modifications and source reductions measures.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1

IN THE MATTER OF	)	DOCKET NO.
	)	CWA-AO-R01-FY17-14
Town of Marion, Massachusetts	)	
Department of Public Works	)	
NPDES Permit No. MA0100030	)	
	)	ADMINISTRATIVE ORDER
Proceedings under Sections 308(a) and	)	ON CONSENT
309(a)(3) of the Clean Water Act,	)	
as amended, 33 U.S.C. §§ 1318 and	)	
1319(a)(3)	)	

I. STATUTORY AUTHORITY

The following Findings are made and Administrative Order on Consent ("Consent Order") issued pursuant to Sections 308(a) and 309(a)(3) of the Clean Water Act, as amended (the "Act"), 33 U.S.C. §§ 1318(a) and 1319(a)(3). Section 309(a)(3), 33 U.S.C. § 1319(a)(3), of the Act grants to the Administrator of the U.S. Environmental Protection Agency ("EPA") the authority to issue orders requiring persons to comply with Sections 301, 302, 306, 307, 308, 318 and 405 of the Act and any permit condition or limitation implementing any of such sections in a National Pollutant Discharge Elimination System ("NPDES") permit issued under Section 402 of the Act, 33 U.S.C. § 1342. Section 308(a), 33 U.S.C. § 1318(a), of the Act authorizes EPA to require the submission of any information required to carry out the objectives of the Act. These authorities have been delegated to the EPA, Region 1 Administrator, and in turn to the Director of the EPA, Region 1 Office of Environmental Stewardship ("Director of OES").

The Consent Order herein is based on findings of violation of Section 301 of the Act, 33 U.S.C. § 1311, and the conditions of NPDES Permit No. MA0100030, only as such violations are described in Part III of this Consent Order. Pursuant to Section 309(a)(5)(A) of the Act, 33 U.S.C. § 1319(a)(5)(A), the Consent Order provides a schedule which the Director of OES has determined to be reasonable.

II. DEFINITIONS

Unless otherwise defined herein, terms used in this Consent Order shall have the meaning given to those terms in the Act, 33 U.S.C. §§ 1251 *et seq.*, the regulations promulgated thereunder, and any applicable NPDES permit. For the purposes of this Consent Order, "NPDES Permit" or "2017 Permit" means the Town of Marion, Massachusetts NPDES Permit, No. MA0100030, and all amendments and modifications thereto, and renewals thereof, as are applicable and in effect at the time.

III. FINDINGS

The Director of OES makes the following findings of fact:

1. The Town of Marion (the "Town"), established under the laws of the Commonwealth of Massachusetts, is a "municipality" as defined in Section 502(4) of the Act, 33 U.S.C. § 1362(4).
2. The Town is a person under Section 502(5) of the Act, 33 U.S.C § 1362(5). The Town is the owner and operator of a wastewater treatment facility (the "WWTF"), from which it discharges pollutants, as defined in Sections 502(6) and (12) of the Act, 33 U.S.C. §§ 1362(6) and (12), from a point source, as defined in Section 502(14) of the Act, 33 U.S.C. § 1362(14), to an unnamed stream, sometimes referred to as Effluent Brook.
3. The unnamed stream flows into Aucoot Cove, which is an embayment of Buzzards Bay. All are "navigable waters" under Section 502(7) of the Act, 33 U.S.C. § 1362(7).
4. On September 29, 2006, the Town was issued NPDES Permit No. MA0100030 (the "2006 Permit") by the Director of the Office of Ecosystem Protection of EPA, Region 1 ("Director of OEP"). On May 22, 2007, certain conditions of the Permit were modified. All terms and conditions of the modified permit became effective on August 1, 2007.
5. On April 13, 2017, the Director of OEP issued NPDES Permit No. MA0100030 (the "2017 Permit") to the Town, which authorizes the Town to discharge pollutants from Outfall 001 subject to the effluent limitations, monitoring requirements and other conditions specified in the 2017 Permit.
6. On May 15, 2017, the Town filed with the EPA Environmental Appeals Board ("EAB") a Petition for Review of the 2017 Permit under federal regulations governing NPDES

permit appeals. In its Petition, the Town sought EAB review of, among other things, Part I.E of the 2017 Permit ("Lagoon Conditions"), as well as the compliance schedule therefor. On May 15, 2017, the Buzzards Bay Coalition ("BBC") also filed with the EAB a Petition for Review of the Permit. In its Petition, BBC sought EAB review of the 2017 Permit's effluent limit for nitrogen, as well as the compliance schedules for such limit and for the Lagoon Conditions. The filing of the Petitions for Review stayed the effect of the 2017 Permit pursuant to 40 C.F.R. § 124.16(a). Since the Petitions for Review were filed, EPA, the Town, and BBC have engaged in negotiations in an effort to reach a resolution of issues raised in the Petitions for Review.

7. Section 301(a) of the Act, 33 U.S.C. § 1311(a), makes unlawful the discharge of pollutants to waters of the United States except in compliance with, among other things, the terms and conditions of an NPDES permit issued pursuant to Section 402 of the Act, 33 U.S.C. § 1342.

8. Part I.A.1 of the 2006 Permit establishes effluent limitations and monitoring requirements for the discharge of treated effluent from outfall serial number 001.

9. In 2007, EPA Region 1 issued a Findings of Violation and Order for Compliance ("2007 Administrative Order") finding that the Town discharged wastewater containing total copper concentrations in excess of the effluent limitations contained in the 2006 Permit. The 2007 Administrative Order established, among other things, interim effluent limits for total copper.

10. Data the Town has provided to EPA on its Discharge Monitoring Reports demonstrate that the Town has discharged wastewater containing total copper in excess of the limits contained in the 2006 Permit and the interim limits in the 2007 Administrative Order. The 2017 Permit contains the same total copper limits as the 2006 Permit.

11. The Town's discharge of total copper in excess of the limits contained in the 2006 Permit and the 2007 Administrative Order violates Section 301(a) of the Act, 33 U.S.C. § 1311(a).

12. As required by the 2007 Administrative Order, the Town has submitted an Annual Copper Optimization Report each year detailing the actions taken during the prior year by the Town to identify copper sources entering the WWTF and to further optimize removal from the WWTF's effluent.

13. In the 2016 Annual Copper Optimization Report (dated January 26, 2017), the Town indicated that it was waiting until issuance of a final revised NPDES permit prior to implementing certain recommendations described in the Copper Optimization Engineering Report.

14. The Town is currently participating in an ongoing regionalization effort centered around the Wareham WWTF, which includes the Towns of Wareham, Bourne, and Plymouth, and with the Massachusetts Maritime Academy ("MMA"). As part of that effort, Marion is investigating the options, and the costs required, to extend the Town's sewage collection system to connect to, and to upgrade, the Wareham WWTF, with the ultimate goal of sending all of its sewerage to the Wareham WWTF and eliminating the need for the Marion WWTF ("Regionalization"). Marion has not decided whether it will connect to the Wareham WWTF, but is fully committed to investigating whether Regionalization is in the Town's best interest. The Town's commitment to investigate Regionalization includes funding a study to determine the costs of transporting Marion's wastewater to the Wareham WWTF (the "Regionalization Study"). EPA supports the Town's efforts and recognizes that the Town may decide that Regionalization is not in its best interests or that, due to circumstances outside the Town's control, Regionalization may not ultimately occur. EPA further recognizes that a number of steps, potentially spread out over several years, are required for the Town to come to a decision on Regionalization and connect to the Wareham WWTF.

IV. ORDER

Accordingly, pursuant to Sections 308 and 309(a)(3) of the Act, the Parties agree, and it is hereby ordered that:

1. **Copper**

   Nothing in this Consent Order supersedes or in any way affects the continuing authority of the 2007 Administrative Order. As a supplement to the requirements therein, as part of the Annual Copper Optimization Report for 2017 to be submitted by January 31, 2018 ("2017 Report"), as required by the 2007 Administrative Order, in addition to including all requirements in the 2007 Administrative Order, the 2017 Report shall specifically include the following:

a. Describe what plans the Town has to implement the Phase 1 Recommendations in the Copper Optimization Engineering Report regarding replacing valves on the lagoons in order to modify sludge disposal operations with the goal of sequestering copper.

b. Describe the impact of the Phase 2 Recommendations in the Report regarding the revised sewer use ordinance on copper effluent results at the WWTF. Describe how the Town's historic and recent sampling results have been used to identify industrial and commercial sources of copper contributing to the WWTF's effluent. Provide a list of sample locations, sample results and potential sources of the copper. Describe the specific follow-up activities the Town has taken, or will take, based on those sampling results to further reduce copper levels in the WWTF's effluent.

c. Describe the Town's plans with respect to the Phase 3 Recommendations in the Report regarding modifications to the operation of sludge disposal such as waste activated sludge thickening.

d. Describe what further actions the Town plans to take at its three drinking water treatment locations regarding pH adjustment and corrosion control, to further minimize copper levels in the WWTF's plant effluent.

2. **Lagoons**

a. Within 2 years of the Effective Date of this Consent Order, the Town shall comply with Part I.E of the 2017 Permit with respect to Lagoon 1, including by removing all sludge solids then in Lagoon 1 and lining Lagoon 1. Upon the lining of Lagoon 1, the Town shall measure, and report to EPA, monthly sludge volumes placed in Lagoon 1, if any.

b. The Town shall cease the placement of sludge and other treatment-related solids in Lagoons 2 (except during the period when Marion is making modifications to Lagoon 1 as described in Part IV.2.a) and 3.

c. Within 3 months of the Effective Date of this Consent Order, the Town shall monitor total nitrogen concentrations in each lagoon quarterly and report the results of such monitoring to EPA and the Massachusetts Department of Environmental Protection ("MassDEP") annually. Following completion of the

modifications to Lagoon 1, as described in Part IV.2.a, the frequency of total nitrogen concentrations monitoring shall be increased to monthly. Total nitrogen samples will be taken as integrated depth samples. If, after two years of such monthly monitoring, the total nitrogen concentrations in one or more of the lagoons consistently meet the total nitrogen effluent limits established in the NPDES Permit for outfall 001, then the Town may petition EPA and MassDEP to reduce the frequency of this testing requirement as to the lagoon(s) that meet such effluent limits.

d. Within 30 days of the Effective Date of this Consent Order, the Town shall develop and submit a scope of work for a Lagoon Optimization Plan to EPA and MassDEP. The goal of the Plan is to maximize the use of Lagoon 1 for the receipt and storage of treated and untreated wastewater and minimize to the extent reasonably practicable the Town's use of Lagoons 2 and 3 ("secondary lagoons") for any wastewater. The Plan shall at a minimum:

   i. Describe how the Town will optimize the use of Lagoon 1 for the receipt and storage of treated and untreated wastewater and minimize the Town's use of the secondary lagoons for the receipt and storage of any wastewater, including establishing operational thresholds for such use. If the Optimization Plan finds that one or both secondary lagoons are needed for the receipt and storage of wastewater, then the Optimization Plan must ensure that one secondary lagoon receives treated and/or untreated wastewater only after the storage capacity of Lagoon 1 has been exceeded (such as when there are unusually heavy storm events and other high flow conditions), if necessary to ensure ongoing plant operations, or to conduct unplanned maintenance (such as when an upset condition occurs, there are equipment or WWTF failures, or if a maintenance issue temporarily prevents diversion to Lagoon 1). Under these circumstances, the Optimization Plan must also ensure that the other secondary lagoon receives treated and/or untreated wastewater only after the storage capacities of Lagoon 1 and the other secondary lagoon have been exceeded or if necessary to ensure ongoing WWTF operations or to

undertake necessary maintenance. In addition, treated wastewater diversions required for routine maintenance may be diverted to the secondary lagoons to increase available capacity in Lagoon 1 to the extent necessary to accommodate untreated wasterwater volumes and to operate the aeration systems in the secondary lagoons, if the Plan determines that the secondary lagoons need to maintain water to operate the aeration systems.

ii. Describe the process and timeframe for returning the wastewater from the secondary lagoons to the WWTF for treatment (with respect to untreated wastewater) and discharge through Outfall 001, and consider feasible options for minimizing the time that untreated wastewater and treated wastewater in excess of that needed to operate the aeration systems remains in the secondary lagoons.

iii. Calculate the wastewater storage needs for the WWTF based on historic data, including at least the last 12 years of monitoring reports and rainfall data.

iv. Project the wastewater storage needs for the WWTF over at least the next 25 years.

v. Project the wastewater storage needs for the WWTF over at least the next 25 years, accounting for decreased I/I and climate change.

vi. Consider whether the secondary lagoons can be maintained as dry storage when not required for WWTF operations.

vii. Consider whether use of one or both of the secondary lagoons for storage of wastewater can be limited to (1) temporary storage of emergency storm flows of influent wastewater during high flow conditions for eventual treatment through the WWTF, (2) availability for storage during unusual maintenance events (such as loss of WWTF function (e.g., treatment system failure), and (3) when flows generated during maintenance activities (e.g., replacing UV disinfection lamps) exceed the storage capacity of Lagoon 1.

viii. Consider whether use of one or both of the secondary lagoons for storage of wastewater can be eliminated.

ix. Identify constraints that limit the WWTF's hydraulic throughput capacity and identify feasible options to increase the allowable throughput without adverse effects on effluent quality.

x. Review lagoon aeration system configuration focusing specifically on means of increasing useable storage volume and consider whether changes to the configuration can minimize the amount of treated wastewater needed to maintain the aeration system.

xi. If the Plan determines that the secondary lagoons need to maintain water to operate the aeration systems, the Plan shall identify the minimum level of water needed.

xii. Project the long term operational costs of maintaining each of the secondary lagoons, including but not limited to the cost of treating the current and projected rainfall volumes that will fall on the secondary lagoons, and the costs of operating and maintaining the secondary lagoon aeration system (including but not limited to electrical costs).

xiii. Develop a set of standard operating procedures to guide WWTF operation to maximize the use of Lagoon 1 for the receipt and storage of treated and untreated wastewater and minimize the Town's use of the secondary lagoons for any wastewater.

xiv. Describe the Town's plans to address sludge solids in the secondary lagoons.

xv. Provide all references and citations relied on to support the assumptions and rationales used, and, if the basis is professional opinion, provide the basis for such opinion.

e. EPA and MassDEP will provide any comments on the proposed scope of work within 45 days of receipt of the proposed scope of work, which comments will be reasonably considered by the Town for inclusion into the scope of work.

f. Within 8 months of the Effective Date of this Consent Order, the Town shall develop and submit a proposed Lagoon Optimization Plan to EPA and MassDEP.

EPA and MassDEP will review the Optimization Plan and may provide recommendations to be incorporated into the Plan within 60 days.

g. Upon the Town's submission of the Lagoon Optimization Plan, the Town shall implement the Plan in accordance with the schedule described in the Plan, which shall be incorporated into, and be enforceable under this Consent Order, provided that the schedule in the Plan must be consistent with this Consent Order, and if there are any schedule inconsistencies between the Plan and this Consent Order, the latter governs.

h. Within 3 months of the Effective Date of this Consent Order, the Town shall record the daily volume of untreated wastewater and treated effluent into the lagoon system and report the results of such monitoring to EPA and MassDEP monthly. Upon the completion of the activities described in Part IV.2.a. of the Consent Order, the Town shall record daily volumes of untreated wastewater and/or treated effluent into Lagoon 1, daily volumes of untreated wastewater and treated effluent into Lagoon 2, and daily volumes of untreated wastewater and treated effluent into Lagoon 3 and report the results of such monitoring to EPA and MassDEP monthly.

i. Any deposited sludge solids in the secondary lagoons may remain subject to the terms and conditions of, including the schedule in, the Plan.

3. **Phosphorus**

a. Within 2 months of receiving the Regionalization Study referred to in Part III.14 of this Consent Order, the Town shall notify EPA in writing whether the Town will participate in the Regionalization study process as a full partner.

b. Irrespective of whether the Town's written notice to EPA referred to in Part IV.3.a states that it will or will not participate in the Regionalization study process as a full partner, the Town's compliance with the total phosphorus limits for April 1 through October 31 in Part I.A.1 of the NPDES Permit and with the total phosphorus limit compliance schedule in Parts I.F.3, .4, and .6 of the NPDES Permit is delayed for 2 years from the Effective Date of this Consent Order.

c. If the Town has not previously notified EPA that the Town is no longer participating in the Regionalization process referred to in Part III.14 of this

Consent Order, the Town shall within 2 years of the Effective Date of this Consent Order notify EPA in writing of its continuing progress regarding the Regionalization process. If the Town notifies EPA that it is still proceeding with Regionalization and EPA determines that objective measures confirm such a declaration, compliance with the total phosphorus limits for April 1 through October 31 in Part I.A.1 of the NPDES Permit and with the total phosphorus limit compliance schedule in Parts I.F.3, .4, and .6 of the NPDES Permit shall continue to be delayed. For purposes of Part IV.3 of this Consent Order, objective measures include, but are not limited to, whether the Town is participating in the development of, and has agreed to pay its share for, the design and cost estimate study for the upgrade of the Wareham WWTF necessary for Regionalization, and whether other towns and MMA are still pursuing Regionalization. If the Town fails to notify EPA, notifies EPA that it is no longer proceeding with Regionalization, or notifies EPA that it is still proceeding but EPA determines that objective measures contradict such a declaration and notifies the Town of such determination in writing, the Town shall from that point in time:

i. Within twelve (12) months, submit an alternatives analysis/facility plan to EPA for the treatment and/or pollution prevention improvements required to achieve the total phosphorus limit of 200 μg/L or effect the relocation of the outfall to Aucoot Cove.

ii. Within twenty-four (24) months, complete design and initiate construction of improvements necessary for complying with the total phosphorus limit of 200 μg/L or effect the relocation of the outfall to Aucoot Cove.

iii. Within forty-two (42) months, comply with the total phosphorus limit of 200 μg/L or effect the relocation of the outfall to Aucoot Cove.

d. If the Town has not previously notified EPA that the Town is no longer participating in the Regionalization process referred to in Part III.14 of this Consent Order, the Town shall within 4 years of the Effective Date of this Consent Order, and every 2 years thereafter (*i.e.*, within 6, 8, 10, *etc.*, years of the Effective Date), notify EPA in writing of its continuing progress regarding the Regionalization process. If, in a particular notification, the Town informs EPA

that it is still proceeding with Regionalization, and EPA determines that objective measures confirm the Town's declaration that it is still proceeding with Regionalization, compliance with the phosphorus limit in Part I.A.1 of the NPDES Permit and with the phosphorus limit compliance schedule in Parts I.F.3, .4, and .6 of the NPDES Permit is delayed for an additional two years. If, for any of these required notifications, the Town fails to notify EPA, notifies EPA that it is no longer proceeding with Regionalization, or notifies EPA that it is still proceeding but EPA determines that objective measures contradict such a declaration and notifies the Town of such determination in writing, the Town shall adhere to the compliance schedule in Part IV.3.c.i through Part IV.3.c.iii of this Consent Order. The Town's obligation to notify EPA under this Part IV.3.d shall continue until the earlier of: 1) the end of the Town's participation in Regionalization; or 2) the Town beginning to discharge via the Wareham WWTF and ceasing to discharge from the Marion WWTF.

e. If at any time after the second anniversary date of the Effective Date of this Consent Order, the Town withdraws from the Regionalization process referred to in Part III.14 of this Consent Order, the Town shall promptly notify EPA in writing that the Town is no longer participating in Regionalization and the Town shall adhere to the compliance schedule in Part IV.3.c.i through Part IV.3.c.iii of this Consent Order.

4. The schedules described in Part IV of this Consent Order shall be incorporated and enforceable hereunder, and as amended by the Parties or EPA as described in Part VI of this Consent Order.

5. All work pursuant to this Consent Order shall be performed using sound engineering practices to ensure that construction, management, operation and maintenance of the Marion WWTF complies with the Act.

6. **Interim Limits**

a. From the effective date of this Consent Order until the date the improvements implemented for phosphorus pursuant to Part IV.3 are fully operational, the Town shall comply with the interim effluent limitations and monitoring requirements for phosphorus contained in Attachment #1 of this Consent Order.

b. From the effective date of this Consent Order, the Town shall continue to comply with the interim effluent limitations and monitoring requirements for copper contained in Attachment #1 of this Consent Order.

c. The Town shall comply with all other effluent limitations, monitoring requirements and other conditions specified in the NPDES Permit for the parameters not covered in Part IV or Attachment #1.

7. **Reporting Requirements**

The Town shall submit semi-annual reports to EPA and MassDEP summarizing its compliance with the provisions of this Consent Order. Progress reports shall be submitted on, or before, April 15th and October 15th of each year. Each progress report submitted pursuant to this paragraph shall: a) describe activities undertaken during the reporting period directed at achieving compliance with this Consent Order; b) identify all plans, reports, and other deliverables required by this Consent Order that have been completed and submitted during the reporting period; c) describe the expected activities to be taken during the next reporting period in order to achieve compliance with this Consent Order; and d) identify any anticipated or potential areas of noncompliance with this Consent Order.

V. NOTIFICATION PROCEDURES

1. Where this Consent Order requires a specific action to be performed within a certain time frame, the Town shall submit a written notice of compliance or noncompliance with each deadline. Notification shall be mailed within 14 days after each required deadline. The timely submission of a required report shall satisfy the requirement that a notice of compliance be submitted.

2. If noncompliance is reported, notification should include the following information:

   a. A description of the noncompliance;

   b. A description of any actions taken or proposed by the Town to comply with the lapsed schedule requirements;

   c. A description of any factors that explain or mitigate the noncompliance; and

   d. An approximate date by which the Town will perform the required action.

3. After a notification of noncompliance has been filed, compliance with the past-due requirement shall be reported by submitting all required documents or providing EPA with a written report indicating that the required action has been achieved. Submissions required by this Consent Order shall be in writing, and sent via email, and shall be mailed/emailed to the following addresses:

U.S. Environmental Protection Agency
Region 1, New England
Office of Ecosystem Protection
5 Post Office Square – Suite 100
Boston, MA 02109-3912
Attn: Robin Johnson (Mail Code: OEP06-1)
Johnson.Robin@epa.gov

and

U.S. Environmental Protection Agency
Region 1, New England
Office of Environmental Stewardship
5 Post Office Square – Suite 100
Boston, MA 02109-3912
Attn: Dave Turin (Mail Code: OES04-3)
Turin.David@epa.gov

and

Massachusetts Department of Environmental Protection
One Winter Street
Boston, MA 02108
Attn: Susannah L. King
susannah.king@state.ma.us

and

Massachusetts Department of Environmental Protection
Southeast Region
20 Riverside Drive
Lakeville, MA 02347
Attn: David Burns
david.burns@state.ma.us

VI. GENERAL PROVISIONS

1. This Consent Order does not constitute a waiver or a modification of the terms and conditions of the 2017 Permit. The 2017 Permit remains in full force and effect. EPA reserves the right to seek any and all remedies available under Section 309 of the Act, 33 U.S.C. § 1319, as amended, for any violation cited in this Consent Order.
2. The Town waives any and all claims for relief and otherwise available rights or remedies to judicial or administrative review which the Town may have with respect to any issue of fact or law set forth in this Consent Order, including, but not limited to, any right of judicial review of this Compliance Order on Consent under the Administrative Procedure Act, 5 U.S.C. §§ 701-708. Notwithstanding the foregoing, in signing this Consent Order, the parties do not admit the strength, weakness or validity of any argument raised in the record or the Petition for Review.
3. If at any time the Town believes it has sufficient new information to justify a revision of the compliance schedule set forth herein, including but not limited to information derived from the above-described regionalization investigation, the Town may submit the information to EPA and MassDEP. The agencies will review the information and will give due consideration to a request by the Town to further extend the compliance schedule based on the continuing potential for Regionalization.
4. The EPA may, at its sole discretion, grant extensions of the compliance schedule/deadlines set forth herein by written notice to the Town, without formal amendment to this Consent Order.
5. Any material modification to the terms of this Consent Order shall be by written agreement of the Parties. Any nonmaterial modifications to the terms of this Consent Order, such as approval of modifications to submissions to EPA and MassDEP, or the due dates of such submissions, shall be effective upon written approval from EPA.

6. This Consent Order shall become effective on the Effective Date of the Permit as set forth in the Final Permit Decision for NPDES Permit No. MA0100030, and to which Final Permit Decision this Consent Order shall be attached as Attachment 1.

10/20/2017
Date

Susan Studlien
Susan Studlien, Director
Office of Environmental Stewardship
Environmental Protection Agency, Region 1

10-18-17
Date

Jonathan E. Dickerson, Chairman
Board of Selectmen
Town of Marion, Massachusetts

10/18/17
Date

Stephen C. Gonsalves, Member
Board of Selectmen
Town of Marion, Massachusetts

10 Oct 17
Date

Norman A. Hills, Member
Board of Selectmen
Town of Marion, Massachusetts

ATTACHMENT #1

Interim Effluent Limits and Monitoring Requirements

The Town shall comply with the following interim effluent limits and monitoring requirements from the effective date of the Order until the date the applicable improvements implemented pursuant to Part IV.3 of this Order are fully operational or by the date that EPA determines that the Town has not complied with the milestones set forth in this Order, whichever is earlier.

	Average Monthly	Daily Maximum	Frequency	Type
Total Phosphorus April 1st through October 31st	Report[1]	Report µg/L	1/Week	24-Hour Composite
Total Copper	20 µg/L	Report µg/L	1/Month	24-Hour Composite

[1] Both lbs/day and µg/L

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF APPEALS AND DISPUTE RESOLUTION

IN THE MATTER OF	)	
	)	OADR Docket No. 2017-007
Town of Marion, Massachusetts	)	NPDES Permit No. MA 0100030
Department of Public Works	)	Enf. Doc. 00007011
	)	
	)	
	)	

SETTLEMENT AGREEMENT BY ADMINISTRATIVE CONSENT ORDER

I. PARTIES

1. The Department of Environmental Protection ("Department" or "MassDEP") is a duly constituted agency of the Commonwealth of Massachusetts established pursuant to M.G.L. c. 21A, § 7. MassDEP maintains its principal office at One Winter Street, Boston, Massachusetts 02108, and its Southeast Regional Office at 20 Riverside Drive Lakeville, MA 02347.
2. The Town of Marion (the "Town"), is a municipality established under the laws of the Commonwealth of Massachusetts.
3. Pursuant to M.G.L. c. 30A and 310 CMR 1.01(8)(c), MassDEP and the Town agree to the issuance of a Final Decision incorporating this Settlement Agreement by Administrative Consent Order ("Order") and submit this Order for approval as required by 310 CMR 1.01(8)(c) to finally resolve the above-referenced adjudicatory proceeding as set forth in this Order. Except as otherwise provided herein, this Order settles and releases all claims between the Parties raised in this proceeding regarding the Appeal OADR Docket No. 2017-007 of the dual Surface Water Discharge ("SWD")/National Pollution Discharge Elimination System ("NPDES") Permit No. MA 0100030,

(hereinafter referred to as the "Permit"). Upon the issuance of a Final Decision, the Department and the Town hereby agree that any right to additional administrative review of this matter before the Department, and any appeal to any Court shall be waived.

4. MassDEP and the Town understand that any Final Decision incorporating this Order shall not be subject to 310 CMR 1.01(14)(b).

II. STATUTORY AUTHORITY

5. MassDEP is responsible for the implementation and enforcement of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 ("MCWA"), the Surface Water Discharge Permit Regulations at 314 CMR 3.00, and the Groundwater Discharge Permit Regulations at 314 CMR 5.00. This Order is issued pursuant to M.G.L. c. 21, § 44(1) based on a finding that the Town will be in violation of certain conditions of the Permit. Pursuant to M.G.L. c. 21, §43(7), this Order establishes compliance timelines.

III. DEFINITIONS

6. Unless otherwise defined herein, terms used in this Order shall have the meaning given to those terms in the MCWA, the regulations promulgated thereunder, the federal Clean Water Act, 33 U.S.C. §§ 1251 *et. seq.* ("CWA"), the regulations promulgated thereunder, and any applicable SWD/NPDES Permit.

IV. STATEMENT OF FACTS

The following facts and allegations have led MassDEP to issue this Order:

7. The Town is a person under Section 26A of the MCWA. The Town is the owner and operator of a wastewater treatment facility (the "WWTF"), from which it discharges pollutants, as defined in Section 26A of the MCWA, from a point source, as defined in 310 CMR 3.02, to an unnamed stream, sometimes referred to as Effluent Brook. The receiving waters are waters of the

Commonwealth, as defined in M.G.L. c. 21, §26A and 314 CMR 3.02, and waters of the United States as defined in 40 C.F.R. § 122.2.

8. The unnamed stream flows into Aucoot Cove, which is an embayment of Buzzards Bay. The stream, Cove, and Bay are all "navigable waters" under Section 502(7) of the CWA, 33 U.S.C. § 1362(7) and waters of the Commonwealth under M.G.L. c. 21, §26A and 314 CMR 3.02.

9. On September 29, 2006, the Director of the Office of Ecosystem Protection (OEP) of EPA, Region 1 ("Director of OEP") and the Director of the Division of Watershed Management of MassDEP jointly issued NPDES Permit No. MA0100030 (the "2006 Permit") to the Town. On May 22, 2007, certain conditions of the 2006 Permit were modified. All terms and conditions of the modified permit became effective on August 1, 2007. The Town submitted a timely application for permit renewal, and thus the 2006 Permit was administratively continued until the renewal was completed.

10. On April 13, 2017, the Assistant Commissioner for the Bureau of Water Resources of MassDEP and the Director of OEP jointly issued the Permit to the Town. The Permit authorizes the Town to discharge pollutants from Outfall 001 subject to the effluent limitations, monitoring requirements, and other conditions specified in the Permit.

11. On May 15, 2017, the Town filed with the EPA Environmental Appeals Board ("EAB") a Petition for Review of the Permit under federal regulations governing NPDES permit appeals. In its Petition, the Town sought EAB review of, among other things, Part I.E of the Permit ("Lagoon Conditions"), as well as the compliance schedule therefore. On May 15, 2017, the Town also filed an appeal of the jointly issued Permit with the Department's Office of Appeals and Dispute Resolution ("OADR") pursuant to 314 CMR 2.08 and 310 CMR 1.01. The filing of these appeals stayed the effect of the Permit's terms and conditions pursuant to 40 C.F.R.

§ 124.16(a) and 314 CMR 2.08(3)(c). After the appeals were filed, EPA, MassDEP, and the Town engaged in negotiations in an effort to reach a resolution of issues raised in the appeals.

12. On December 1, 2017, EPA Region 1 issued an Administrative Order on Consent ("EPA AOC") to address issues raised in the Town's appeal. As a result, the Town withdrew its appeal with the EAB.

13. Subject to the terms and conditions of this Order, the Permit will become effective upon the Commissioner's issuance of a Final Decision incorporating this Settlement Agreement by Administrative Consent Order.

14. M.G.L. c. 21, §§ 43(2) makes unlawful the discharge of pollutants to waters of the Commonwealth without a currently valid permit issued by the Department.

15. Part I.A.1 of the 2006 Permit establishes effluent limitations and monitoring requirements for the discharge of treated effluent from outfall serial number 001.

16. In 2007, EPA Region 1 issued a Findings of Violation and Order for Compliance ("2007 Administrative Order") finding that the Town discharged wastewater containing total copper concentrations in excess of the effluent limitations contained in the 2006 Permit. The 2007 Administrative Order established, among other things, interim effluent limits for total copper.

17. Data the Town has provided to EPA and MassDEP on its Discharge Monitoring Reports demonstrate that the Town has discharged wastewater containing total copper in excess of the limits contained in the 2006 Permit and the interim limits in the 2007 Administrative Order. The Permit contains the same total copper limits as the 2006 Permit.

18. The Town's discharge of total copper in excess of the limits contained in the 2006 Permit and the 2007 Administrative Order violates Section 301(a) of the CWA, 33 U.S.C. § 1311(a), as well as 314 CMR 3.19(2).

19. As required by the 2007 Administrative Order, the Town has submitted an Annual Copper Optimization Report each year detailing the actions taken during the prior year by the Town to identify copper sources entering the WWTF and to further optimize removal from the WWTF's effluent.

20. In the 2016 Annual Copper Optimization Report (dated January 26, 2017), the Town indicated that it was waiting until issuance of a final revised SWD/NPDES permit prior to implementing certain recommendations described in the Copper Optimization Engineering Report.

21. Nothing in this Order or the EPA AOC supersedes or in any way affects the continuing authority of the 2007 Administrative Order. As a supplement to the Annual Copper Optimization Report for 2017, to be submitted by January 31, 2018 in accordance with the 2007 Administrative Order, the EPA AOC required the 2017 Report to:

    a. Describe the plans the Town has to implement the Phase 1 Recommendations in the Copper Optimization Engineering Report regarding replacing valves on the lagoons in order to modify sludge disposal operations with the goal of sequestering copper.

    b. Describe the impact of the Phase 2 Recommendations in the Report regarding the revised sewer use ordinance on copper effluent results at the WWTF. Describe how the Town's historic and recent sampling results have been used to identify industrial and commercial sources of copper contributing to the WWTF's effluent. Provide a list of sample locations, sample results, and potential sources of the copper. Describe the specific follow-up activities the Town has taken, or will take, based on those sampling results to further reduce copper levels in the WWTF's effluent.

c. Describe the Town's plans with respect to the Phase 3 Recommendations in the Report regarding modifications to the operation of sludge disposal such as waste activated sludge thickening.

d. Describe what further actions the Town plans to take at its three drinking water treatment locations regarding pH adjustment and corrosion control to further minimize copper levels in the WWTF's plant effluent.

22. On January 31, 2018, the Town submitted the 2017 Report.

23. The EPA AOC required that by December 31, 2017, the Town shall develop and submit a scope of work for a Lagoon Optimization Plan to EPA and MassDEP. The goal of this Plan is to maximize the use of Lagoon 1 for the receipt and storage of treated and untreated wastewater and minimize to the extent reasonably practicable the Town's use of Lagoons 2 and 3 ("secondary lagoons") for any wastewater. The Plan is required to at a minimum:

a. Describe how the Town will optimize the use of Lagoon 1 for the receipt and storage of treated and untreated wastewater and minimize the Town's use of the secondary lagoons for the receipt and storage of any wastewater, including establishing operational thresholds for such use. If the Optimization Plan finds that one or both secondary lagoons are needed for the receipt and storage of wastewater, then the Optimization Plan must ensure that one secondary lagoon receives treated and/or untreated wastewater only after the storage capacity of Lagoon 1 has been exceeded (such as when there are unusually heavy storm events and other high flow conditions), if necessary to ensure ongoing plant operations, or to conduct unplanned maintenance (such as when an upset condition occurs, there are equipment or WWTF failures, or if a maintenance issue temporarily prevents diversion to Lagoon 1). Under these circumstances, the

Optimization Plan must also ensure that the other secondary lagoon receives treated and/or untreated wastewater only after the storage capacities of Lagoon 1 and the other secondary lagoons have been exceeded or if necessary to ensure ongoing WWTF operations or to undertake necessary maintenance. In addition, treated wastewater diversions required for routine maintenance may be diverted to the secondary lagoons to increase available capacity in Lagoon 1 to the extent necessary to accommodate untreated wastewater volumes and to operate the aeration systems in the secondary lagoons, if the Plan determines that the secondary lagoons need to maintain water to operate the aeration systems.

b. Describe the process and timeframe for returning the wastewater from the secondary lagoons to the WWTF for treatment (with respect to untreated wastewater) and discharge through Outfall 001, and consider feasible options for minimizing the time that untreated wastewater and treated wastewater in excess of that needed to operate the aeration systems remains in the secondary lagoons.

c. Calculate the wastewater storage needs for the WWTF based on historic data, including at least the last 12 years of monitoring reports and rainfall data.

d. Project the wastewater storage needs for the WWTF over at least the next 25 years.

e. Project the wastewater storage needs for the WWTF over at least the next 25 years, accounting for decreased I/I and climate change.

f. Consider whether the secondary lagoons can be maintained as dry storage when not required for WWTF operations.

g. Consider whether use of one or both of the secondary lagoons for storage of wastewater can be limited to (1) temporary storage of emergency storm flows of influent wastewater

during high flow conditions for eventual treatment through the WWTF, (2) availability for storage during unusual maintenance events (such as loss of WWTF function (e.g., treatment system failure), and (3) when flows generated during maintenance activities (e.g., replacing UV disinfection lamps) exceed the storage capacity of Lagoon 1.

h. Consider whether use of one or both of the secondary lagoons for storage of wastewater can be eliminated.

i. Identify constraints that limit the WWTF's hydraulic throughput capacity and identify feasible options to increase the allowable throughput without adverse effects on effluent quality.

j. Review lagoon aeration system configuration focusing specifically on means of increasing useable storage volume and consider whether changes to the configuration can minimize the amount of treated wastewater needed to maintain the aeration system.

k. If the Plan determines that the secondary lagoons need to maintain water to operate the aeration systems, the Plan shall identify the minimum level of water needed.

l. Project the long term operational costs of maintaining each of the secondary lagoons, including but not limited to the cost of treating the current and projected rainfall volumes that will fall on the secondary lagoons, and the costs of operating and maintaining the secondary lagoon aeration system (including but not limited to electrical costs).

m. Develop a set of standard operating procedures to guide WWTF operation to maximize the use of Lagoon 1 for the receipt and storage of treated and untreated wastewater and minimize the Town's use of the secondary lagoons for any wastewater.

n. Describe the Town's plans to address sludge solids in the secondary lagoons.

o. Provide all references and citations relied on to support the assumptions and rationales used, and, if the basis is professional opinion, provide the basis for such opinion.

24. The EPA AOC required that by February 28, 2018 the Town would begin monitoring total nitrogen concentrations in each lagoon quarterly and report the results of such monitoring to EPA and MassDEP annually.

25. The EPA AOC required that by February 28, 2018, the Town would record the daily volume of untreated wastewater and treated effluent into the lagoon system and report the results of such monitoring to EPA and MassDEP monthly.

26. On December 28, 2017, the Town submitted the Scope of Work for the Lagoon Optimization Plan to EPA Region 1 and MassDEP. On February 15, 2018, MassDEP submitted comments to the Town on the Scope of Work.

27. The EPA AOC required that by August 1, 2018 the Town develop and submit a proposed Lagoon Optimization Plan to EPA and MassDEP. The AOC specified that EPA and MassDEP would review the Optimization Plan and may provide recommendations to be to be incorporated into the Plan within 60 days of receipt of the Optimization Plan from the Town.

28. On August 1, 2018, the Town submitted the Lagoon Optimization Plan to EPA and MassDEP.

29. EPA and MassDEP submitted recommendations to the Town to be incorporated into the Lagoon Optimization Plan on September 27, 2018 and September 28, 2018, respectively.

30. The EPA AOC required that upon the Town's submission of the Lagoon Optimization Plan, the Town shall implement the Plan in accordance with the schedule described in the Plan, which shall be incorporated into, and be enforceable under the AOC, provided that the schedule in the Plan must be consistent with the AOC, and if there are any schedule inconsistencies between the Plan and the AOC, the latter governs.

31. The Town is currently participating in an ongoing regionalization effort centered around the Wareham WWTF, which includes the Towns of Wareham, Bourne, and Plymouth, and with the Massachusetts Maritime Academy ("MMA"). As part of that effort, Marion is investigating the options, and the costs required, to extend the Town's sewage collection system to connect to, and to upgrade, the Wareham WWTF, with the ultimate goal of sending all of its sewerage to the Wareham WWTF and eliminating the need for the Marion WWTF ("Regionalization"). Marion has not decided whether it will connect to the Wareham WWTF, but is fully committed to investigating whether Regionalization is in the Town's best interest. The Town's commitment to investigate Regionalization includes funding a study to determine the costs of transporting Marion's wastewater to the Wareham WWTF (the "Regionalization Study"). EPA and MassDEP support the Town's efforts and recognize that the Town may decide that Regionalization is not in its best interests or that, due to circumstances outside the Town's control, Regionalization may not ultimately occur. EPA and MassDEP further recognize that a number of steps, potentially spread out over several years, are required for the Town to come to a decision on Regionalization and connection to the Wareham WWTF.

32. In February 2019, the Town submitted to MassDEP for review and approval an application for WM16, Treatment Works Plan Approval, without Permit Modification. The application discussed plans to remove sludge and line Lagoon 1, as well as miscellaneous lagoon distribution and return system improvements that the Town plans to complete as part of the Wastewater Treatment Plant and Lagoon Improvements project, and steps to mitigate the potential for creation of nuisance odor generation. The submittal also included stamped engineered plans for all modifications.

V. DISPOSITION AND ORDER

Accordingly, pursuant to M.G.L. c. 21, § 44(1), MassDEP hereby issues and the Town hereby consents to this Order:

33. **Copper**

a. The Town shall continue to comply with the 2007 Administrative Order.

34. **Lagoons**

a. To address potential groundwater impacts from the WWTF lagoons, the Town shall take the actions described below. To summarize, the intent of this section is to develop a process and timeframe for: (1) the lining of Lagoon 1; (2) converting Lagoon 2 to be maintained in a dry condition; and (3) one of the following: (a) maintaining Lagoon 3 in a "pond" condition, (b) converting Lagoon 3 to be maintained in a dry condition, or (c) repurposing all or part of the Lagoon 3 footprint to meet Town infrastructure needs.

b. The actions in this section are premised on a preliminary statistical model prepared by the Town that analyzed the projected use of Lagoons 2 and 3 considering such factors as future plant operations and capacity, historic and anticipated weather conditions, anticipated I/I reductions, and the impacts of climate change. Assuming Lagoon 2 would be dry in the future, the preliminary model estimates that Lagoon 2 would be used for intermittent wastewater storage on average once every four years and Lagoon 3 might not be needed for future wastewater storage.

c. By June 30, 2020, the Town shall comply with Part I.E. of the 2017 Permit with respect to Lagoon 1 and all conditions of MassDEP's approval of the WM16 application discussed above in Paragraph 32, including removing all sludge solids from Lagoon 1

and lining Lagoon 1. Upon lining Lagoon 1, the Town shall measure, and report monthly to MassDEP and EPA, the sludge volumes placed in Lagoon 1, if any.

d. By November 30, 2020, the Town shall submit to DEP and EPA a preliminary draft High Flow Management Plan that will describe the operation of the treatment plant and lagoons in a future state where:

   i. Lagoon 2 is unlined and dry, other than when impacted by precipitation or on rare occasions when it receives high flows from the collection system that cannot be accommodated by the plant or the lined Lagoon 1, or wastewater (untreated or treated) from necessary or unplanned maintenance of the plant (such as a disk filter cleaning, or cleaning the post-SBR equalization tank) when they cannot be accommodated in Lagoon 1 or delayed to a low flow period, and

   ii. Lagoon 3: (i) is maintained as a "pond" receiving no treated or untreated wastewater whatsoever, (ii) is redesigned to be lined or operated dry similar to Lagoon 2, or (iii) otherwise repurposed in all or in part to meet the Town's infrastructure needs. In these cases, because the sludge has been found to meet the criteria for all parameters in 310 CMR 32.12 (2)(a), the sludge may remain in the lagoon or be tilled into the ground as part of redesigning or repurposing the lagoon.

The preliminary draft High Flow Management Plan should include:

   i. An assessment of the expected frequency of use of Lagoon 2 for wastewater storage and the length of time wastewater would remain in the lagoon under the anticipated use scenarios. The assessment will be completed using the lagoon optimization model updated with data obtained during a 3-month

commissioning period (anticipated as July through September 2020) that would follow the completion of treatment plant-Lagoon 1 upgrades described in Paragraph 34.c;

ii. Recommendations for managing the precipitation that falls on a dry lagoon (when pumped to the treatment plant and when discharged to the environment), as well as recommendations for transitioning a dry lagoon back to a dry condition after its temporary use for wastewater storage, including:

1. The impact on WWTF operations if precipitation is pumped back to the WWTF;
2. Whether and under what circumstances precipitation that falls into/on the lagoons can be released to the environment without treatment; and
3. Best Management Practices (BMPs) to disinfect, neutralize or otherwise prepare Lagoon 2 to be maintained in a dry state (and receive precipitation) after periods of wastewater storage.

iii. Updates to the Standard Operating Procedures based on the operations during the commissioning period.

e. From the effective date of this Order, the Town shall cease the placement of sludge and other treatment-related solids in Lagoon 2 (except during the period when the Town is making modifications to Lagoon 1 as required by Paragraph 34.c of this Order) and Lagoon 3.

f. From the effective date of this Order, the Town shall continue to monitor total nitrogen concentrations in each lagoon quarterly and report the results of such monitoring to EPA and MassDEP annually. Quarters shall be defined as January 1 through March 31, April

1 through June 30, July 1 through September 30 and October 1 through December 31. The annual report shall be submitted on or before January 30 for the prior calendar year. Following completion of the modifications to Lagoon 1, as required by Paragraph 34.c. of this Order, the frequency of total nitrogen concentrations monitoring shall be increased to monthly. Following completion of the modifications to Lagoon 2, as required in this Section 34, monitoring of any water in Lagoon 2 will be required only after a diversion of wastewater to the lagoon and will stop when a de minimis amount of wastewater/rainwater remains. Total nitrogen samples will be taken as integrated depth samples. These testing requirements will not apply to Lagoon 3 beginning on the date the lagoon is removed from operations.

g. From the effective date of this Order, the Town shall continue to record the daily volume of untreated wastewater and treated effluent into the lagoon system and report the results of such monitoring to EPA and MassDEP monthly. Upon the completion of the activities required by Paragraph 34.c. of this Order, the Town shall record daily volumes of untreated wastewater and/or treated effluent into Lagoon 1, and daily volumes of untreated wastewater and treated effluent into Lagoon 2, and, for as long as Lagoon 3 remains in the WWTF operations, daily volumes of untreated wastewater and treated effluent into Lagoon 3 and report the results of such monitoring to EPA and MassDEP monthly. Reports required by this subsection shall be submitted on or before the fifteenth day of the following month.

h. By March 15, 2021, September 15, 2021 and March 15, 2022, the Town shall submit progress reports that summarize the previous 6 months of WWTF operations and related WWTF modifications and preliminary draft High Flow Management Plan in Paragraph

34.d. The progress reports shall assess the effectiveness of WWTF modifications and high flow management implementation to reduce the use of Lagoons 2 and 3 for wastewater storage. If progress reducing use of Lagoons 2 and 3 is not meeting the high flow management forecasts, progress reports shall recommend additional steps to further reduce lagoon usage.

i. By October 31, 2022, the Town shall submit a revised draft High Flow Management Plan for MassDEP review to operate Lagoons 2 and 3. The revised draft High Flow Management Plan should include:

    i. A determination to be made by the Town on whether all or part of Lagoon 3 can be maintained as a pond (meaning any existing effluent and precipitation would remain but no additional treated or untreated wastewater would enter the lagoon), or can be repurposed to some other infrastructure use. In either event, the existing sludge may remain in the lagoon or be tilled into the ground;

    ii. If the WWTF needs all or part of Lagoon 3 for operations, a process and timetable for reconfiguring the volumes of Lagoons 2 and 3 to enlarge a dry Lagoon 2 and/or operate Lagoon 3 in a dry condition after its temporary use for wastewater storage and an assessment of the expected frequency of use of Lagoon 3 for wastewater storage and the length of time wastewater would remain in the lagoon. If Lagoon 2 is enlarged, the remaining portions of Lagoon 3 can remain as a pond.

    iii. If monitoring from Paragraph 34.g above indicates that implementation of the Lagoon 1 and associated WWTF modifications has resulted in a substantial departure from the anticipated usage predicted by the Town's preliminary statistical model, this submittal shall include recommendations for additional

measures that could further reduce the use of Lagoons 2 and 3 for wastewater storage or proposed modifications to Lagoon 2 and/or 3 to increase storage capacity in lined or dry operated lagoons.

j. MassDEP shall provide any comments to the revised draft High Flow Management Plan and associated BMPs within 30 days of receipt. The Town agrees to respond within 30 days of receipt to any MassDEP comments.

k. Within 90 days after receiving MassDEP's High Flow Management Plan comments on the revised draft, the Town shall submit its final draft High Flow Management Plan that addresses MassDEP's comments and the monitoring performed as required in Paragraph 34.g above.

l. Within 30 days of receiving the Town's final draft High Flow Management Plan, MassDEP will complete its review and provide the Town with any comments and its opinion as to whether operations under the High Flow Management Plan, including plant changes finished by 2020 per Paragraph 34.c has adequately reduced the anticipated use of Lagoons 2 and 3 for wastewater storage, or whether additional measures are necessary to further reduce their use.

m. Within 30 days of receipt of MassDEP's review comments and opinion, the Town shall modify the High Flow Management Plan accordingly and submit for MassDEP review and approval.

n. The Town shall begin implementing the High Flow Management Plan for Lagoon 2 according to one of the following timeframes:

    i. By the start of the Town's fiscal year (July 1) after receiving MassDEP approval of the final High Flow Management Plan, if the Town has received (a) MassDEP

comments on the revised draft High Flow Management Plan before February of that year, and (b) approval of the High Flow Management Plan by July 1 of that year;

ii. Within 30 days of receiving MassDEP approval of the High Flow Management Plan, if MassDEP provides comments on the revised draft High Flow Management Plan by February of that year, but MassDEP approval of the High Flow Management Plan occurs after July 1; or

iii. By July 1 of the following year, if MassDEP provides comments on the revised draft High Flow Management Plan after February of that year.

o. Five months after the applicable date in subsection 34.n, the Town shall submit the 90 percent design for Lagoon 2 improvements for MassDEP approval. MassDEP shall review the 90 percent design and approve the project to be advertised for bidding within the timeframe provided by 310 CMR 4.00. The Town shall complete the Lagoon 2 design within 30 days of receiving MassDEP approval to be advertised for bidding. Construction of Lagoon 2 improvements shall begin no later than May, if MassDEP provides approval for bidding by December of the prior year, or as soon as reasonably practicable thereafter if MassDEP provides approval after December. Construction will follow the dewatering of Lagoon 2, which is anticipated to occur during the next winter (November through March) after starting design. The Town shall complete construction of Lagoon 2 within 8 months of starting construction.

p. The Town shall begin implementing the High Flow Management Plan for Lagoon 3 as follows:

i. If Lagoon 3 will be maintained as a "pond," within 60 days of the applicable date of subsection 34.n, the Town shall submit the work plan to remove Lagoon 3 from WWTF operations and maintain it as a pond (receiving no treated or untreated wastewater whatsoever). Once severed from WWTF operations, Lagoon 3, including all contained liquid and sludge, will be allowed to remain and transition to a more natural condition. If some or all of Lagoon 3 is re-purposed to some other infrastructure use, the Town may till the sludge into the ground.

ii. If Lagoon 3 will receive treated or untreated wastewater, within 60 days of the applicable date in subsection 34.n, the Town shall submit – for MassDEP review and approval – a proposed plan and schedule to line some or all of Lagoon 3 or operate some or all of Lagoon 3 in a dry condition for the occasional receipt of treated or untreated wastewater similar to Lagoon 2. If some of Lagoon 3's area is to be added to Lagoon 2, the design and construction of this work shall occur on the same schedule as the remainder of the Lagoon 2 implementation. If some or all of Lagoon 3 is to remain in a dry condition, the Town may till the sludge into the ground.

q. MassDEP has determined that the Town's operation of the WWTF in full compliance with the SWD/Permit, this Order, and the MassDEP-approved High Flow Management Plan required by paragraph 34 of this Order, will significantly reduce the potential for Sanitary Sewer Overflows (SSOs) and have a *de minimis* potential impact on groundwater, for which MassDEP will not seek permitting under the Massachusetts Groundwater Discharge Permitting Program. Should MassDEP determine that future

lagoon operations have caused or contributed to greater than a *de minimis* impact on groundwater, MassDEP may require groundwater discharge permitting at that time.

35. **Phosphorus**

a. Within 2 months of receiving the Regionalization Study referred to in Part IV.31 of this Order, the Town shall notify EPA and MassDEP in writing whether the Town will participate in the Regionalization study process as a full partner.

b. Irrespective of whether the Town's written notice to EPA and MassDEP referred to in Part V.35.a states that it will or will not participate in the Regionalization study process as a full partner, the Town's compliance with the total phosphorus limits for April 1 through October 31 in Part I.A.1 of the Permit and with the total phosphorus limit compliance schedule in Parts I.F.3, .4, and .6 of the Permit is delayed until November 30, 2019.

c. If the Town has not previously notified EPA and MassDEP that the Town is no longer participating in the Regionalization process referred to in Part IV.31 of this Order, the Town shall by November 30, 2019 notify EPA and MassDEP in writing of its continuing progress regarding the Regionalization process. If the Town notifies EPA and MassDEP that it is still proceeding with Regionalization and EPA and MassDEP determine that objective measures confirm such a declaration, compliance with the total phosphorus limits for April 1 through October 31 in Part I.A.1 of the Permit and with the total phosphorus limit compliance schedule in Parts I.F.3, .4, and .6 of the Permit shall continue to be delayed. For purposes of Part V.35 of this Order, objective measures include, but are not limited to, whether the Town is participating in the development of, and has agreed to pay its share for, the design and cost estimate study for the upgrade of

the Wareham WWTF necessary for Regionalization, and whether other towns and MMA are still pursuing Regionalization. If the Town fails to notify EPA and MassDEP, notifies EPA and MassDEP that it is no longer proceeding with Regionalization, or notifies EPA and MassDEP that it is still proceeding but EPA and MassDEP determine that objective measures contradict such a declaration and notifies the Town of such determination in writing, the Town shall from that point in time:

i. Within twelve (12) months, submit an alternatives analysis/facility plan to EPA and MassDEP for the treatment and/or pollution prevention improvements required to achieve the total phosphorus limit of 200 μg/L or effect the relocation of the outfall to Aucoot Cove.

ii. Within twenty-four (24) months, complete design and initiate construction of improvements necessary for complying with the total phosphorus limit of 200 μg/L or effect the relocation of the outfall to Aucoot Cove.

iii. Within forty-two (42) months, comply with the total phosphorus limit of 200 μg/L or effect the relocation of the outfall to Aucoot Cove.

d. If the Town has not previously notified EPA and MassDEP that the Town is no longer participating in the Regionalization process referred to in Part IV.31 of this Order, the Town shall by November 30, 2021 and every 2 years thereafter, notify EPA and MassDEP in writing of its continuing progress regarding the Regionalization process. If, in a particular notification, the Town informs EPA and MassDEP that it is still proceeding with Regionalization, and EPA and MassDEP determine that objective measures confirm the Town's declaration that it is still proceeding with Regionalization, compliance with the phosphorus limit in Part I.A.1 of the Permit and with the phosphorus

limit compliance schedule in Parts I.F.3, .4, and .6 of the Permit is delayed for an additional two years. If, for any of these required notifications, the Town fails to notify EPA and MassDEP, notifies EPA and MassDEP that it is no longer proceeding with Regionalization, or notifies EPA and MassDEP that it is still proceeding but EPA and MassDEP determine that objective measures contradict such a declaration and notifies the Town of such determination in writing, the Town shall adhere to the compliance schedule in Part V.35.c.i through Part V.35.c.iii of this Order. The Town's obligation to notify EPA and MassDEP under this Part V.35.d shall continue until the earlier of: 1) the end of the Town's participation in Regionalization; or 2) the Town beginning to discharge via the Wareham WWTF and ceasing to discharge from the Marion WWTF.

e. If at any time after December 1, 2019, the Town withdraws from the Regionalization process referred to in Part IV.31 of this Order, the Town shall promptly notify EPA and MassDEP in writing that the Town is no longer participating in Regionalization and the Town shall adhere to the compliance schedule in Part V.35.c.i through Part V.35.c.iii of this Order.

36. The schedules described in Part V of this Order may be amended by the Parties upon mutual written agreement and shall be incorporated and enforceable hereunder, as amended.

37. All work pursuant to this Order shall be performed using sound engineering practices to ensure that construction, management, operation and maintenance of the Marion WWTF complies with the CWA and MCWA.

38. **Interim Limits**

a. From the effective date of this Order until the date the improvements implemented for phosphorus pursuant to Part V.35 are fully operational, the Town shall comply with the

interim effluent limitations and monitoring requirements for phosphorus contained in Attachment #1 of this Order.

b. From the effective date of this Order, the Town shall continue to comply with the interim effluent limitations and monitoring requirements for copper contained in Attachment #1 of this Order.

c. The parties recognize that the capital and operational changes to the lagoons contemplated in Section 34 of this Order will affect the flow and total nitrogen the WWTF discharges through Outfall 001 during and after construction. Therefore, to facilitate these changes, the Town shall be subject to the following temporary limits for flow and total nitrogen during certain limited periods of the lagoon construction process:

    i. During the periods when the Town is drawing water from the lagoon system as necessary to construct a dry lagoon and for 12 months thereafter, the flow limit shall be 0.64 mgd. The first temporary limit period is associated with Lagoon 1 construction and will commence in January 2019 and is expected to last through June 2020. The second temporary period will commence before the construction to convert Lagoon 2 to a dry condition with an interim limit of 0.63 mgd and expected to commence in November 2023 and last until March 2025. The Town will send MassDEP and EPA a letter informing them of the start of drawdown for construction of Lagoon 2, and when the drawdown is completed for Lagoons 1 and 2.

    ii. For the Lagoon 1 upgrade, starting in April 2019 and until the drawdown is complete, and for the subsequent 7 months when a total nitrogen limit is in effect, the total nitrogen concentration limit shall be 8 mg/L and the load limit shall be

39 lbs/day. This limit is expected to commence in April 2019 and be in effect through October 2020.

iii. For the period starting when Lagoon 2 is drawn down to facilitate construction of the dry lagoon until drawdown is completed and for 7 months thereafter when the total nitrogen limit is in effect , the total nitrogen concentration and load limits shall be 8 mg/L and 39 lbs/day. This limit is expected to commence in April 2024 and be in effect through October 2024.

d. The Town shall comply with all other effluent limitations, monitoring requirements and other conditions specified in the Permit for the parameters not covered in Part V or Attachment #1.

39. **Reporting Requirements** The Town shall submit semi-annual progress reports to EPA and MassDEP summarizing its compliance with the provisions of this Order. Progress reports shall be submitted on, or before, April 15th and October 15th of each year. Each progress report submitted pursuant to this paragraph shall: a) describe activities undertaken during the reporting period directed at achieving compliance with this Order; b) identify all plans, reports, and other deliverables required by this Order that have been completed and submitted during the reporting period; c) describe the expected activities to be taken during the next reporting period in order to achieve compliance with this Order; and d) identify any anticipated or potential areas of noncompliance with this Order.

VI. NOTIFICATION PROCEDURES

40. Where this Order requires a specific action to be performed within a certain time frame, the Town shall submit a written notice of compliance or noncompliance with each deadline.

Notification shall be mailed within 14 days after each required deadline. The timely submission of a required report shall satisfy the requirement that a notice of compliance be submitted.

41. If noncompliance is reported, notification should include the following information:

    a. A description of the noncompliance;

    b. A description of any actions taken or proposed by the Town to comply with the lapsed schedule requirements;

    c. A description of any factors that explain or mitigate the noncompliance; and

    d. An approximate date by which the Town will perform the required action.

42. After a notification of noncompliance has been filed, compliance with the past-due requirement shall be reported by submitting all required documents or providing EPA and MassDEP with a written report indicating that the required action has been achieved. Submissions required by this Order shall be in writing, and sent via email, and shall be mailed/emailed to the following addresses:

U.S. Environmental Protection Agency
Region 1, New England
Office of Ecosystem Protection
5 Post Office Square – Suite 100
Boston, MA 02109-3912
Attn: Robin Johnson (Mail Code: OEP06-1)
Johnson.robin@epa.gov

and

U.S. Environmental Protection Agency
Region 1, New England
Office of Environmental Stewardship
5 Post Office Square – Suite 100
Boston, MA 02109-3912
Attn: Dave Turin (Mail Code: OES04-3)
Turin.David@epa.gov

and

Massachusetts Department of Environmental Protection
One Winter Street
Boston, MA 02108
Attn: Susannah L. King
susannah.king@mass.gov

and

Massachusetts Department of Environmental Protection
Southeast Region
20 Riverside Drive
Lakeville, MA 02347
Attn: David Burns
david.burns@mass.gov

VII. GENERAL PROVISIONS

Actions required by this Order shall be taken in accordance with all applicable federal, state, and local laws, regulations and approvals. This Order shall not be construed as, nor operate as, relieving the Town or any other person of the necessity of complying with all applicable federal, state, and local laws, regulations and approvals.

43. The Town understands, and hereby waives, its right to an adjudicatory hearing before MassDEP on, and judicial review of, the issuance and terms of this Order and to notice of any such rights of review. This waiver does not extend to any other order issued by the MassDEP.
44. This Order may be modified only by written agreement of the parties hereto.
45. MassDEP hereby determines, and the Town hereby agrees, that any deadlines set forth in this Order constitute reasonable periods of time for the Town to take the actions described.
46. The provisions of this Order are severable, and if any provision of this Order or the application thereof is held invalid, such invalidity shall not affect the validity of other provisions of this Order, or the application of such other provisions, which can be given effect without the invalid

provision or application, provided however, that MassDEP shall have the discretion to void this Order in the event of any such invalidity.

47. Nothing in this Order shall be construed or operate as barring, diminishing, adjudicating or in any way affecting (i) any legal or equitable right of MassDEP to issue any additional order or to seek any other relief with respect to the subject matter covered by this Order, or (ii) any legal or equitable right of MassDEP to pursue any other claim, action, suit, cause of action, or demand which MassDEP may have with respect to the subject matter covered by this Order, including, without limitation, any action to enforce this Order in an administrative or judicial proceeding.

48. This Order shall not be construed or operate as barring, diminishing, adjudicating, or in any way affecting, any legal or equitable right of MassDEP or the Town with respect to any subject matter not covered by this Order.

49. This Order shall be binding upon the Town and upon the Town' successors and assigns. The Town shall not violate this Order and shall not allow or suffer The Town' directors, officers, employees, agents, contractors or consultants to violate this Order. Until the Town has fully complied with this Order, the Town shall provide a copy of this Order to each successor or assignee at such time that any succession or assignment occurs.

50. The Town shall pay stipulated civil administrative penalties to the Commonwealth in accordance with the following schedule if the Town violates any provision of this Order:

51. For each day, or portion thereof, of each violation, the Town shall pay stipulated civil administrative penalties in the following amounts:

Period of Violation	Penalty per day
1st through 15th days	$ 500.00 per day
16th through 30th days	$750.00 per day

31st day and thereafter $1,000.00 per day

a. Stipulated civil administrative penalties shall begin to accrue on the day a violation occurs and shall continue to accrue until the day the Town corrects the violation or completes performance, whichever is applicable. Stipulated civil administrative penalties shall accrue regardless of whether MassDEP has notified the Town of a violation or act of noncompliance. All stipulated civil administrative penalties accruing under this Order shall be paid within thirty (30) days of the date MassDEP issues the Town a written demand for payment. If simultaneous violations occur, separate penalties shall accrue for separate violations of this Order. The payment of stipulated civil administrative penalties shall not alter in any way the Town's obligation to complete performance as required by this Order. MassDEP reserves its right to elect to pursue alternative remedies and alternative civil and criminal penalties which may be available by reason of the Town's failure to comply with the requirements of this Order. In the event MassDEP collects alternative civil administrative penalties, the Town shall not be required to pay stipulated civil administrative penalties pursuant to this Order for the same violations.

b. The Town reserves whatever rights it may have to contest MassDEP's determination that the Town failed to comply with the Order and/or to contest the accuracy of MassDEP's calculation of the amount of the stipulated civil administrative penalty. Upon exhaustion of such rights, if any, the Town agrees to assent to the entry of a court judgment if such court judgment is necessary to execute a claim for stipulated penalties under this Order.

52. Failure on the part of MassDEP to complain of any action or inaction on the part of the Town shall not constitute a waiver by MassDEP of any of its rights under this Order. Further, no

waiver by MassDEP of any provision of this Order shall be construed as a waiver of any other provision of this Order.

53. To the extent authorized by the current owner, the Town agrees to provide MassDEP, and MassDEP's employees, representatives and contractors, access at all reasonable times to the WWTF for purposes of conducting any activity related to its oversight of this Order. Notwithstanding any provision of this Order, MassDEP retains all of its access authorities and rights under applicable state and federal law.

54. This Order may be executed in one or more counterpart originals, all of which when executed shall constitute a single Order.

55. This Order does not constitute a waiver or modification of the terms and conditions of the Permit. The Permit remains in force and effect. MassDEP reserves the right to seek remedies available under the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and other applicable laws or of any violation cited in this Order.

56. The undersigned certify that they are full authorized to enter into the terms and conditions of this Order and to legally bind the party on whose behalf they are signing this Order.

57. This Order shall become effective on the date that the Commissioner or his designee issues a Final Decision incorporating this Order.

Consented To:

The Town of Marion

29 MAR 2019
Date

Norman A. Hills
Norman A. Hills, Chairman
Board of Selectmen
Town of Marion, Massachusetts

3/29/2019
Date

Randy L. Parker, Member
Board of Selectmen
Town of Marion, Massachusetts

March 29, 2019
Date

John P. Waterman, Member
Board of Selectmen
Town of Marion, Massachusetts

No additional text on this page

Issued By:

DEPARTMENT OF ENVIRONMENTAL PROTECTION

By: _____

Print Name: Lealdon Langley, Director, Division of Watershed Management

Date: 4/2/19

ATTACHMENT #1

Interim Effluent Limits and Monitoring Requirements

The Town shall comply with the following interim effluent limits and monitoring requirements from the effective date of the Order until the date the applicable improvements implemented pursuant to Part IV.3 of this Order are fully operational or by the date that EPA and MassDEP determine that the Town has not complied with the milestones set forth in this Order, whichever is earlier.

	Average Monthly	Daily Maximum	Frequency	Type
Total Phosphorus April 1st through October 31st	Report[1]	Report µg/L	1/Week	24-Hour Composite
Total Copper	20 µg/L	Report µg/L	1/Month	24-Hour Composite

3865427

[1] Both lbs/day and µg/L

Michael A. Leon
Direct Line: (617) 439-2815
Fax: (617) 310-9815
E-mail: mleon@nutter.com

December 30, 2020
117230-1

Via E-Mail and U.S. Mail

MacDara Fallon, Esq.
Deirdre Desmond, Esq.
Massachusetts Department of Environmental Protection
Office of General Counsel
One Winter Street, Third Floor
Boston, MA 02108
Macdara.fallon@state.ma.us
Deirdre.desmond@state.ma.us

Re: Town of Marion ACO Modification Request

Dear Dara and Deirdre:

On behalf of our client the Town of Marion, I am writing to request modification to the Administrative Consent Order entered into by the Town and MassDEP in April 2019 and amended on January 30, 2020 ("state ACO") regarding NPDES Permit No. MA0100030 ("Permit") for the Town's wastewater treatment facility. Specifically, the Town requests that the deadline to complete lining of Lagoon 1 in Section 34(c) of the state ACO be extended from January 31, 2021 until January 31, 2022, and the deadline for completion of the preliminary high flow management plan be extended to July 31, 2022.

As we discussed with you, this change is necessary because the volume of sludge in Lagoon 1 was found to be substantially greater than was included in the bid and award for the construction work involved in lining Lagoon 1. The invitation to bid prepared by CDM Smith specified a price for 350 tons of sludge removal. The dredging process began on August 26, 2020. At the outset of the work, it is our understanding that the sludge management subcontractor noted that there could be some uncertainty regarding the total sludge volume, but provided no substantial recommendations to those present at the job meeting, in which we understood that a DEP representative was present.

At the inception of the sludge work, the contractor floated a barge on to the lagoon while maintaining the depth of the water in the lagoon to remove as much sludge as possible to control odors. When this method had reached its limit in early October 2020, the sludge contractor began to dewater the lagoon. It was not possible to discern the extent of the volume of sludge in excess

of 350 tons until the dewatering process began. At the time the mid-October progress report was submitted to DEP, the lagoon dewatering had not been completed, and it was not yet possible to estimate the extent of the excess sludge above 350 tons. As of the date of this letter, 991 total tons of dry sludge have been removed from lagoon 1, effectively completing the sludge removal process.

At the time of our initial contacts with the Department representatives last month, we noted that the estimated additional costs to address this substantial increase in sludge management and disposal would completely consume the entire balance of the contract amount - $1,200,000, as well as the contingency - $400,000 - carried by the Town. To permit the sludge contractor to remain on site and complete the sludge removal, with the agreement of the Department, the Town executed a change order with Methuen Construction, the general contractor, which eliminated all of the remaining work to complete the lagoon 1 reconstruction program, and allocate all remaining funds to the sludge work. The balance of the lagoon construction work, which involves the construction of a new liner base, subdrains, a new forebay and installation of a sealed liner, was deferred until a further change order can be negotiated. While the liner material has been delivered to the site, no additional work on the lagoon can proceed, although certain treatment process work by the general contractor and for which payments have already been made, will be completed in January and February 2021. As of December 15, all reallocated funds have been expended, and no further funds remain in the project budget except for the retainage held pending completion of the contract work.

Because of this development regarding the sludge volume, the Town now anticipates completion of the Lagoon 1 lining project by January 31, 2022. As we have discussed, the Town had only appropriated $ 7,760,000 for the project, including a $7,000,000 SRF borrowing authorization, and an additional $ 760,000 in non-SRF loans to conduct the work. To complete the work, the Town will need to obtain Town Meeting approval of the additional borrowing and appropriation necessary. Unfortunately, further funding cannot be appropriated until the May 2021 Marion Town Meeting. The Town does not believe a Special Town Meeting is advisable to request authorization based on its significant experience in financing similar projects, a point understood and shared with the Department in several discussions.

Our current plan is to develop a proposed budget for the completion of the work in preparation for the spring Town Meeting, and to obtain bids concurrent with that process. Our current expectation is that work could resume in June 2021, with a completion date of January 31, 2022. Obviously, these dates are contingent upon Town Meeting authorization and a satisfactory bid and contract process.

In addition to the extension of the completion date for the lagoon 1 lining, the Town requests corresponding limits to the high flow and adjusted nitrogen limits in paragraph 35 and paragraph 38 of the ACO to be correspondingly extended to January 31, 2022 for the work associated with Lagoon 1. Without the full operation of Lagoon 1 in 2021, the operations will require a continuation of the interim limits applicable to the time in which lagoon 1 is offline. The same relief may be necessary if and when work is performed on Lagoon 2, but it may be prudent to wait to determine this when the High Flow Management Plan is completed.

Paragraph 34(d) requires the preparation of a High Flow Management Plan that will describe the operation of the treatment plant and lagoons under various scenarios. These plans require data collected over several months once Lagoon 1 has been lined and is placed in operation under various hydraulic conditions. We request that the date for submittal of the preliminary High Flow Management Plan be extended until July 31, 2022, and the future dates for subsequent plan revisions to be extended commensurately. Further, we request that the progress reports required in Paragraph 34(h) be limited to the general operation of the facility until Lagoon 1 has been placed back in service and data has become available. While the dates for these progress reports were not specifically addressed in the Department's earlier Modification to the ACO in February 2020, these additional dates should be adjusted accordingly, to January 1, 2023, July 31, 2023, and January 31, 2024. The Revised Draft High Flow Management Plan should be submitted by July 31, 2024.

Thank you for your consideration of these requested modifications. I suggest that we schedule a call to discuss any questions the Department may have, as well as any thoughts on the details of the modification language. We look forward to working with the Department and appreciate your understanding of this substantial challenge to the Town's work.

Very Truly Yours,

Michael A. Leon

MAL2:vam
None

cc: J. McGrail
D. Willett

DRAFT

APPENDIX E

Future Flow Calculations

Marion, MA - CWMP
Wastewater Flow Summary

Flow Description	Average (MGD)
Existing Flow[1]	0.531
Infill & Growth Areas	0.056
Unsewered System Needs Areas (High Priority Areas)	0.056
Known Development	0.019
Additional Future Flow TOTAL	**0.662**

[1]Existing Flow includes those contributed by Tabor Academy and Existing Inflow/ Infiltration

Flow Description	Low (MGD)	Mid (MGD)	High (MGD)
Unsewered System Needs Areas	0.056	0.126	0.173
Infill	0	0.028	0.056
Known Development	0.019	0.019	0.019
Inflow/ Infiltration (Removal)	-0.07	-0.035	0
Additional Future Flow TOTAL	**0.005**	**0.138**	**0.248**

Flow Description	Future Design (MGD)	Low (MGD)	Mid (MGD)	High (MGD)
Existing Flow Total	0.531	0.531	0.531	0.531
Additional Future Flow Total	0.131	0.005	0.138	0.248
Total Future Flow at WPCF	**0.6621**	**0.536**	**0.6691**	**0.7791**

[1] Would require additional NPDES capacity

Marion, MA - CWMP
Wastewater Flow Summary

Wastewater Flow Summary - Future Flow from Needs Areas

Needs Area	Number of Total Lot Connections	# Lot Connections by Zoning Type		Projected Average Daily Flow	Projected Max Day Flow
		# Connections	Zoning Type	(GPD)	(GPD)
River Road / Wareham Street	91	6	General Business	20,300	30,450
		85	Residential		
Delano Road / Weweantic River	33	33	Residential	12	18
Wing Cove / Piney Point	187	187	Residential	66	99
Lower Sippican Neck	37	37	Residential	13	20
Planting Island	76	76	Residential	27	40
Allen's Point	35	35	Residential	12	19
Converse Point	26	26	Residential	9	14
Aucoot Creek	50	50	Residential	18	27
Lower Mill Street	112	112	Residential	40	59
Upper Front Street	96	96	Residential	34	51
County Road	41	41	Residential	15	22
		Total Sanitary Flow Projection		20,545	30,818

Assumptions:

1. Calculated Town Wide General Business Average Flow Per Lot (400gpd) from Existing Billing Information
2. 3 Bedrooms Per Residential Lot Multiplied by 110 GPD Per Bedroom

Marion, MA - CWMP
Wastewater Flow Summary

Wastewater Flow Summary - Future Flow from Infill

	Sewershed Areas	# Infill Units	Infill Future Flow[1,2] (GPD)
Gravity	Creek Road PS	32	7,040
	Front Street PS	30	6,600
Low Pressure	LP1	20	4,400
	LP2	31	6,820
	LP3	7	1,540
	LP4	39	8,580
	LP5	47	10,340
	LP6	38	8,360
TOTAL		244	45,320

[1] Calculated based on 220 gpd future flow per infill unit
[2] Infill is calculated for fronting munipical and private sewer

DRAFT

APPENDIX F

Public Presentations

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Citizens Advisory Committee Meeting

August 11, 2021

Weston & Sampson

Marion CWMP

Presentation Agenda

- Observations Since Last Meeting
- CAC Discussion of Alternatives for Unsewered Needs Area
  - Area by Area Discussion
- CAC Recommendations for Sewer Extensions
- Other Questions & Discussion
- Next CAC Meeting

Marion CWMP

Observations Since Last Meeting

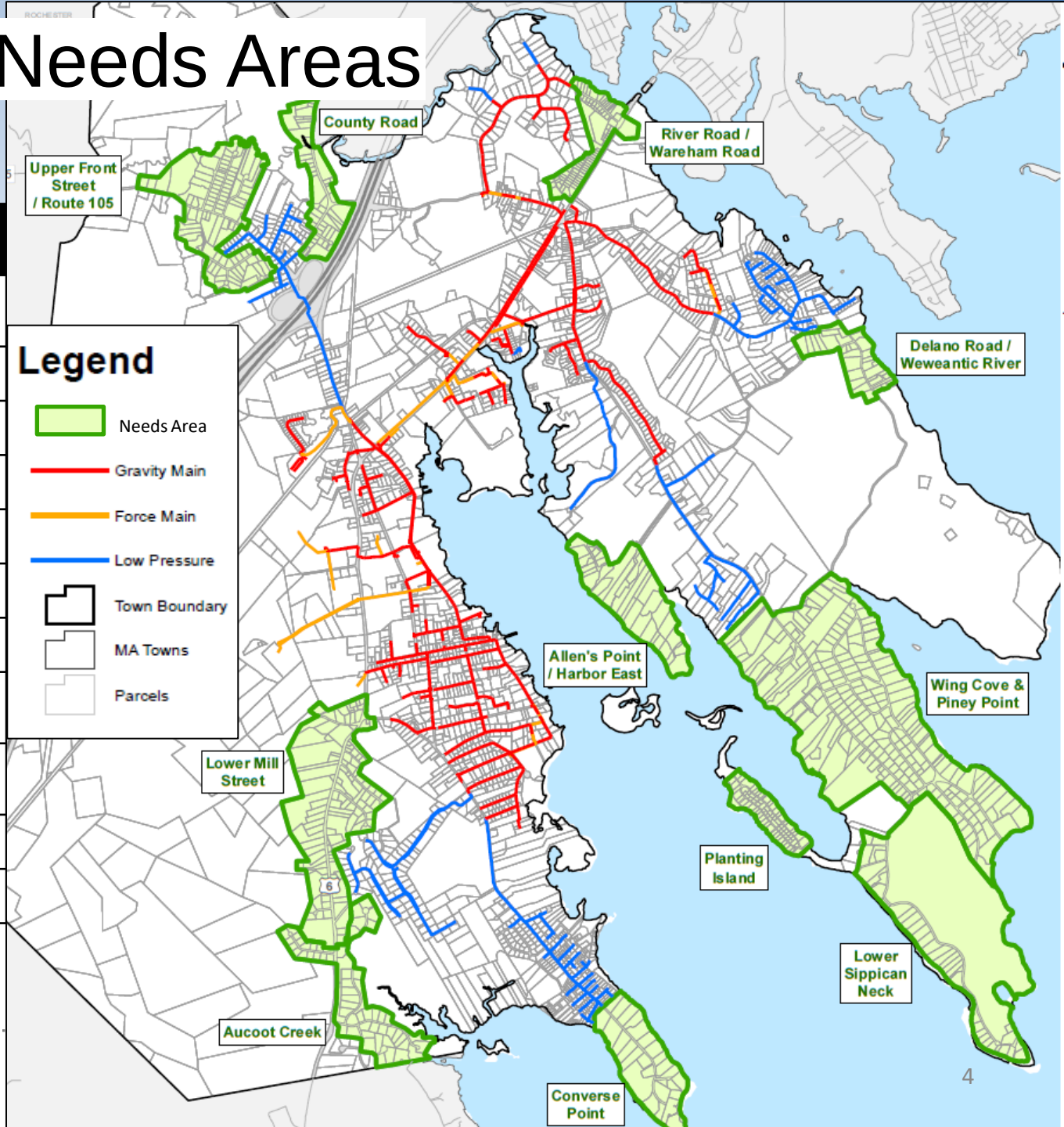
Follow Up Questions -

- CAC Meeting #3
- WPCF Plant Tour (#4)

Other Observations/Input Since Last Meeting

Unsewered Needs Areas

Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wing Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allen's Point/ Harbor East
Converse Point
Aucoot Cove
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP

Unsewered Areas Alternatives

Needs Area	Priority Rank	No Action	Enhanced On-site Program	Localized Treatment	Sewer Extension
Planting Island	High		✓	✓	✓
Lower Sippican Neck	High		✓	✓	✓
Upper Front Street	High	✓	✓		✓
Aucoot Creek	High		✓		✓
River Road/ Wareham Street	High		✓		✓
Lower Mill Street	Medium		✓		✓
County Road	Medium	✓	✓		✓
Wing Cove/ Piney Point	Medium	✓	✓		✓
Delano Road/ Weweantic River	Low	✓	✓		✓
Allen's Point/ Harbor East	Low	✓	✓		✓
Converse Point	Low	✓	✓		✓

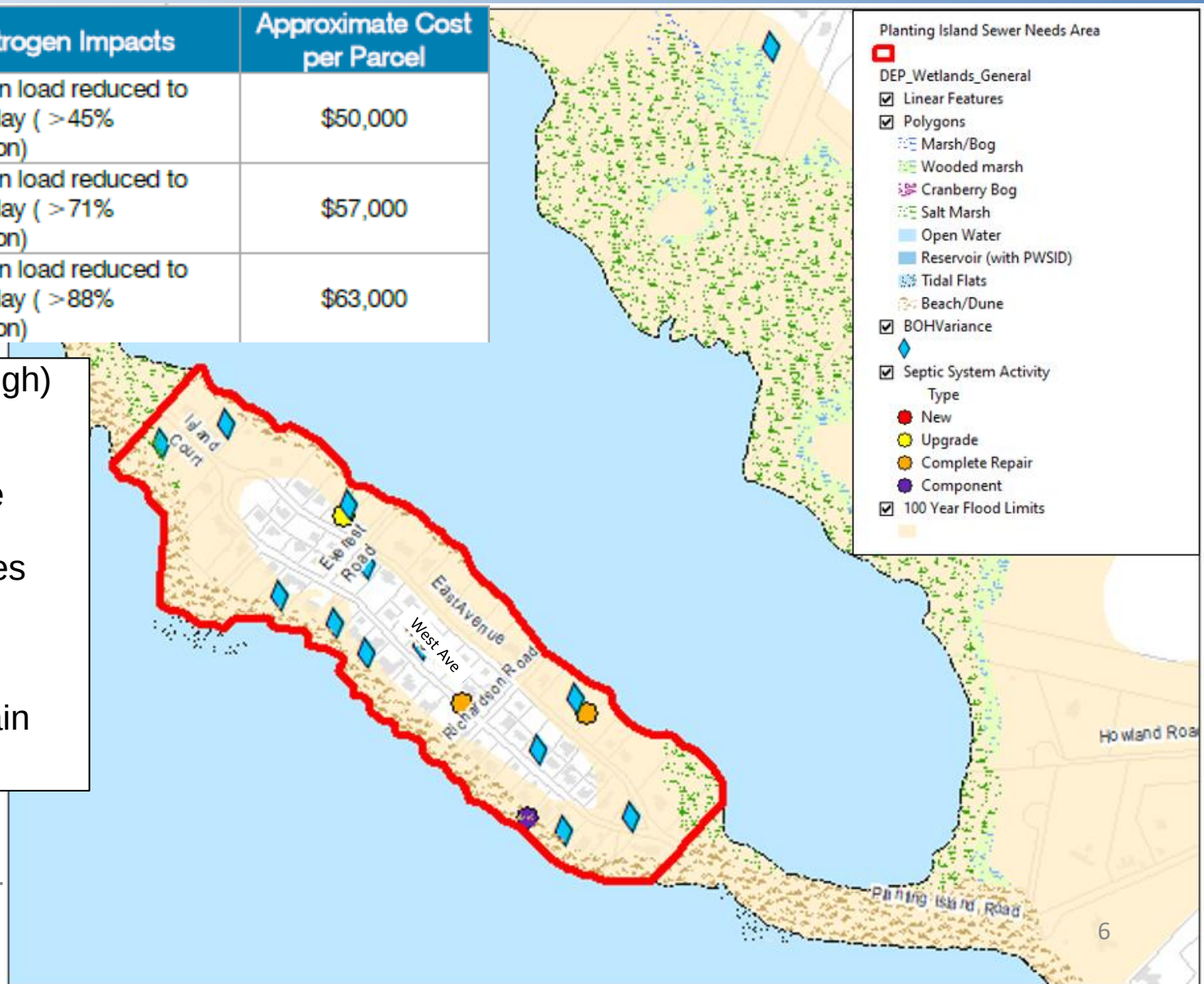
Unsewered Areas

Planting Island

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 2.0 lb/day (>45% reduction)	$50,000
Localized (Cluster) Treatment	Nitrogen load reduced to 1.0 lb/day (>71% reduction)	$57,000
Sewer Extension	Nitrogen load reduced to 0.4 lb/day (>88% reduction)	$63,000

Priority Concerns (High)

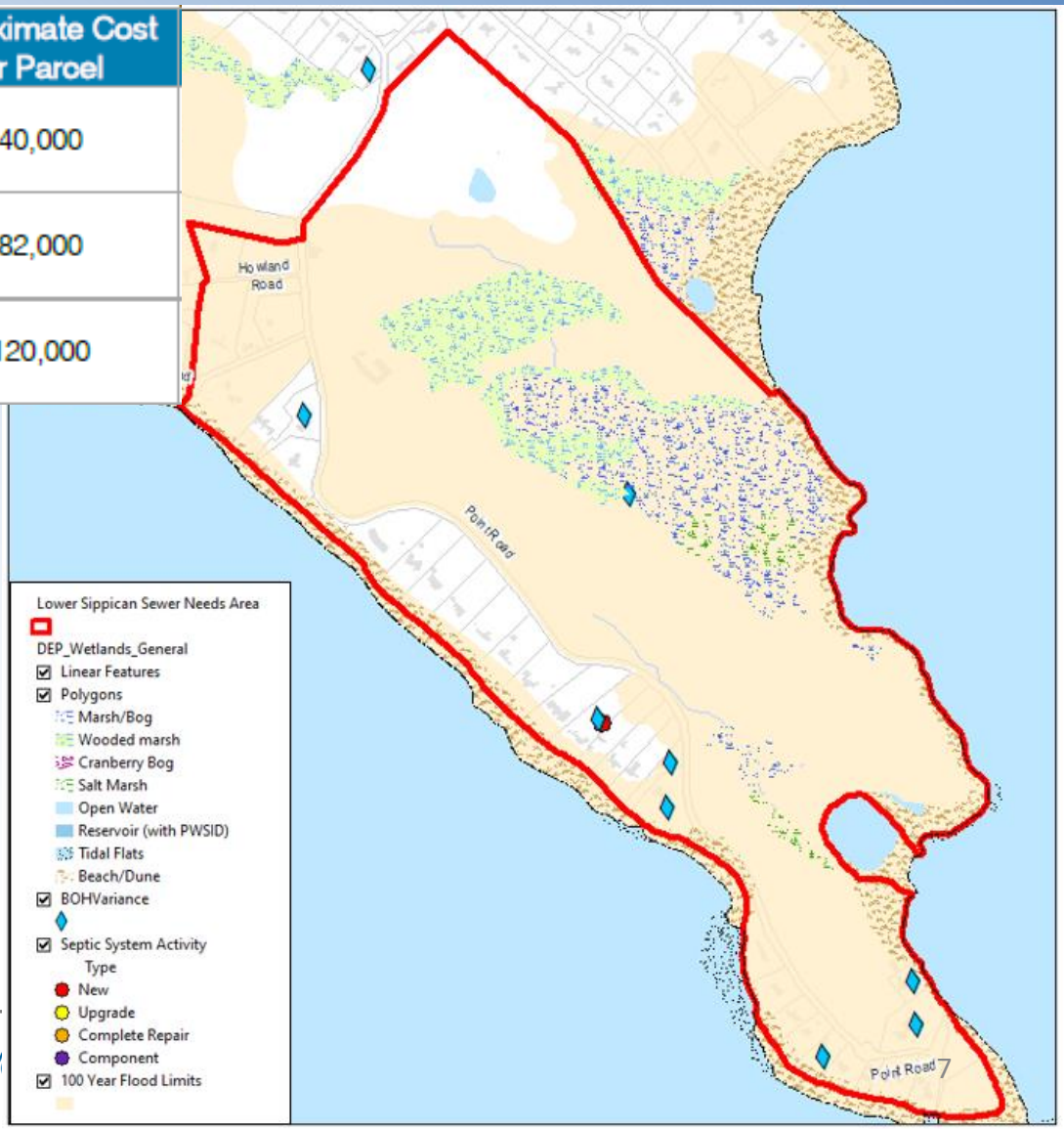
- 80 Total Parcels
  - 75 Built
- Average Lot Size
  - 0.33 Acre
- 12 BOH Variances (16%)
- 81% Excessive Draining Soils
- 71% in Flood Plain



Unsewered Areas

Lower Sippican Neck

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 0.9 lb/day (>45% reduction)	$40,000
Localized (Cluster) Treatment	Nitrogen load reduced to 0.5 lb/day (>71% reduction)	$82,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$120,000



Priority Concerns (High)

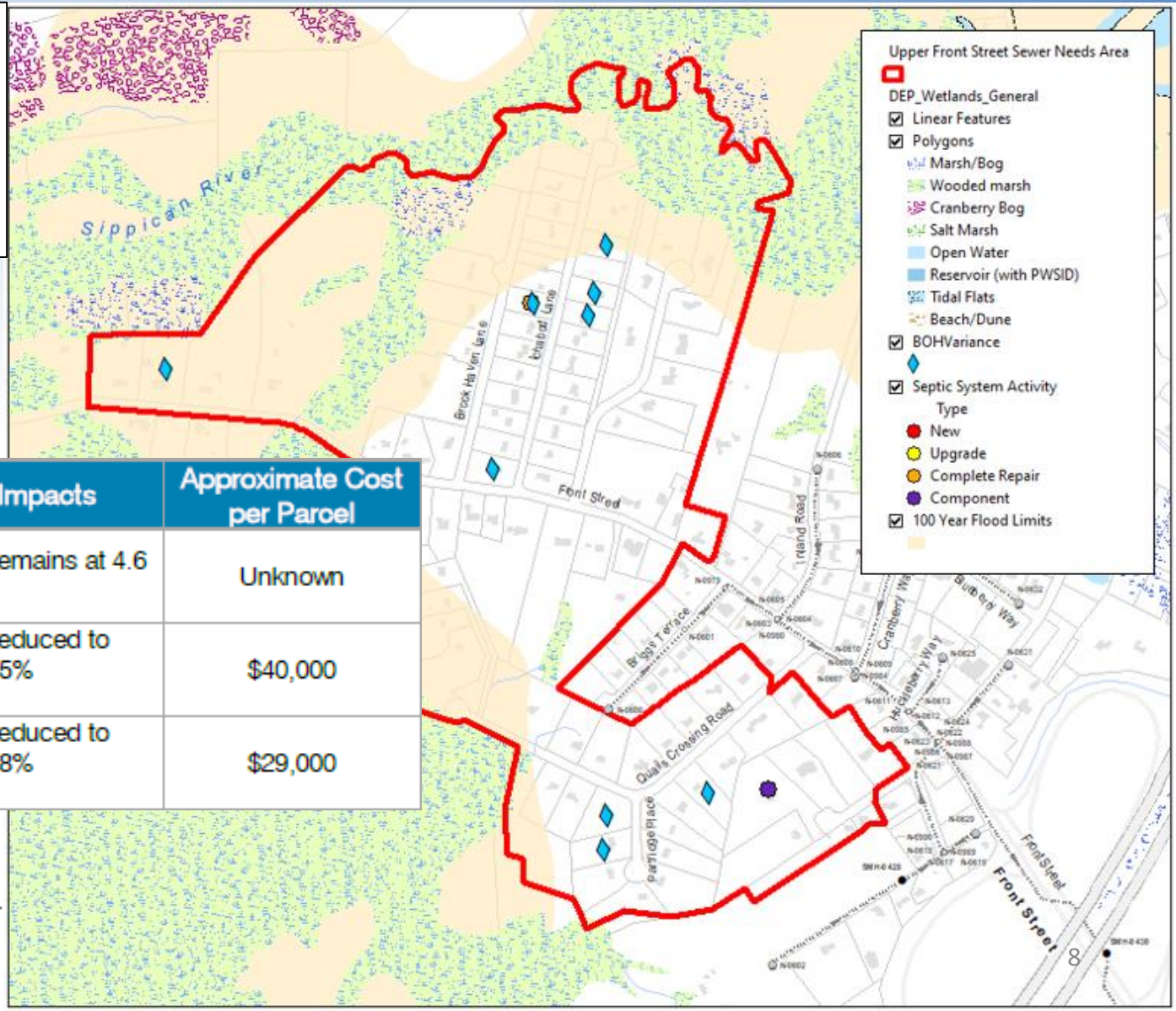
- 39 Total Parcels
  - 34 Built
- Average Age
  - 68 years
- 7 BOH Variances (21%)
- 83% in Flood Plain

Unsewered Areas

Upper Front Street

Priority Concerns (High)

- 102 Total Parcels
  - 96 Built
- 10 BOH Variances (10%)
- Well Protection Zone



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 4.6 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 2.5 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.5 lb/day (>88% reduction)	$29,000

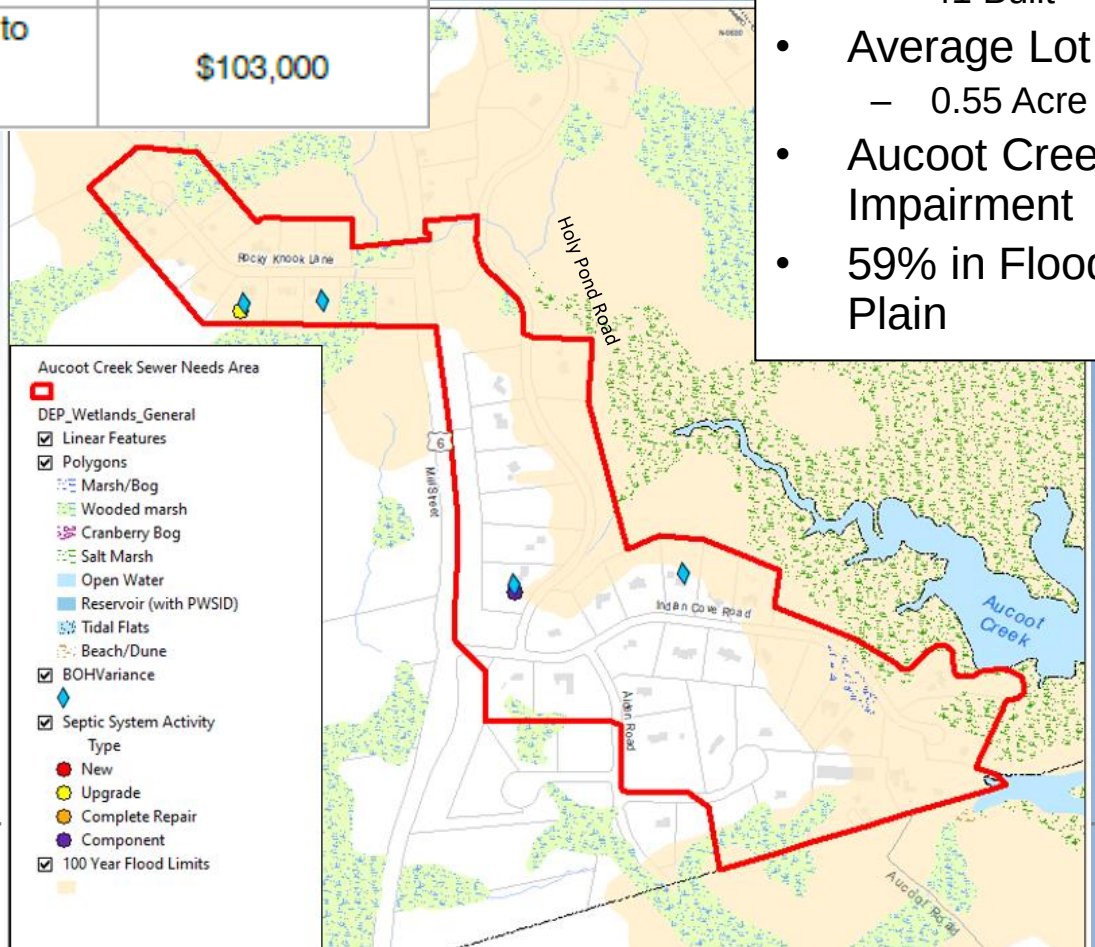
Unsewered Areas

Aucoot Creek

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 1.1 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$103,000

Priority Concerns (High)

- 52 Total Parcels
  - 41 Built
- Average Lot Size
  - 0.55 Acre
- Aucoot Creek N Impairment
- 59% in Flood Plain

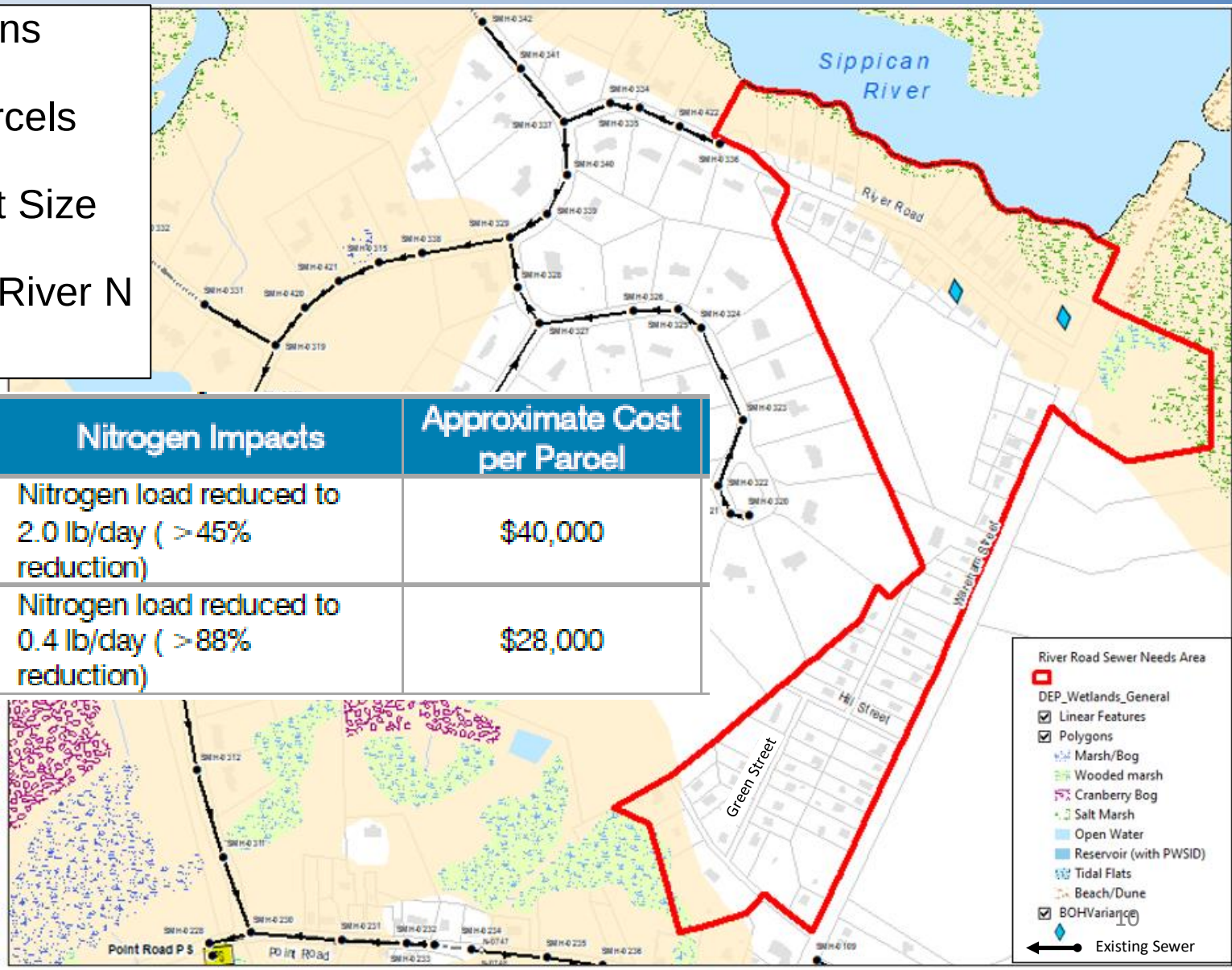


Unsewered Areas

River Road/ Wareham Street

Priority Concerns (High)

- 84 Total Parcels
  - 77 Built
- Average Lot Size
  - 0.55 Acre
- Weweantic River N Impairment

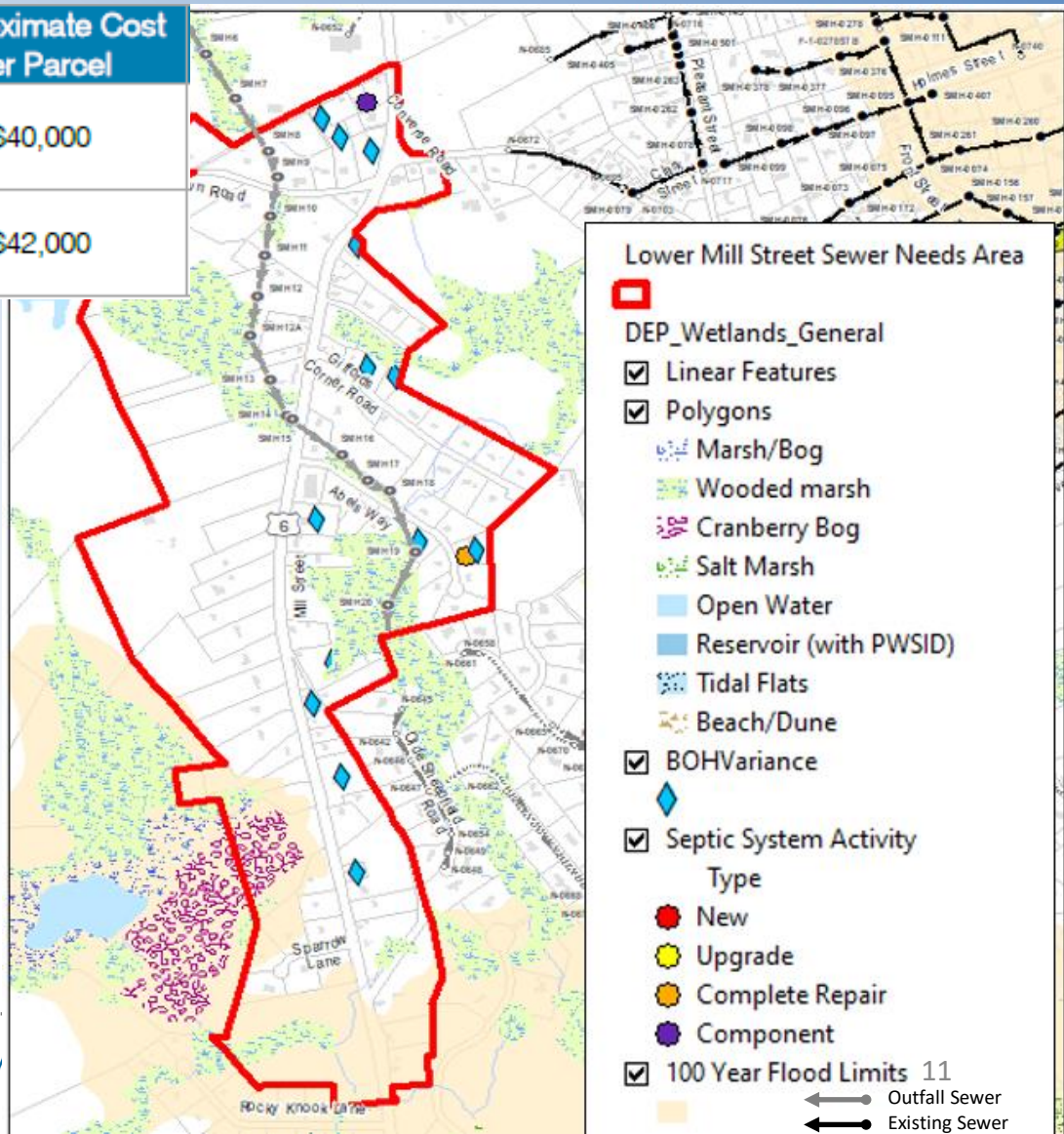


Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 2.0 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.4 lb/day (>88% reduction)	$28,000

Unsewered Areas

Lower Mill Street

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 0.6 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.1 lb/day (>88% reduction)	$42,000



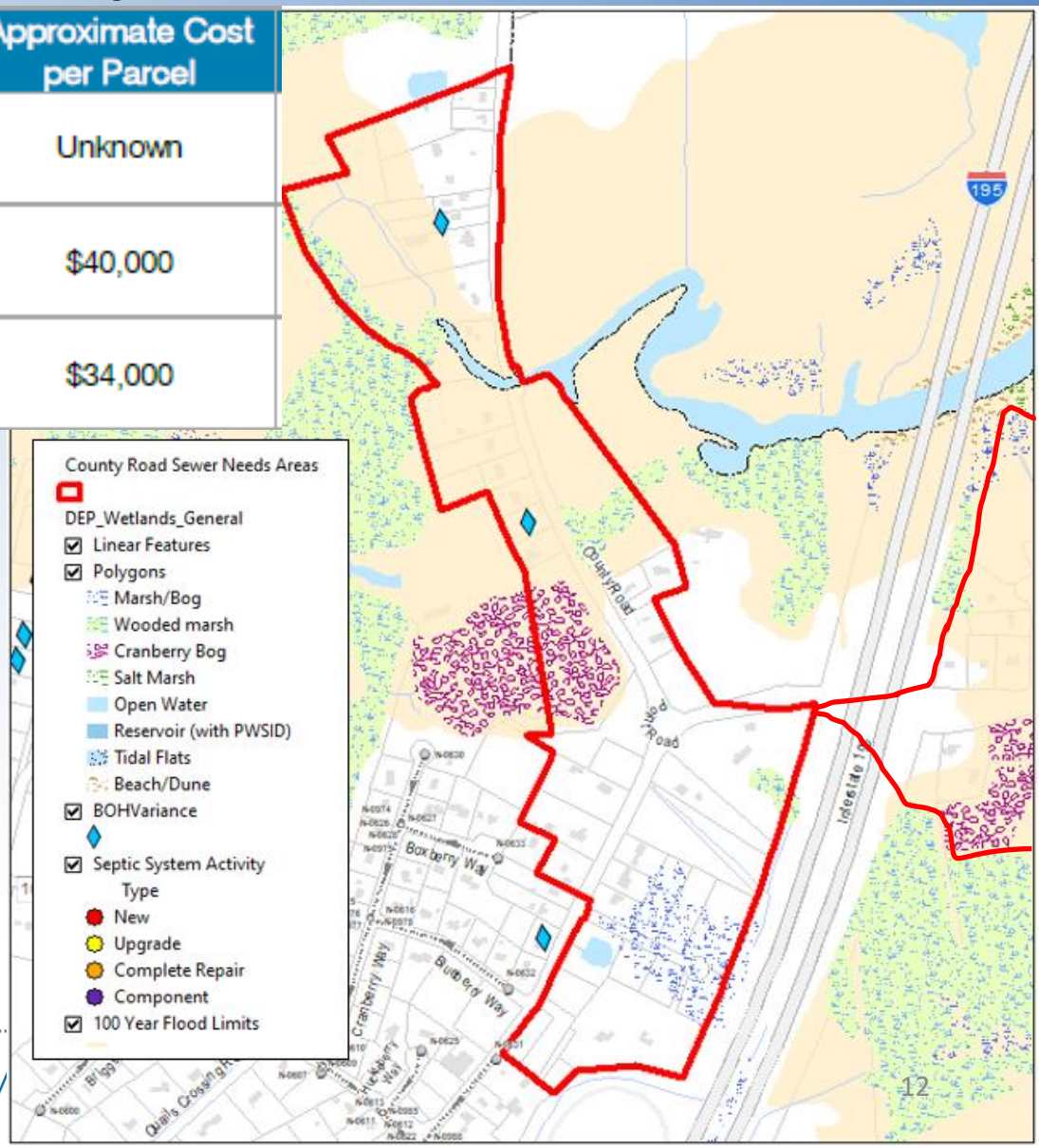
Priority Concerns (Med)

- 116 Total Parcels
  - 104 Built
- 13 BOH Variances (13%)

Unsewered Areas

County Road

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.9 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 1.0 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$34,000



Priority Concerns (Med)

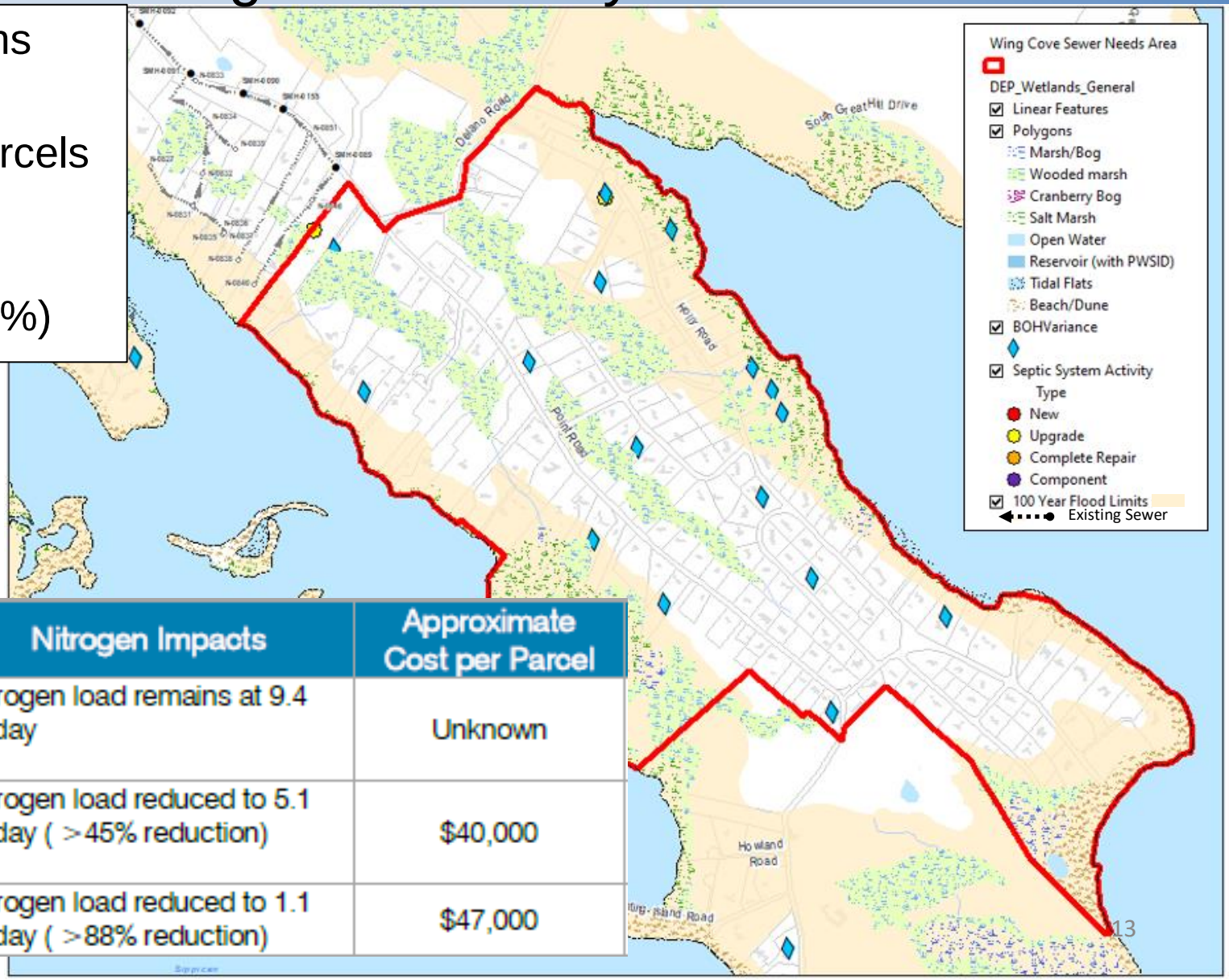
- 67 Total Parcels
  - 39 Built
- Average Age
  - 61 years

Unsewered Areas

Wings Cove/ Piney Point

Priority Concerns (Med)

- 217 Total Parcels
  - 180 Built
- 16 BOH Variances (9%)



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 9.4 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 5.1 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 1.1 lb/day (>88% reduction)	$47,000

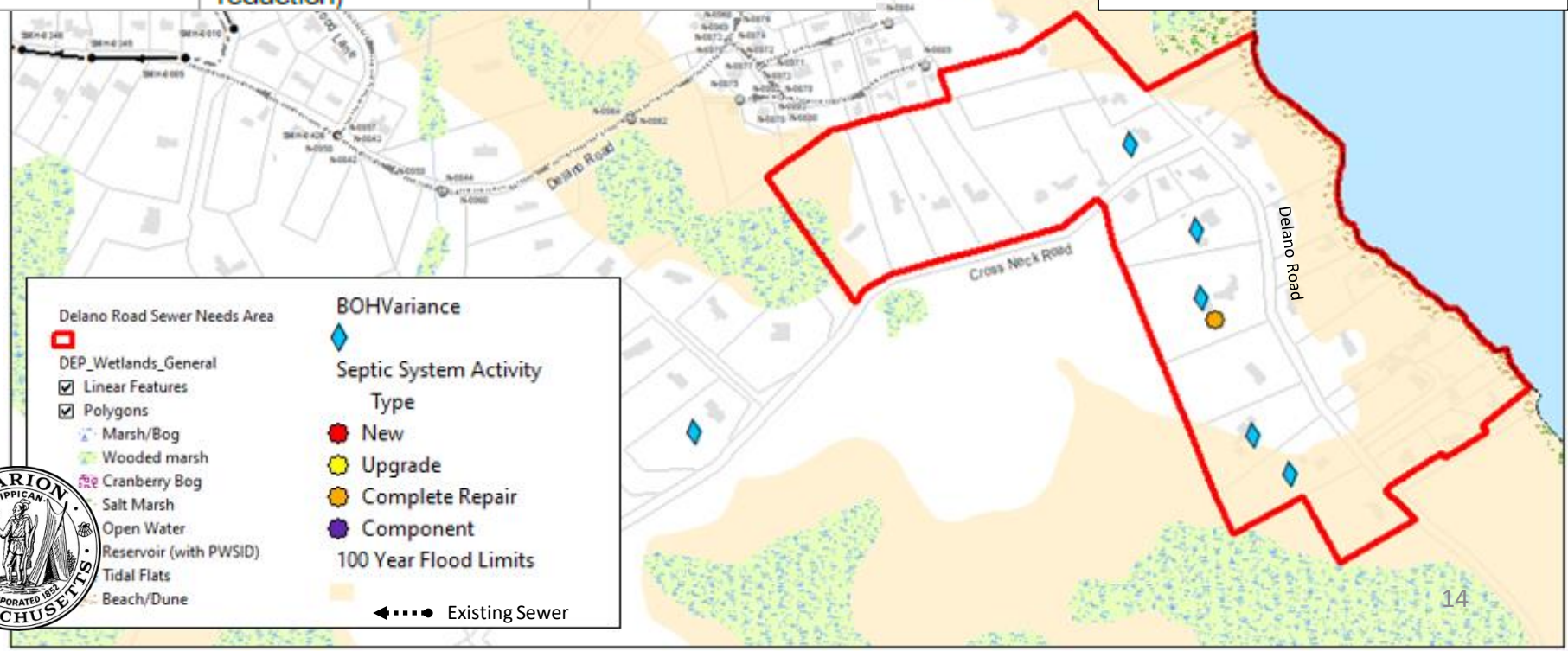
Unsewered Areas

Delano Road/ Weweantic River

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.5lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 0.8 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$36,000

Priority Concerns (Low)

- 33 Total Parcels
  - 31 Built
- 5 BOH Variances (16%)
- Weweantic River N Impairment

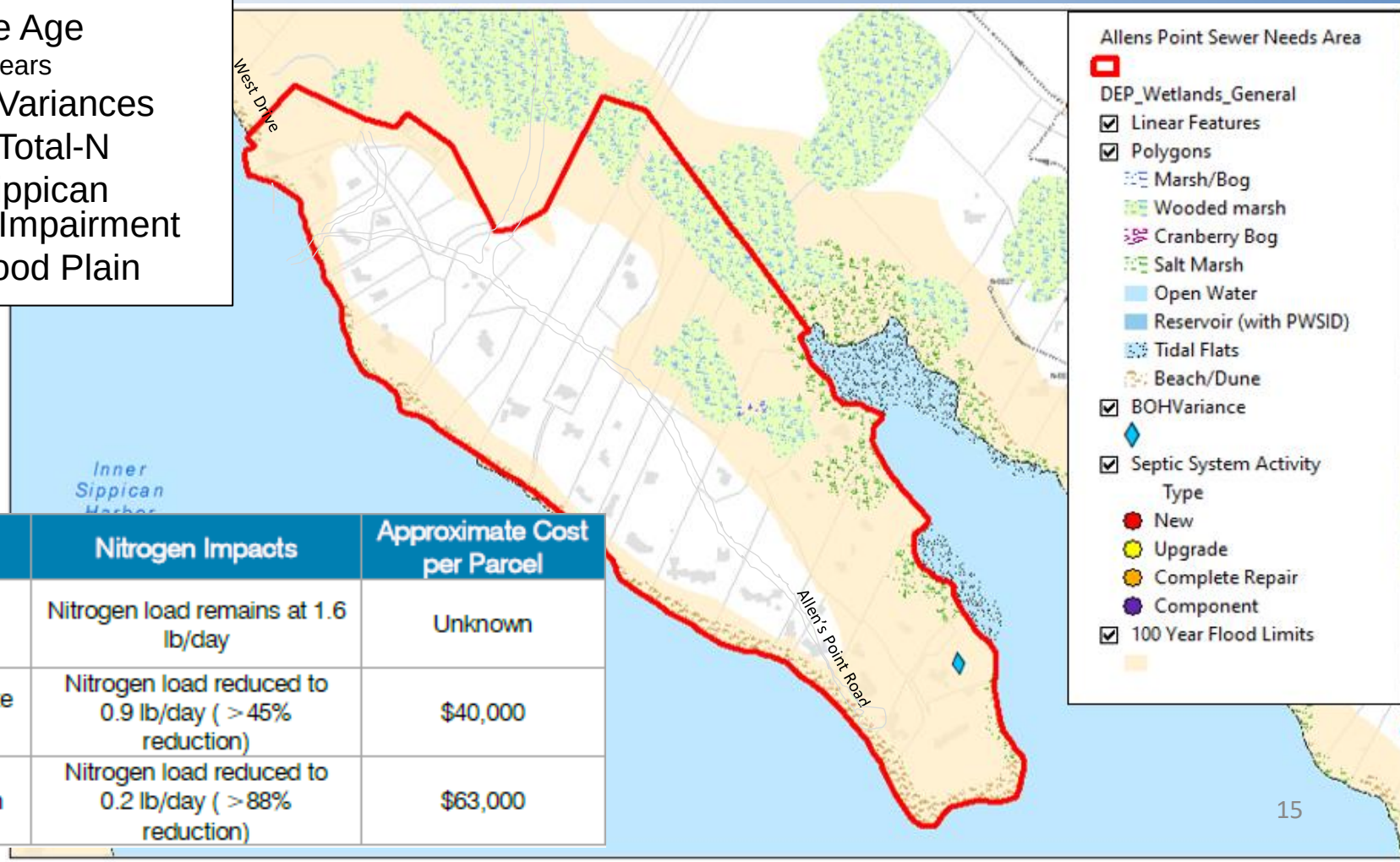


Unsewered Areas

Allens Point/ Harbor East

Priority Concerns (Low)

- 35 Total Parcels
  - 29 Built
- Average Age
  - 86 years
- 1 BOH Variances
- 2.0lb/d Total-N
- Inner Sippican Harbor Impairment
- 57% Flood Plain

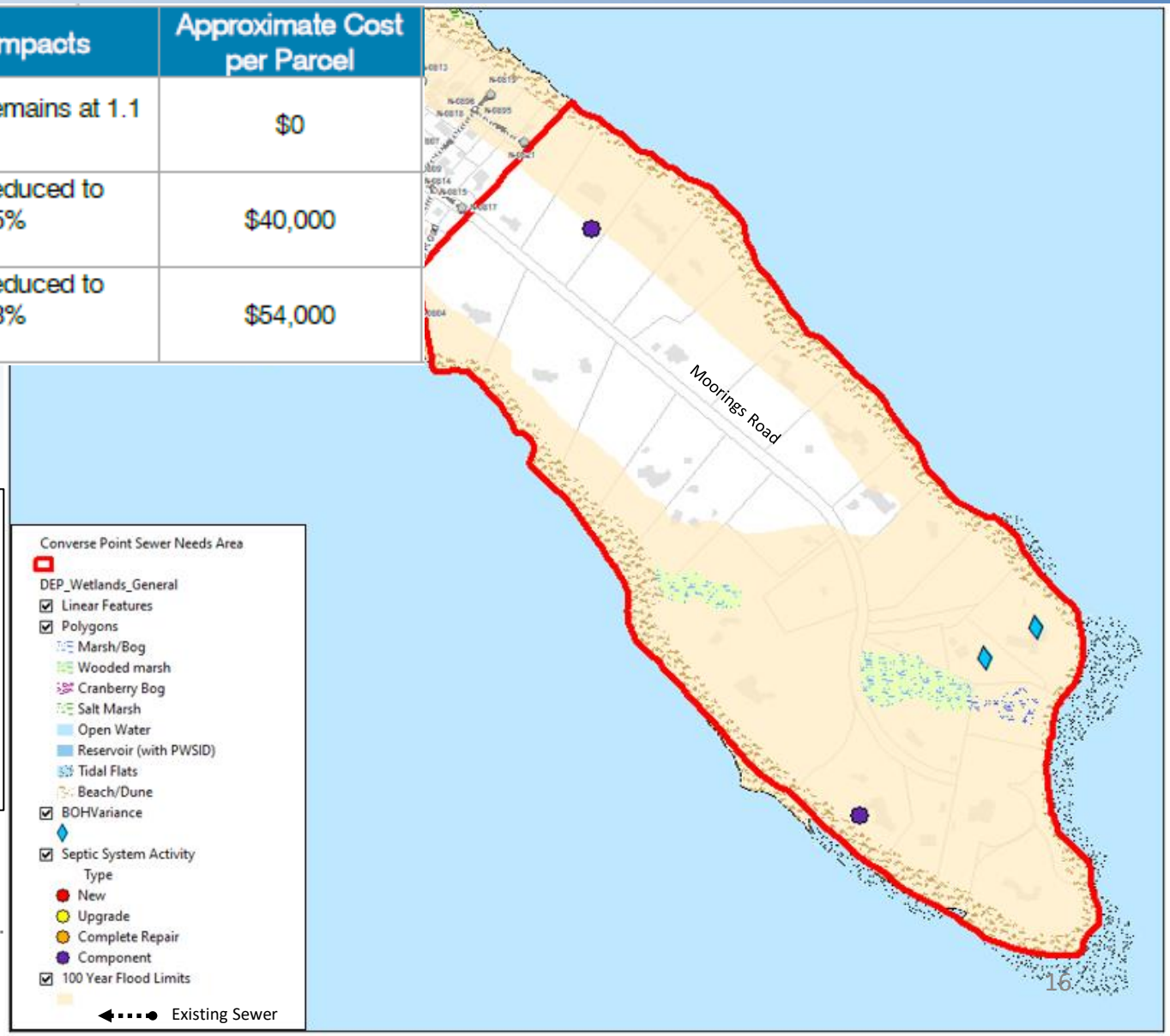


Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.6 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 0.9 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$63,000

Unsewered Areas

Converse Point

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.1 lb/day	$0
Enhanced On-Site Treatment	Nitrogen load reduced to 0.6 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.1 lb/day (>88% reduction)	$54,000



Priority Concerns (Low)

- 27 Total Parcels
  - 23 Built
- 72% in Flood Plain

Marion CWMP

Sewer Extension Alternative Summary

Needs Area	Priority Rank	Total Area Cost *	Area Cost per Parcel*	Combined Area Cost per Parcel*
Planting Island	High	$5.0M	$63,000	Planting Island + Lower Sippican Neck $60,000**
Lower Sippican Neck	High	$4.6M	$120,000	Planting Island + Lower Sippican Neck + Wing Cove/Piney Point $44,000
Upper Front Street	High	$2.8M	$29,000	-
Aucoot Creek	High	$4.6M	$103,000	Aucoot Creek + Lower Mill Street $45,000
River Road/ Wareham Street	High	$2.3M	$28,000	-
Lower Mill Street	Medium	$4.4M	$42,000	Aucoot Creek + Lower Mill Street $45,000
County Road	Medium	$1.8M	$34,000	-
Wing Cove/ Piney Point	Medium	$69.2M	$47,000	Planting Island + Lower Sippican Neck + Wing Cove/Piney Point $44,000
Delano Road/ Weweantic River	Low	$1.2M	$36,000	-
Allens Point/ Harbor East	Low	$2.1M	$63,000	-
Converse Point	Low	$1.4M	$54,000	-

*costs are approximate and only represent those associated with sewer construction

Weston & Sampson

** decentralized treatment alternative cost for combined area is $60,000, dependent on identifying an appropriate site

CAC Recommendation for Sewer Extensions

Questions / Discussion

Marion CWMP

Next Meeting

Select Board Worksession – August/September (TBD)

CAC Meeting - September (TBD)

Public Meeting on CWMP Findings (TBD)

Weston & Sampson℠

Thank You

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Select Board Meeting

September 27, 2021

Weston & Sampson

Marion CWMP

Presentation Agenda

- Summary of CAC Opinions
- Discussion of Alternatives for Unsewered Needs Area
- Recommendations for Sewer Extensions
- Future Flow Considerations
- Other Questions & Discussion

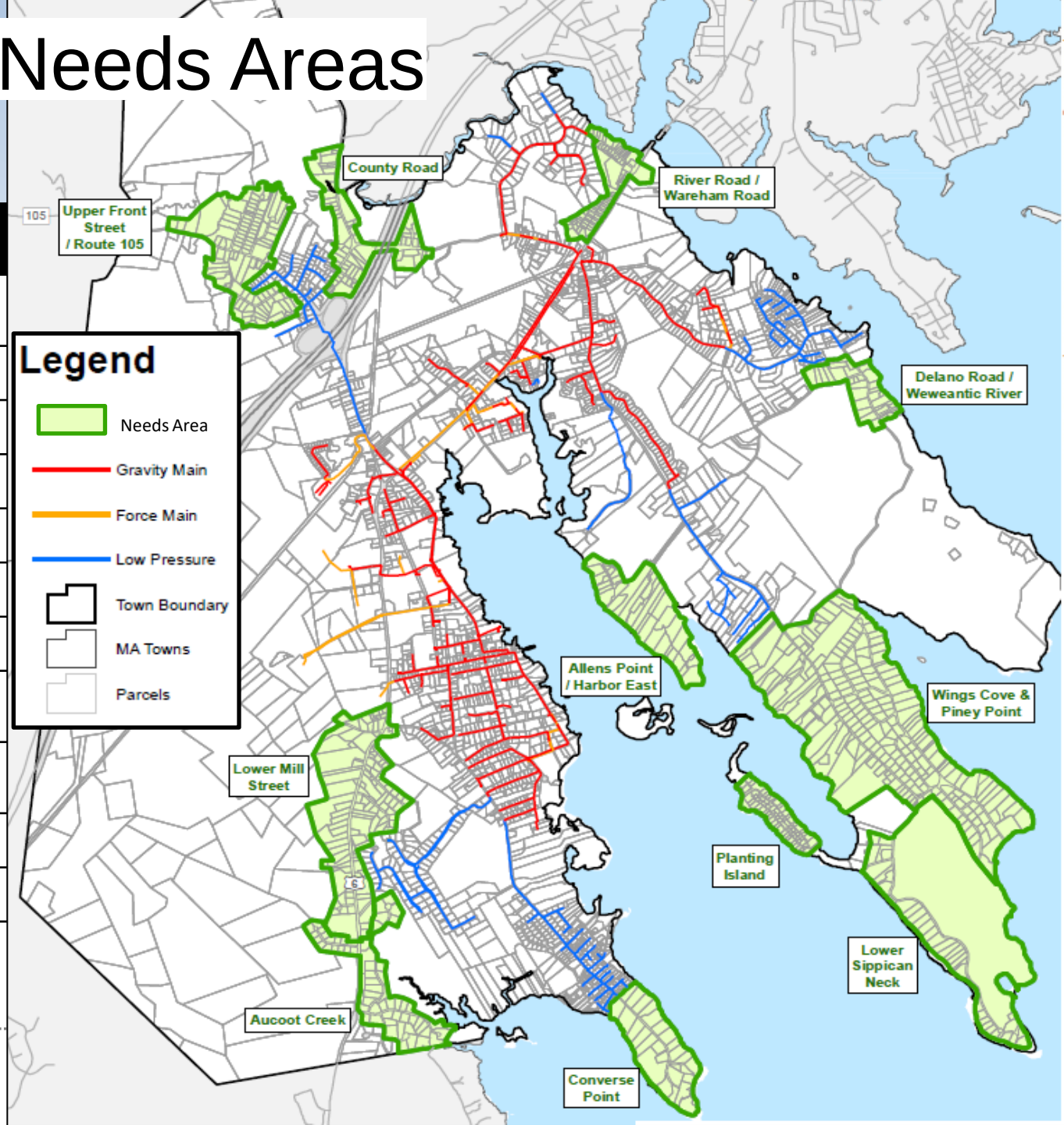
Marion CWMP
Summary of CAC Opinions

If cost or other limitations did not exist, sewer extensions would be recommended to all Unsewered Needs Areas. However, given constraints:

- Sewer Extensions are Strongly Supported for:
  - River Rd/Wareham Rd
  - Combination: Planting Island + Wings Cove/Piney Point + Lower Sippican Neck
  - Combination: Aucoot Creek + Lower Mill St
- Sewer Extensions are Preferred, but Lower Priority for:
  - Upper Front St
  - County Rd
  - Delano Rd/Weweantic River
  - Allens Point/Harbor East
  - Converse Point
- Capacity is another key consideration
  - May require further ranking or phasing needs areas within the above two sewer extension categories
  - Confirming consistent capacity remaining at WPCF (annual fluctuation)
- Increased concern for nitrogen loading from septic systems

Unsewered Needs Areas

Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wings Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allens Point/ Harbor East
Converse Point
Aucoot Cove
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP

Unsewered Areas Alternatives

Needs Area	Priority Rank	No Action	Enhanced On-site Program	Localized Treatment	Sewer Extension
Planting Island	High		✓	✓	✓
Lower Sippican Neck	High		✓	✓	✓
Upper Front Street	High	✓	✓		✓
Aucoot Creek	High		✓		✓
River Road/ Wareham Street	High		✓		✓
Lower Mill Street	Medium		✓		✓
County Road	Medium	✓	✓		✓
Wings Cove/ Piney Point	Medium	✓	✓		✓
Delano Road/ Weweantic River	Low	✓	✓		✓
Allens Point/ Harbor East	Low	✓	✓		✓
Converse Point	Low	✓	✓		✓

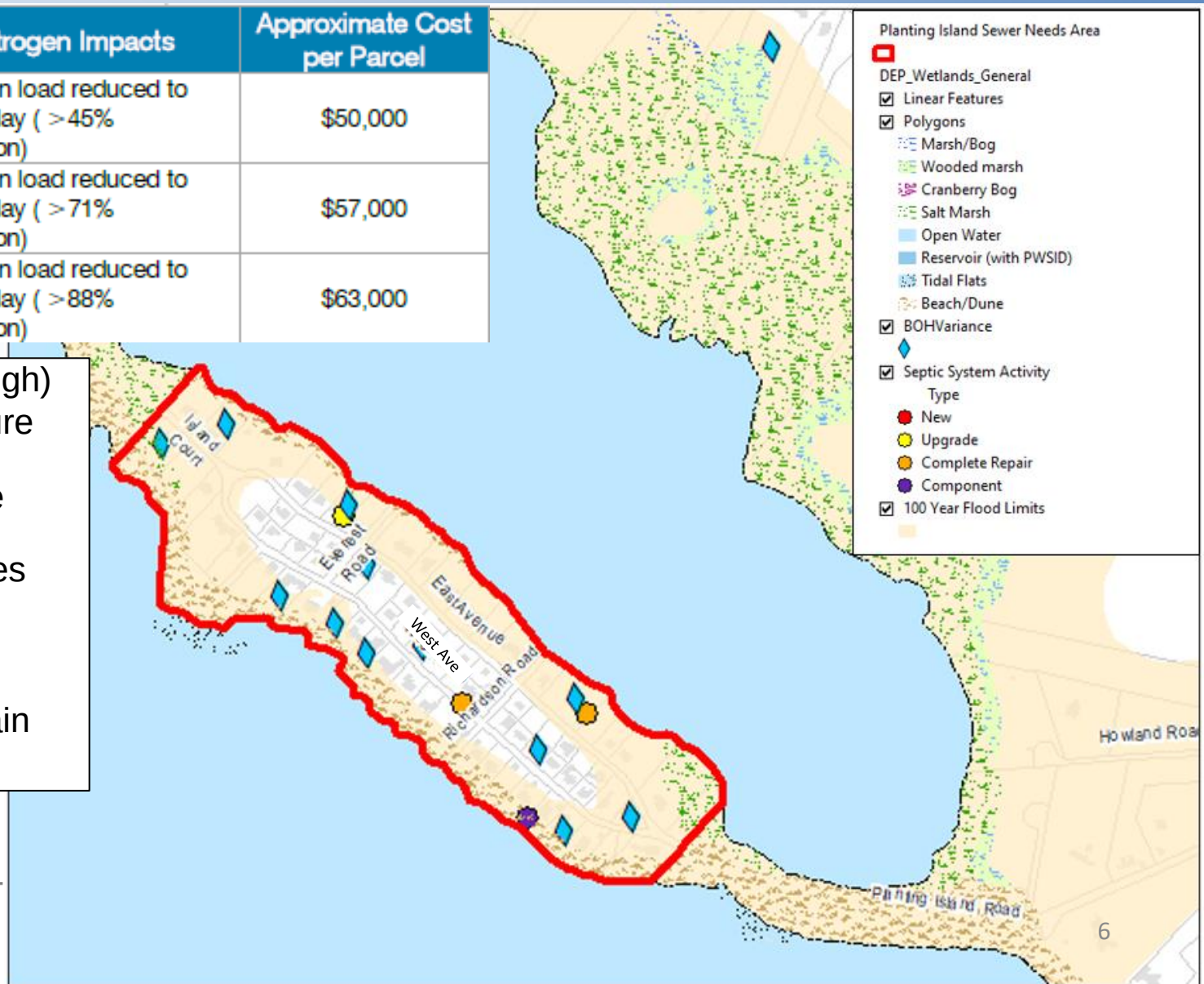
Unsewered Areas

Planting Island

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 2.0 lb/day (>45% reduction)	$50,000
Localized (Cluster) Treatment	Nitrogen load reduced to 1.0 lb/day (>71% reduction)	$57,000
Sewer Extension	Nitrogen load reduced to 0.4 lb/day (>88% reduction)	$63,000

Priority Concerns (High)

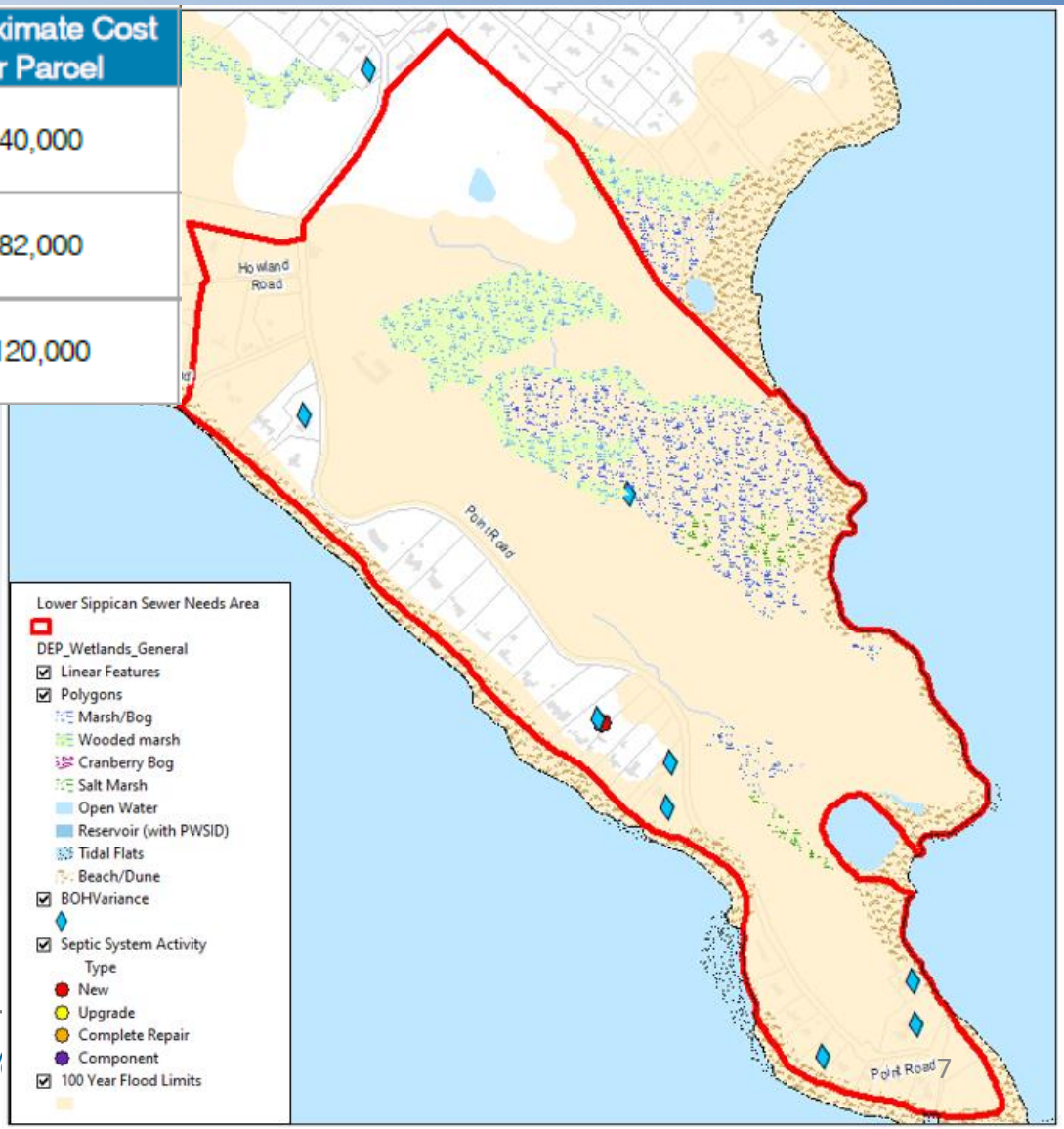
- 79 Potential Future Connections
- Average Lot Size
  - 0.33 Acre
- 12 BOH Variances (16%)
- 81% Excessive Draining Soils
- 71% in Flood Plain



Unsewered Areas

Lower Sippican Neck

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 0.9 lb/day (>45% reduction)	$40,000
Localized (Cluster) Treatment	Nitrogen load reduced to 0.5 lb/day (>71% reduction)	$82,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$120,000



Priority Concerns (High)

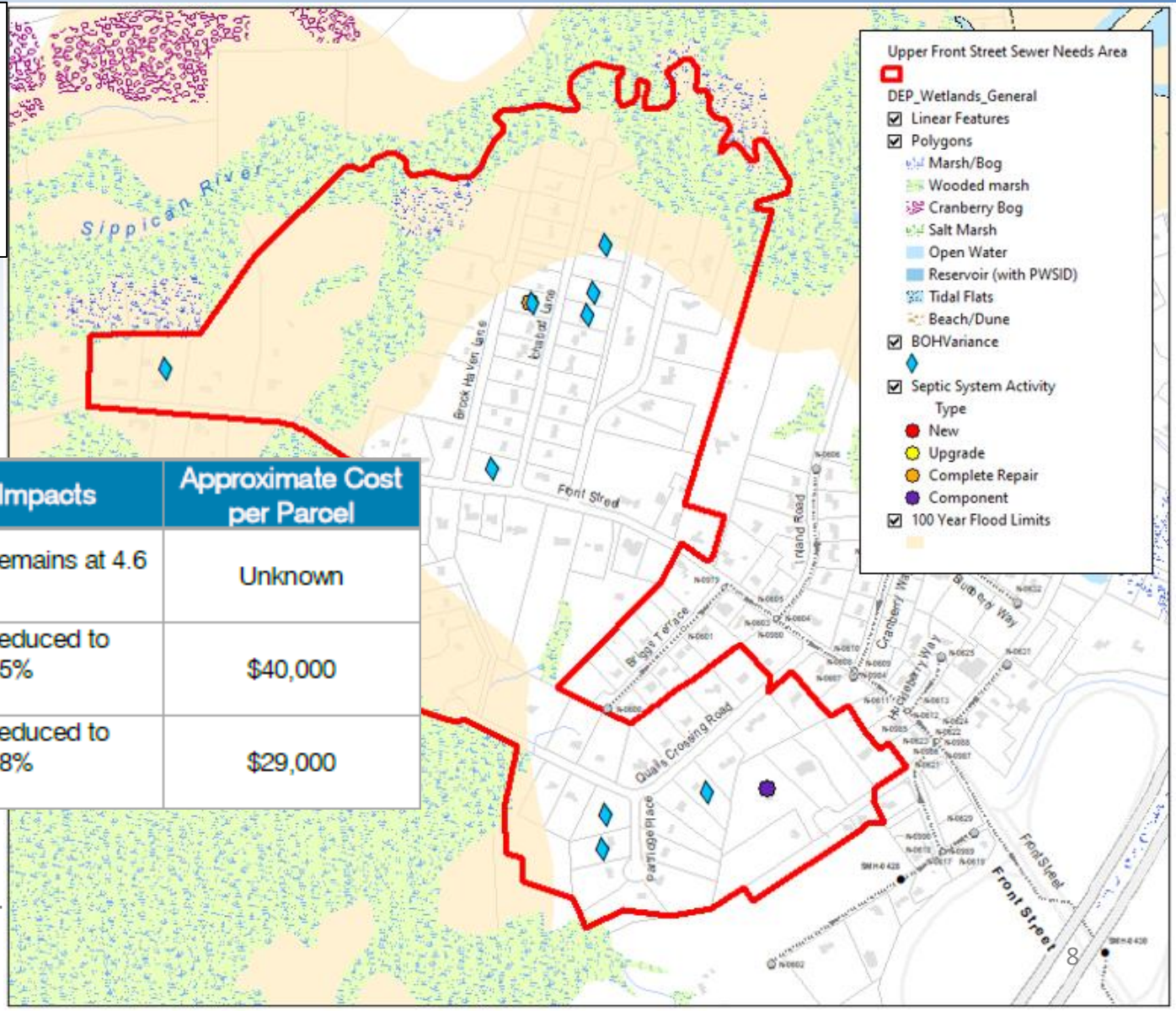
- 38 Potential Future Connections
- Average Age
  - 68 years
- 7 BOH Variances (21%)
- 83% in Flood Plain

Unsewered Areas

Upper Front Street

Priority Concerns (High)

- 99 Potential Future Connections
- 10 BOH Variances (10%)
- Well Protection Zone



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 4.6 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 2.5 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.5 lb/day (>88% reduction)	$29,000

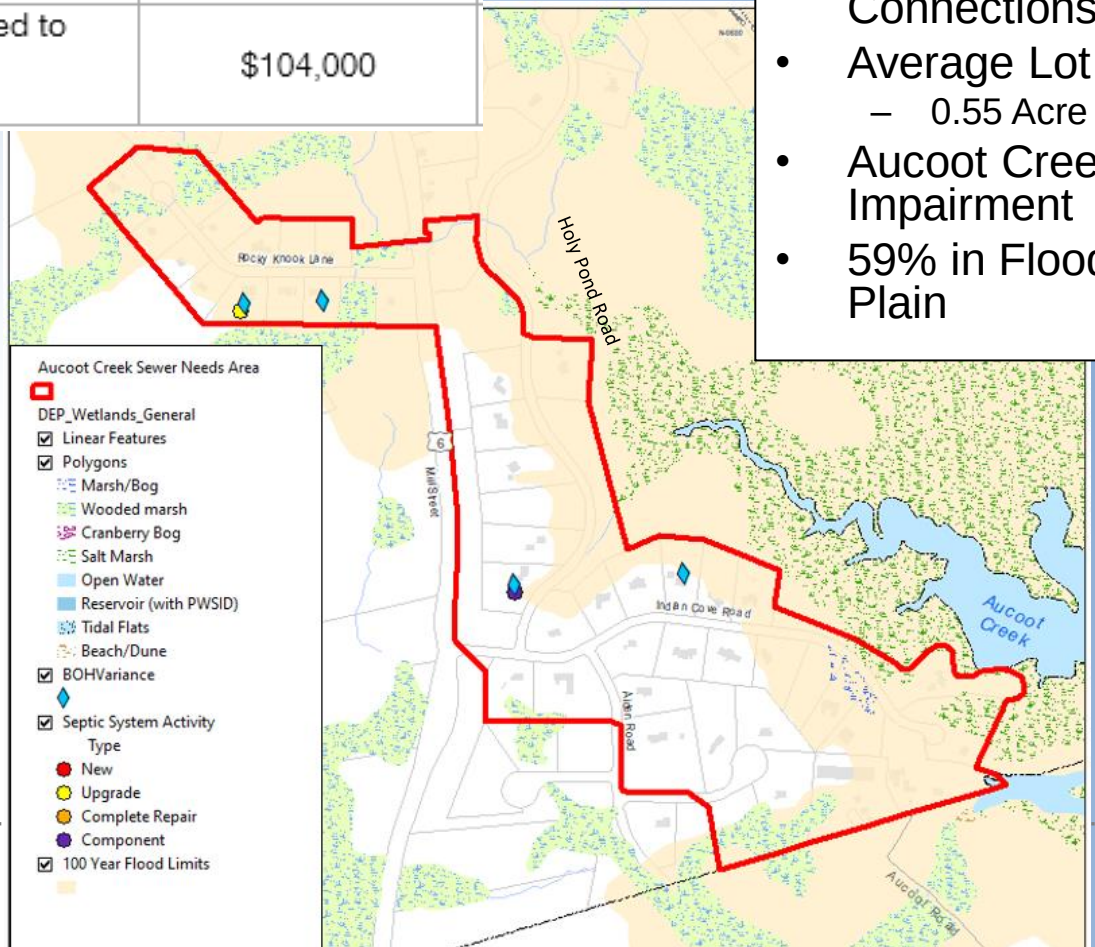
Unsewered Areas

Aucoot Creek

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 1.1 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$104,000

Priority Concerns (High)

- 44 Potential Future Connections
- Average Lot Size
  - 0.55 Acre
- Aucoot Creek N Impairment
- 59% in Flood Plain

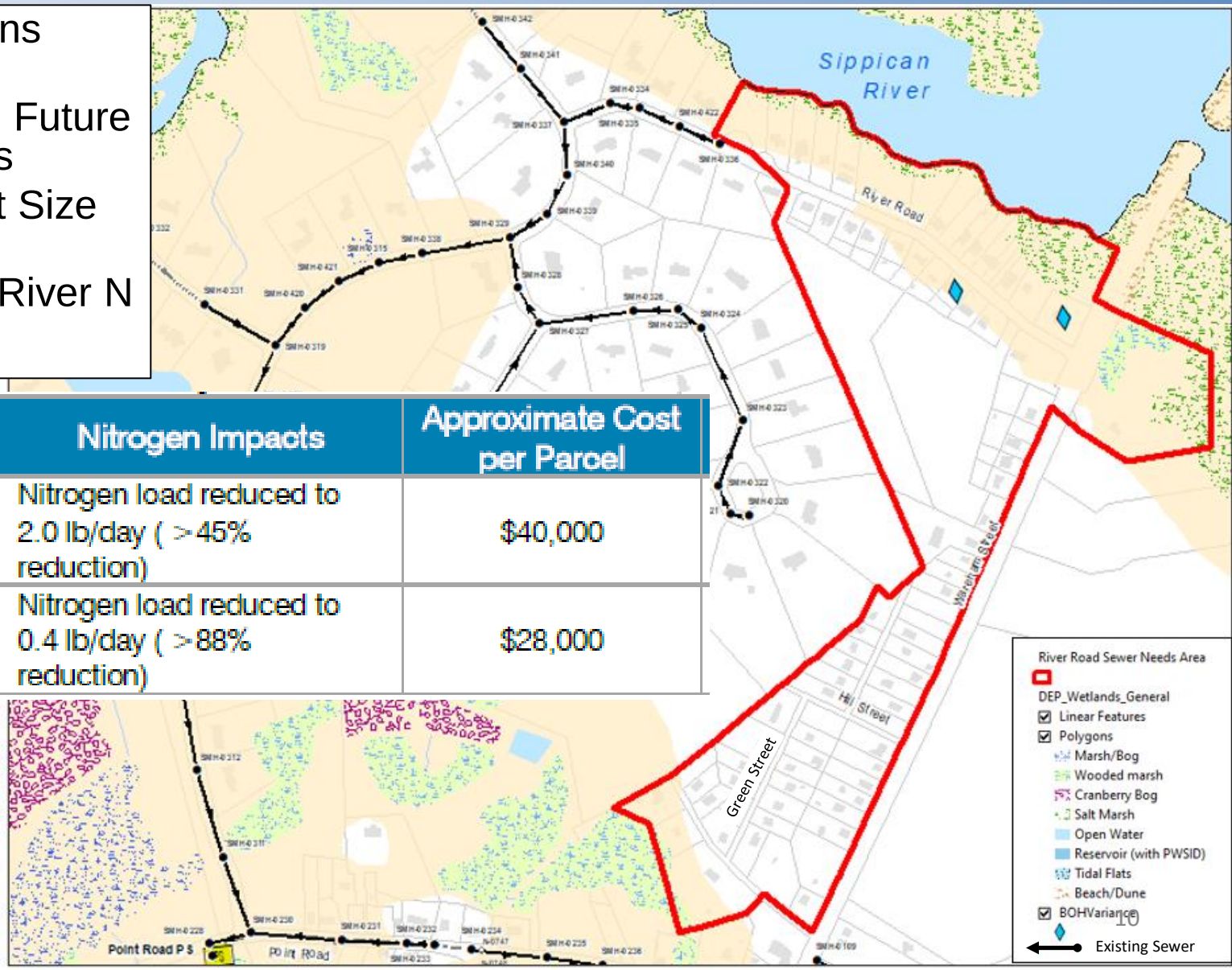


Unsewered Areas

River Road/ Wareham Street

Priority Concerns (High)

- 82 Potential Future Connections
- Average Lot Size
  - 0.55 Acre
- Weweantic River N Impairment

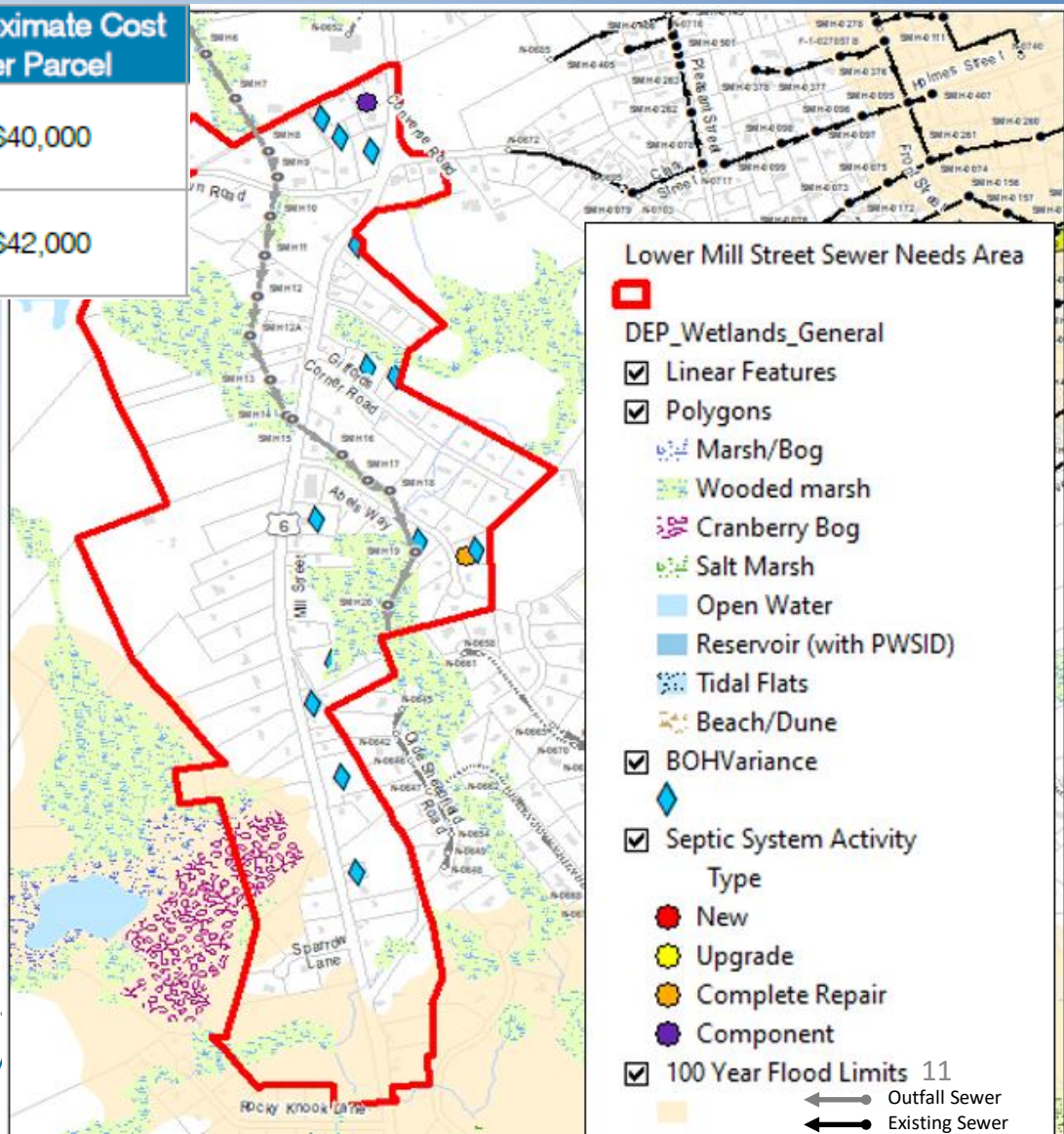


Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 2.0 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.4 lb/day (>88% reduction)	$28,000

Unsewered Areas

Lower Mill Street

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 0.6 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.1 lb/day (>88% reduction)	$42,000



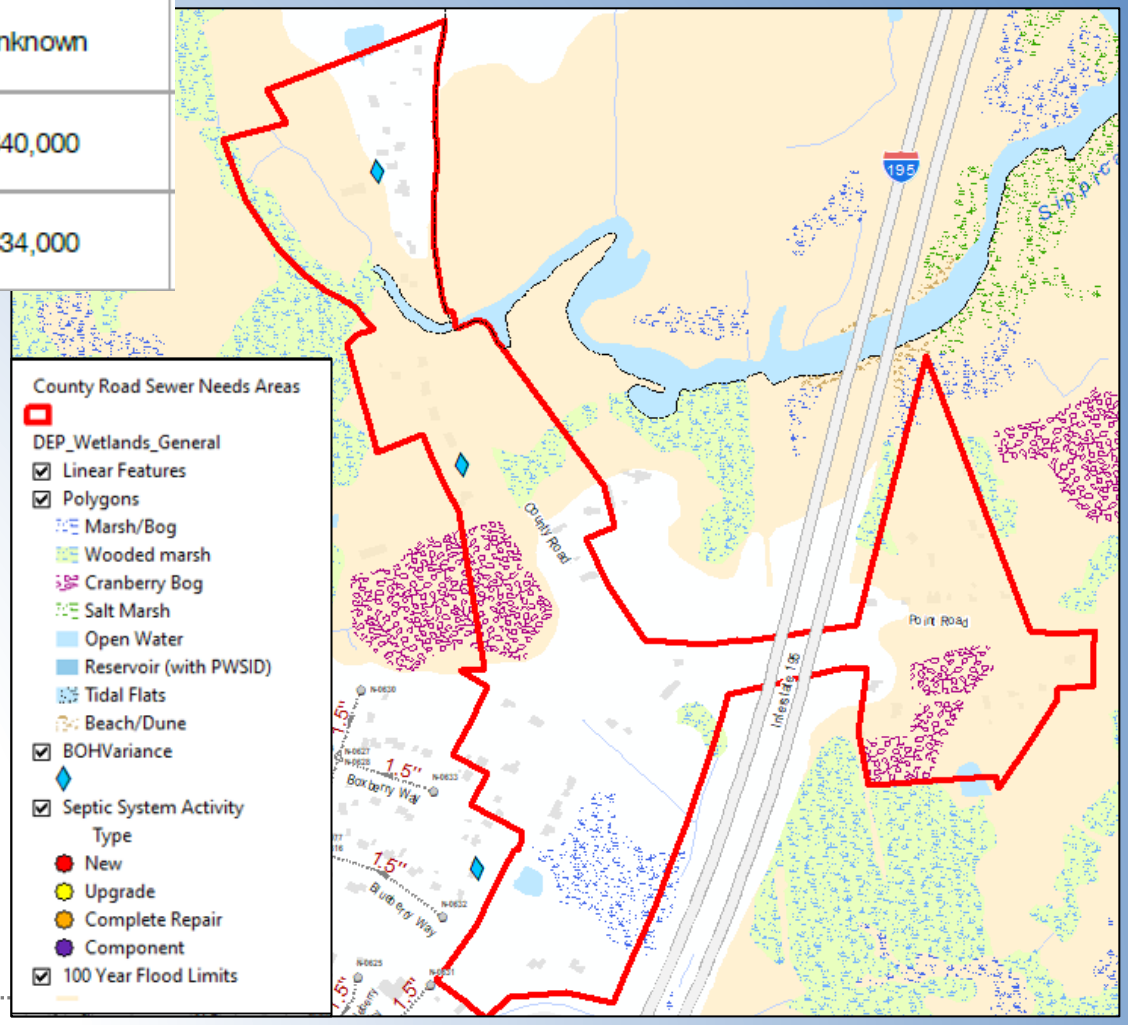
Priority Concerns (Med)

- 111 Potential Future Connections
- 13 BOH Variances (13%)

Unsewered Areas

County Road

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.9 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 1.0 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$34,000



Priority Concerns (Med)

- 53 Potential Future Connections
- Average Age
  - 61 years

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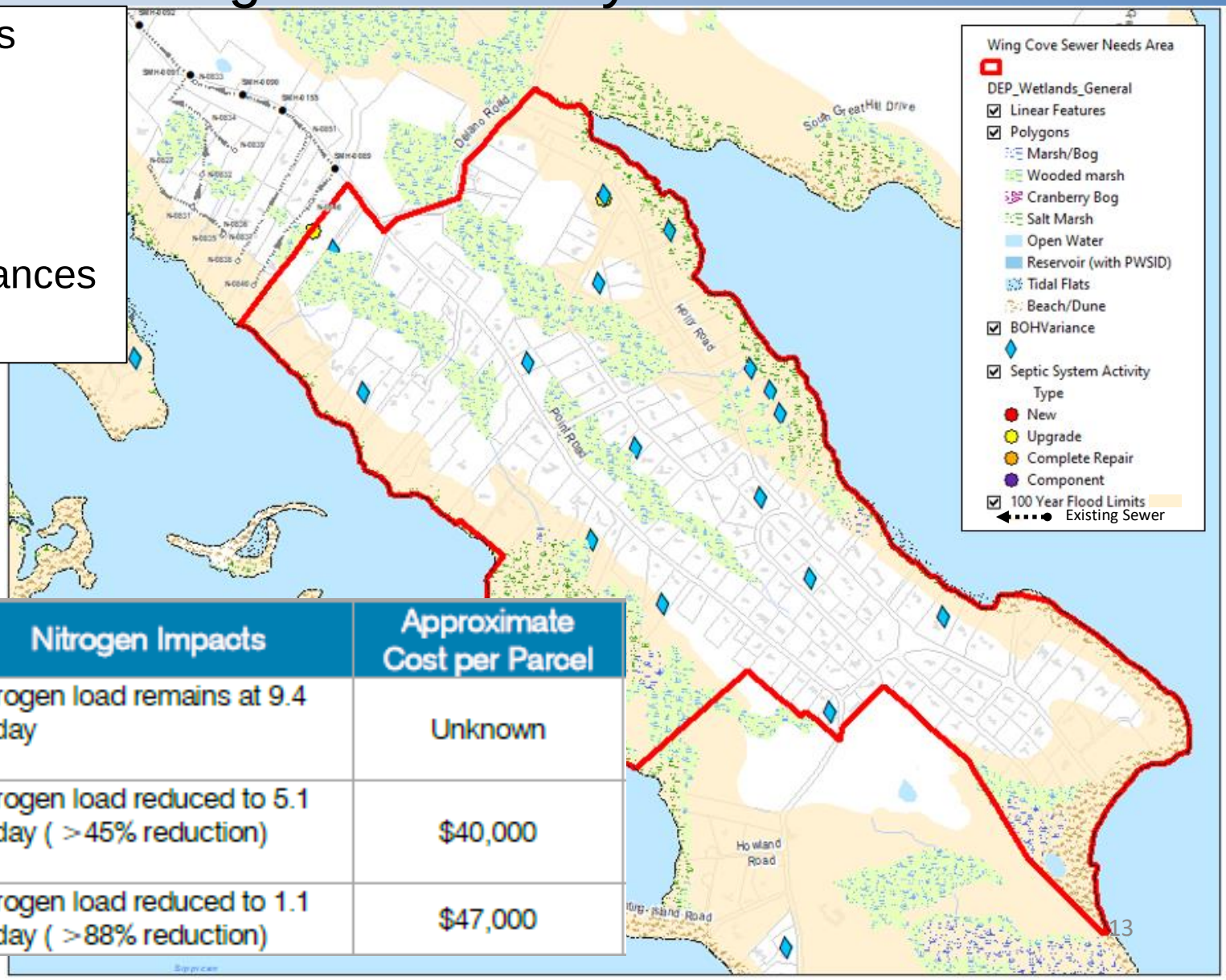
Unsewered Areas

Wings Cove/ Piney Point

Priority Concerns (Med)

- 196 Potential Future Connections
- 16 BOH Variances (9%)



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 9.4 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 5.1 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 1.1 lb/day (>88% reduction)	$47,000

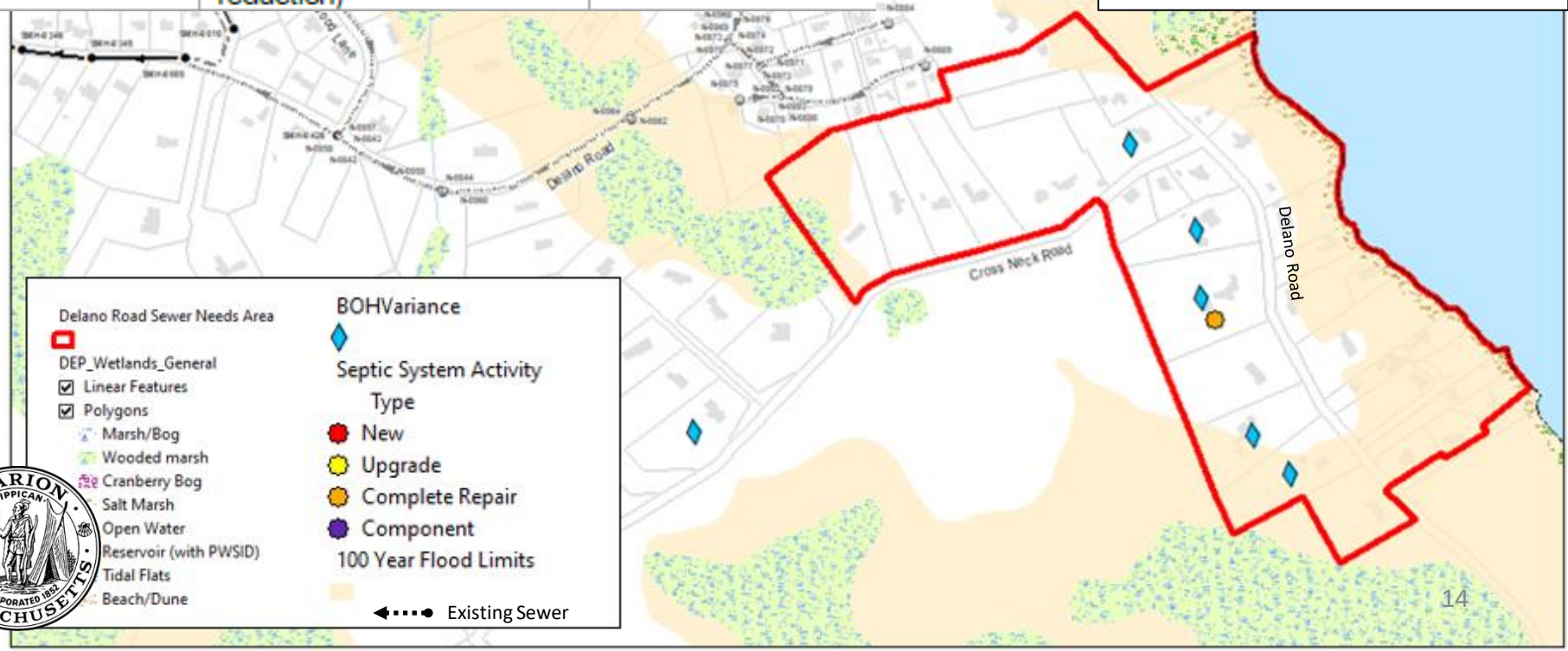
Unsewered Areas

Delano Road/ Weweantic River

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.5lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 0.8 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$36,000

Priority Concerns (Low)

- 33 Potential Future Connections
- 5 BOH Variances (16%)
- Weweantic River N Impairment

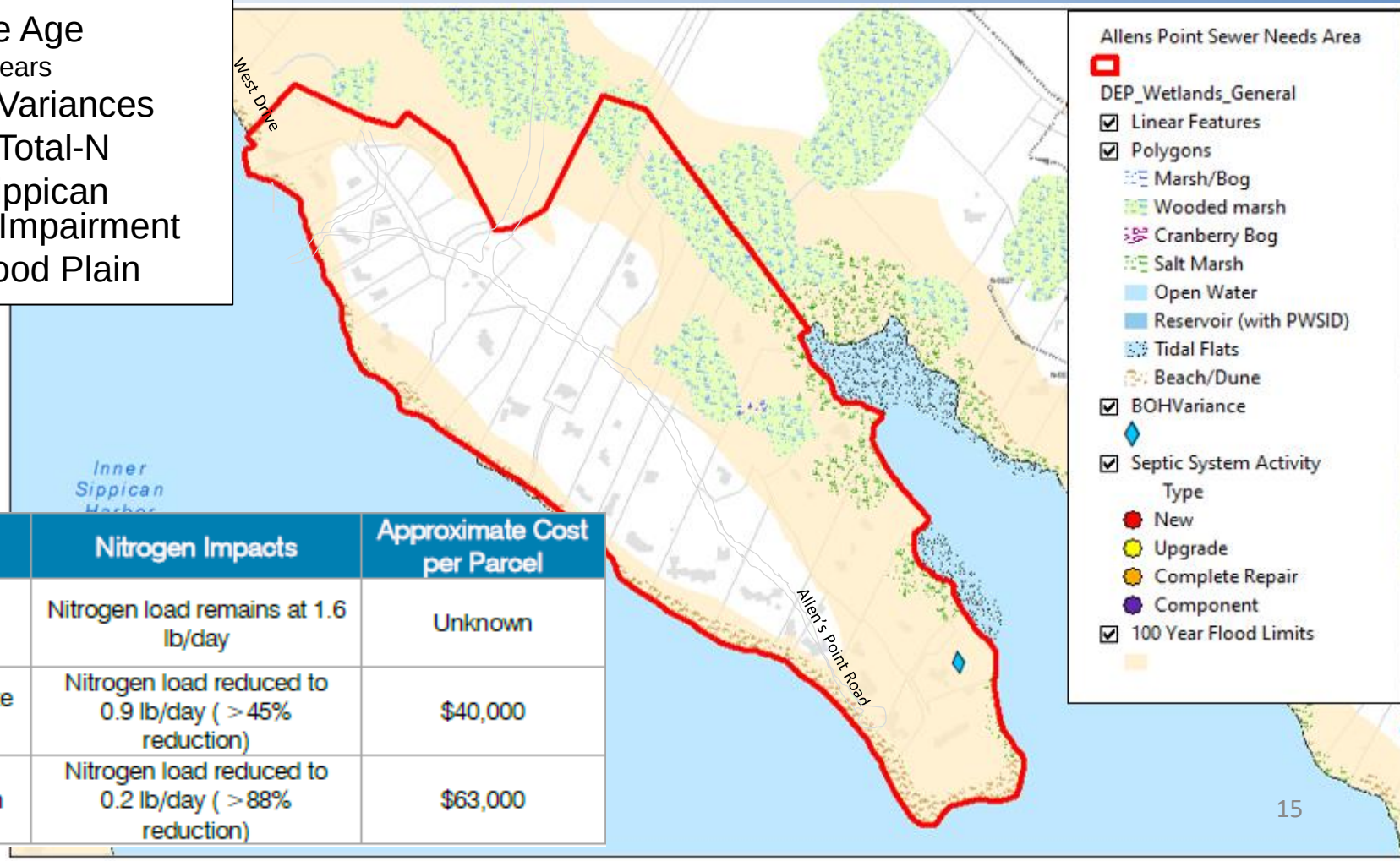


Unsewered Areas

Allens Point/ Harbor East

Priority Concerns (Low)

- 34 Potential Future Connections
- Average Age
  - 86 years
- 1 BOH Variances
- 2.0lb/d Total-N
- Inner Sippican Harbor Impairment
- 57% Flood Plain



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.6 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 0.9 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$63,000

Unsewered Areas

Converse Point

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.1 lb/day	$0
Enhanced On-Site Treatment	Nitrogen load reduced to 0.6 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.1 lb/day (>88% reduction)	$54,000

Priority Concerns (Low)

- 26 Potential Future Connections
- 72% in Flood Plain

Converse Point Sewer Needs Area
DEP_Wetlands_General
Linear Features
Polygons
Marsh/Bog
Wooded marsh
Cranberry Bog
Salt Marsh
Open Water
Reservoir (with PWSID)
Tidal Flats
Beach/Dune
BOHVariance
Septic System Activity
Type
New
Upgrade
Complete Repair
Component
100 Year Flood Limits
Existing Sewer

Marion CWMP

Sewer Extension Alternative Summary

Needs Area	Priority Rank	Total Area Cost	Area Cost per Parcel	Combined Area Cost per Parcel
Planting Island	High	$5.0M	$63,000	Planting Island + Lower Sippican Neck $60,000
Lower Sippican Neck	High	$4.6M	$120,000	Planting Island + Lower Sippican Neck + Wing Cove/Piney Point $44,000
Upper Front Street	High	$2.8M	$29,000	-
Aucoot Creek	High	$4.6M	$104,000	Aucoot Creek + Lower Mill Street $45,000
River Road/ Wareham Street	High	$2.3M	$28,000	-
Lower Mill Street	Medium	$4.4M	$42,000	Aucoot Creek + Lower Mill Street $45,000
County Road	Medium	$1.8M	$34,000	-
Wings Cove/ Piney Point	Medium	$9.2M	$47,000	Planting Island + Lower Sippican Neck + Wing Cove/Piney Point $44,000
Delano Road/ Weweantic River	Low	$1.2M	$36,000	-
Allens Point/ Harbor East	Low	$2.1M	$63,000	-
Converse Point	Low	$1.4M	$54,000	-

Marion CWMP

Future Flow Considerations

Flow Description	Average (MGD)[2]
Existing Flows[1]	0.531
Infill & Growth in Sewered Areas	0.050
Unsewered System Needs Areas (All Areas)	0.132
Planned/Anticipated Development	0.030
Projected Future Flow to WPCF - TOTAL	**0.743**

[1]Existing Flow includes those contributed by Tabor Academy and existing inflow/infiltration.
[2]Average Flow from Jan. 2017 – Dec. 2020

Marion CWMP

Future Flow Considerations

Flow Description	Low Flows (MGD)	Mid-Range Flows (MGD)	High Flows (MGD)
Unsewered System Needs Areas [1]	0.060	0.116	0.132
Infill & Growth in Sewered Areas [2]	0	0.025	0.050
Planned/Anticipated Development [3]	0.014	0.022	0.030
Inflow/ Infiltration (Removal) [4]	-0.070	-0.035	0
Future Flows - TOTAL	**0.004**	**0.128**	**0.212**

[1]Needs area flows include only High Priority areas in the low estimate, High and Medium Priority areas in the middle range estimate, and all areas in the high estimate.
[2]The high estimate includes all projected infill and growth, while the middle estimate includes half this amount, and the low estimate assumes no growth.
[3]The high estimate includes all identified development, while the low estimate assumes only the currently proposed Heron Cove development flows. The middle number assumes the mid-point between these numbers.
[4]These are estimates of inflow/infiltration removal on an average flow basis, and thus are negative numbers. The high flow assumes no net removal, while the low flow assumes a significant net removal, estimated by the current I/I improvements design staff. The middle number assumes the mid-point between these numbers.

Marion CWMP
Future Flows

Flow Description	Future Design (MGD)	Low (MGD)	Mid (MGD)	High (MGD)
Existing Flow Total	0.531	0.531	0.531	0.531
Additional Future Flow Total	0.212	0.004	0.128	0.212
Total Future Flow at WPCF	**0.743[1]**	**0.535**	**0.659[1]**	**0.743[1]**

[1] Would require additional discharge permit capacity.

Low (MGD): High Priority Needs Areas
Mid (MGD): High + Medium Priority Needs Areas
High (MGD): High + Medium + Low Needs Areas (all)

Recommendation for Sewer Extensions

Questions / Discussion

- What areas should the Town pursue with a focus for sewer extension?
- What areas should the Town provide future capacity for, even if they are a lower priority?

Weston & Sampson℠

Thank You

Marion CWMP

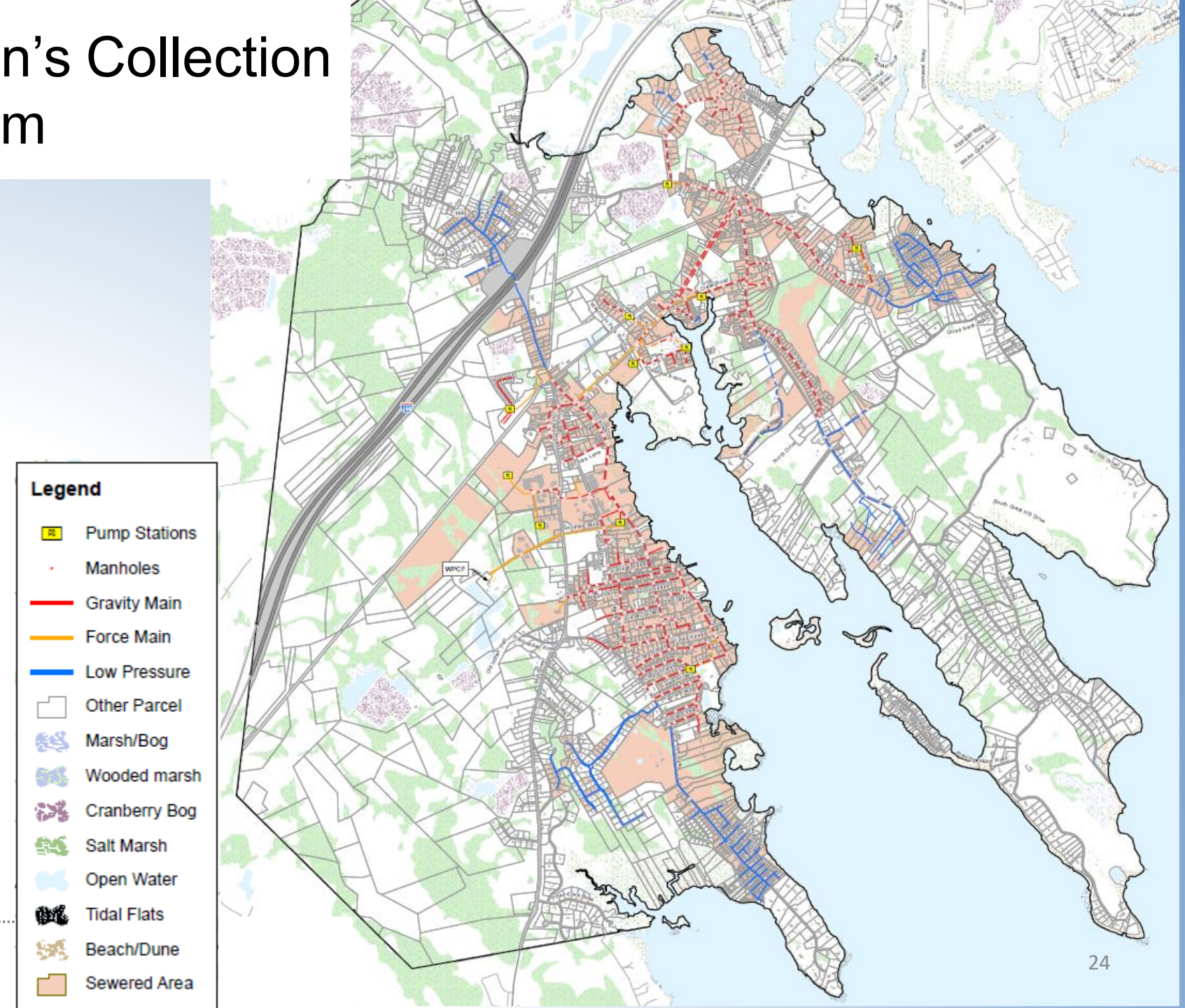
Unsewered Areas Prioritization

Needs Area	Priority Score	Priority Rank
Planting Island	45	High
Lower Sippican Neck	39	High
Upper Front Street	35	High
Aucoot Creek	33	High
River Road/ Wareham Street	28	High
Lower Mill Street	32	Medium
County Road	29	Medium
Wings Cove/ Piney Point	28	Medium
Delano Road/ Weweantic River	26	Low
Allen's Point/ Harbor East	18	Low
Converse Point	17	Low

Priority Criteria:

- Nitrogen Loading & Impairments
- BOH Variances
- Lot Size
- Soil Characteristics
- Flood Plains
- Other

Marion's Collection System



Marion CWMP

Collection System Needs

Ongoing Annual Program to Remove Infiltration & Inflow

– Work prioritized based on known problem areas and physical characteristics
  - Known Problem Areas
  - Sewers within Village Area (Oldest, VC)
  - Areas within 100 Flood Zone
  - Remaining or Recently Repaired

Marion CWMP
Collection System Needs
Ongoing Annual Program to Remove Infiltration & Inflow

Sewershed	Rank	Program Year	Estimated Sewer Length (LF)	Estimated Remaining (LF)	% Sewer in 100-Year Flood Zone
F-1	1	3	5,359	236	91%
F-3	3		9,716	6,545	13%
F-2	2	4	5,922	1,572	96%
F-8	4		3,397	2,524	11%
S-1	6		5,034	4,148	72%
S-2	5	5	8,958	6,639	66%
F-7	7		3,138	2,716	52%
F-5	8	6	8,803	8,445	97%
F-6	11	7	3,028	3,028	27%
C-6	9		7,599	6,566	93%
C-1	10	8	7,509	6,716	61%
C-5	13		3,846	3,846	94%
C-7	12	9	4,850	4,850	100%
C-2	15		6,864	6,864	31%
C-3	14	10	3,775	3,775	90%
C-4	16		7,119	7,119	22%
F-4	17	Complete (1&2)	2,113	0	58%
		Overall	97,030	75,589	63%

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Marion CWMP

Collection System Needs

Ongoing Annual Program to Remove Infiltration & Inflow

Program Year	Program Dates	Problem Area Sewersheds	Work Completed	Estimated I/I Removed
Year 1	June – Nov. 2019	C-1, C-6, F-1, F-3, F-4, F-7, S-1, S-2	Inspected and/or Repaired 7,500 LF of 8-inch Sewer	4,680 GPD
Year 2	May 2020 – Mar. 2021	F-1, F-2, F-3, F-4, F-5, F-8	Inspected and/or Repaired 10,000 LF of 8 to 15-inch Sewer	8,200 GPD
			Total Removed	12,880 GPD

Marion CWMP

Existing Collection System

- Private Sewers
  - Policy
  - O&M
- Grinder Pumps
  - Policy
  - O&M

Private System	Sewershed	Tributary Pump Station
Rezendes Terrace	C-3	Creek Road PS
Rebecca Drive	C-4	Creek Road PS
Barros Drive	C-6	Creek Road PS
Whynot Court	C-6	Creek Road PS
Jerei Lane	C-7	Creek Road PS
Hammets Cove Road @ Point Road	LP-3	Creek Road PS
Cross Neck Road @ Point Road	LP-4	Creek Road PS
Point Road	LP-4	Creek Road PS
Pawkechatt Way	F-1	Front Street PS
Cottage Lane	F-4	Front Street PS
Tabor Academy (multiple discharge locations)	F-6	Front Street PS
Industrial Park/ Lockheed Martin	F-6	Front Street PS
Intersection of Front Street and Route 6	F-5 ? F-8?	Front Street PS
Marion Villages Estates	LP-1	Front Street PS
Old Knoll Road	LP-5	Front Street PS
Bell Guzzle Lane	S-2	Front Street PS

Marion CWMP
Pump Stations

Front Street Pump Station

Creek Road Pump Station

Silvershell Pump Station

Point Road Pump Station

Littleneck Pump Station

Oakdale Pump Station Wet Well

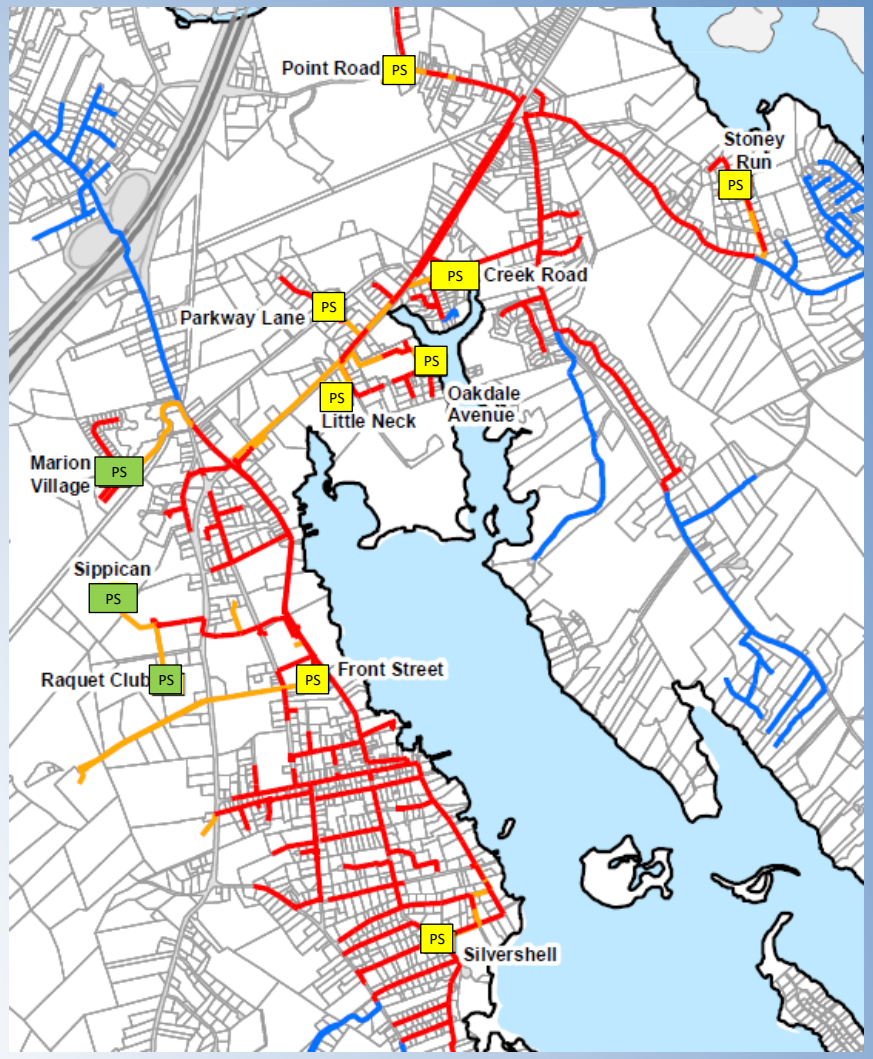
Stoney Run Pump Station Hatches

Parkway Lane Pump Station Wetwell

Marion CWMP

Pump Stations

Pump Station	Approx. Age (years)	Approx. No. Properties Served
Front Street	50 *2005 Update	1,700
Creek Road	50	500
Silvershell	60	500
Oakdale Avenue	30	70
Littleneck	10	10
Parkway Lane	35	15
Point Road	50	70
Stoney Run	25	30



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Pump Station Alternatives

Preliminary Screening

Pump Station	No Action	Minor Renovation	Major Renovation	Complete Replacement	Eliminate/ Abandon
Front Street			✓	✓	
Creek Road			✓	✓	
Silvershell			✓	✓	
Oakdale Avenue			✓	✓	
Littleneck	✓	✓			
Parkway Lane			✓	✓	✓
Point Road		✓	✓		
Stoney Run	✓	✓			

Marion WPCF Needs

- Nature of WPCF Needs
  - Modernization Needs (Condition, Technology, etc.)
  - Capacity Needs
  - Regulatory and Permit Needs
  - Sustainability (Resiliency/Efficiency/Safety) Needs
- WPCF Needs Categories
  - 'Big Picture' Needs
  - Specific Needs
    (Process, System or Structure)

Marion WPCF 'Big Picture' Needs

- WPCF Treatment Capacity

General Need	General Alternatives for Screening
WPCF Capacity How much wastewater can the WPCF treat and discharge. Current permit limits discharge to 588,000 gpd.	Water Conservation
	Infiltration/Inflow Removal
	WPCF Process Rerating
	WPCF Process Improvements
	Permit Modification
	Effluent Reuse
	Groundwater Discharge
	Outfall Relocation
	Regionalization

Marion WPCF 'Big Picture' Needs

- Nitrogen Treatment and Discharge Limit

General Need	General Alternatives for Screening
Nitrogen Facility is designed to remove nitrogen in the effluent. Current permit includes limit of 4.0 mg/l total nitrogen.	WPCF Process Improvements
	Permit Modification
	Effluent Reuse
	Groundwater Discharge
	Outfall Relocation
	Regionalization
	Non-Point Source Mitigation

Marion CWMP

Marion WPCF 'Big Picture' Needs

- Phosphorus Treatment and Discharge Limit

General Need	General Alternatives for Screening
Phosphorus Facility is not presently designed to remove phosphorus in the effluent. Current permit limit of 200 ug/l total phosphorus is currently deferred by AO.	WPCF Process Improvements
	Permit Modification
	Effluent Reuse
	Groundwater Discharge
	Outfall Relocation
	Regionalization
	Non-Point Source Mitigation

Marion WPCF 'Big Picture' Needs

- Copper Treatment and Discharge Limit

General Need	General Alternatives for Screening
Copper Facility is not presently designed to remove copper in the effluent. Current permit limit of 7.7 ug/l total copper is currently deferred by AO.	WPCF Process Improvements
	Permit Modification
	Groundwater Discharge
	Outfall Relocation
	Regionalization
	Source Control

Marion CWMP

Marion WPCF 'Big Picture' Needs

- Waste Solids (a.k.a. 'Sludge') Disposal

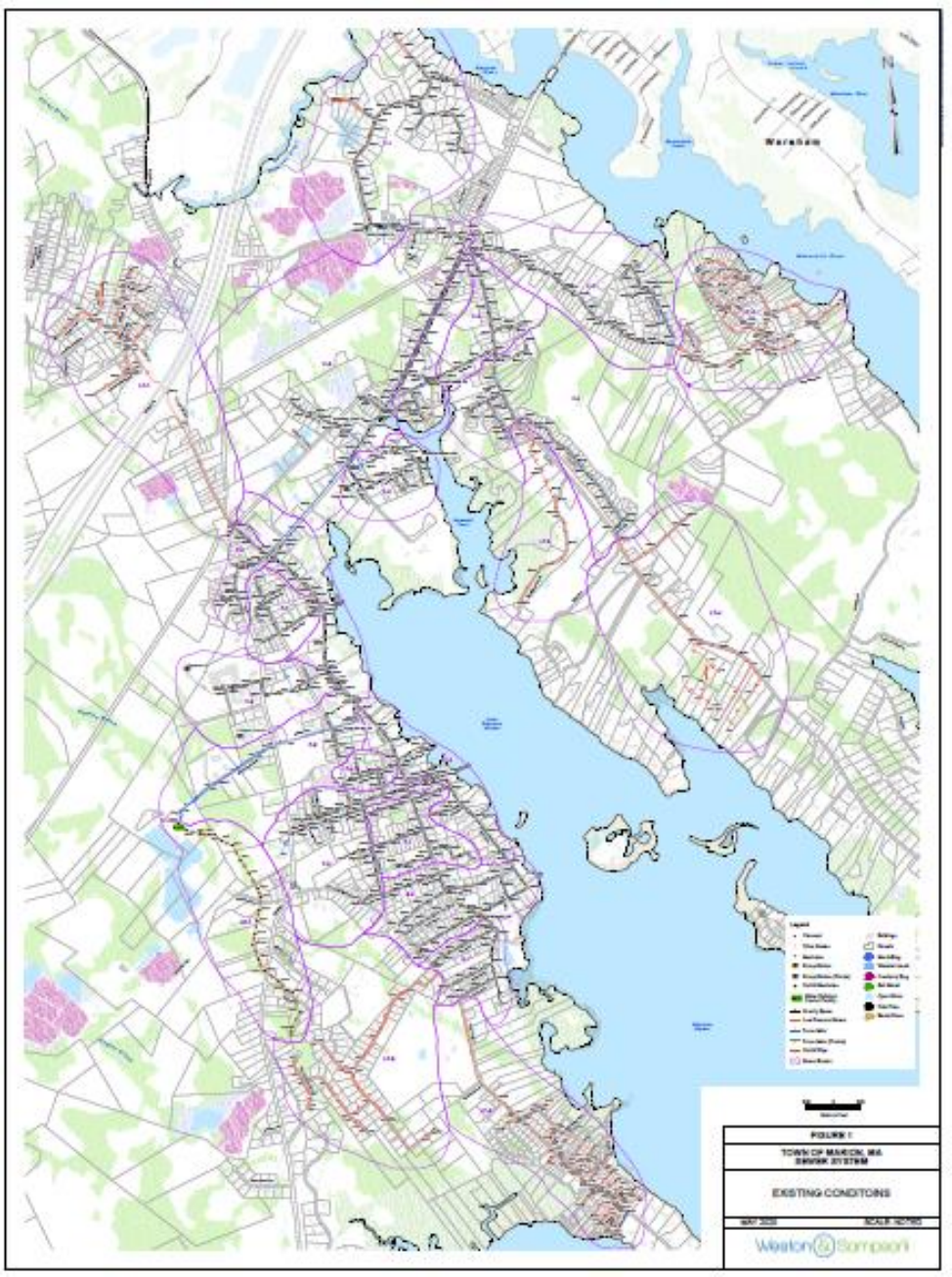
General Need	General Alternatives for Screening
Solids Disposal Waste solids historically disposed to on-site lagoons.	WPCF Process Improvements
	Regionalization
	Continue Disposal to Lagoon
	Thicken Solids & Haul Away
	Dewater Solids & Haul Away

Marion CWMP

Marion WPCF Specific Needs

General Need	Process Areas with Specific Needs
WPCF Needs for Process, System and Structures Specific needs exist throughout the WPCF. Many of these systems would require action to address 'big picture' needs (e.g. capacity).	Headworks
	SBR / Biological Treatment
	Chemical Feed & Ancillary Systems
	Effluent Filtration
	UV Disinfection
	Lagoon Systems
	Discharge Outfall
	Operations Buildings and Site
	Electrical & Control Systems

Marion Wastewater Systems



Marion CWMP

Wastewater Capacity Alternatives

- Existing WPCF & Surface Discharge
- Existing WPCF & Groundwater Discharge
- Wastewater Reuse Options
- Partnering Opportunities for Capacity
  - Private Developments
- Infiltration/Inflow Reduction
- Water Conservation

Unsewered Areas

Needs Area	Total # Parcels with Possible On-Site Systems	# Parcels with Existing Buildings	# Developable Vacant Parcel Lots	Review Criteria												Priority
				Estimated Total Nitrogen Loading (lb/day)		Proximate Nitrogen Impairment	Average Age of System (years)	# BOH Variances (% of Systems)	Upgrade or New Systems; Past 20 years	Land Use & Zoning	Avg Lot Size (acres)	Soil Characteristics		Flood Plain Protections 100-year floodplain	Other	
				BEST CASE	WORST CASE							Excessive Draining	Poor/Very Poor Draining			
River Road / Wareham Street	91	72	19	4.2	6.3	Weweantic River	42	2 (3%)	2	Majority Residence A and C	0.55	17%	13%	33%	-	High
Lower Sippican Neck	37	34	3	1.7	2.7	None	68	7 (21%)	1	All Residence D	1.5	0%	39%	83%		High
Planting Island	76	68	8	3.5	5.5	None	60	12 (18%)	3	All Residence D	0.3	81%	4%	71%		High
Aucoot Creek	50	45	5	2.3	3.6	Aucoot Creek	36	4 (9%)	2	Majority Residence C	1.4	0%	31%	59%		High
Upper Front Street	96	91	5	4.5	7.2	None	43	10 (11%)	2	Residence B, C, D	1.2	4%	24%	47%	Well Protection Zone	High
Lower Mill Street	112	100	12	5.2	8.1	None	54	13 (13%)	2	All Residential Districts	1.3	0%	30%	14%		Medium
Wing Cove / Piney Point	187	158	29	8.5	13.2	None	59	16 (10%)	2	Majority Residence C	1.8	0%	13%	42%		Medium
County Road	41	27	14	1.8	2.6	None	61	2 (7%)	0	Residence B and C	1	17%	36%	45%		Medium
Delano Road / Weweantic River	33	30	3	1.5	2.4	Weweantic River	48	5 (17%)	1	Majority Residence D	1.2	0%	5%	41%		Low
Converse Point	26	22	4	1.2	1.8	None	55	2 (9%)	2	All Residence D	2.6	0%	6%	72%		Low
Allen's Point/ Habor East	35	28	7	1.6	2.4	Inner Sippican Harbor	86	1 (3%)	0	All Residence D	2.4	14%	11%	57%		Low

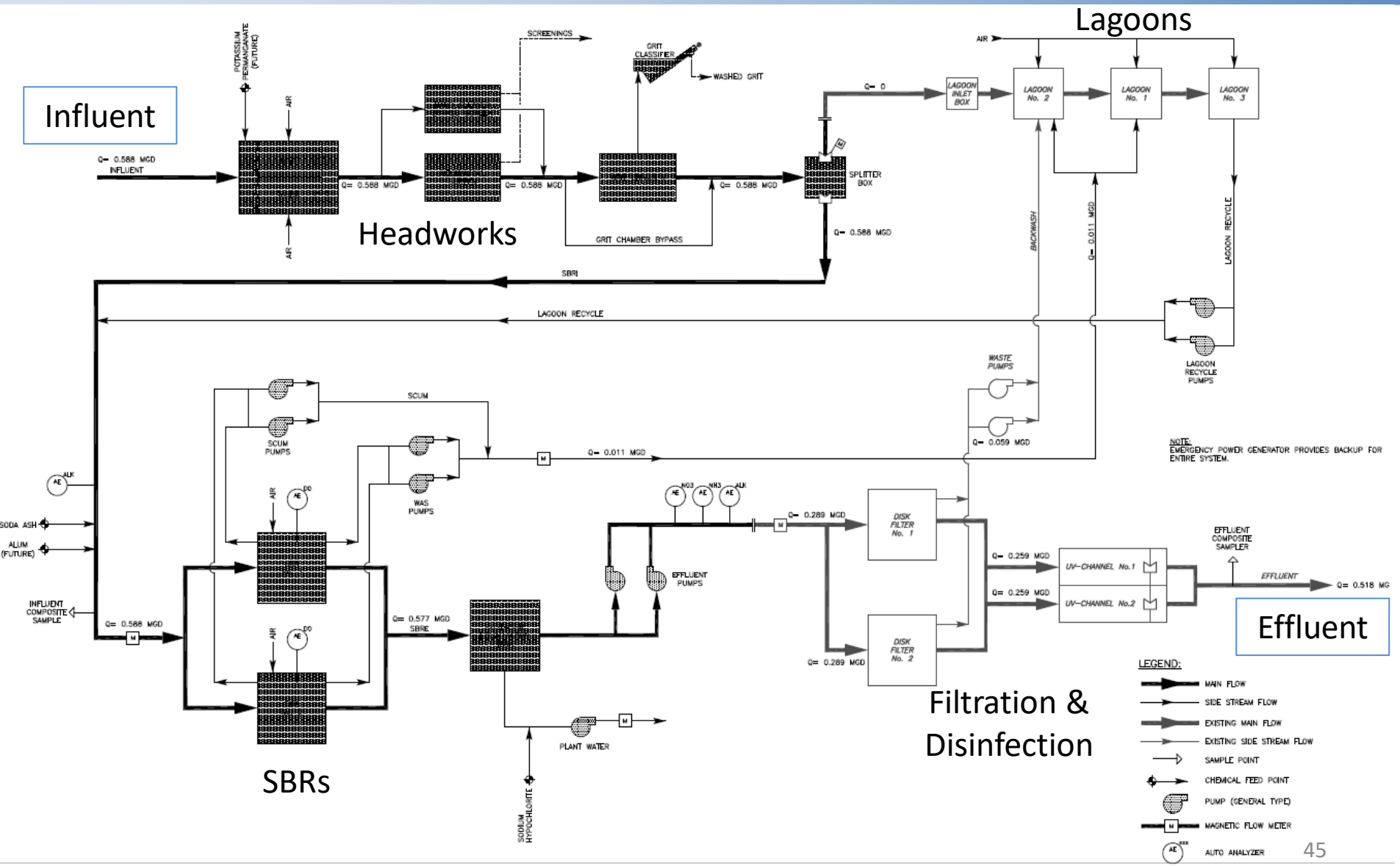
Marion's WPCF

- WPCF located on Benson Brook Road
- NPDES Permitted Discharge
  - 0.588 MGD Avg. Daily Flow
  - Peak Capacity of 1.1 MGD
  - Lagoon System Handles Wet Weather Flow

Marion CWMP
Marion's WPCF

Marion CWMP
Marion's WPCF

Marion CWMP
Marion's WPCF



Marion CWMP
Marion's WPCF

Influent Rotary Fine Screen with Screw Conveyor

Sequencing Batch Reactor (SBR)

Headworks Building

Aeration Blowers

Marion CWMP
Marion's WPCF

Disk Filter Building

Disk Filters (Cloth Media Disks)

UV Disinfection Building

UV Disinfection

Marion CWMP
Marion's WPCF

Soda Ash Storage Silo

Plant Water System

Lagoon No. 1

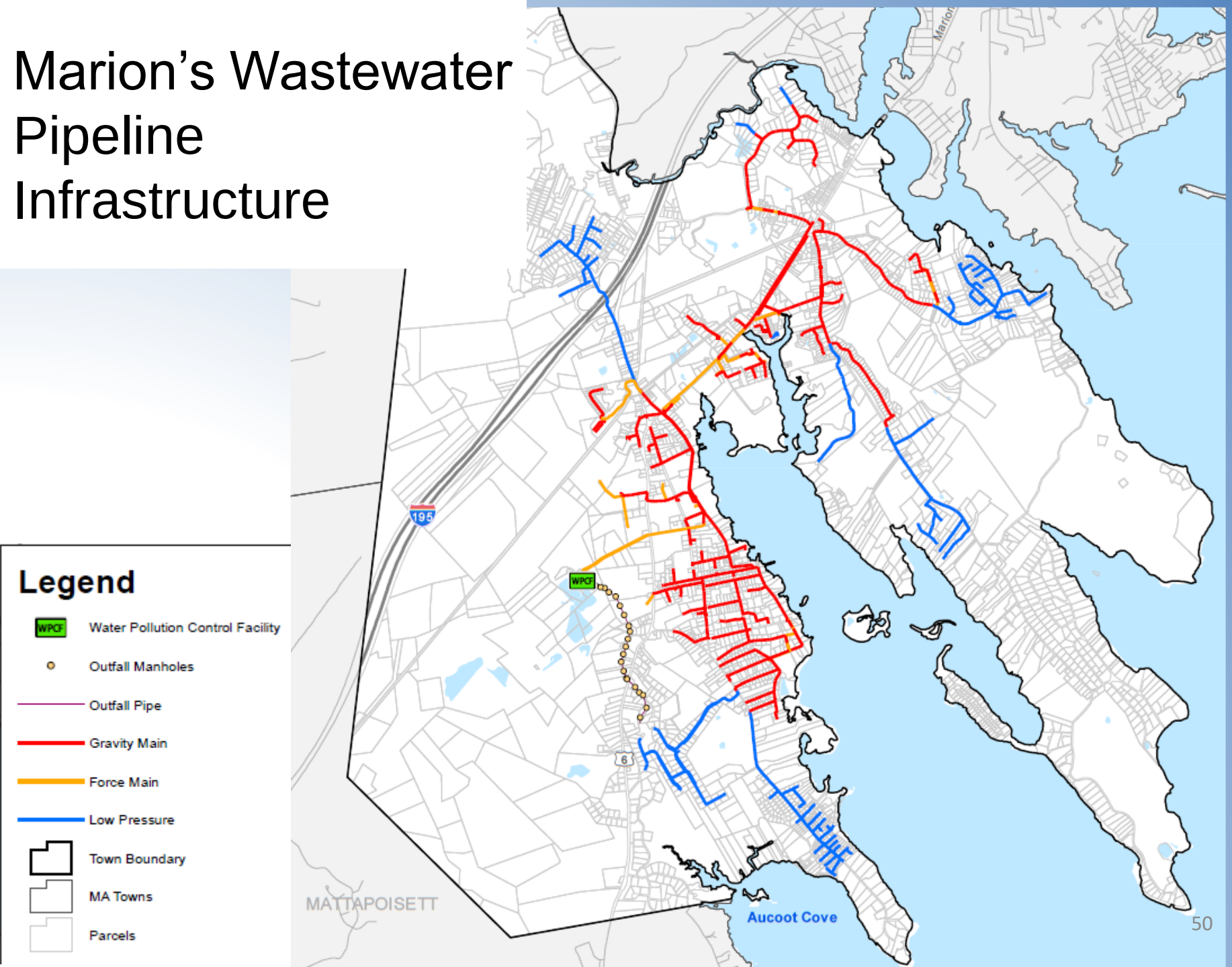
Marion CWMP

Marion's WPCF

Permitting & Regulatory Issues

- NPDES Permitted Discharge
  - Capacity
  - Nitrogen
  - Phosphorus
  - Metals
  - Lagoons
- Consent Orders

Marion's Wastewater Pipeline Infrastructure



Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Select Board Meeting

January 13, 2022

Weston & Sampson

Marion CWMP
Agenda

Alternatives

- Private Sewer Lines
- Individual Grinder Pumps

Next Steps

Marion CWMP

Private Sewer Lines

- Private Sewers
  - Policy
  - O&M
  - Existing Private Lines
  - New Private Lines

Private System	Sewershed	Tributary Pump Station
Rezendes Terrace	C-3	Creek Road PS
Rebecca Drive	C-4	Creek Road PS
Barros Drive	C-6	Creek Road PS
Whynot Court	C-6	Creek Road PS
Jerei Lane	C-7	Creek Road PS
Hammets Cove Road @ Point Road	LP-3	Creek Road PS
Cross Neck Road @ Point Road	LP-4	Creek Road PS
Point Road (TJ Walker)	LP-4	Creek Road PS
Pawkechatt Way	F-1	Front Street PS
Cottage Lane	F-4	Front Street PS
Tabor Academy (multiple discharge locations)	F-6	Front Street PS
Industrial Park/ Lockheed Martin	F-6	Front Street PS
Intersection of Front Street and Route 6	F-5 ? F-8?	Front Street PS
Marion Villages Estates	LP-1	Front Street PS
Old Knoll Road	LP-5	Front Street PS
Bell Guzzle Lane	S-2	Front Street PS

Marion CWMP

Private Sewer Lines

Description of Issue	Alternatives to Address	
Private Sewers in Marion The large number of private sewer lines in Town creates challenges with system maintenance responsibility, responsiveness, public/user perception, and user connection fees.	A	No Change – Private Sewers Remain as an Acceptable Option for New Extensions in Marion
	B	Increase Regulation – Town Adopts Regulations that are More Prescriptive on How Private Sewers are Constructed and Maintained
	C	Disallow Future Private Lines – Town Adopts Policy that Future Sewers in Town may not be Privately Owned, but No Change to Existing Private Sewers
	D	Disallow Future & Increase Regulation for Existing – Adopt Policy on No Future Private Sewers & Adopt Regulations that are More Prescriptive on How Existing Private Sewers are Maintained
	E	Disallow Future & Phase Out Private Lines – Adopt Policy on No Future Private Sewers & Begin Process of Town Taking All Private Lines

Marion CWMP

Individual Grinder Pumps (GP)

Town-Maintained GPs

- Approx. 470 existing GPs
- Total Town Cost to Maintain
  - $68,300 (actual expended) in FY2021
  - $72,000 (budgeted) in FY2022
  - Budget line item for GP maintenance expected to increase significantly for FY2023
- Individual Cost to Maintain
  - $1,086 per service call 2019-2020
  - $1,238 per service call 2020-2021
  - $1,442 per service call in 2021 (including minor service calls)

Marion CWMP

Individual Grinder Pumps (GP)

Privately Owned and Maintained GPs

- Approx. 70 existing GPs
- Approx. 90 lots with potential to connect to existing private sewer requiring GPs
- Up to 90 lots with potential to connect to municipal sewer requiring GPs

Marion CWMP

Individual Grinder Pumps

Description of Issue		Alternatives to Address
Individual Grinder Pump (GP) Ownership & Maintenance Some pumps are maintained by the Town, while others are privately owned and maintained.	A	No Change – Town Continues to Maintain GPs
	B	Maintain with Fee – Town Continues to Maintain GPs, but Adds a Fee for Units Maintained
	C	Stop Maintaining (Immediate) – Town Immediately Ceases Maintenance & Directs Responsibility to Property Owners
	D	Stop Maintaining (Phased) - Town Ceases Maintenance on a Rolling Basis & Directs Responsibility to Property Owners
	E	Stop Maintaining (Future Date) – Town Elects a Future Date to Transition Maintenance to Property Owners
	F	Comprehensive Maintenance – Town Maintains all GPs within the System, with a Fee System

Marion CWMP

Next Steps

- WPCF Capacity and Treatment Alternatives

Weston & Sampson℠

Thank You

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Select Board Meeting

April 11, 2022

Weston & Sampson

Marion CWMP

Presentation Agenda

- Summary of Treatment Alternatives
- Discussion of Individual Alternatives
  - WPCF Process Improvements
  - Groundwater Discharge of WPCF Effluent
  - WPCF Outfall Extension
  - Regionalization
- Present Worth Comparison
- Questions & Discussion of Next Steps

Marion CWMP

Summary of Treatment Alternatives

Key Issues for Treatment -

- Capacity (Planned Future ADF ~686,000 gpd)
- Nitrogen
- Phosphorus
- Copper
- Solids Handling

Treatment Alternatives Identified as Feasible -

A. Process Improvements to the Marion WPCF
B. Groundwater Discharge of WPCF Effluent
C. WPCF Outfall Relocation
D. Regionalization with Wareham WPCF

Marion CWMP

Considerations in Comparing Alternatives

What is included in alternatives for comparison –

- Goal is 'Apples to Apples' Comparison
- Costs related to needed work independent of the WPCF are <u>not</u> included (e.g., collection system repairs, pump station improvements, sewer extension projects).
- Work to address ancillary needs at the WPCF are included (e.g., building repairs), where these costs are applicable to the alternative.
- Solids (sludge) handling is included in Marion WPCF alternatives.

Basis for Financial Comparisons -

Cost information for alternatives is in addition to current/incurred costs (i.e., these costs add to current debt and operating costs).

Marion CWMP

Planning for Future Flows

Treatment Alternatives Consider Future Flows

Planning to date has identified future Marion wastewater flows to be treated, summarized here.

Flow Description	Average Daily Flow
Existing Flows	515,000 gpd
Infill & Growth in Sewer Area	50,000 gpd
Unsewered Needs Areas (Recommended)	91,000 gpd
Planned/Anticipated Development	30,000 gpd
Total Future ADF	**686,000 gpd**

Marion CWMP

Alt A – Process Improvements to the WPCF

Two Levels of Alternative -

A1 – Process Improvements / Optimization

Improve and optimize existing SBR system, add P removal, copper source control.

A2 – Process Improvements / 3rd SBR

Add 3rd SBR and ancillary work, add P removal, copper source control.

Alternative	Capital Costs
A1 – Process Improvements / Optimization	Discrete Alternative ~$2.5 million
	Total ~$10.8 million with Ancillary Costs
A2 – Process Improvements / 3rd SBR	Discrete Alternative ~$4.5 million
	Total ~$12.8 million with Ancillary Costs

Both options considered feasible and implementable.

Marion CWMP
Alt B – Groundwater Discharge at WPCF

Two Levels of Alternative -

B1 – Supplemental (Partial) Groundwater Discharge

New GWD system on WPCF site to discharge (~100,000 gpd) effluent. Includes process improvements similar to Alternative A2 (3rd SBR and related work).

B2 – Groundwater Discharge of All Effluent

New GWD system on WPCF site to discharge all WPCF effluent. Includes improvements related to 3rd SBR, but not P removal.

Alternative	Capital Costs
B1 – Supplemental Groundwater Discharge	Discrete Alternative ~$7.3 million
	Total ~$15.6 million with Ancillary Costs
B2 – Groundwater Discharge of All Effluent	Discrete Alternative ~$9.2 million
	Total ~$17.3 million with Ancillary Costs

Alt B2 is <u>not</u> considered feasible and implementable.

Marion CWMP
Alt C – WPCF Outfall Extension

Two Levels of Alternative -

C1 – Outfall Extension to Salt Marsh

Extension of WPCF outfall to edge of salt marsh (adding ~5,200 ft). Includes improvements related to 3rd SBR, but not P removal.

C2 – Outfall Extension to Outer Cove

Extension of WPCF outfall to outer cove (adding ~17,800 ft). Includes improvements related to 3rd SBR, but not P removal.

Alternative	Capital Costs
C1 – Outfall Extension to Salt Marsh	Discrete Alternative ~$7.3 million
	Total ~$15.6 million with Ancillary Costs
C2 – Outfall Extension to Outer Cove	Discrete Alternative ~$48 million
	Total ~$56 million with Ancillary Costs

Alt C2 is <u>not</u> considered feasible and implementable.

Marion CWMP
Alt D – Regionalization

Single Level Alternative -

Includes all work to implement alternative for treatment:

- Modification and selective decommissioning of Marion WPCF process areas.
- New wastewater transmission system to send flows to Wareham WPCF.
- Improvements to Wareham WPCF for regional treatment (Marion share).
- New Wareham WPCF outfall extension to Cape Cod Canal and discharge permit (Marion share).

Costs are from available reports related to regionalization plan, with CWMP budget for WPCF modification and decommissioning. Assumes Marion WPCF lagoon system will remain in service to limit peak diurnal flows to Wareham collection system.

Alternative	Capital Costs
D – Regionalization with Wareham WPCF	Discrete Alternative ~$71 million
	Total ~$76 million with Ancillary Costs

Alt D is <u>tentatively</u> considered feasible and implementable.

Marion CWMP

Present Worth Comparison of Feasible Alternatives

Present Worth calculation uses 20-year present value and a 5% annual rate of return, to compare as 2022 costs.

Alternative	Capital Cost	Annual Cost	Present Worth
A1 – Process Improvements - Optimization	$10.8 million	$220,000	$13.5 million
A2 – Process Improvements – 3rd SBR	$12.8 million	$220,000	$15.5 million
B1 – Supplemental Groundwater Discharge	$15.6 million	$260,000	$18.8 million
C1 – Outfall Relocation to Salt Marsh	$15.6 million	$140,000	$17.3 million
D - Regionalization	$76 million	$1.48 million	$94 million

Questions / Discussion

- Questions on Alternatives Comparison
- Next Steps
  - Further Discussion of Alternatives
  - Selecting a Recommended Plan
  - Implementation Considerations
  - Application for Marion WPCF NPDES Permit Renewal
  - Public Meeting on CWMP

Weston & Sampson℠

Thank You

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Informational Public Meeting

May 23, 2022

Weston & Sampson

Marion CWMP

Agenda

- Introductions
- CWMP Goals & Drivers
- CWMP Process & Structure
- Marion's Wastewater System
- Wastewater Needs
- Wastewater Alternatives
- Developing the Recommended Plan
- Questions & Comments

Marion CWMP
Introductions

- Town Manager
  - James McGrail
- Select Board
  - Carlton Burr Jr., Norman Hills, Randy Parker,
  - John Waterman (Former Selectman)
- WPCF Staff
  - Nathaniel Munafo, Frank Cooper, Rebecca Tilden, Meghan Davis
- CAC (Citizen's Advisory Committee)
  - Don Anderson, Margherita Baldwin, Dot Brown, Ray Cullum, Sherman Briggs
- Weston & Sampson
  - Kent Nichols, Laurie Toscano, Gina Cortese

Marion CWMP

Town of Marion's Goals

CWMP = Roadmap for Wastewater Management

- Driven by:
  - Environmental Resource Protection
  - Aging Infrastructure & Modernization
  - System Resiliency
  - Regulatory Requirements
  - System Expansion
  - Possible Regionalization
  - Public Input

Marion CWMP

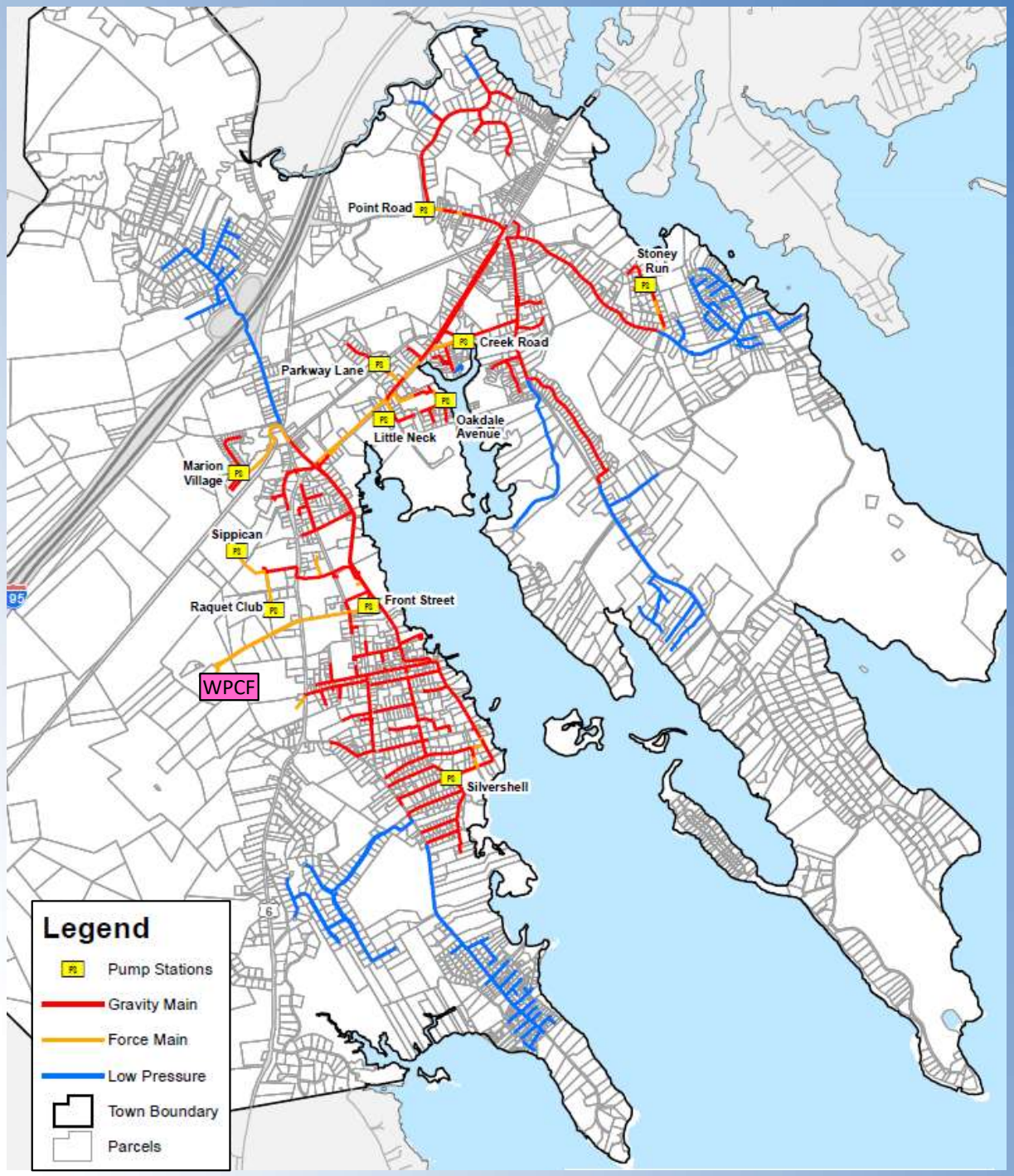
CWMP Basics

- Update 2001 CWMP
  - Reevaluate Needs Areas from 2001 Sewer Needs Analysis
- Address Capacity Needs to Support Planning and Economic Development
- Incorporate Existing Sewer System & PS Rehab. Needs
- Evaluate WPCF & Lagoons Supplemental Future Needs
- Review & Incorporate the Regional Alternative

Marion CWMP

Marion Wastewater Systems

- On-site Septic Systems
- ~32 mi of Sewer
- 8 Town-Owned Pump Stations
- ~1680 Connections
- 0.588 MGD WPCF



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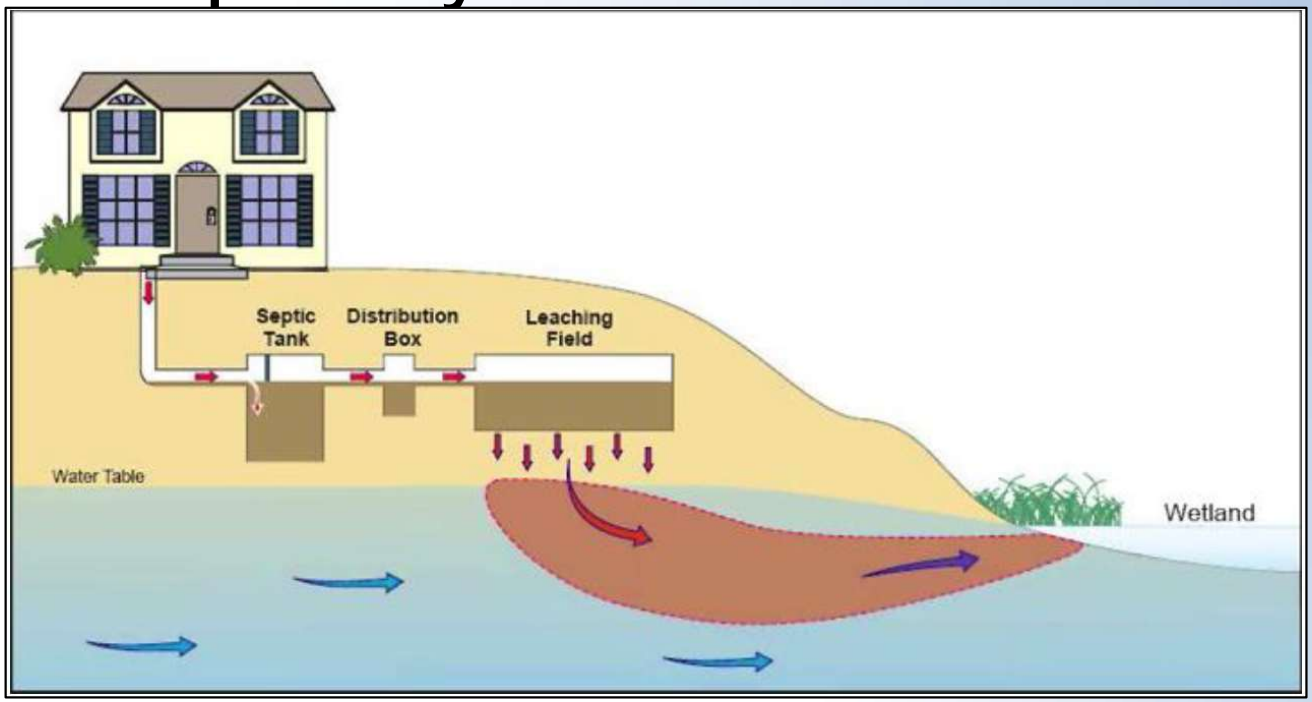
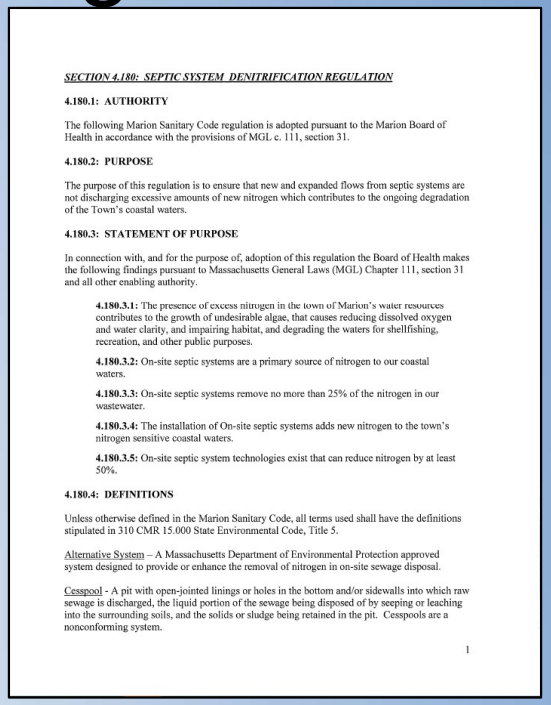
Marion CWMP
Unsewered Areas

On-Site Systems

- ~900 on-site septic systems (~1/3 developed properties)
- Septic System Denitrification Regulations





SECTION 4.180: SEPTIC SYSTEM DENITRIFICATION REGULATION

4.180.1: AUTHORITY

The following Marion Sanitary Code regulation is adopted pursuant to the Marion Board of Health in accordance with the provisions of MGL c. 111, section 31.

4.180.2: PURPOSE

The purpose of this regulation is to ensure that new and expanded flows from septic systems are not discharging excessive amounts of new nitrogen which contributes to the ongoing degradation of the Town's coastal waters.

4.180.3: STATEMENT OF PURPOSE

In connection with, and for the purpose of, adoption of this regulation the Board of Health makes the following findings pursuant to Massachusetts General Laws (MGL) Chapter 111, section 31 and all other enabling authority.

4.180.3.1: The presence of excess nitrogen in the town of Marion's water resources contributes to the growth of undesirable algae, that causes reducing dissolved oxygen and water clarity, and impairing habitat, and degrading the waters for shellfishing, recreation, and other public purposes.

4.180.3.2: On-site septic systems are a primary source of nitrogen to our coastal waters.

4.180.3.3: On-site septic systems remove no more than 25% of the nitrogen in our wastewater.

4.180.3.4: The installation of On-site septic systems adds new nitrogen to the town's nitrogen sensitive coastal waters.

4.180.3.5: On-site septic system technologies exist that can reduce nitrogen by at least 50%.

4.180.4: DEFINITIONS

Unless otherwise defined in the Marion Sanitary Code, all terms used shall have the definitions stipulated in 310 CMR 15.000 State Environmental Code, Title 5.

Alternative System – A Massachusetts Department of Environmental Protection approved system designed to provide or enhance the removal of nitrogen in on-site sewage disposal.

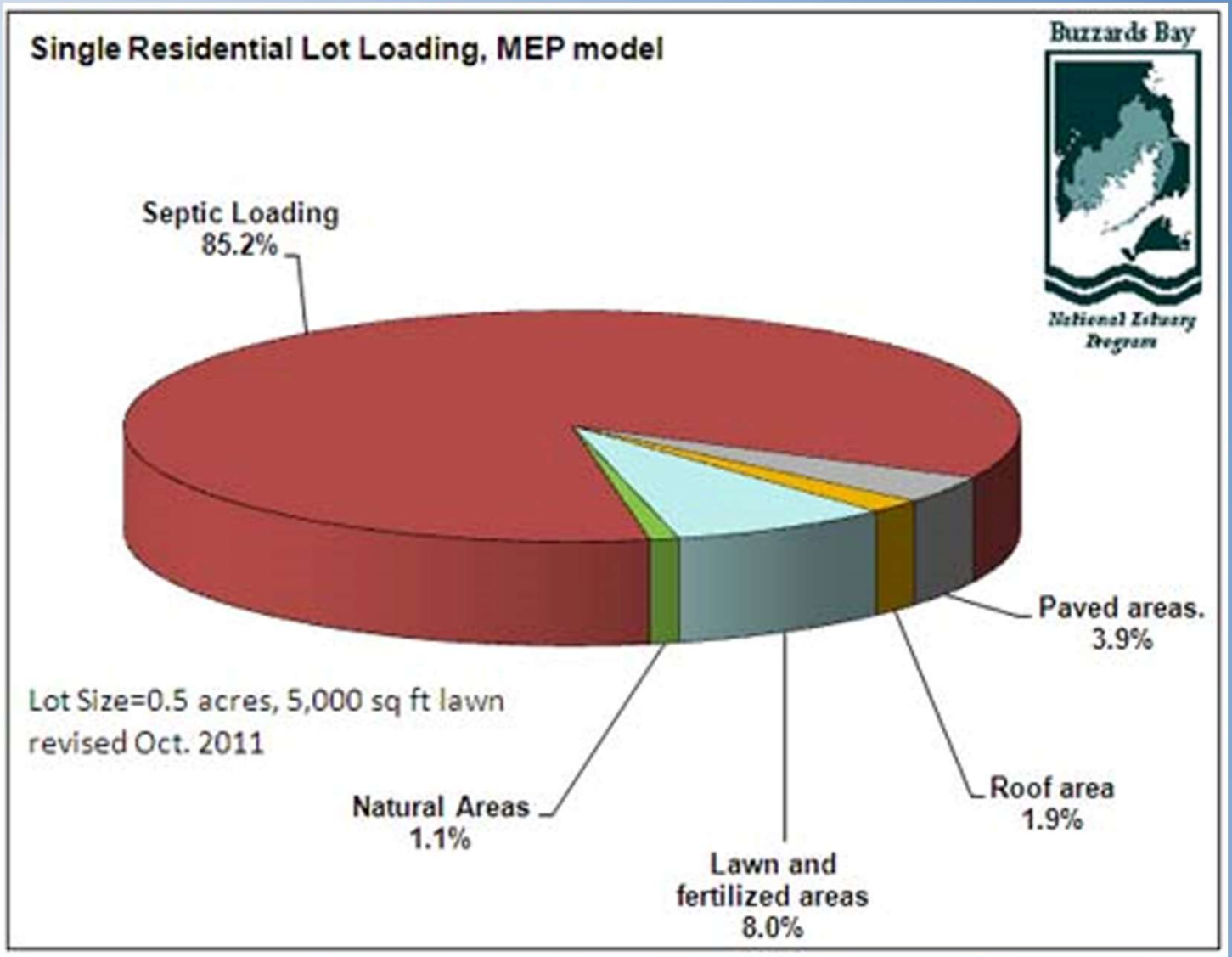
Cesspool - A pit with open-jointed linings or holes in the bottom and/or sidewalls into which raw sewage is discharged, the liquid portion of the sewage being disposed of by seeping or leaching into the surrounding soils, and the solids or sludge being retained in the pit. Cesspools are a nonconforming system.

1

Marion CWMP

Unsewered Areas

On-Site Systems – Sources of Nitrogen from Individual Homes



Source: Buzzards Bay National Estuary Program

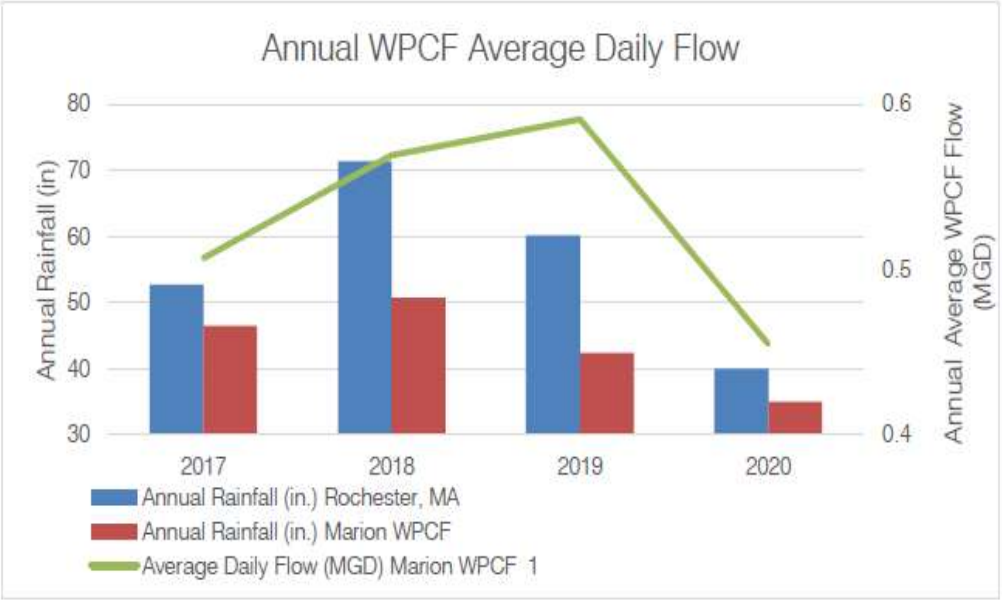
Marion CWMP
Marion's Existing Collection System

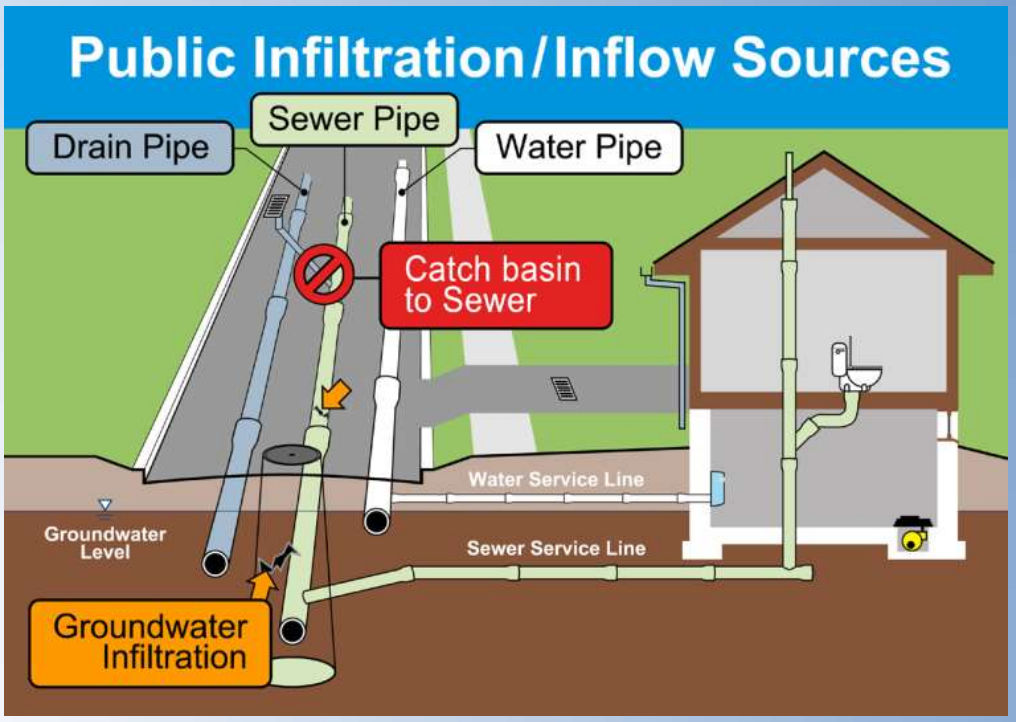
Pipeline Infrastructure

– Inflow & Infiltration

Broken Pipe

Infiltration





Marion CWMP

Existing Collection System Program

Ongoing Annual Program to Remove Infiltration & Inflow

- Goal is restoration of capacity in collection system and WPCF through repair and rehabilitation
- Continuing work in Year 3 of 10-year program for I/I mitigation
- ~$200,000 spent on I/I Program in 2021
- Work prioritized based on known problem areas and physical characteristics

Marion CWMP
Pump Stations

Front Street Pump Station

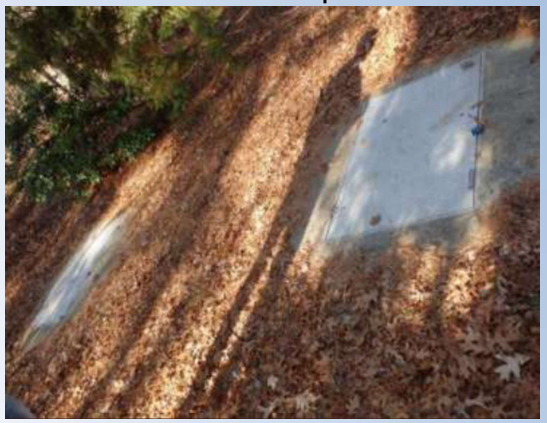
Creek Road Pump Station

Silvershell Pump Station

Point Road Pump Station

Littleneck Pump Station

Oakdale Pump Station Wet Well



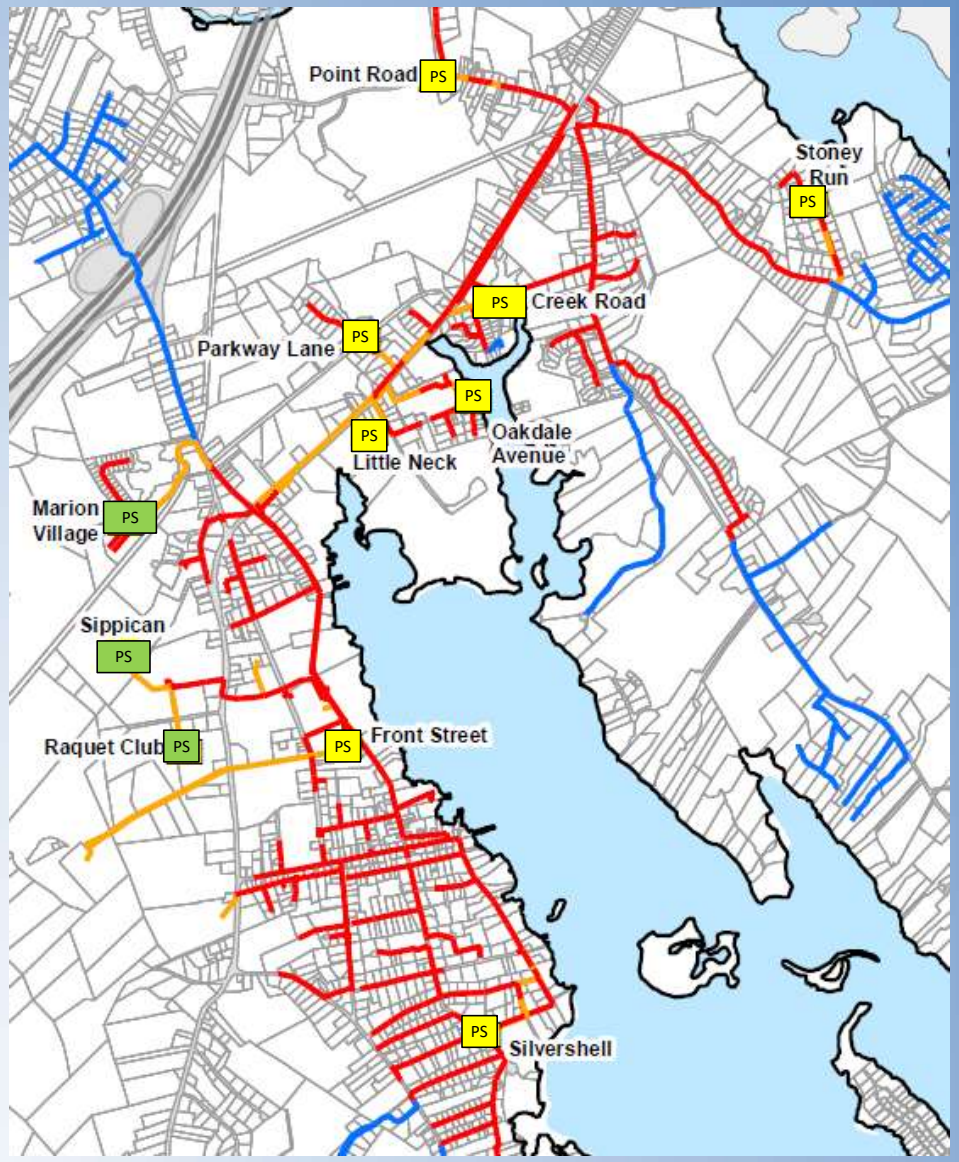
Stoney Run Pump Station Hatches

Parkway Lane Pump Station Wetwell

Marion CWMP

Pump Stations

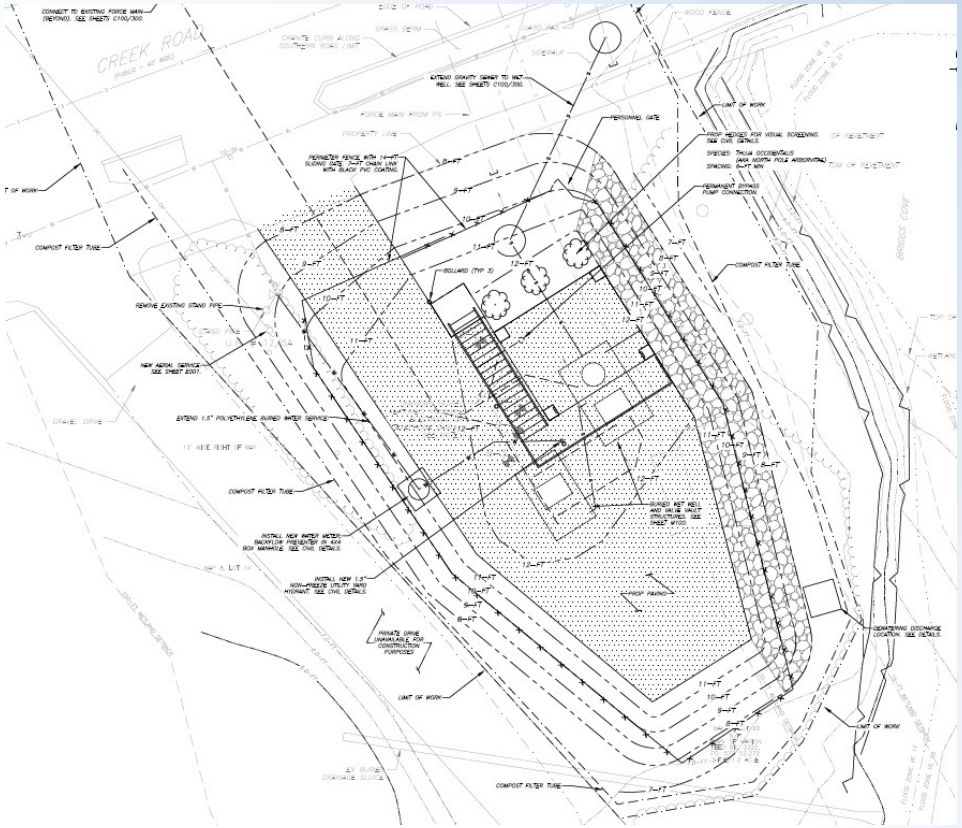
Pump Station	Approx. Age (years)	Approx. No. Properties Served
Front Street	50 *2005 Update	1,700
Creek Road	50	500
Silvershell	60	500
Oakdale Avenue	30	70
Littleneck	10	10
Parkway Lane	35	15
Point Road	50	70
Stoney Run	25	30



Marion CWMP

Pump Stations

- Pump Station projects are already underway e.g. Creek Road



Marion CWMP

Marion's WPCF

- WPCF located on Benson Brook Road
- NPDES Permitted Discharge
  - 0.588 MGD Avg. Daily Flow
  - Peak Capacity of ~1.1 MGD
  - Lagoon System Handles Wet Weather Flow

Marion CWMP
Marion's WPCF

Marion CWMP

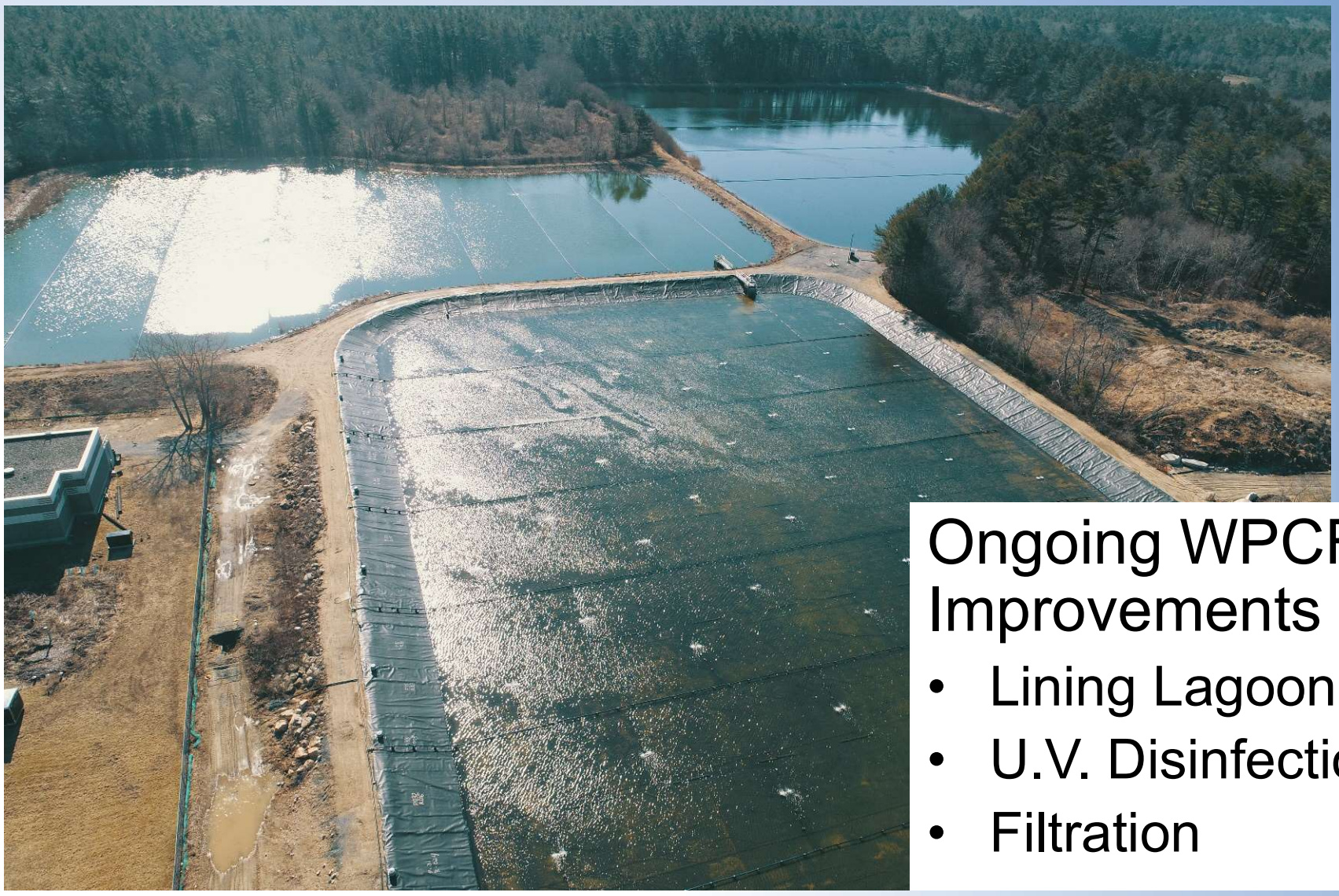
Marion's WPCF

Permitting & Regulatory Items

- NPDES Permitted Discharge
  - Capacity
  - Nitrogen
  - Phosphorus
  - Metals
  - Lagoons
- Consent Orders

Marion CWMP

Marion's WPCF



Ongoing WPCF Improvements Project

- Lining Lagoon No. 1
- U.V. Disinfection
- Filtration

Marion CWMP

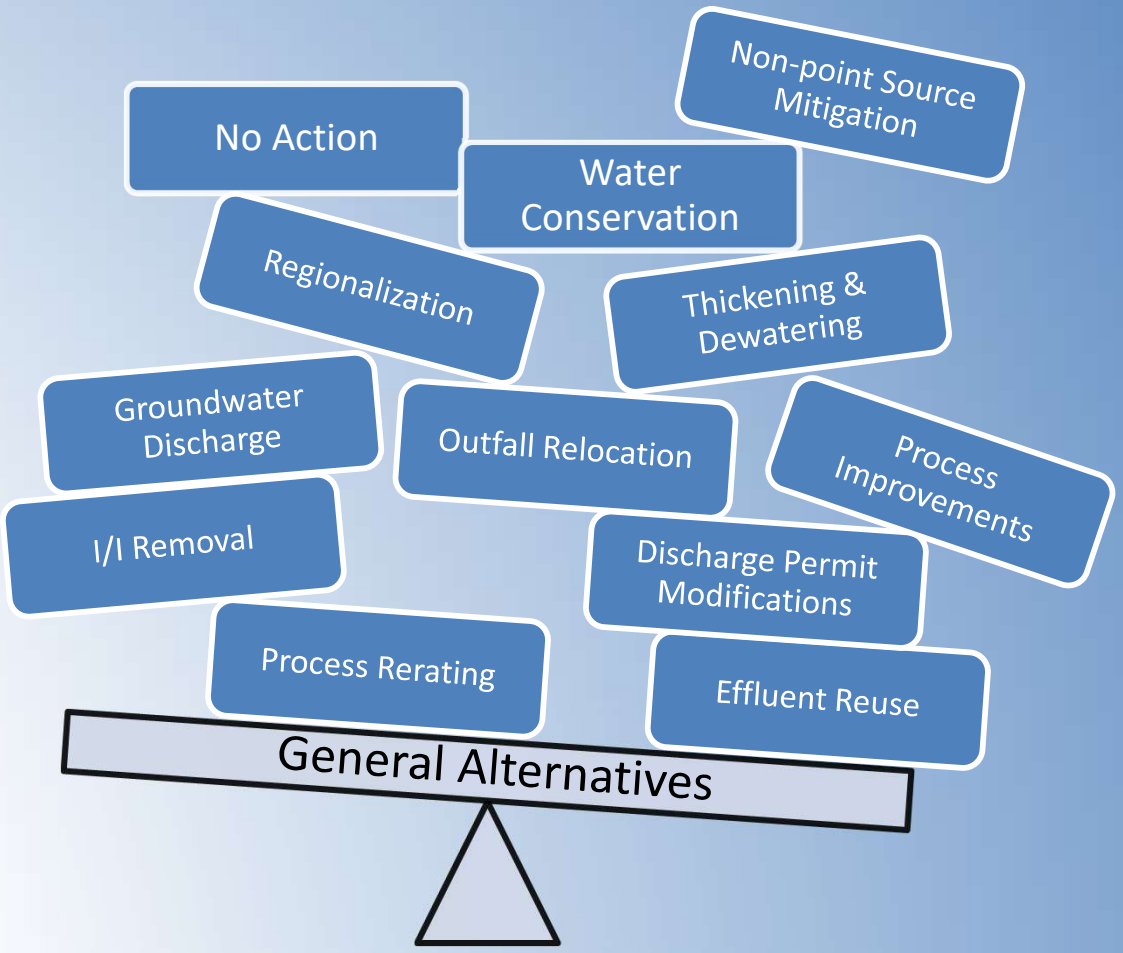
Marion WPCF Needs

- Nature of WPCF Needs
  - Modernization Needs (Condition, Technology, etc.)
  - Capacity Needs
  - Regulatory and Permit Needs
  - Sustainability (Resiliency/Efficiency/Safety) Needs
- WPCF Needs Categories
  - 'Big Picture' Needs
  - Specific Needs (Process, System, or Structure)

Marion CWMP

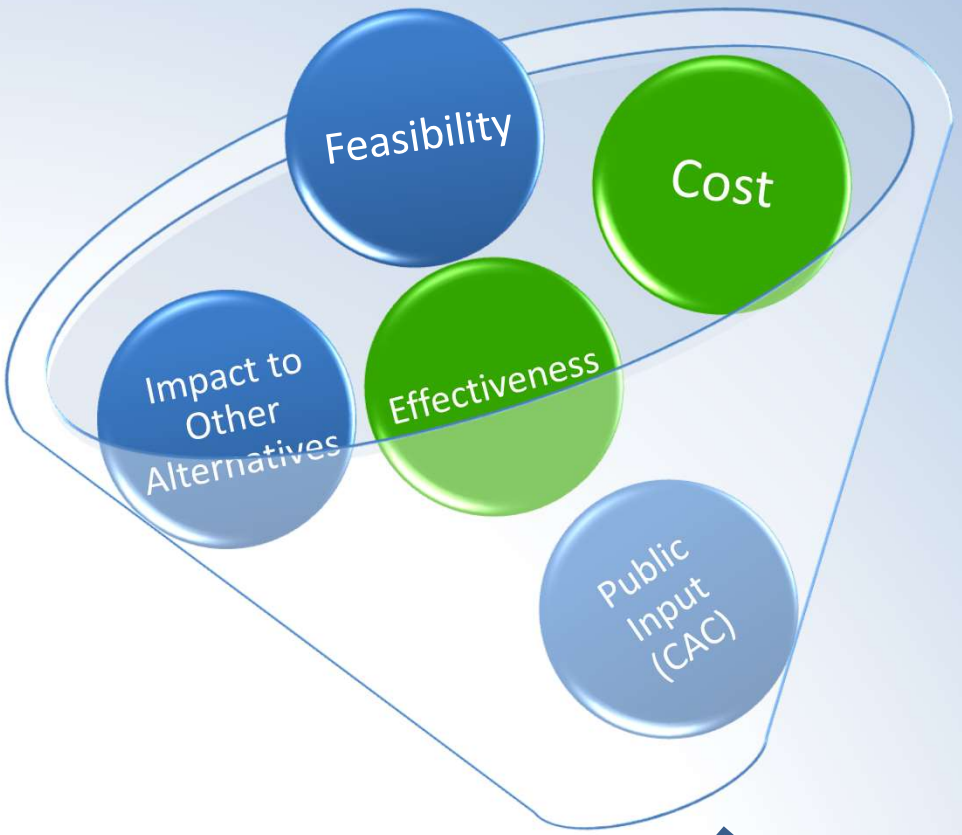
WPCF Needs & Alternatives

- General Needs
  - Treatment Capacity
  - Nitrogen Removal
  - Phosphorus Removal
  - Copper Removal
  - Biosolids Management



Marion CWMP

WPCF Needs & Alternatives



Evaluate all alternatives against broad criteria to filter for preferred alternatives

Comparable Alternatives

Marion CWMP
WPCF Needs & Alternatives

Alternative	WPCF Needs Met	Total Capital Cost[1]	Feasibility
A1 – Process Improvements - Optimization	✓	$11 M	High Feasibility
A2 – Process Improvements - 3rd SBR	✓	$13 M	High Feasibility
B1 – Groundwater Discharge - Supplemental Discharge	✓	$16 M	Moderate Feasibility
B2 – Groundwater Discharge - All Flows	✓	$17 M	Low Feasibility
C1 – Outfall Relocation to Salt Marsh	✓	$16 M	Moderate Feasibility
C2 – Outfall Relocation to Outer Aucoot Cove	✓	$56 M	Low Feasibility
D – Regionalization with Wareham	✓	$76 M	Moderate to Low Feasibility

[1]Development of costs are detailed in the CWMP Report. They are used in this presentation for comparison purposes only.

Marion CWMP

WPCF Capacity

- Capacity at WPCF remains limited, is a current and future need

Collection System & Pump Station Needs

- Inflow & Infiltration work prioritized
  - Known Problem Areas
  - Sewers within Village Area
  - Areas within Flood Zone
- Policy Needs
  - Grinder Pumps
  - Private Sewers
- Pump Station & Collection System Needs
  - Modernization (Age/Condition) & Resiliency Needs

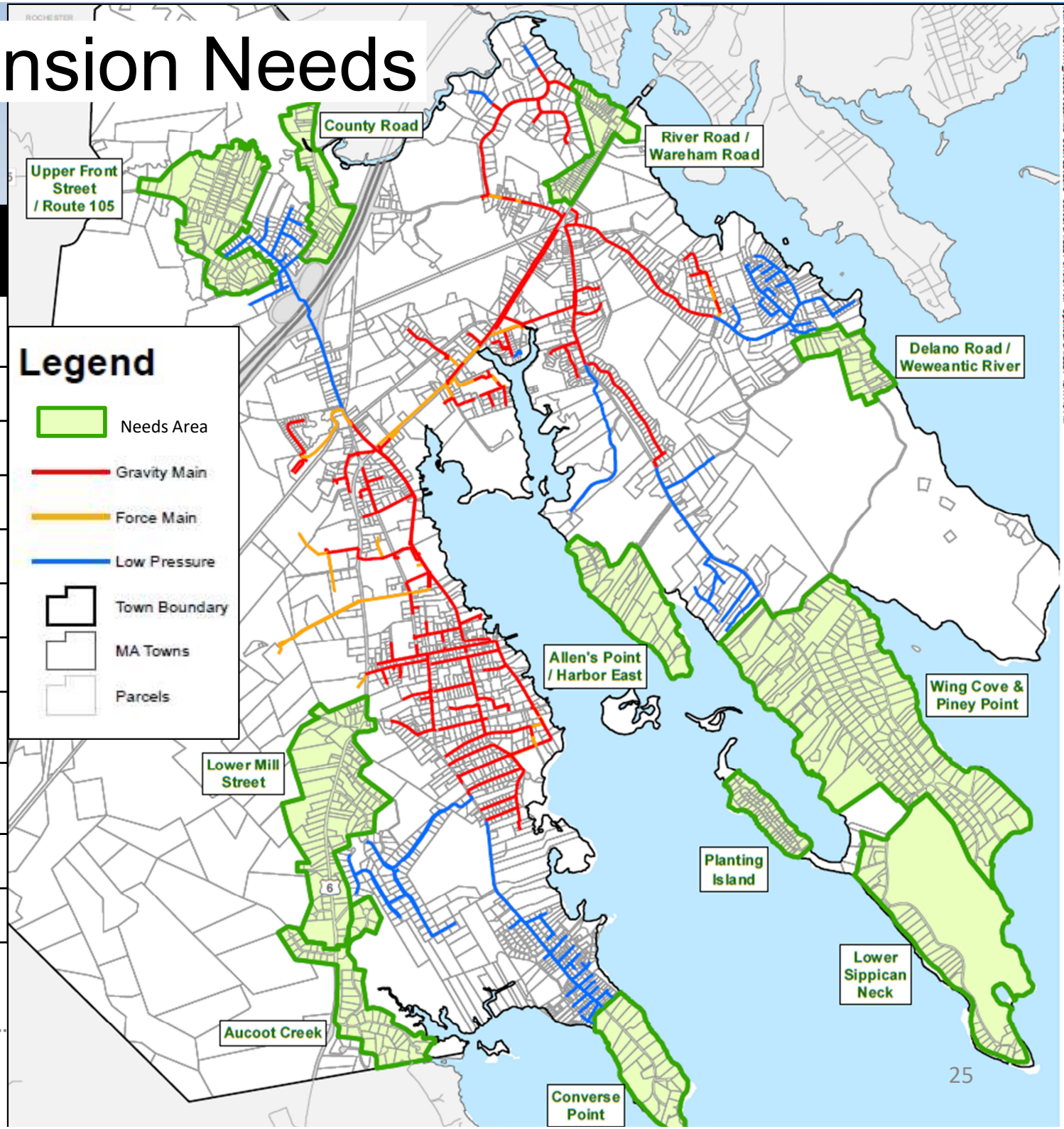
Front Street Pump Station

Pump Station Alternatives

Pump Station	No Action	Minor Renovation	Major Renovation	Complete Replacement	Eliminate/ Abandon
Front Street			✓	✓	
Creek Road			✓	✓	
Silvershell			✓	✓	
Oakdale Avenue			✓	✓	
Littleneck	✓	✓			
Parkway Lane			✓	✓	✓
Point Road		✓	✓		
Stoney Run	✓	✓			

Sewer Expansion Needs

Unsewered Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wings Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allens Point/ Harbor East
Converse Point
Aucoot Creek
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP

Unsewered Areas Prioritization

Needs Area	Priority Criteria	Priority Score	Priority Rank
Planting Island	➢ Nitrogen Loading & Impairments ➢ BOH Variances ➢ Lot Size ➢ Soil Characteristics ➢ Flood Plains ➢ Other	45	High
Lower Sippican Neck		39	High
Upper Front Street		35	High
Aucoot Creek		33	High
River Road/ Wareham Street		28	High
Lower Mill Street		32	Medium
County Road		29	Medium
Wings Cove/ Piney Point		28	Medium
Delano Road/ Weweantic River		26	Low
Allens Point/ Harbor East		18	Low
Converse Point		17	Low

Marion CWMP

Unsewered Areas Alternatives

Needs Area	No Action	Enhanced On-site Program	Localized Treatment	Sewer Extension
Planting Island		✓	✓	✓
Lower Sippican Neck		✓	✓	✓
Upper Front Street	✓	✓		✓
Aucoot Creek		✓		✓
River Road/ Wareham Street		✓		✓
Lower Mill Street		✓		✓
County Road	✓	✓		✓
Wings Cove/ Piney Point	✓	✓		✓
Delano Road/ Weweantic River	✓	✓		✓
Allens Point/ Harbor East	✓	✓		✓
Converse Point	✓	✓		✓

Marion CWMP

CAC/ Select Board Preferred Alternatives

Needs Area	Preferred Alternative
Planting Island	Sewer Extension
Lower Sippican Neck	Sewer Extension
Upper Front Street	Enhanced On-Site Program
Aucoot Creek	Sewer Extension
River Road/ Wareham Street	Sewer Extension
Lower Mill Street	Sewer Extension
County Road	Enhanced On-Site Program
Wings Cove/ Piney Point	Sewer Extension
Delano Road/ Weweantic River	Enhanced On-Site Program
Allens Point/ Harbor East	Enhanced On-Site Program
Converse Point	Enhanced On-Site Program

Marion CWMP

Future Flow Considerations

Flow Description	Average (MGD)
Existing Flows[1] (Avg. 2017 – 2021)	0.515
Infill & Growth in Sewered Areas	0.050
Sewer Extensions (Recommended)	0.091
Planned/Anticipated Development	0.030
Proposed Future Average Daily Flow to WPCF - TOTAL	**0.686**

[1]Existing Flow includes those contributed by Tabor Academy and existing inflow/infiltration.

Developing the Recommended Plan

- Actions Needed
  - Collection System Improvements/ I&I Mitigation
  - Policy Revisions (Grinder Pumps & Private Sewer Systems)
  - Pump Station Modernization & Resiliency Improvements
  - WPCF Modernization & Resiliency Improvements
  - Sewer Extensions
  - WPCF Capacity & Permit Compliance

Developing the Recommended Plan

- Overview of Components (& Cost)

Alternative	Capital Cost	Annual Cost Impact	20 year Present Worth
A1 – Process Improvements - Optimization	$11 M	$220,000	$13.5 M
A2 – Process Improvements - 3rd SBR	$13 M	$220,000	$15.5 M
B1 – Groundwater Discharge - Supplemental Discharge	$16 M	$260,000	$18.8 M
C1 – Outfall Relocation to Salt Marsh	$16 M	$140,000	$17.3 M
D – Regionalization with Wareham	$76 M	$1,480,000	$98.0 M

Public Involvement

What will the Town do to address nitrogen loadings on its waters from septic systems?

Public Involvement

Is there a preference for advanced on-site (septic) systems with enhanced nitrogen removal over sewer extensions?

Public Involvement

Can the Town choose to ‘do nothing’?

Public Involvement

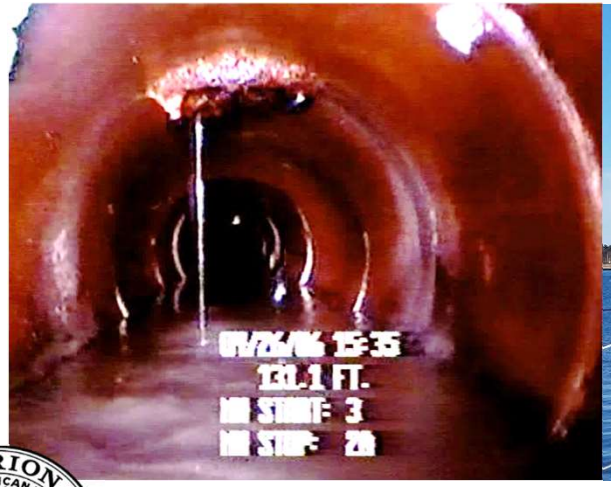
Recognizing that sewer extensions or advanced septic systems will have a significant cost, what is the appropriate time for the Town to take actions?

Public Involvement

Considering treatment and the Marion WPCF, does the Town prefer local options to regional despite the higher costs?

Marion CWMP

Questions/ Comments?



Weston & Sampson℠

Thank You

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Select Board Workshop

July 20, 2022

Weston & Sampson

Marion CWMP

Agenda

- Feedback from Past Meetings
  - Public Meeting
  - BBC Discussion on Alternatives
- Outline of Recommended Plan
  - Collection System
  - Sewer Extensions
  - WPCF
- Implementing the Plan
- Questions & Comments

Marion CWMP

Feedback from Past Meetings

- CWMP Public Meeting (May 23, 2022)
  - Public Attendance and Comments
- Meeting with Buzzards Bay Coalition (July 7, 2022)
  - Discussion on Regional and Local Alternatives
- Other Discussion

Outlining the Recommended Plan

CWMP Recommended Plan

- Long-Term (20 year) Plan for Wastewater Management in Marion
- Capital Projects/Improvements
- Programmatic/Policy Improvements
- Implementation Phased over Time (improvements generally scheduled over next two decades)
- Timing for Some Improvements Linked to Permit or Regulatory Compliance

Marion CWMP

Existing Collection System

Sewer System – Capital Improvements:

- Annual Infiltration & Inflow (I/I) Control & Sewer Rehabilitation Program
- Sewer O&M Access Provisions (Manholes, Cross-Country Sewers, and Easements)

Sewer System – Programmatic Improvements

- Private Sewer Policy
- Individual Grinder Pump O&M Policy

Marion CWMP

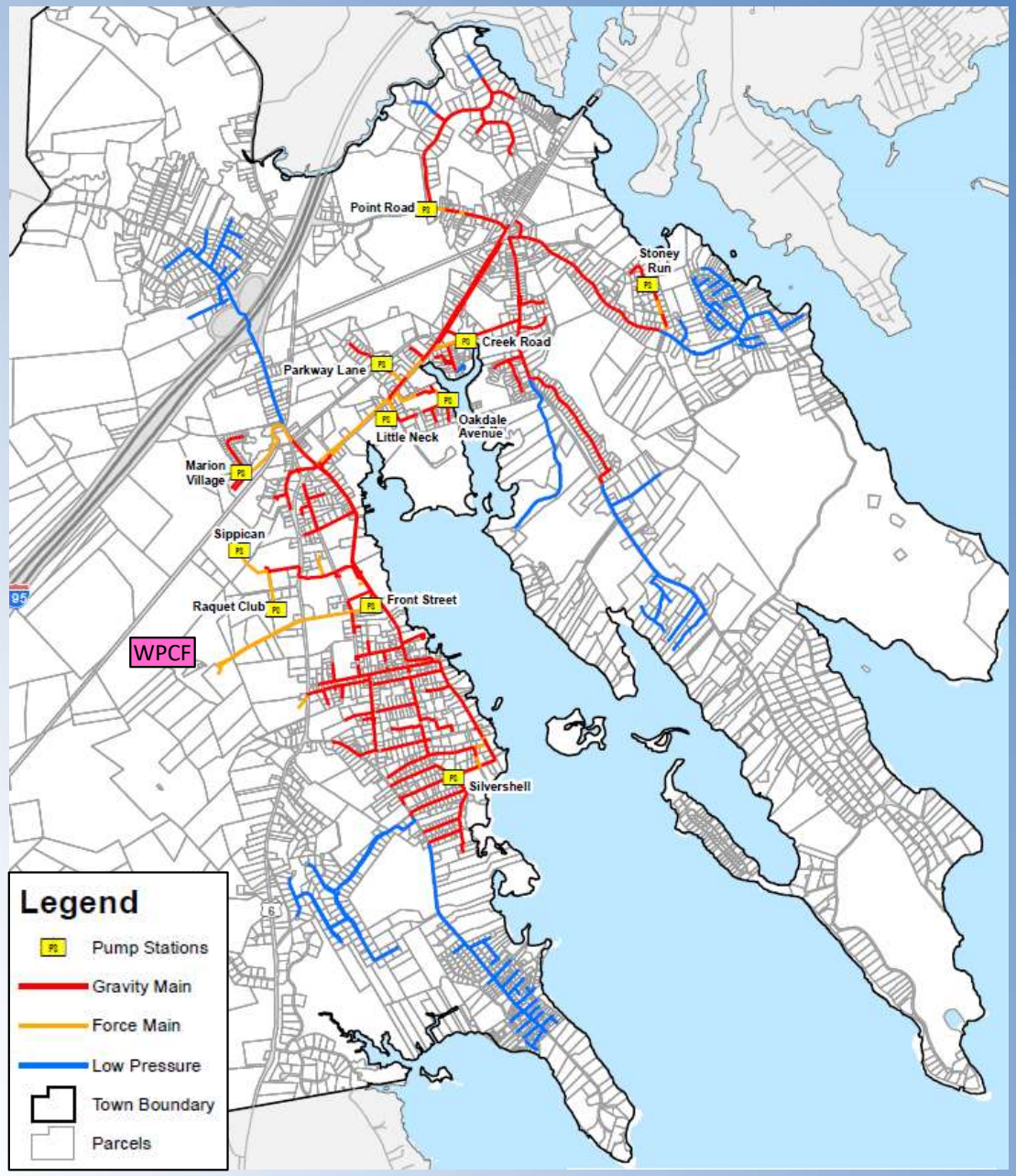
Collection System

Capital Improvements

- I/I Program and Sewer Rehabilitation
  - $4 million over 20 years
- Sewer Access Improvements
  - Budget $500,000

Program/ Policy Improvements

- Costs TBD



Weston & Sampson

Marion CWMP

Existing Sewer Pump Stations

Capital Improvements:

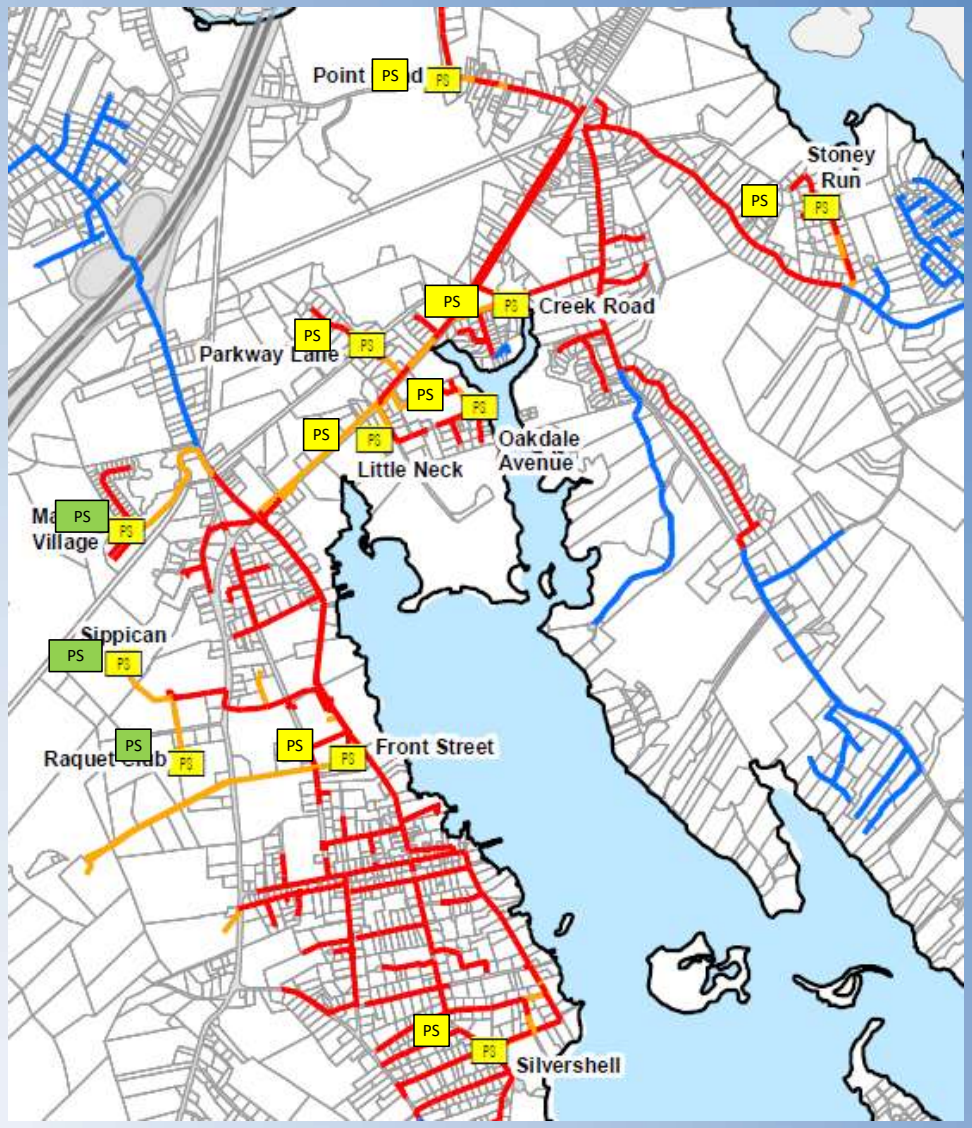
- Modernization & Resiliency Focus
- Front Street PS Renovation
- Creek Road PS Replacement
- Major Renovations/Improvements or Replacements (Silvershell PS, Oakdale PS, Parkway PS)
- Renovations/Improvements (Point PS, Stoney Run PS, Littleneck PS)
- Force Main Evaluations & Improvements

Marion CWMP
Sewer Pump Stations

Capital Improvements

- Creek Road PS Replacement
  - $2.6 million
- Major Renovations or Replacements (4 PS)
  - Total Budget $6 million
- Other PS Renovations (3 PS)
  - Total Budget $2 million
- Force Main Evaluations & Improvements *
  - Total Budget $2 million

* Does not include second Front St PS force main.



Marion CWMP
Wastewater Management in Unsewered Areas

Capital Improvements:

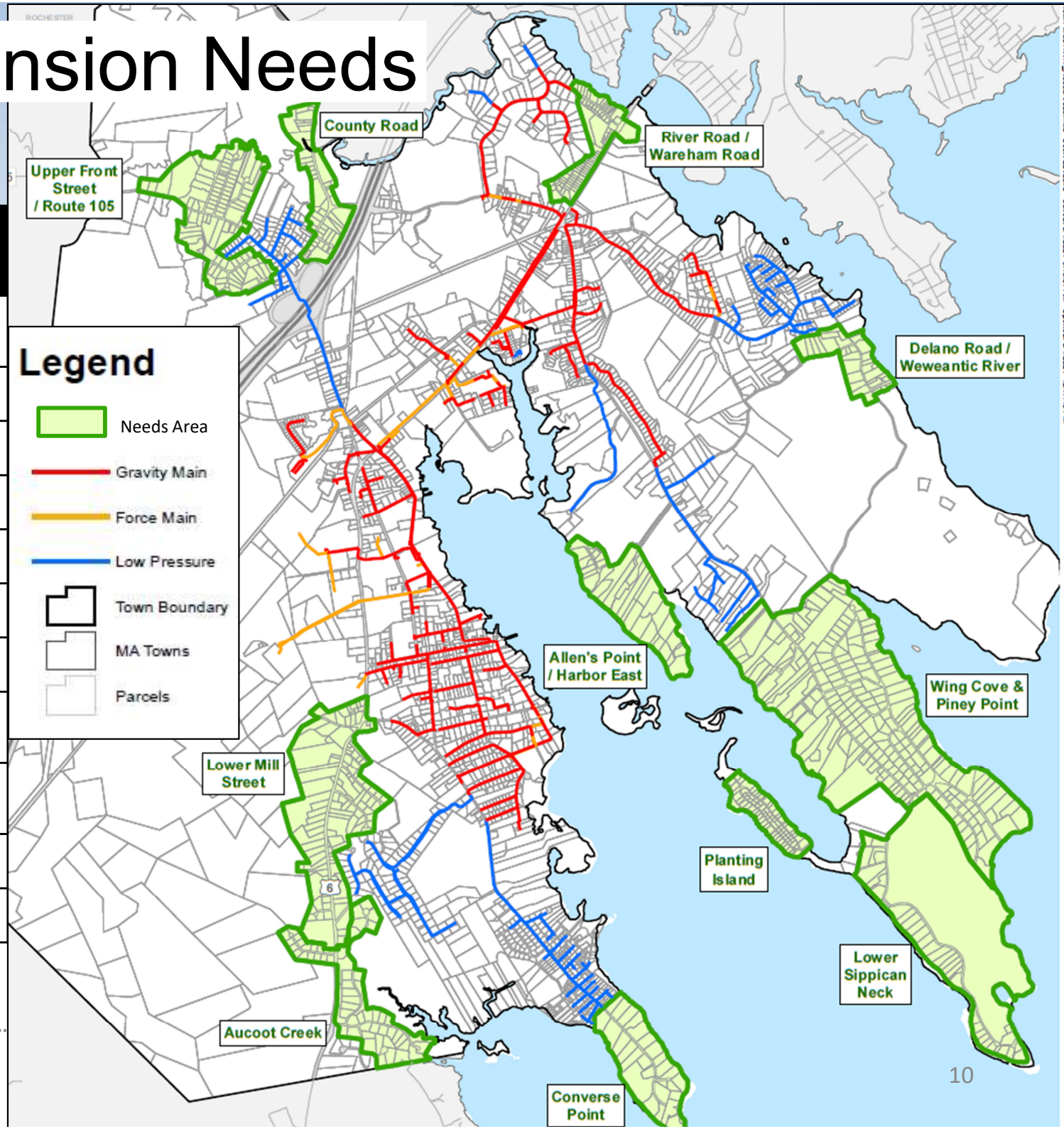
- Sewer Extensions to Unsewered Areas
  - Includes 6 of 11 Sewer Needs Areas Evaluated
  - Flexibility to Allow Additional Connections
  - Phased Program to Mitigate Cost Impacts

Programmatic Improvements & Other Actions

- Additional BOH Requirements for Enhanced On-Site (Title 5) Treatment
- Evaluation of Localized Treatment Options (e.g., Planting Island)

Sewer Expansion Needs

Unsewered Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wings Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allens Point/ Harbor East
Converse Point
Aucoot Creek
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP
Budget Costs for Sewer Extensions

Needs Area	Approx. Area Cost	Approx. Area Cost per Parcel	Combined Area Cost per Parcel
Recommended Areas			
Aucoot Creek	$4.6 M	$104,000	Aucoot Creek + Lower Mill Street Total Cost ~$9.0 M ~$45,000 per parcel
Lower Mill Street	$4.4 M	$42,000	
Planting Island	$5.0 M	$63,000	Planting Island + Lower Sippican Neck Total Cost ~$9.6 M ~$60,000 per parcel Planting Island + Lower Sippican Neck + Wing Cove/Piney Point Total Cost ~$19 M ~$44,000 per parcel
Lower Sippican Neck	$4.6 M	$120,000	
Wings Cove/ Piney Point	$9.2 M	$47,000	
River Road/ Wareham Street	$2.3 M	$28,000	-
Other Needs Areas			
Upper Front Street	$2.8 M	$29,000	Recommendation for these Areas is Continued Use of Individual On-Site Systems Management will include Enhanced On-Site Systems, where Appropriate
County Road	$1.8 M	$34,000	
Delano Road/ Weweantic River	$1.2 M	$36,000	
Allens Point/ Harbor East	$2.1 M	$63,000	
Converse Point	$1.4 M	$54,000	

Marion CWMP
Wastewater Management in Unsewered Areas

Capital Improvement Costs:

- Sewer Extensions to Unsewered Areas
  - River Rd/Wareham Rd; Aucoot Creek/Lower Mill St; Planting Island, Lower Sippican & Wings Cove/Piney Pt
  - Total Budget ~$30 million

Programmatic & Other Action Costs:

- On-Site Policy Development & Implementation
  - Budget TBD
- Evaluate Localized Treatment Options
  - Budget ~$100,000 to ~$300,000

Marion CWMP

WPCF & Treatment System

WPCF – Capital Improvements:

- WPCF Improvements to Address:
  - Treatment Capacity
  - Permit & Regulatory Requirements
  - Facility Modernization, Resiliency & Sustainability
- Follow on from Alternatives Evaluation
  - Primary & Optional Plans (Contingency)

Marion CWMP

Future Flow Considerations

Flow Description	Average (MGD)
Existing Flows[1] (Avg. 2017 – 2021)	0.515
Infill & Growth in Sewered Areas	0.050
Sewer Extensions (Recommended)	0.091
Planned/Anticipated Development	0.030
Proposed Future Average Daily Flow to WPCF - TOTAL	0.686

[1] Existing Flow includes those contributed by Tabor Academy and existing inflow/infiltration.

Marion CWMP

WPCF & Treatment System

- Comparison of WPCF Alternatives

Alternative	Capital Cost	Annual Cost Impact	20 year Present Worth
A1 – Process Improvements - Optimization	$11 M	$220,000	$13.5 M
A2 – Process Improvements - 3rd SBR	$13 M	$220,000	$15.5 M
B1 – Groundwater Discharge - Supplemental Discharge	$16 M	$260,000	$18.8 M
C1 – Outfall Relocation to Salt Marsh	$16 M	$140,000	$17.3 M
D – Regionalization with Wareham	$76 M	$1,480,000	$98.0 M

Marion CWMP

WPCF & Treatment System

WPCF – Capital Improvements (Alternative A2):

- Discrete Alternative Components
  - Add a Third SBR & Process Modifications
  - Add Chemical Feed for Phosphorus Precipitation
  - Enhance Water System Corrosion Control for Copper
- Ancillary Components
  - WPCF System Repairs & Technology Improvements (e.g., structural repairs, second force main, etc.)
- Biosolids (Sludge) Management
  - Improvements to Allow Hauling of Thickened Sludge

Marion CWMP

WPCF & Treatment System

WPCF – Optional/Contingency Capital Improvements:

- Alternative B1 – Supplemental Groundwater Discharge
  - This should be evaluated as a back-up plan if EPA does not grant the NPDES permit capacity change.
- Alternative D – Regionalization with Wareham
  - The Town will continue to track this alternative as costs, funding and Marion's cost share are further developed.

Marion CWMP

WPCF & Treatment

Capital Improvements (A2)

- Process Improvements
  - $4.5 million
- Ancillary Improvements
  - $6.3 million
- Biosolids Improvements
  - Budget $2 million

Programmatic & Other Actions

- Engage EPA/DEP on NPDES Permit Increase (Cost $30,000 plus TBD)
- Site Screening for Possible GWD, Supplemental (Cost $100,000 plus TBD)
- Continue Tracking Regional Plan (Cost TBD)

Marion CWMP

Summary of Recommended Plan

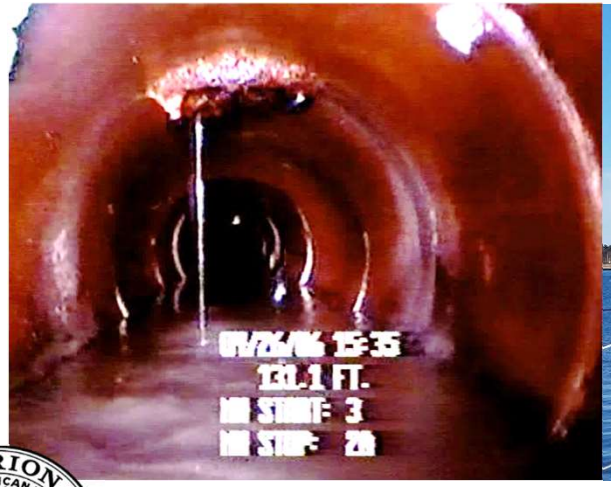
Wastewater Management System	Capital Cost	Programmatic Costs	Total Costs
Existing Collection System	$4.5 M	TBD	~ $4.5 M
Existing Pump Stations	$12.6 M	-	~$12.6 M
Sewer Extensions to Unsewered Areas	$30 M	~$200,000	~$30.2 M
WPCF & Treatment System	$13 M	~$130,000 +	~$13.1 M
Total CWMP Capital Recommendations	~$60 M	~$330,000 +	~$60 M

Marion CWMP
Implementing the Plan

- Capital Improvements to be Phased
  - WPCF Improvements –
    - Phosphorus & Copper are Needed in Short-Term
    - Third SBR can be Somewhat Deferred
    - Ancillary Improvements
      - Most Repairs are Needed in Short-Term
      - Some Improvements can be Somewhat Deferred
    - Biosolids Improvements can be Somewhat Deferred
  - Collection System & PS Improvements
    - I/I Program Should be Continued
    - Programmatic Actions can be Phased over Time
    - PS Improvements can be Phased over Time
  - Sewer Extensions can be Phased over Time

Marion CWMP

Questions/ Comments?



Weston & Sampson℠

Thank You

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Select Board Workshop

January 10, 2023

Weston & Sampson

Marion CWMP

Agenda

- NPDES Small General Permit Status
- Review of Recommended Plan
  - Collection System
  - Sewer Extensions
  - WPCF
- Implementation Discussion
- Questions & Comments

Marion CWMP

NPDES Small General Permit Status

Draft NPDES Small General Permit Status

- Initial Review of Draft Effluent Limitations and Monitoring Requirements
- Comment period ends January 25, 2023
- Notable concerns for discussion

Marion CWMP

Recommended Plan Outline

CWMP Recommended Plan

- Long-Term (20 year) Plan for Wastewater Management in Marion
- Capital Projects/Improvements
- Programmatic/Policy Improvements
- Implementation Phased over Time (improvements generally scheduled over next two decades)
- Timing for Some Improvements Linked to Permit or Regulatory Compliance

Marion CWMP

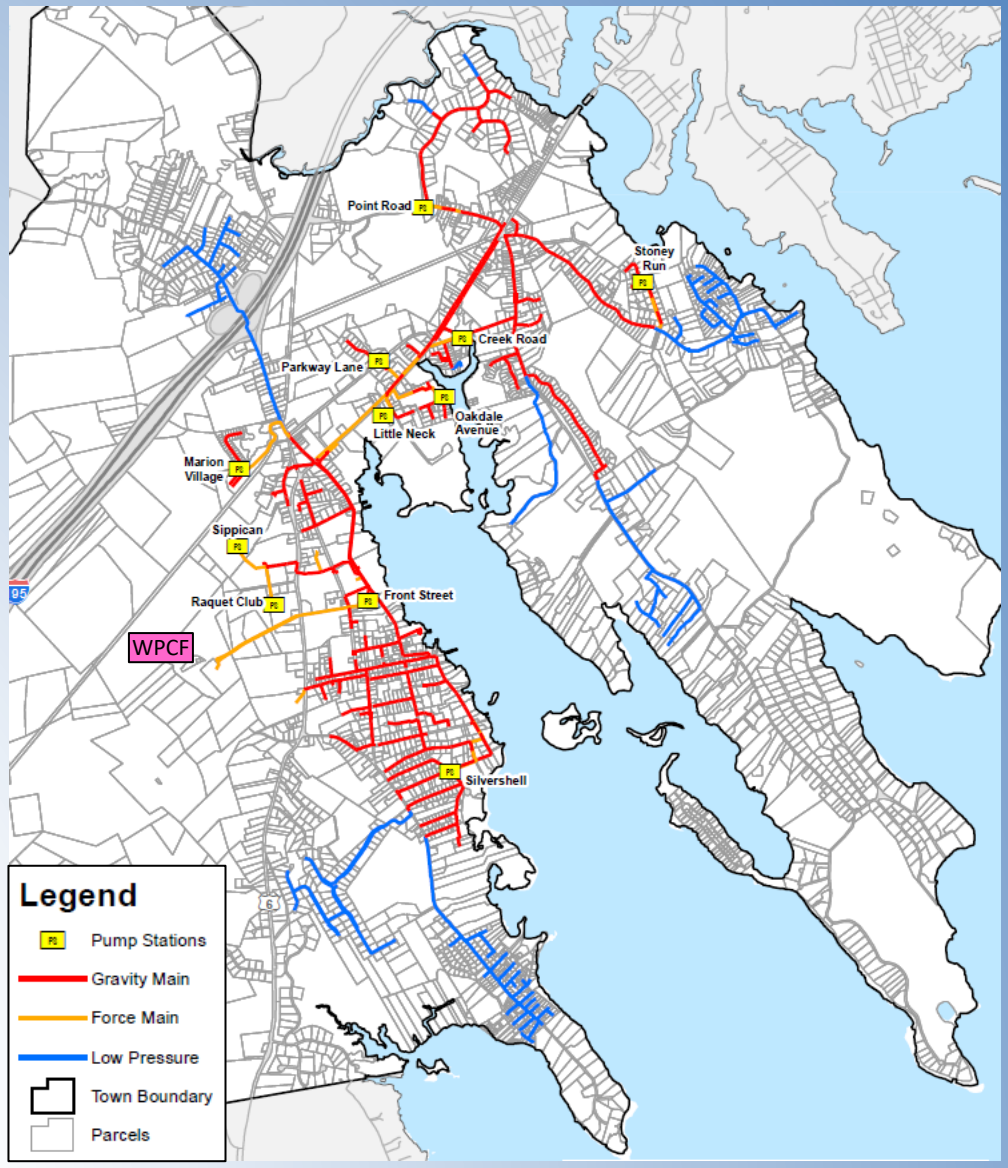
Collection System

Capital Improvements

- I/I Program and Sewer Rehabilitation
  - $4 million over 20 years
- Sewer Access Improvements
  - Budget $500,000

Program/ Policy Improvements

- Costs TBD



Weston & Sampson

Sewer Expansion Needs

Unsewered Needs Areas
River Road/ Wareham Road
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Wings Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allens Point/ Harbor East
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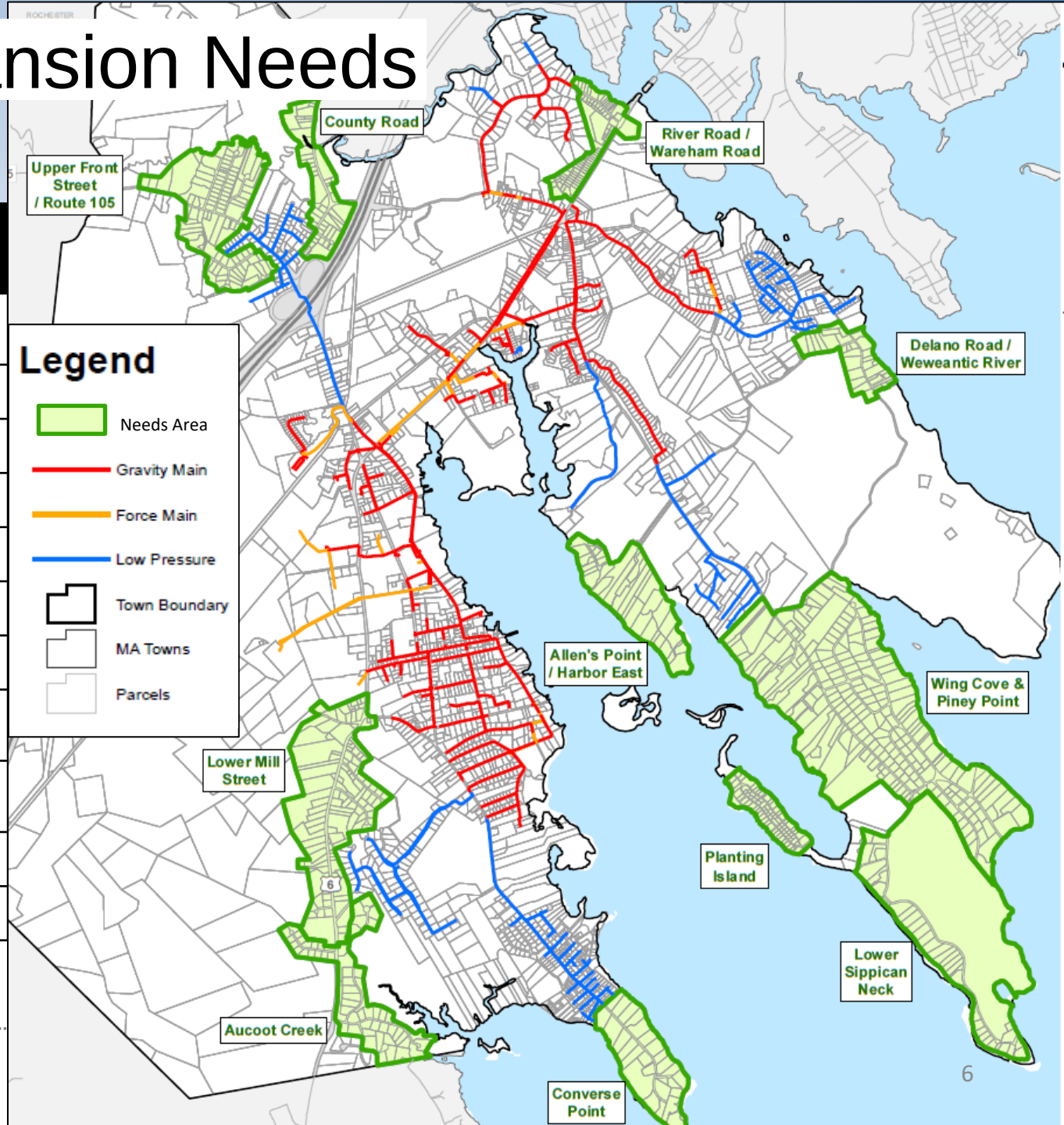
Aucoot Creek
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP
Wastewater Management in Unsewered Areas

Capital Improvements:

- Sewer Extensions to Unsewered Areas
  - Includes 6 of 11 Sewer Needs Areas Evaluated
  - Flexibility to Allow Additional Connections
  - Phased Program to Mitigate Cost Impacts

Programmatic Improvements & Other Actions

- Additional BOH Requirements for Enhanced On-Site (Title 5) Treatment
- Evaluation of Localized Treatment Options (e.g., Planting Island)

Marion CWMP
Wastewater Management in Unsewered Areas

Capital Improvement Costs:

- Sewer Extensions to Unsewered Areas
  - River Rd/Wareham Rd; Aucoot Creek/Lower Mill St; Planting Island, Lower Sippican & Wings Cove/Piney Pt
  - Total Budget ~$24 million

Programmatic & Other Action Costs:

- On-Site Policy Development & Implementation
- Evaluate Localized Treatment Options
  - Budget ~$100,000 to ~$300,000

Marion CWMP
Budget Costs for Sewer Extensions

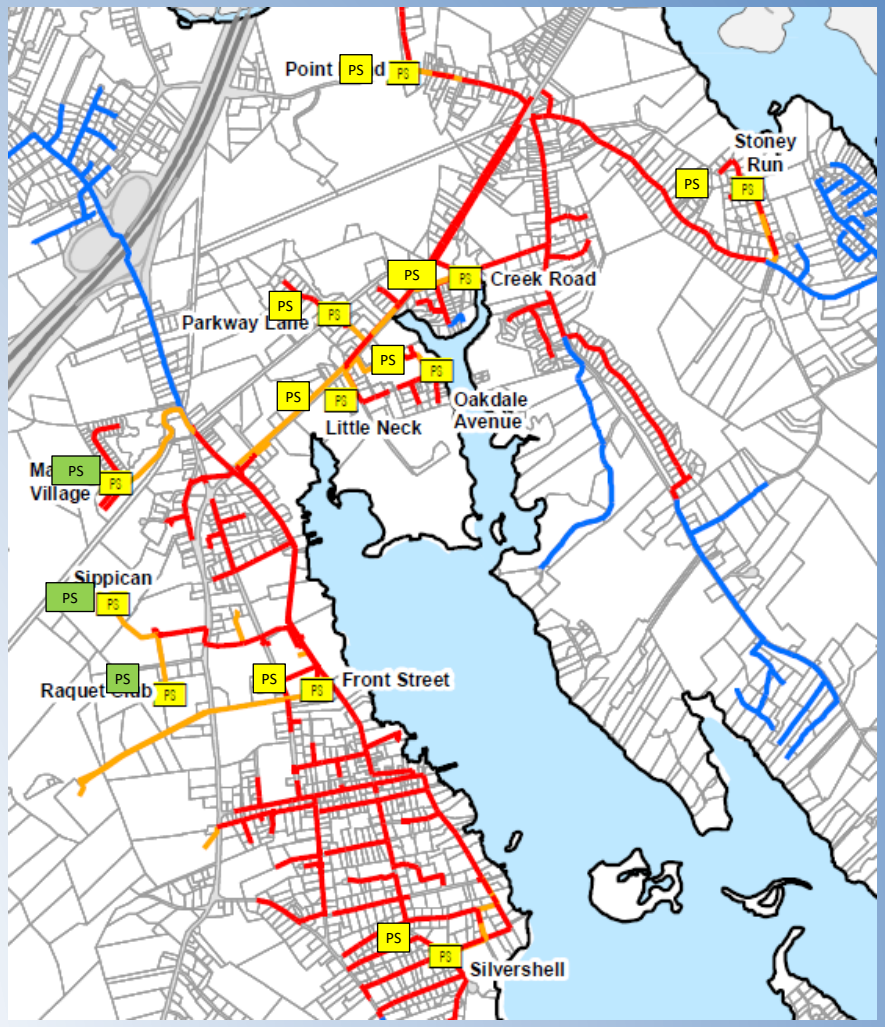
Needs Area	Approx. Area Cost	Approx. Area Cost per Parcel	Combined Area Cost per Parcel
Recommended Areas			
Aucoot Creek	$4.6 M	$104,000	Aucoot Creek + Lower Mill Street Total Cost ~$7.0 M ~$45,000 per parcel
Lower Mill Street	$4.7 M	$42,000	
Planting Island	$5.0 M	$63,000	Planting Island + Lower Sippican Neck Total Cost ~$7 M ~$60,000 per parcel Planting Island + Lower Sippican Neck + Wing Cove/Piney Point Total Cost ~$14 M ~$44,000 per parcel
Lower Sippican Neck	$4.6 M	$120,000	
Wings Cove/ Piney Point	$9.2 M	$47,000	
River Road/ Wareham Street	$2.3 M	$28,000	-
Other Needs Areas			
Upper Front Street	$3.9 M	$40,000 per parcel to upgrade, replace or install new septic system meeting nitrogen reduction standards	Recommendation for these Areas is Continued Use of Individual On-Site Systems Management will include Enhanced On-Site Systems, where Appropriate
County Road	$2.1 M		
Delano Road/ Weweantic River	$1.4 M		
Allens Point/ Harbor East	$1.6 M		
Converse Point	$1.1 M		

Marion CWMP
Sewer Pump Stations

Capital Improvements

- Creek Road PS Replacement
  - $2.6 million
- Major Renovations or Replacements (4 PS)
  - Total Budget $6 million
- Other PS Renovations (3 PS)
  - Total Budget $2 million
- Force Main Evaluations & Improvements *
  - Total Budget $2 million

* Does not include second Front St PS force main.



Marion CWMP

WPCF & Treatment System

WPCF – Capital Improvements:

- WPCF Improvements to Address:
  - Treatment Capacity
  - Permit & Regulatory Requirements
  - Facility Modernization, Resiliency & Sustainability
- Follow on from Alternatives Evaluation
  - Primary & Optional Plans (Contingency)

Marion CWMP

Future Flow Considerations

Flow Description	Average (MGD)
Existing Flows[1] (Avg. 2017 – 2021)	0.515
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Sewer Extensions (Recommended)	0.091
Planned/Anticipated Development	0.030
Proposed Future Average Daily Flow to WPCF - TOTAL	**0.686**

[1] Existing Flow includes existing inflow/infiltration.

Marion CWMP

WPCF & Treatment System

- Comparison of WPCF Alternatives

Alternative	Capital Cost	Annual Cost Impact	20 year Present Worth
A1 – Process Improvements - Optimization	$11 M	$220,000	$13.5 M
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Marion CWMP

WPCF & Treatment System

WPCF – Capital Improvements (Alternative A2):

- Discrete Alternative Components
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  - Enhance Water System Corrosion Control for Copper
- Ancillary Components
  - WPCF System Repairs & Technology Improvements (e.g., structural repairs, second force main, etc.)
- Biosolids (Sludge) Management
  - Improvements to Allow Hauling of Thickened Sludge

Marion CWMP
WPCF & Treatment System

WPCF – Optional/Contingency Capital Improvements:

- Alternative B1 – Supplemental Groundwater Discharge
  - This should be evaluated as a back-up plan if EPA does not grant the NPDES permit capacity change.
- Alternative D – Regionalization with Wareham
  - The Town will continue to track this alternative as costs, funding and Marion's cost share are further developed.

Marion CWMP

WPCF & Treatment

Capital Improvements (A2)

- Process Improvements
  - $4.5 million
- Ancillary Improvements
  - $6.3 million
- Biosolids Improvements
  - Budget $2 million

Programmatic & Other Actions

- Engage EPA/DEP on NPDES Permit Increase
- Site Screening for Possible GWD, Supplemental
- Continue Tracking Regional Plan

Marion CWMP

Summary of Recommended Plan

Wastewater Management System	Capital Cost	Programmatic Costs	Total Costs
Existing Collection System	$4.5 M	TBD	~ $4.5 M
Existing Pump Stations	$12.6 M	-	~$12.6 M
Sewer Extensions to Unsewered Areas	$24 M	~$200,000	~$24.2 M
WPCF & Treatment System	$13 M	~$130,000 +	~$13.1 M
Total CWMP Capital Recommendations	~$54 M	~$330,000 +	~$54 M

Marion CWMP
Implementing the Plan

- Capital Improvements to be Phased
  - WPCF Improvements –
    - Phosphorus & Copper are Needed in Short-Term
    - Third SBR can be Somewhat Deferred
    - Ancillary Improvements
      - Most Repairs are Needed in Short-Term
      - Some Improvements can be Somewhat Deferred
    - Biosolids Improvements can be Somewhat Deferred
  - Collection System & PS Improvements
    - I/I Program Should be Continued
    - Programmatic Actions can be Phased over Time
    - PS Improvements can be Phased over Time
  - Sewer Extensions can be Phased over Time

Marion CWMP

Implementation Plan

What would financing of the project look like for rate payers?

Marion CWMP
Cost Impacts of the Plan

- Capital Improvements Costs
  - Assume Financing over 20 Years
    - SRF Funding 2% Interest Rate
      - Each $1 M = ~$61,000 in annual debt service
    - SRF Nutrient Financing Zero Interest
      - Each $1 M = ~$50,000 in annual debt service
  - WPCF Recommended Improvements (Alt. A2)
    - Cost of $13 M at 2% over 20 years = ~$800,000 annually
      - Avg. of ~$470 per current Marion sewer user account (~1,700 accounts)
  - Cost Impact Mitigation Strategies
    - Phase Improvements – Spread Payments Over Time
    - Finance Nutrient Related Costs at Zero Interest
    - Maximize Use of Outside Funding (e.g., grants, fees)

Marion CWMP
Implementation Plan
Benefits of Additional Users

- Anticipated short term additional sewer connections

Service Area/Development	Proposed # of Connections	Estimated Flow (GPD)
Heron Cove Estates (40B)	120	14,000
78 Wareham Road (Zuker)	48	8,000
River Road/Wareham Road	82	12,700
Total	250	34,700

- Possible additional revenue from new connections
  - $250,000 or more in annual user charges

Marion CWMP
Cost Impacts of the Plan

- Example of a Phased Project Approach
  - Assume ‘Phase 1/A’ WPCF improvements include:
    - Phosphorus Removal (Chem Feed/Mixing)
    - Critical WPCF Repairs (Structures & Systems)
    - Approx. Budget Cost ~$4 M
    - Finance through SRF Loan at 2% for 20 years (Design Costs paid by Town Funds)
  - Cost Impacts
    - Design Costs ~$350,000 (spread over two FY)
    - SRF Debt Service ~$225,000 per year (20 years)
    - Short-Term Borrowing through SRF at Zero Percent
    - First Debt Service Payment 3 years out (FY25 or FY 26)
      - Avg. of ~$135 per current Marion sewer user account (~1,700 accounts)

Marion CWMP

Implementation Plan

What should new users who are served by the sewer extension pay for betterments?

Marion CWMP
Implementation Plan
Betterments Example

Needs Area	Future Parcel Connected	Approx. Construction Cost	Approx. Cost per Parcel
River Road / Wareham Road	82	$2,300,000	$28,000
Planting Island, Lower Sippican Neck, Wings Cove / Piney Point	313	$14,000,000	$44,000
Aucoot Creek / Lower Mill Street	155	$7,000,000	$45,000

- What is an affordable cost?
- Why should the Town contribute general funds to reduce betterments in these areas?

Marion CWMP

Implementation Plan

What other priorities would the Select Board want to focus on in implementing the CWMP?

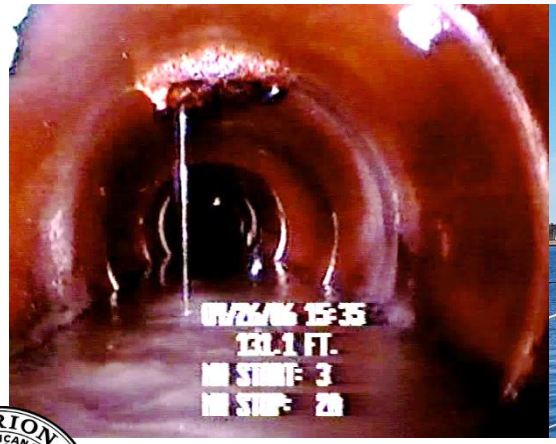
Marion CWMP

Next Steps

- Select Board should plan on having a public hearing to take comments on the final CWMP Recommended Plan
- Finalize discussions with EPA and DEP on NPDES Permit
- Begin implementation of CWMP recommendations

Marion CWMP

Questions/ Comments?



Weston & Sampson℠

Thank You

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

TOWN OF MARION, MASSACHUSETTS
Comprehensive Wastewater Management Plan (CWMP)

Citizen's Advisory Committee (CAC) Meeting

Location – Virtual

February 24, 2021; 2:00 pm

AGENDA

1. Introductions

2. CWMP Goals for Marion

3. Key Wastewater Issues Facing the Town – Project Drivers

4. CWMP Process
   a. What is a CWMP?
   b. Outline of the CWMP Process

5. Citizen's Advisory Committee
   a. Role of the CAC
   b. Introductory Thoughts from CAC Members

6. Questions and Discussion Points

7. Next CAC Meeting

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Citizens Advisory Committee Meeting

February 24, 2021

Weston & Sampson

Marion CWMP

Presentation Agenda

- Introductions
- CWMP Goals for Marion
- Key Wastewater Issues – Project Drivers
- CWMP Process
- CAC Members – Role and Initial Thoughts
- Next CAC Meeting – Existing Conditions

Marion CWMP

Weston & Sampson Team

Kent Nichols, Jr., PE
Principal-in-charge

Laurie Toscano
Project Manager

Gina Cortese

Carl Stone, PE, BCEE

Steven Pedersen, PE

Will Blais

Nathan Michael, PE

Town of Marion Introductions

- DPW:
  - David Willett – Director
  - Frank Cooper – WPCF Manager
  - Nathaniel Munafo – WPCF Asst. Chief Operator
  - Rebecca Tilden – Office Manager
  - Meghan Davis – Engineering Manger
- CAC:
  - Dot Brown
  - Sherman Briggs
  - Ray Cullum

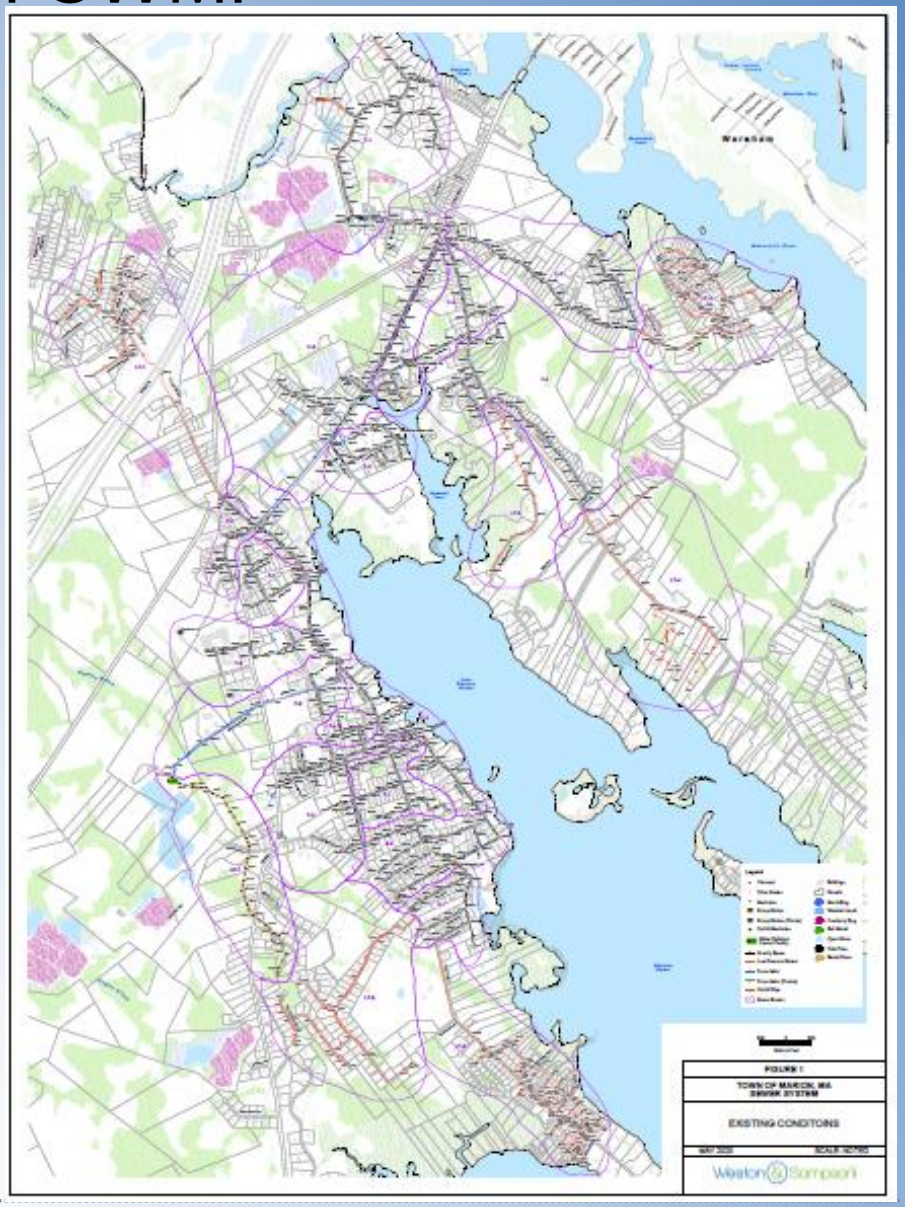
Marion CWMP

Town of Marion's Goals

- CWMP = Roadmap for Wastewater Management
- Take Stock of the Existing Wastewater Systems
- Wastewater System Resiliency
- Local Wastewater Solutions v. Regionalization
- Plan for System Extensions & Capacity Needs
- Financial Sustainability
- Engage Public Stakeholders

Marion CWMP

Marion Wastewater Systems



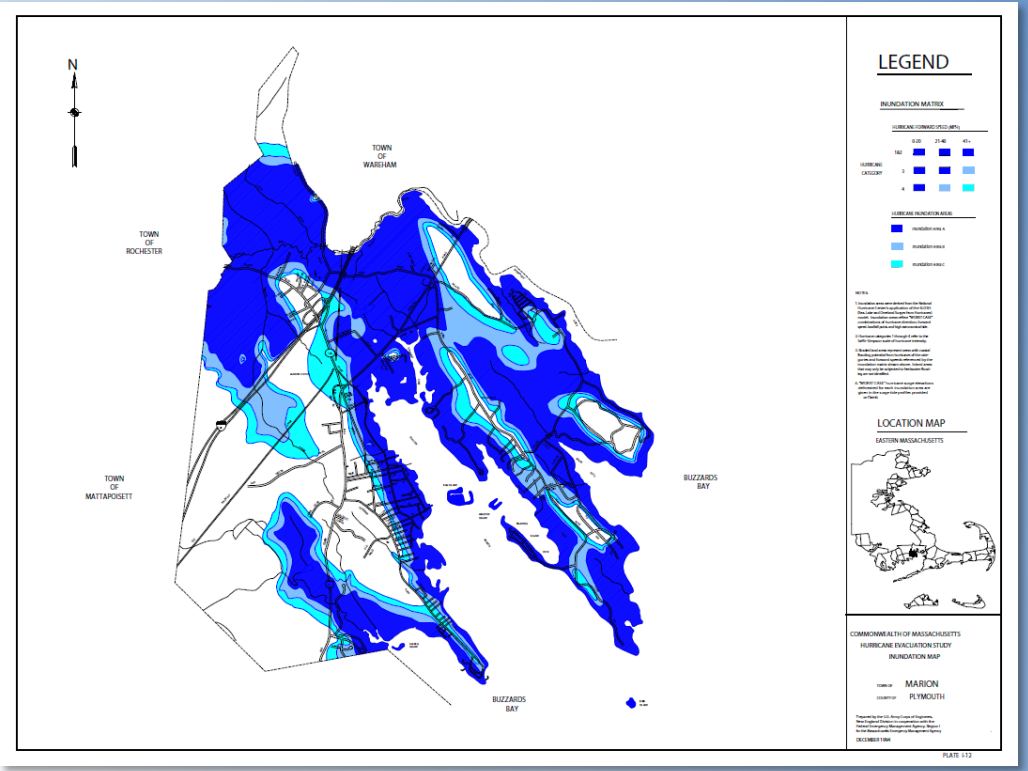
Marion CWMP

Key Planning Issues – Project Drivers

- Continued Environmental Resource Protection
- Aging Infrastructure and Modernization Needs
  - Particular Focus on Collection System
  - WPCF
  - Pump Stations

Key Planning Issues – Project Drivers

- System Resiliency
  - Infrastructure proximity to mapped coastal flood zones and projected storm inundation areas
  - Projected impacts of climate change on flooding & coastal storms



NOAA SLOSH Hurricane Inundation Map

Marion CWMP

Key Planning Issues – Project Drivers

- Compliance with NPDES Permit & Regulatory Orders
  - NPDES Permit, AO, AOC, ACO
- WWTF Regulatory Issues
  - Lagoons
  - Copper
  - Phosphorus
  - Flows
- Effluent Discharge Options

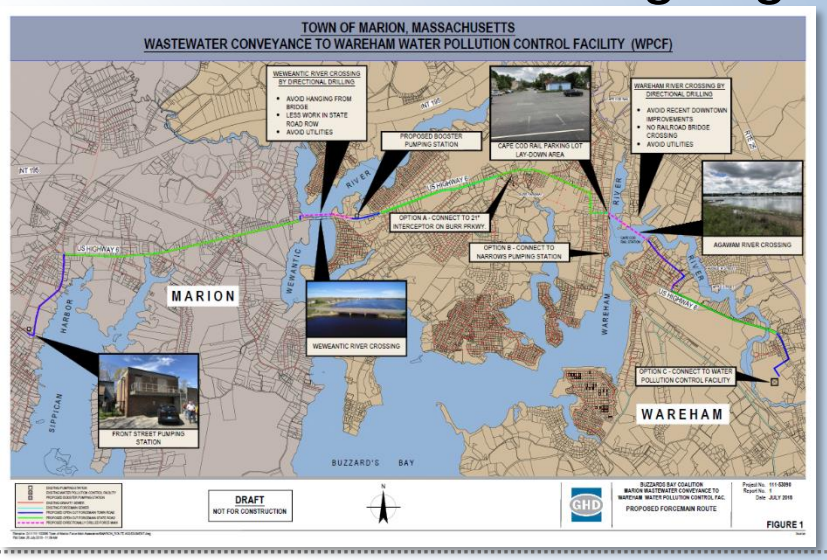
NPDES & AOC Reporting Requirements

Name	Due Date	Reference	How is It Due? EPA	How is It Due? DEP	Written By
Monthly DMRs	15th of Next Month	NPDES 1.G.1 (Page 13 of 15)	NetDMR	NetDMR	*WPCF*
Toxicity DMRs	March 31, June 30, Sept. 30, Dec. 31	NPDES 1.G.6 (Page 15 of 15)	NetDMR	US Mail	*WPCF*
Copper Report	Jan 31	Copper AO IV. 1., Att. 1	• NetDMR • US Mail	US Mail	*Engineer*
Bio-Solids Report (aka Sludge Report)	Feb 19	NPDES 1.D.9 (Page 12 of 15)	EPA NeT Website	US Mail	*WPCF*
Report if Previous Year's Annual Flow Exceeded 80% of Design Flow	Mar 31	NPDES 1.A.1h (Page 6 of 15)	*Not Required*	US Mail	*Engineer*
Collection System O&M Report	Apr 15	NPDES 1.C.6 (Page 10 of 15)	NetDMR Attachment	US Mail	*Engineer*
April AOC Progress Report	Apr 15	AOC IV. 7 (p. 12)	• Email • US Mail	• Email • US Mail	*Engineer*
October AOC Progress Report	Oct 15	AOC IV. 7 (p. 12)	• Email • US Mail	• Email • US Mail	*Engineer*
Report Quarterly Lagoon Total Nitrogen Monitoring Results	Nov 30	AOC IV.2.c (P. 5-6)	• Email • US Mail	• Email • US Mail	*WPCF*
Non-Annual Requirements					
MADEP - Marine Fisheries Report *(Due Every Three Years)*	Oct 31, 2019		*Not Required*	Email	*WPCF*
Full Collection System O&M Plan	Nov 30, 2019	NPDES 1.C.5 (Page 9 of 15)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*
Written Notification of Continuing Progress on Regionalization	Nov 30, 2019	AOC IV.3.c (p. 9)	• *Email* • *US Mail*	• Email • US Mail	*Town Admin*
Collection System Map	May 31, 2020	NPDES 1.C.4 (Page 8 of 15)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*
Written Notification of Continuing Progress on Regionalization	Nov 30, 2021	AOC IV.3.c (p. 9)	• *Email* • *US Mail*	• Email • US Mail	*Town Admin*
Copper Optimization Engineering Report (if Violation 3 of 12 months or 2 consecutive)	365 Days After Repeat Violation	Copper AO IV. 32., Att. 3	• NetDMR • US Mail	US Mail	*Engineer*
Additional Requirements Listed in "Draft" State ACO					
Draft High Flow Management Plan	Nov 30, 2020	ACO V.34.d (p. 12)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*
High Flow Management Plan Progress Report	Mar 15, 2021	ACO V.34.h (p. 14)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*
High Flow Management Plan Progress Report	Sep 15, 2021	ACO V.34.h (p. 14)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*
High Flow Management Plan Progress Report	Mar 15, 2022	ACO V.34.h (p. 14)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*
Revised Draft High Flow Management Plan	Oct 31, 2022	ACO V.34.i (p. 15)	• *Email* • *US Mail*	• Email • US Mail	*Engineer*

Marion CWMP

Key Planning Issues – Project Drivers

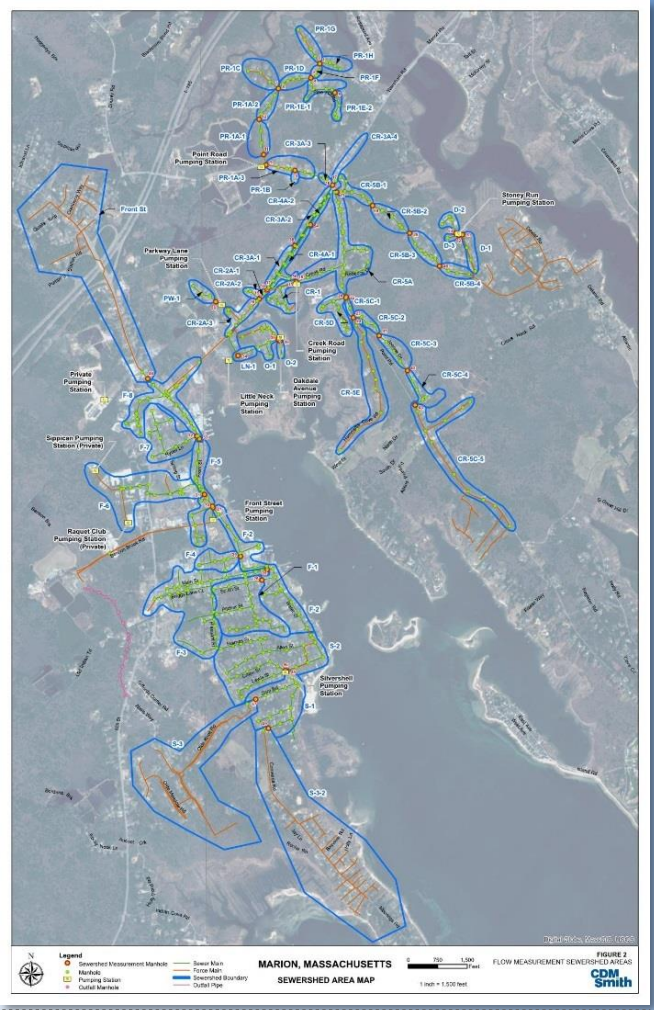
- Regionalization
  - Understanding Marion's In-Town Alternatives for Comparison to Regional Approach
  - Cost Information is Critical to Informed Decision Making
  - Role of Stakeholders in Selecting Right Plan for Marion



Marion CWMP

Key Planning Issues – Project Drivers

- System Expansion Needs
  - Service to Additional Areas
  - Capacity Planning
- Financial Considerations
  - Local Cost Mitigation
  - Rates & Affordability
- Stakeholder Outreach & Public Involvement
  - Importance of Townspeople Understanding the Wastewater Plan
  - Local Support for Needed Actions



CWMP Approach

- **Building the Framework**
  - Financial
  - Regulatory
- **Shaping the Pieces**
  - Focus
  - Customize to Your Community
  - Build on Experiences of Other Communities
- **Fitting the Pieces Together**
  - Combine Projects to Achieve a Bigger Goal
  - Adaptive Management

Marion CWMP

CWMP Approach

- Update Information on Needs Areas from Sewer Needs Analysis & 2001 CWMP
- Address Capacity Needs to Support Planning and Economic Development
- Review & Incorporate the Regional Alternative
- Incorporate Existing Sewer System & PS Rehab. Needs
- Evaluate WPCF & Lagoons Supplemental Future Needs

Marion CWMP

CWMP Report Outline

1. Introduction & Background
2. Existing Conditions Assessment
3. Future Conditions Assessment
   - Flows and Loads
4. Identification of Project Needs
5. Alternatives Screening
6. Recommended Plan
7. Implementation & Financing
8. Public Participation

Marion CWMP

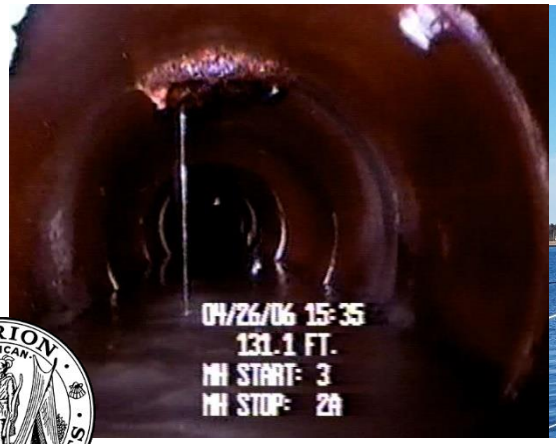
Role of CAC

- Provide community perspective on what is important to Marion
- Participate in discussion of key wastewater issues facing Marion
- Support prioritization of local wastewater needs
- Help facilitate review of CWMP alternatives
- Support development of recommendations based on knowledge of local issues/concerns
- Foster communication with others about wastewater issues in Marion

Marion CWMP

CAC Comments

From your perspective, what is important to Marion?



Marion CWMP

Next CAC Meeting

March 24, 2021 – 2:00PM

Existing Wastewater Conditions & Preliminary Needs Discussion

Weston & Sampson℠

Thank You

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

TOWN OF MARION, MASSACHUSETTS
Comprehensive Wastewater Management Plan (CWMP)

Citizen's Advisory Committee (CAC) Meeting

Location – Virtual

March 24, 2021; 2:00 pm

AGENDA

1. Introductions/ Observations Since Last Meeting
2. Marion's Existing Wastewater Systems
    a. Collection System & Pump Stations
    b. Water Pollution Control Facility
    c. On-Site Treatment Systems
3. Unsewered Areas
4. CAC Input – Future Sewer Extensions
5. Questions and Discussion Points
6. Next CAC Meeting

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Citizens Advisory Committee Meeting

March 24, 2021

Weston & Sampson

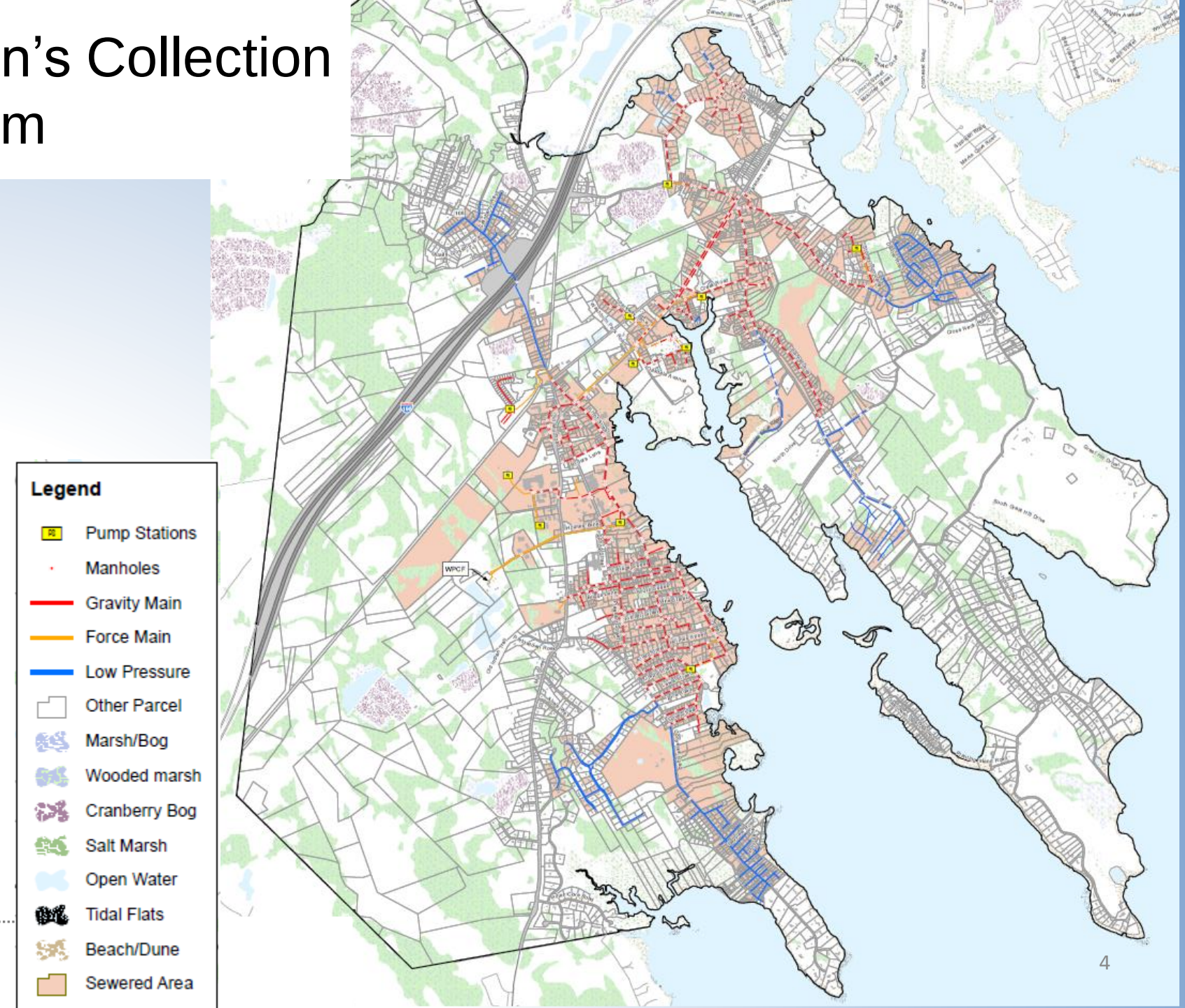
Marion CWMP

Presentation Agenda

- Introductions/ Observations Since Last Meeting
- Marion's Existing Collection System
- Unsewered Areas
- CAC Input – Future Sewer Extensions
- Questions & Discussion
- Next CAC Meeting – Needs & Alternatives

Introductions / Observations Since Last Meeting

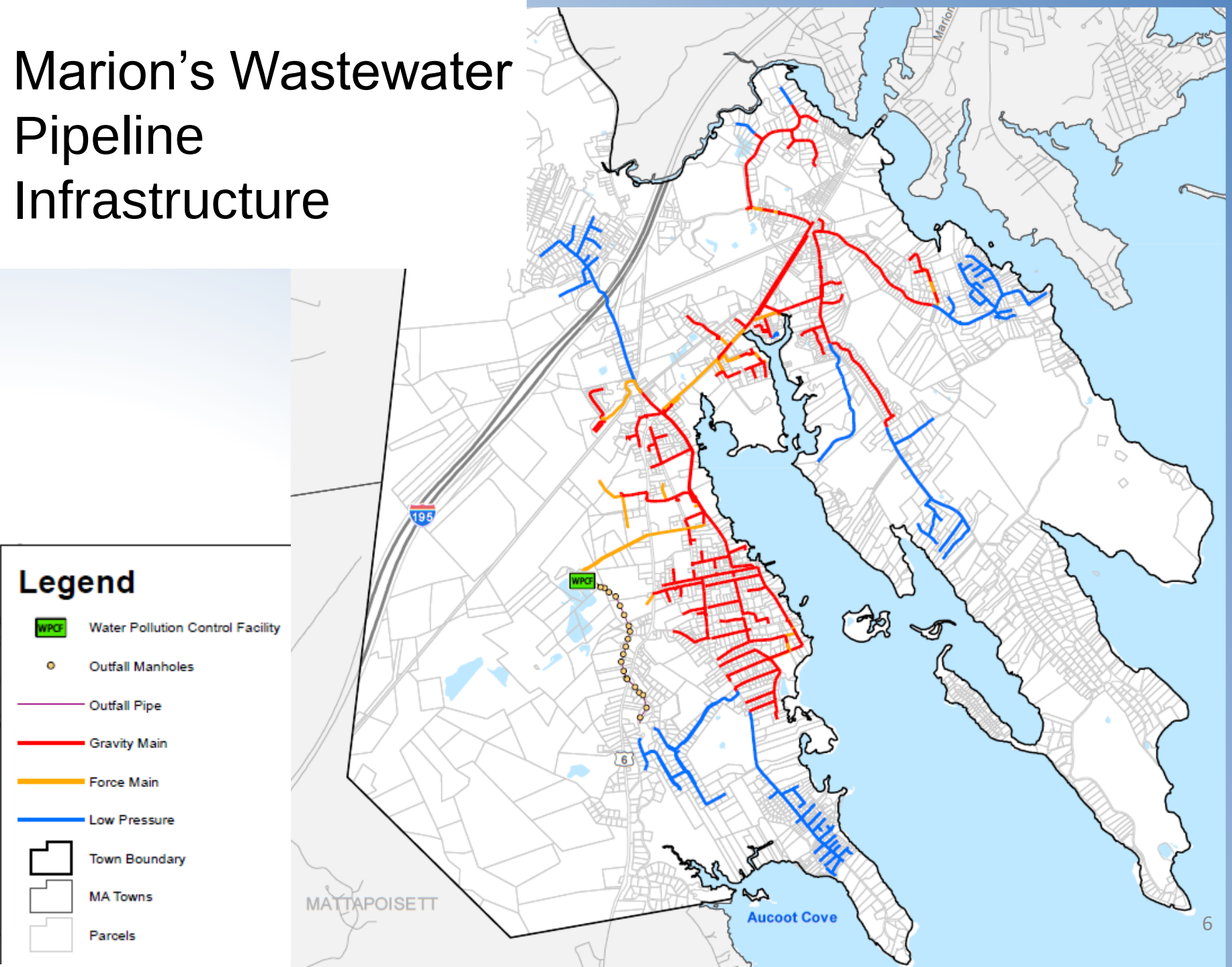
Marion's Collection System



Marion's Existing Collection System

- 19 Miles of Gravity Sewer Main
- 4.5 Miles of Force Main
- 8.5 Miles of Low-Pressure Sewer
- 8 Pump Stations
- ~1,690 Connections
  - ~70% Gravity
  - ~500 Grinder Pumps

Marion's Wastewater Pipeline Infrastructure



Marion CWMP

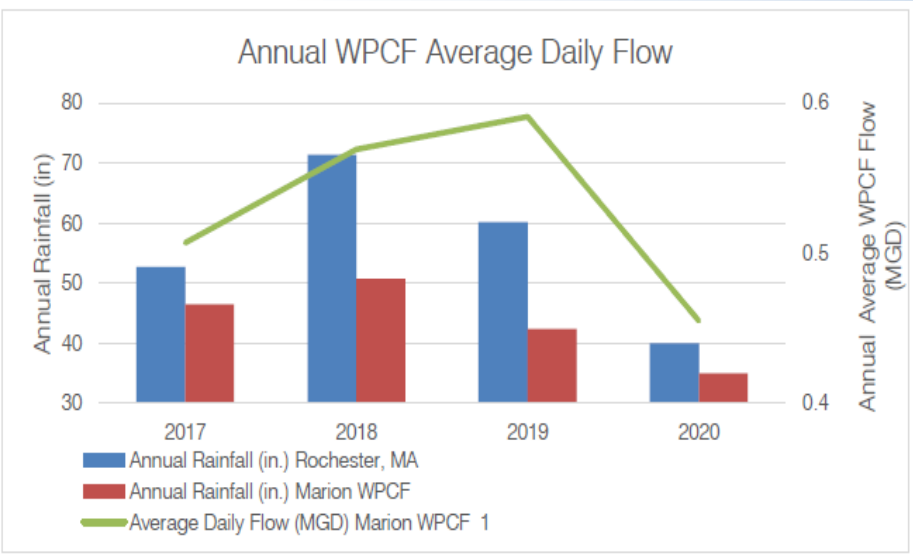
Marion's Existing Collection System

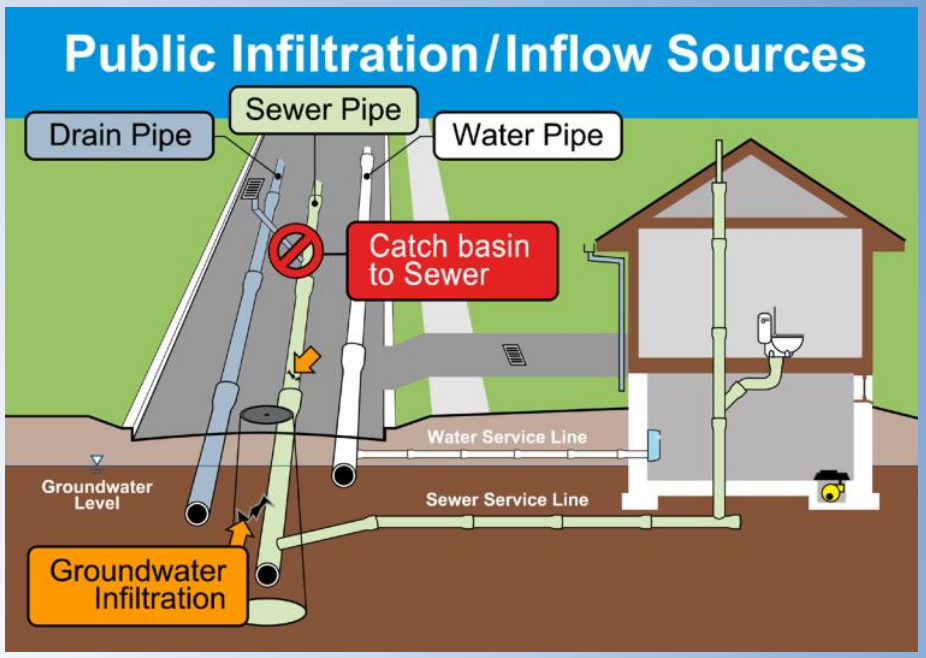
Pipeline Infrastructure

– Inflow & Infiltration

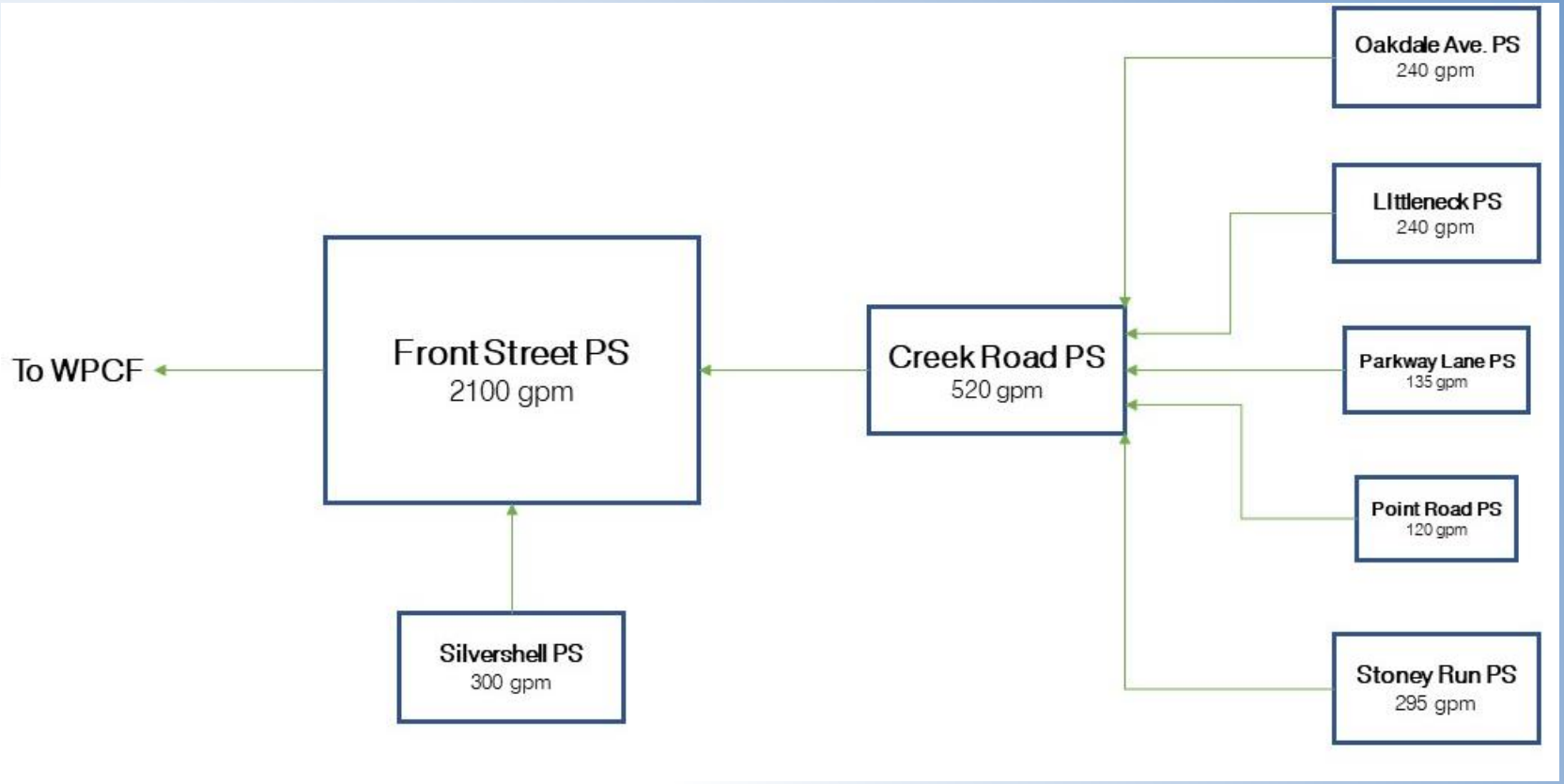
Broken Pipe

Infiltration





Marion CWMP
Pump Stations



Marion CWMP
Pump Stations

Front Street Pump Station

Creek Road Pump Staion

Silvershell Pump Station

Point Road Pump Station

Littleneck Pump Station

Oakdale Pump Station Wet Well

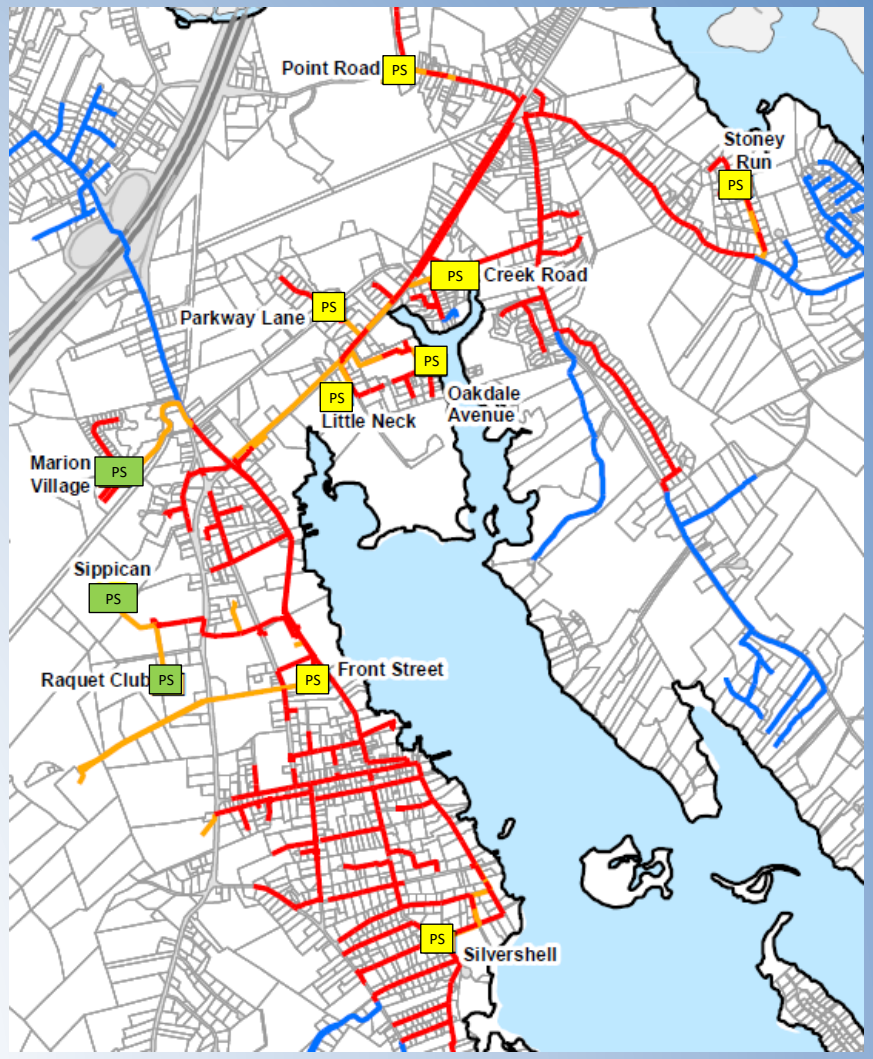
Stoney Run Pump Station Hatches

Parkway Lane Pump Station Wetwell

Marion CWMP

Pump Stations

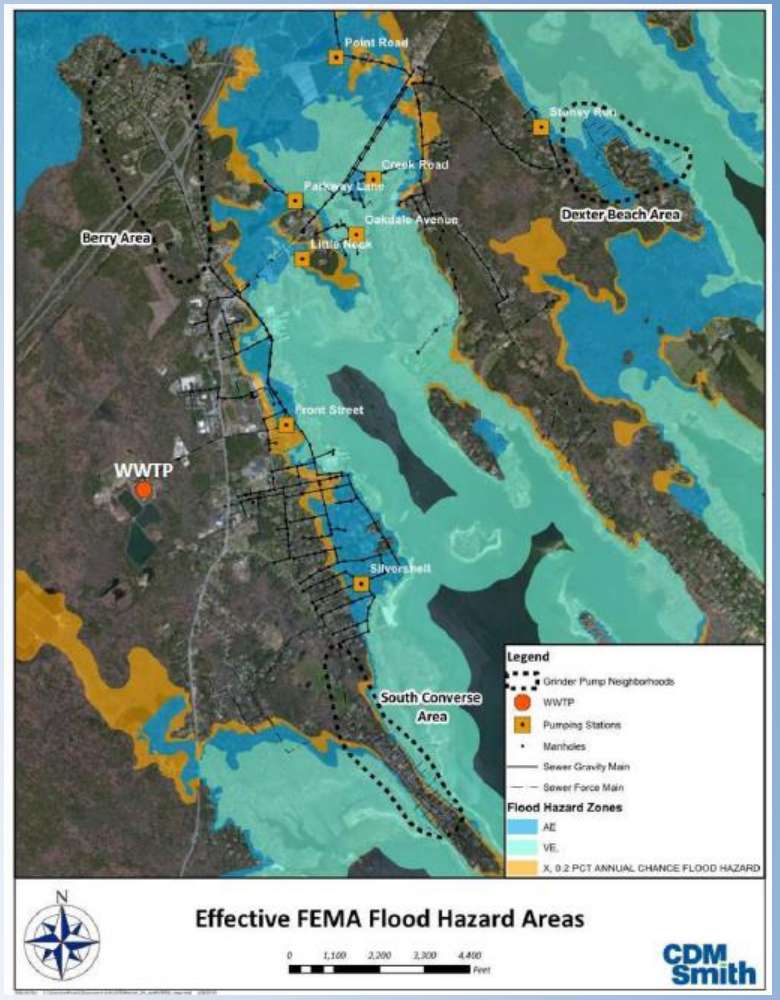
Pump Station	Approx. Age (years)	Approx. No. Properties Served
Front Street	50 *2005 Update	1,700
Creek Road	50	500
Silvershell	60	500
Oakdale Avenue	30	70
Littleneck	10	10
Parkway Lane	35	15
Point Road	50	70
Stoney Run	25	30



Marion CWMP

Existing Collection System

- Private Sewers
- Grinder Pumps
- Resiliency Concerns



Marion CWMP

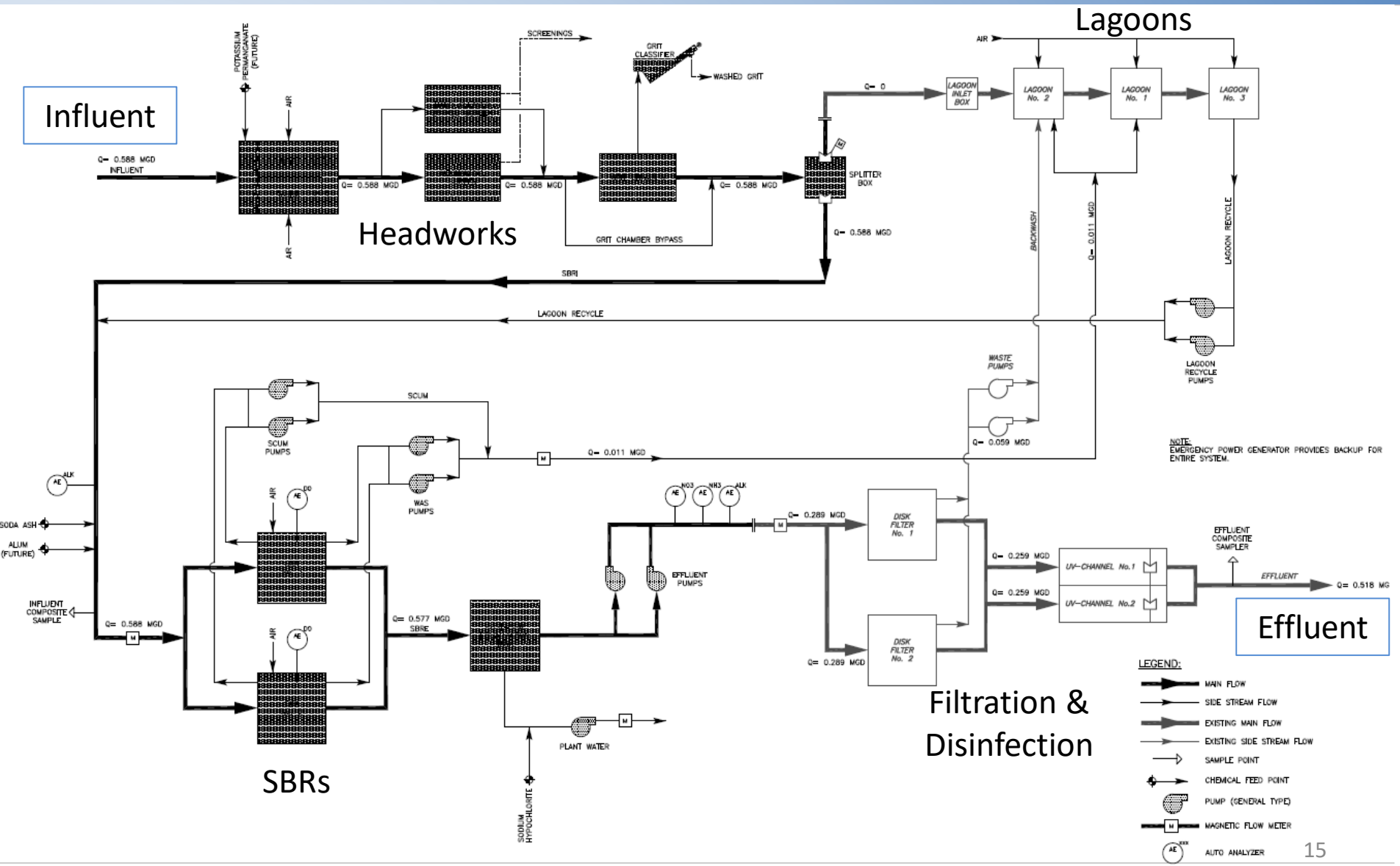
Marion's WPCF

- WPCF located on Benson Brook Road
- NPDES Permitted Discharge
  - 0.588 MGD Avg. Daily Flow
  - Peak Capacity of 1.1 MGD
  - Lagoon System Handles Wet Weather Flow

Marion CWMP
Marion's WPCF

Marion CWMP
Marion's WPCF

Marion CWMP
Marion's WPCF



Marion CWMP
Marion's WPCF

Influent Rotary Fine Screen with Screw Conveyor

Sequencing Batch Reactor (SBR)

Headworks Building

Aeration Blowers

Marion CWMP
Marion's WPCF

Disk Filter Building

Disk Filters (Cloth Media Disks)

UV Disinfection Building

UV Disinfection

Marion CWMP
Marion's WPCF

Soda Ash Storage Silo

Plant Water System

Lagoon No. 1

Marion CWMP

Marion's WPCF

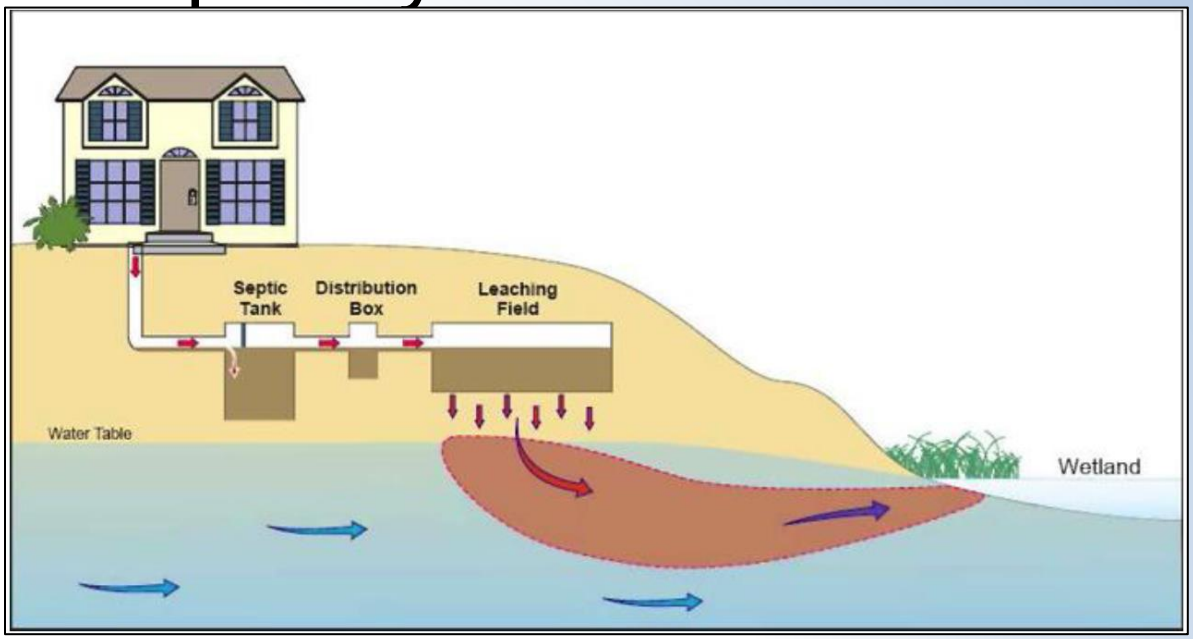
Permitting & Regulatory Issues

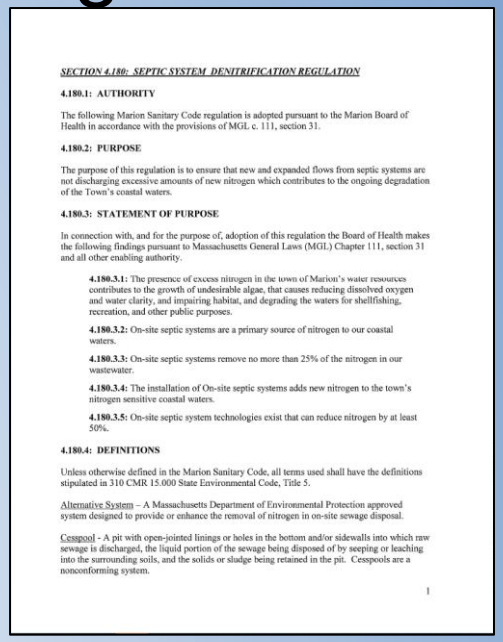
- NPDES Permitted Discharge
  - Capacity
  - Nitrogen
  - Phosphorus
  - Metals
  - Lagoons
- Consent Orders

Marion CWMP
Unsewered Areas

On-Site Systems

- ~900 on-site septic systems (~1/3 developed properties)
- Septic System Denitrification Regulations





SECTION 4.180: SEPTIC SYSTEM DENITRIFICATION REGULATION

4.180.1: AUTHORITY

The following Marion Sanitary Code regulation is adopted pursuant to the Marion Board of Health in accordance with the provisions of MGL c. 111, section 31.

4.180.2: PURPOSE

The purpose of this regulation is to ensure that new and expanded flows from septic systems are not discharging excessive amounts of new nitrogen which contributes to the ongoing degradation of the Town's coastal waters.

4.180.3: STATEMENT OF PURPOSE

In connection with, and for the purpose of, adoption of this regulation the Board of Health makes the following findings pursuant to Massachusetts General Laws (MGL) Chapter 111, section 31 and all other enabling authority.

4.180.3.1: The presence of excess nitrogen in the town of Marion's water resources contributes to the growth of undesirable algae, that causes reducing dissolved oxygen and water clarity, and impairing habitat, and degrading the waters for shellfishing, recreation, and other public purposes.

4.180.3.2: On-site septic systems are a primary source of nitrogen to our coastal waters.

4.180.3.3: On-site septic systems remove no more than 25% of the nitrogen in our wastewater.

4.180.3.4: The installation of On-site septic systems adds new nitrogen to the town's nitrogen sensitive coastal waters.

4.180.3.5: On-site septic system technologies exist that can reduce nitrogen by at least 50%.

4.180.4: DEFINITIONS

Unless otherwise defined in the Marion Sanitary Code, all terms used shall have the definitions stipulated in 310 CMR 15.000 State Environmental Code, Title 5.

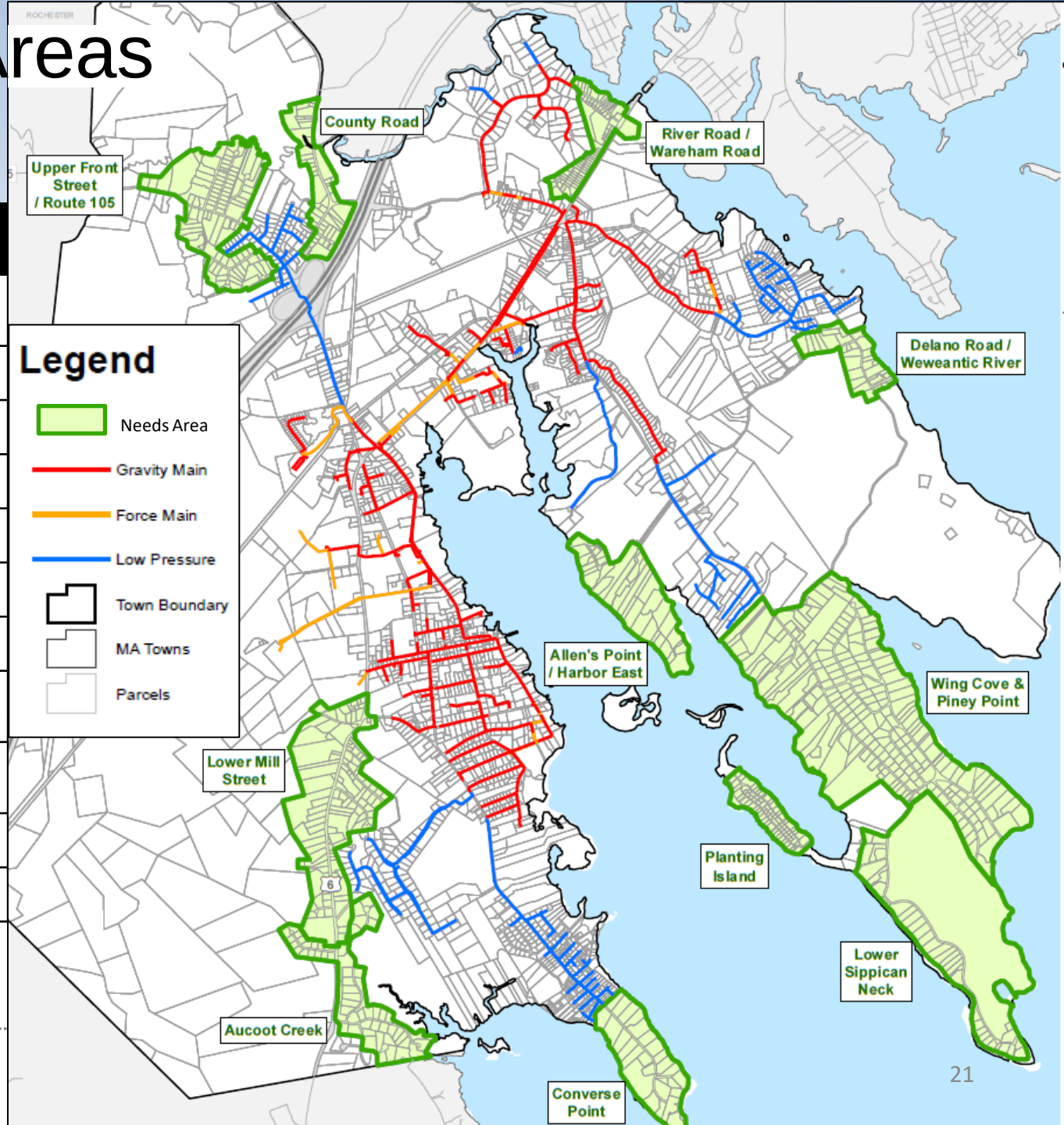
Alternative System – A Massachusetts Department of Environmental Protection approved system designed to provide or enhance the removal of nitrogen in on-site sewage disposal.

Cesspool - A pit with open-jointed linings or holes in the bottom and/or sidewalls into which raw sewage is discharged, the liquid portion of the sewage being disposed of by seeping or leaching into the surrounding soils, and the solids or sludge being retained in the pit. Cesspools are a nonconforming system.

1

Unsewered Areas

Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wing Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allen's Point/ Harbor East
Converse Point
Aucoot Cove
Lower Mill Street
Upper Front Street/ Route 105
County Road

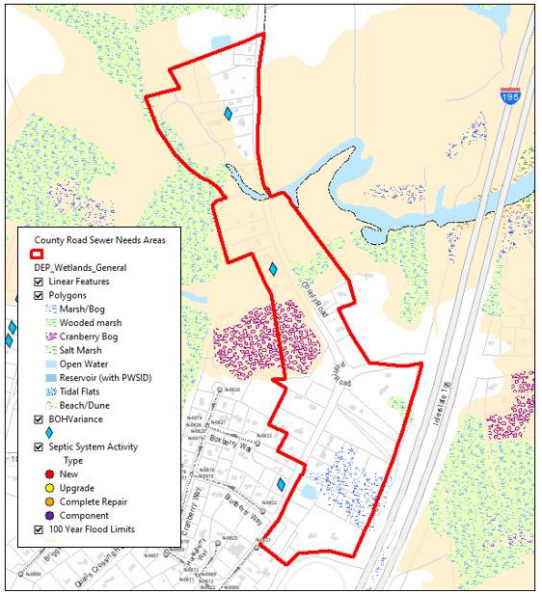


Marion CWMP

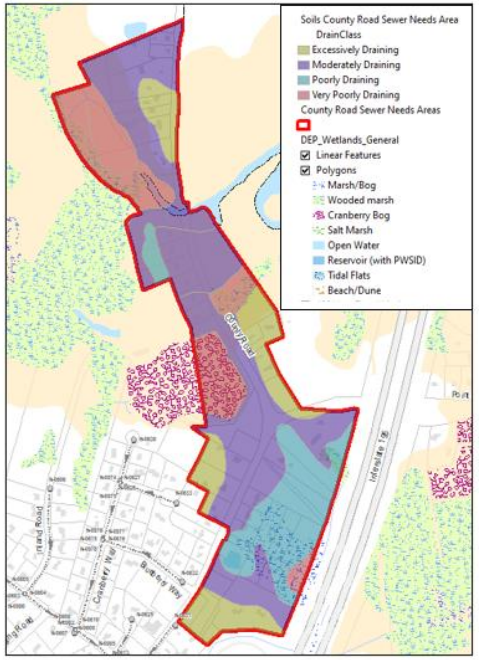
Unsewered Areas

Priority Criteria:

- # Parcels (Developed & Developable)
- Nitrogen Loading & Proximate Impairments
- Assumed Age of On-Site Systems
- BOH Variances
- Zoning
- Lot Size
- Soil Characteristics
- Flood Plains
- Other



County Road Needs Area



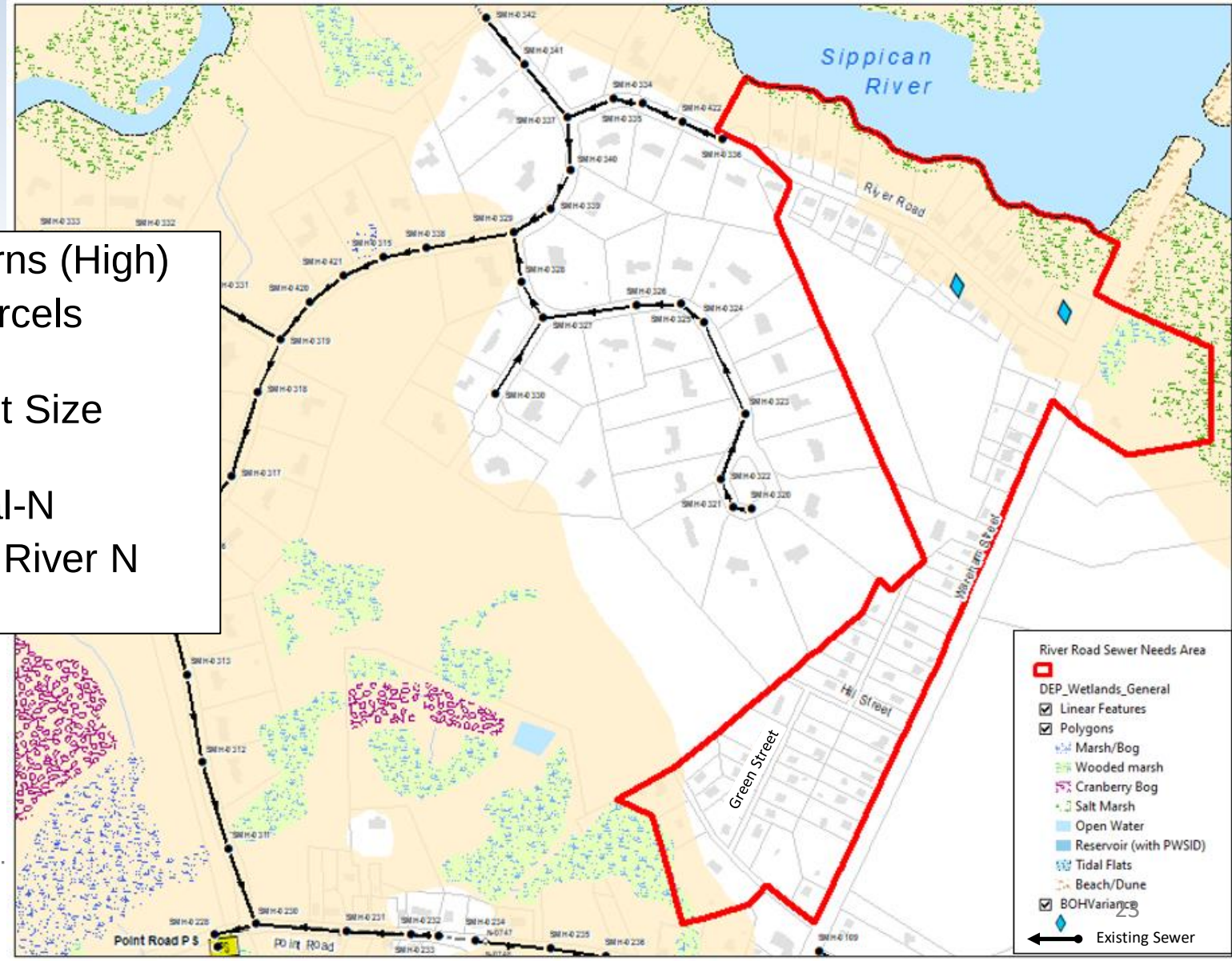
County Road Soils Profile

Unsewered Areas

River Road/ Wareham Street

Priority Concerns (High)

- 95 Total Parcels
  - 72 Built
- Average Lot Size
  - 0.55 Acre
- 5.3lb/d Total-N
- Weweantic River N Impairment

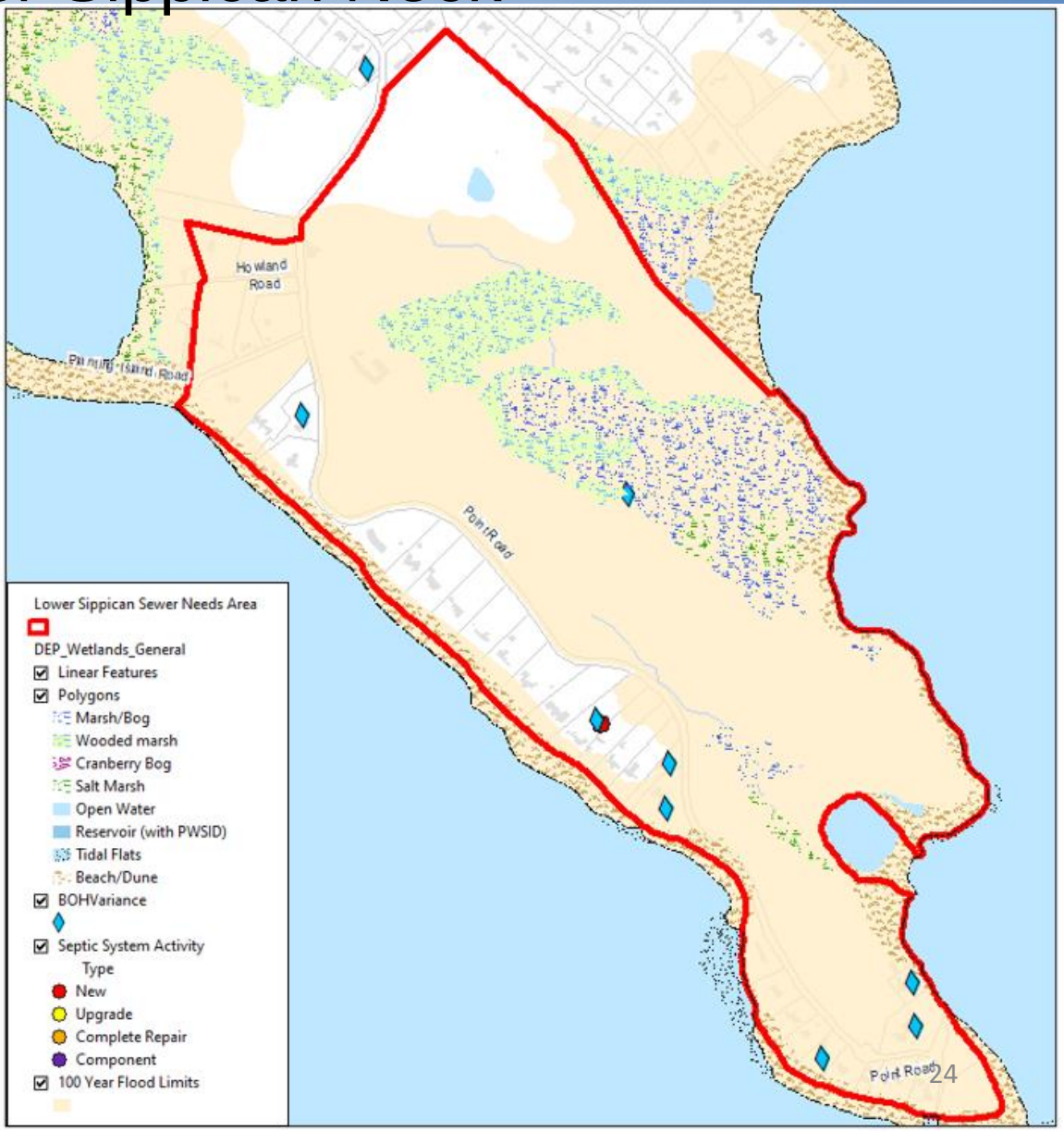


Unsewered Areas

Lower Sippican Neck

Priority Concerns (High)

- 38 Total Parcels
  - 34 Built
- Average Age
  - 68 years
- 7 BOH Variances (21%)
- 83% in Flood Plain



Unsewered Areas

Planting Island

Priority Concerns (High)

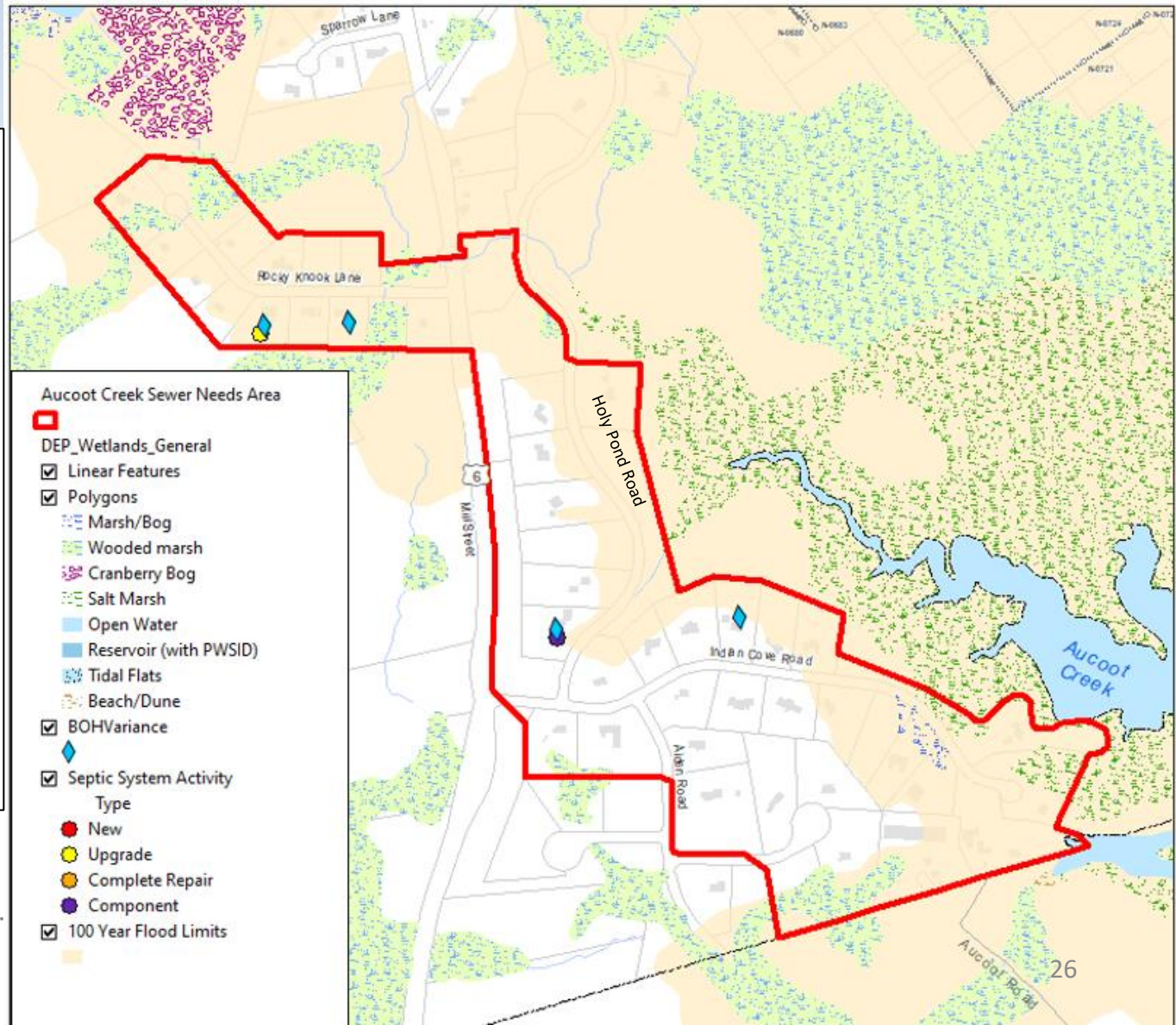
- 80 Total Parcels
  - 68 Built
- Average Lot Size
  - 0.33 Acre
- 12 BOH Variances (18%)
- 4.5 lb/d Total-N
- 81% Excessive Draining Soils
- 71% in Flood Plain

Unsewered Areas

Aucoot Creek

Priority Concerns (High)

- 58 Total Parcels
  - 45 Built
- Average Lot Size
  - 0.55 Acre
- 3.0lb/d Total-N
- Aucoot Creek N Impairment
- 59% in Flood Plain

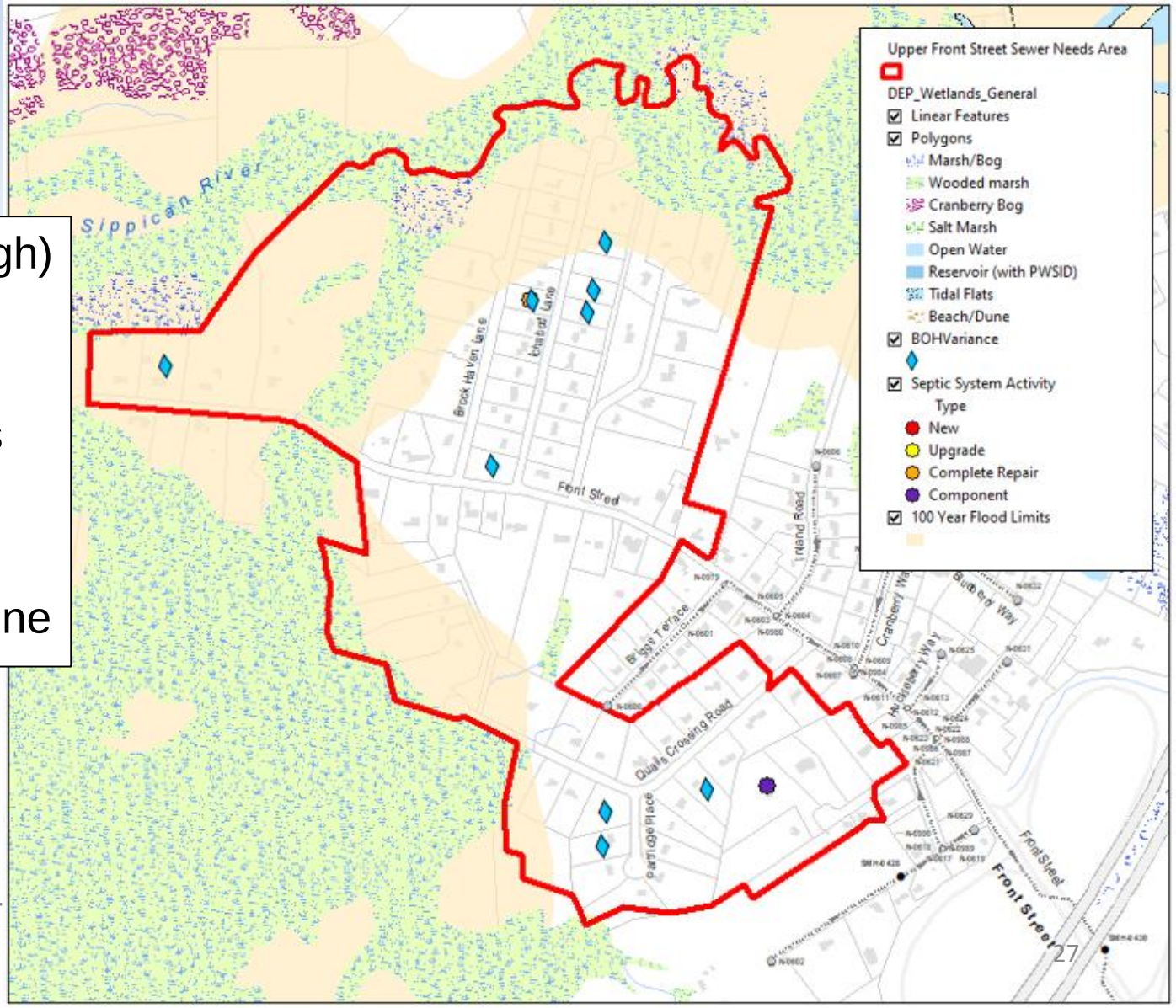


Unsewered Areas

Upper Front Street

Priority Concerns (High)

- 98 Total Parcels
  - 91 Built
- 10 BOH Variances (11%)
- 5.9lb/d Total-N
- Well Protection Zone

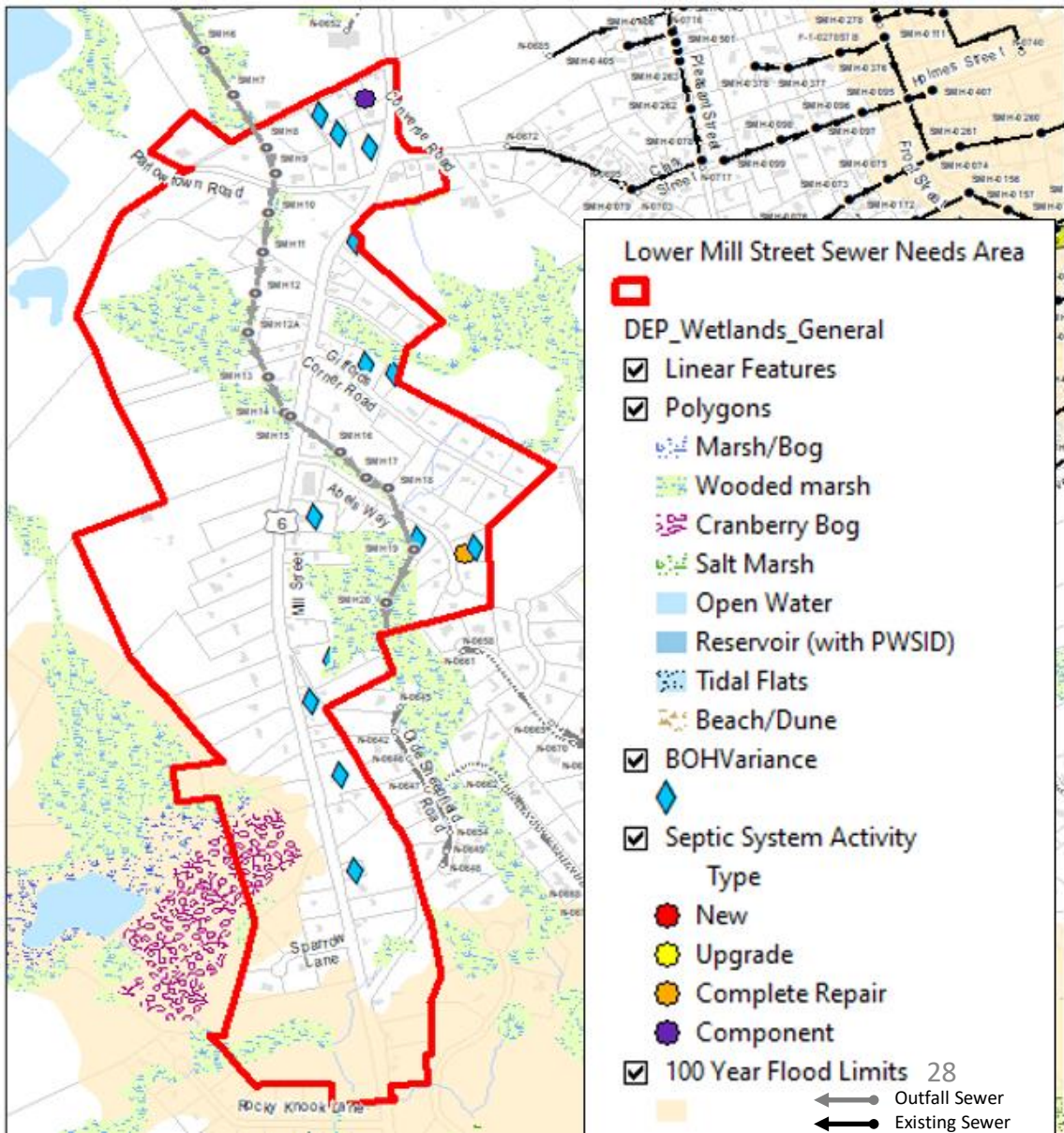


Unsewered Areas

Lower Mill Street

Priority Concerns (Med)

- 116 Total Parcels
  - 100 Built
- 13 BOH Variances (13%)
- 6.7 lb/d Total-N

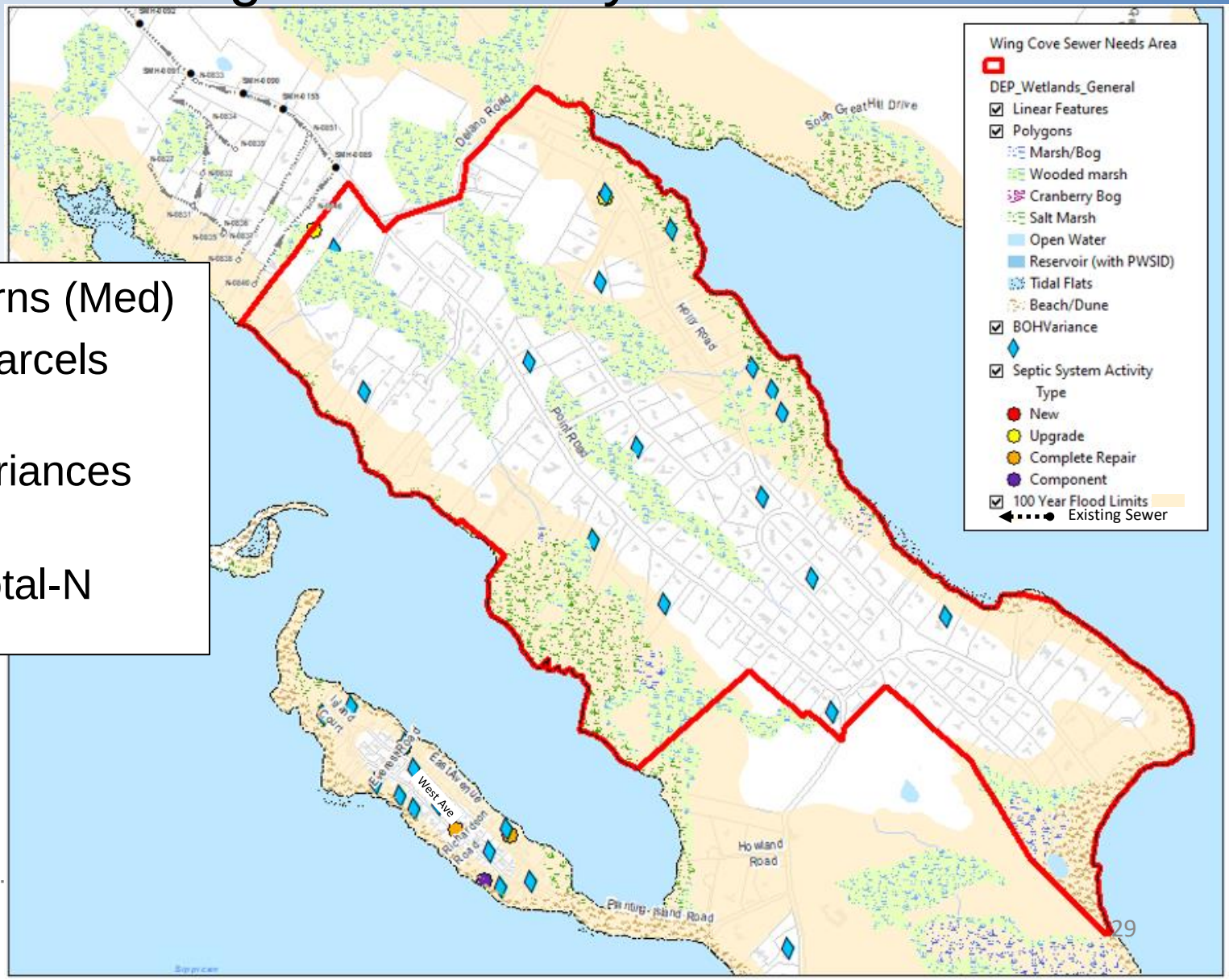


Unsewered Areas

Wings Cove/ Piney Point

Priority Concerns (Med)

- 222 Total Parcels
  - 158 Built
- 16 BOH Variances (10%)
- 10.9 lb/d Total-N

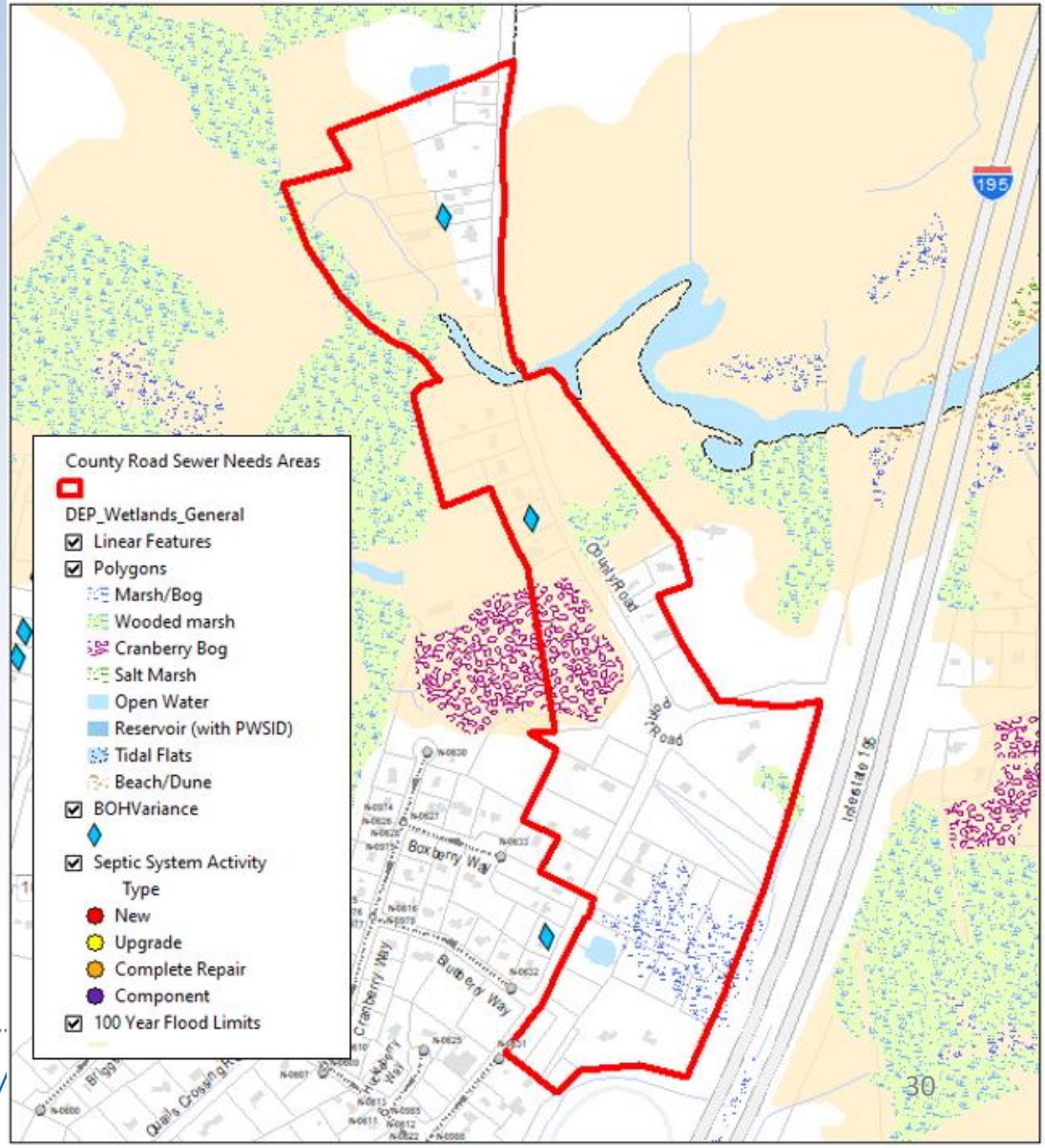


Unsewered Areas

County Road

Priority Concerns (Med)

- 48 Total Parcels
  - 27 Built
- Average Age
  - 61 years

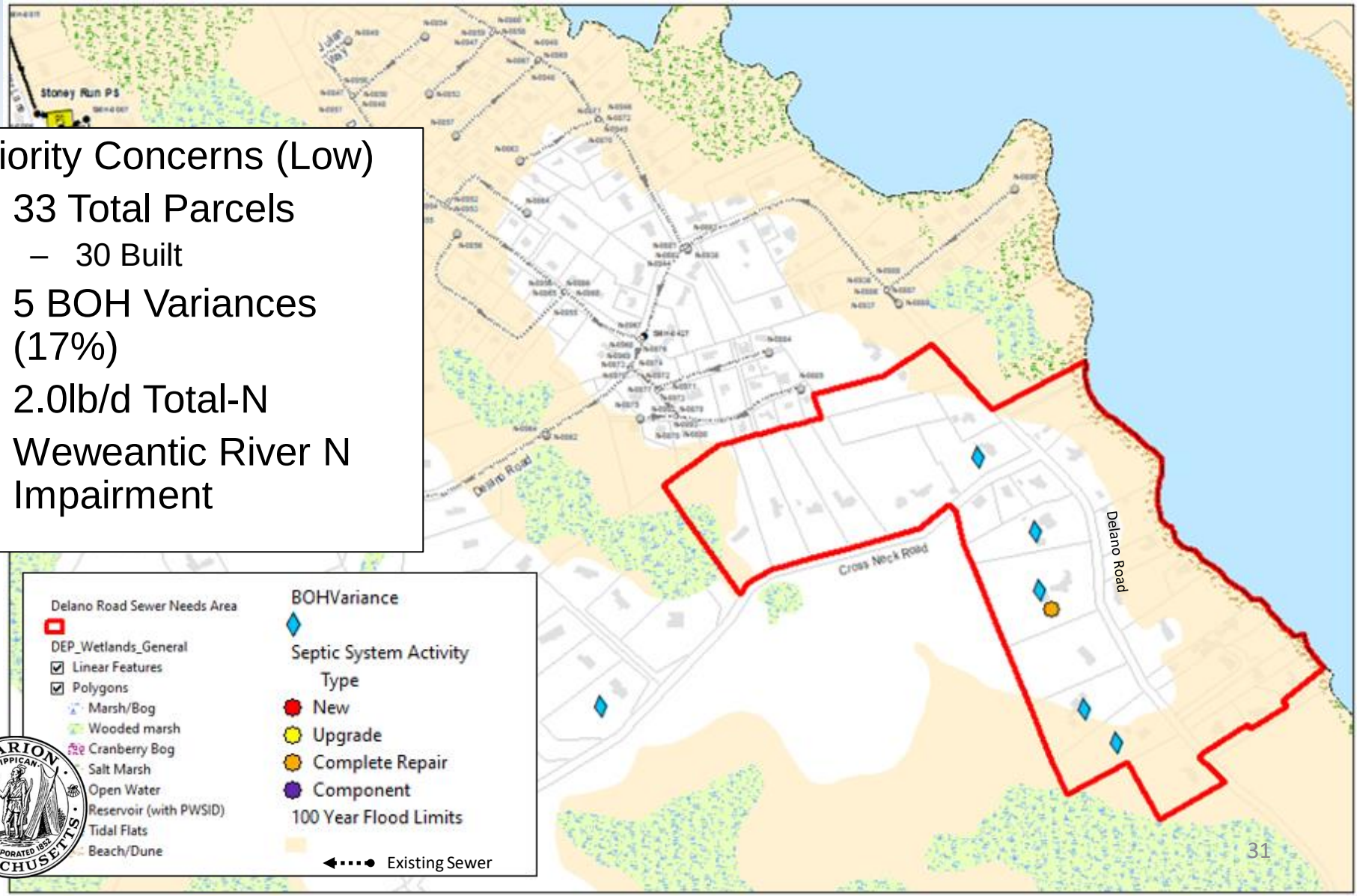


Unsewered Areas

Delano Road/ Weweantic River

Priority Concerns (Low)

- 33 Total Parcels
  - 30 Built
- 5 BOH Variances (17%)
- 2.0lb/d Total-N
- Weweantic River N Impairment

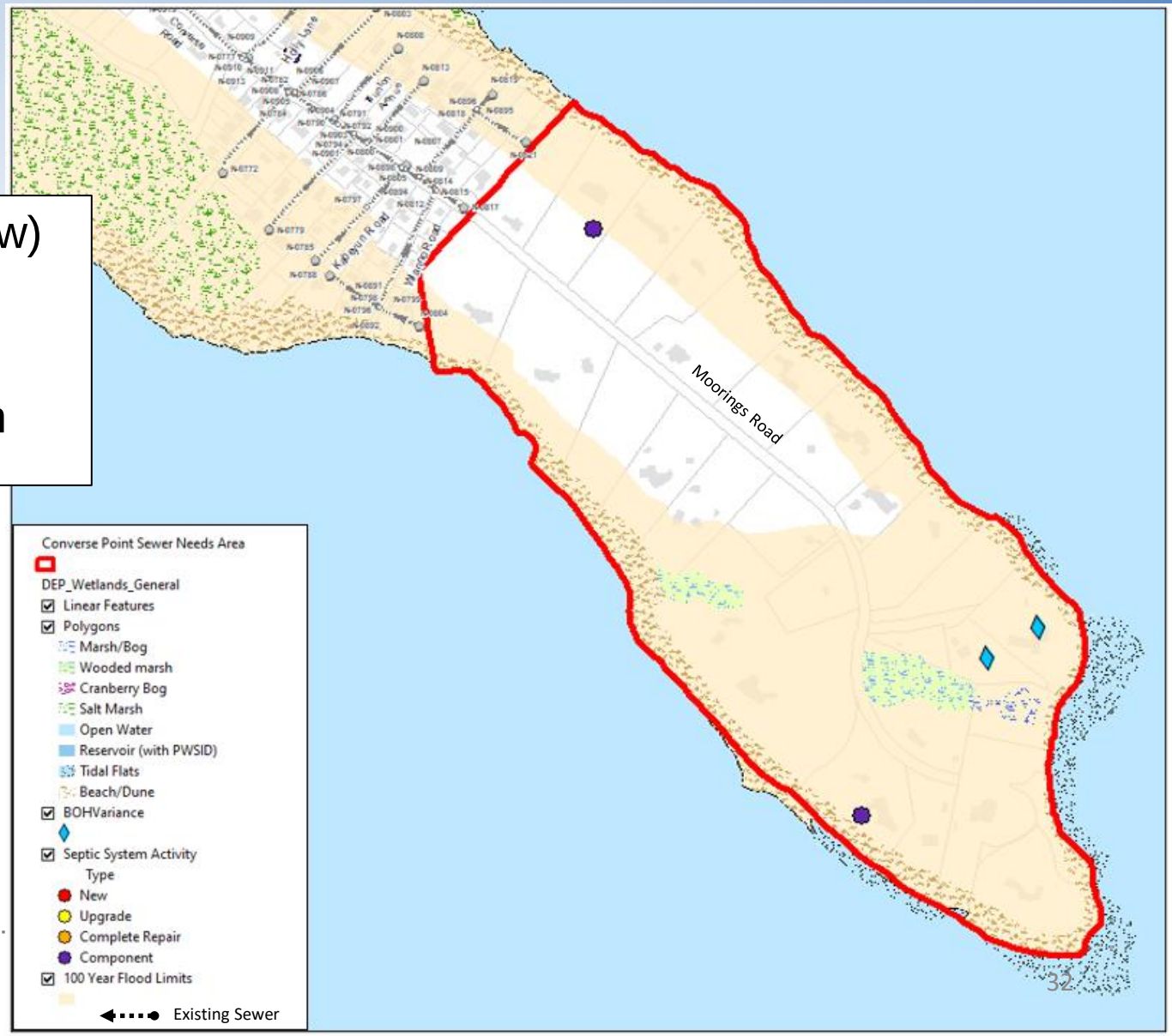


Unsewered Areas

Converse Point

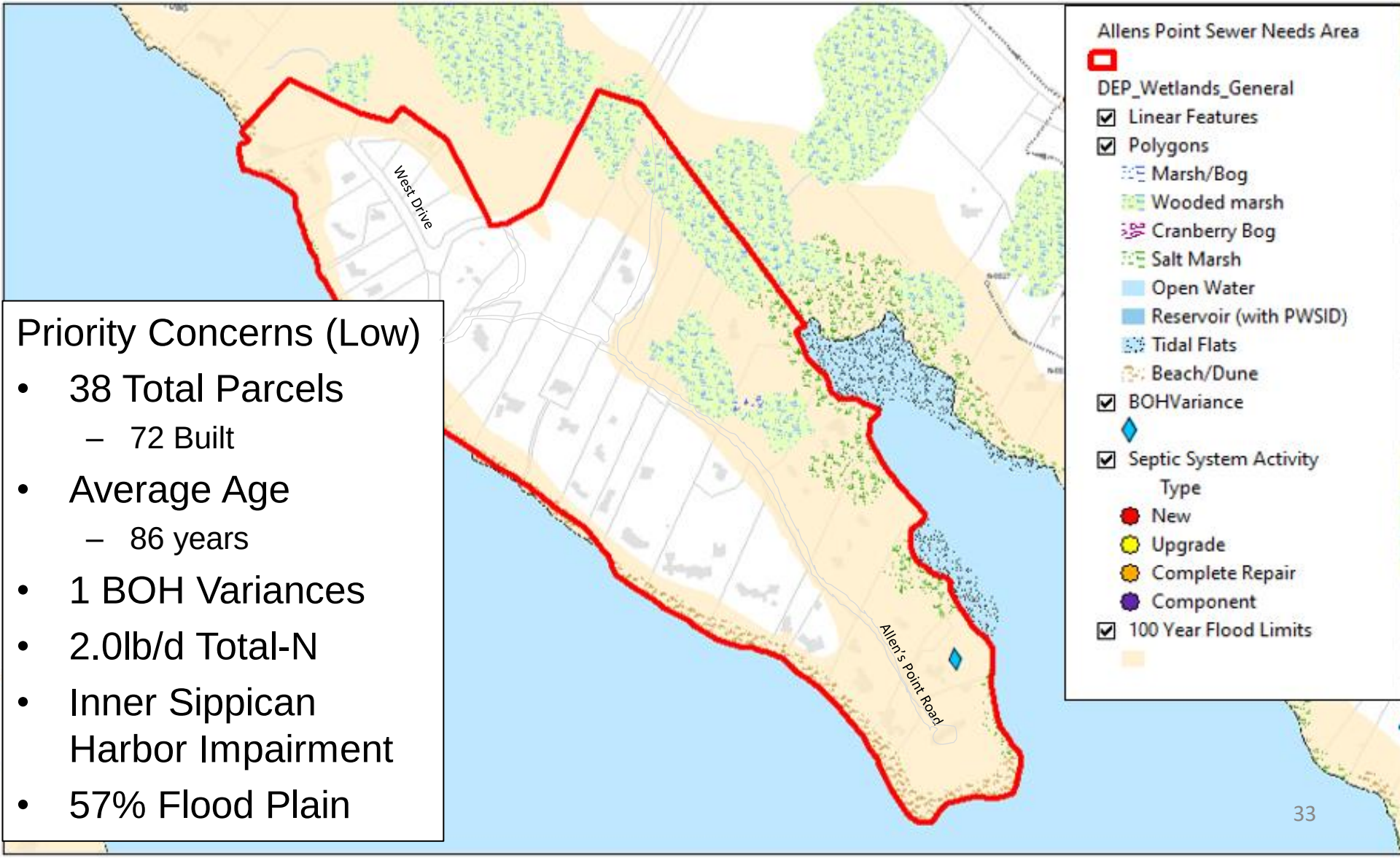
Priority Concerns (Low)

- 28 Total Parcels
  - 22 Built
- 72% in Flood Plain



Unsewered Areas

Allen's Point/ Harbor East



Priority Concerns (Low)

- 38 Total Parcels
  - 72 Built
- Average Age
  - 86 years
- 1 BOH Variances
- 2.0lb/d Total-N
- Inner Sippican Harbor Impairment
- 57% Flood Plain

Unsewered Areas

Needs Area	Total # Parcels with Possible On-Site Systems	# Parcels with Existing Buildings	# Developable Vacant Parcel Lots	Review Criteria												Priority
				Estimated Total Nitrogen Loading (lb/day)		Proximate Nitrogen Impairment	Average Age of System (years)	# BOH Variances (% of Systems)	Upgrade or New Systems; Past 20 years	Land Use & Zoning	Avg Lot Size (acres)	Soil Characteristics		Flood Plain Protections 100-year floodplain	Other	
				BEST CASE	WORST CASE							Excessive Draining	Poor/Very Poor Draining			
River Road / Wareham Street	91	72	19	4.2	6.3	Weweantic River	42	2 (3%)	2	Majority Residence A and C	0.55	17%	13%	33%	-	High
Lower Sippican Neck	37	34	3	1.7	2.7	None	68	7 (21%)	1	All Residence D	1.5	0%	39%	83%		High
Planting Island	76	68	8	3.5	5.5	None	60	12 (18%)	3	All Residence D	0.3	81%	4%	71%		High
Aucoot Creek	50	45	5	2.3	3.6	Aucoot Creek	36	4 (9%)	2	Majority Residence C	1.4	0%	31%	59%		High
Upper Front Street	96	91	5	4.5	7.2	None	43	10 (11%)	2	Residence B, C, D	1.2	4%	24%	47%	Well Protection Zone	High
Lower Mill Street	112	100	12	5.2	8.1	None	54	13 (13%)	2	All Residential Districts	1.3	0%	30%	14%		Medium
Wing Cove / Piney Point	187	158	29	8.5	13.2	None	59	16 (10%)	2	Majority Residence C	1.8	0%	13%	42%		Medium
County Road	41	27	14	1.8	2.6	None	61	2 (7%)	0	Residence B and C	1	17%	36%	45%		Medium
Delano Road / Weweantic River	33	30	3	1.5	2.4	Weweantic River	48	5 (17%)	1	Majority Residence D	1.2	0%	5%	41%		Low
Converse Point	26	22	4	1.2	1.8	None	55	2 (9%)	2	All Residence D	2.6	0%	6%	72%		Low
Allen's Point/ Habor East	35	28	7	1.6	2.4	Inner Sippican Harbor	86	1 (3%)	0	All Residence D	2.4	14%	11%	57%		Low

Questions / Discussion

Marion CWMP

Next CAC Meeting

Wednesday, May 26 (Tentative)

Needs & Alternatives

Weston & Sampson℠

Thank You

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

TOWN OF MARION, MASSACHUSETTS
Comprehensive Wastewater Management Plan (CWMP)

Citizen's Advisory Committee (CAC) Meeting

Location – Virtual

May 19, 2021; 2:00 pm

AGENDA

1. Observations Since Last Meeting

2. Needs & Alternatives Screening

    a. Review of Unsewered Needs Areas Prioritization
    b. Review Needs Analysis (WPCF, Collection System, Pump Stations)
    c. Screening of Alternatives

3. CAC Input

4. Questions and Discussion Points

5. Next CAC Meeting

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Citizens Advisory Committee Meeting

May 19, 2021

Weston & Sampson

Marion CWMP

Presentation Agenda

- Observations Since Last Meeting
- Needs & Alternatives
  - Unsewered Needs Areas Prioritization
  - WPCF, Collection System, Pump Station Needs
  - Alternatives
- CAC Input
- Questions & Discussion
- Next CAC Meeting

Marion CWMP

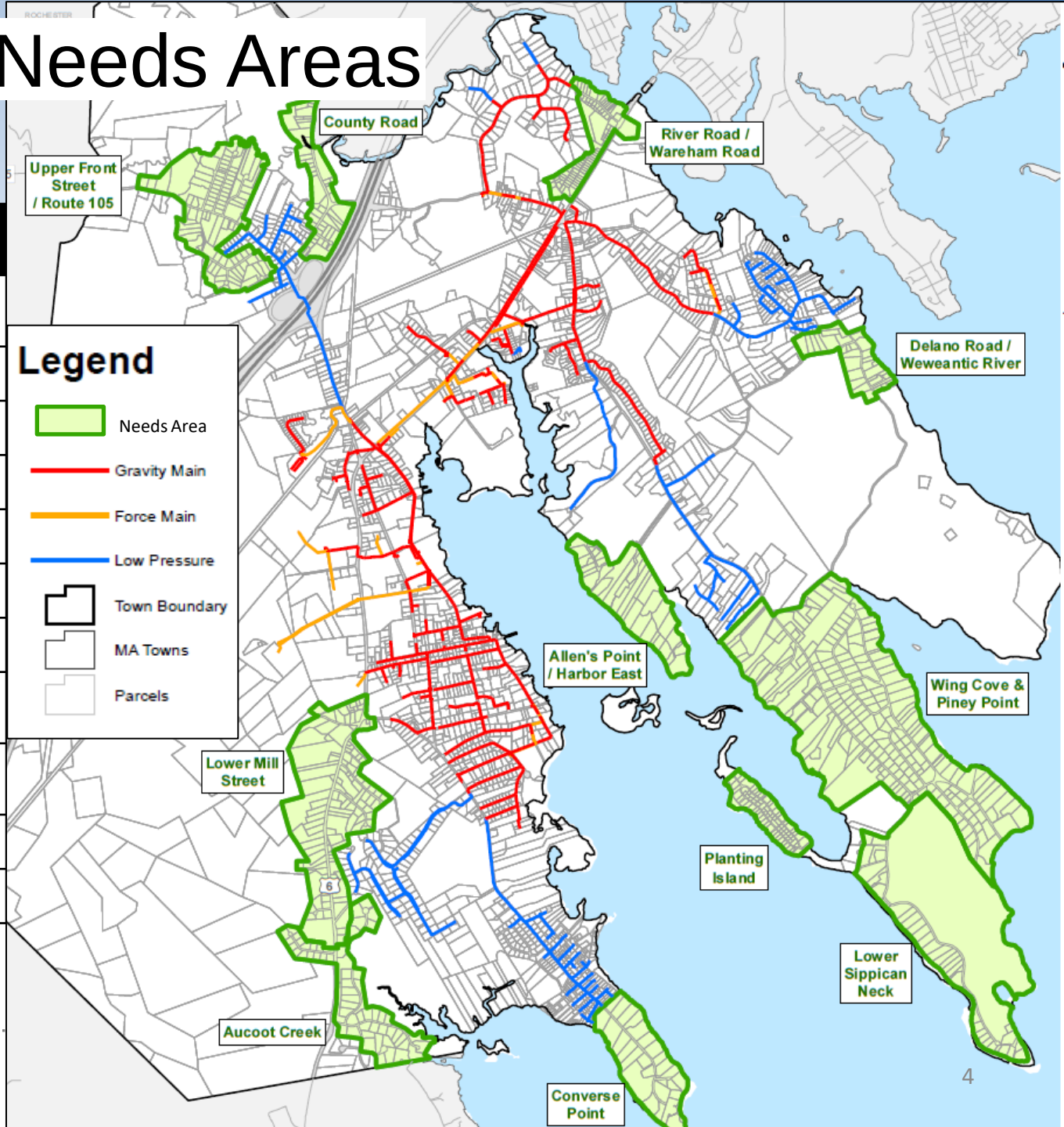
Recap of CAC Meeting #2

- Existing System
  - Collection System
  - Pump Stations
  - WPCF
- Unsewered Areas & On-Site Systems
- Future Sewer Extensions

Observations/Input Since Last Meeting

Unsewered Needs Areas

Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wing Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allen's Point/ Harbor East
Converse Point
Aucoot Cove
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP

Unsewered Areas Prioritization

Needs Area	Priority Score	Priority Rank
Planting Island	45	High
Lower Sippican Neck	39	High
Upper Front Street	35	High
Aucoot Creek	33	High
River Road/ Wareham Street	28	High
Lower Mill Street	32	Medium
County Road	29	Medium
Wing Cove/ Piney Point	28	Medium
Delano Road/ Weweantic River	26	Low
Allen's Point/ Harbor East	18	Low
Converse Point	17	Low

Priority Criteria:

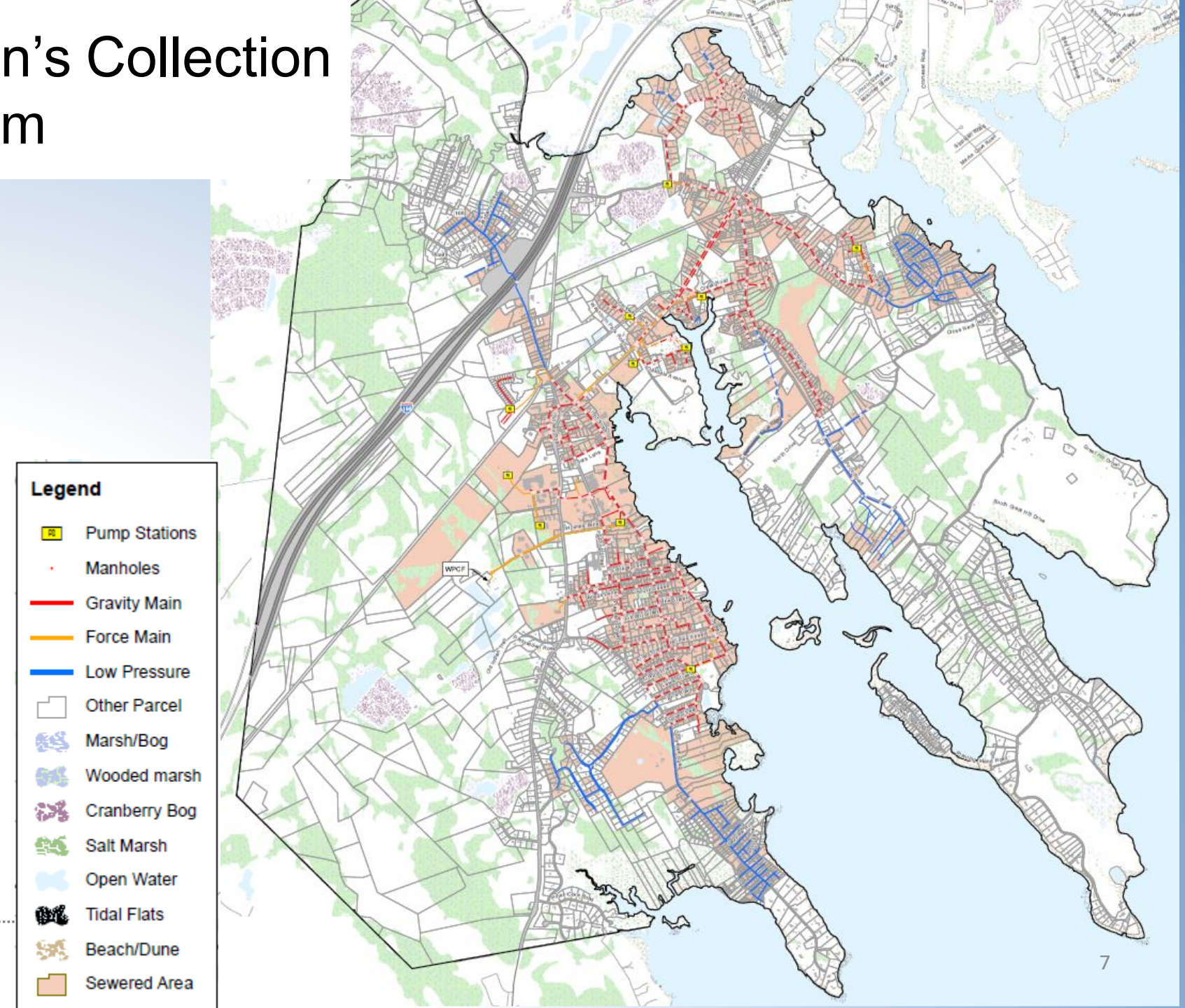
- Nitrogen Loading & Impairments
- BOH Variances
- Lot Size
- Soil Characteristics
- Flood Plains
- Other

Marion CWMP

Unsewered Areas Alternatives

Needs Area	Priority Rank	No Action	Enhanced On-site Program	Localized Treatment	Sewer Extension
Planting Island	High		✓	✓	✓
Lower Sippican Neck	High		✓	✓	✓
Upper Front Street	High		✓		✓
Aucoot Creek	High		✓		✓
River Road/ Wareham Street	High		✓		✓
Lower Mill Street	Medium	✓	✓		✓
County Road	Medium	✓	✓		✓
Wing Cove/ Piney Point	Medium	✓	✓		✓
Delano Road/ Weweantic River	Low	✓	✓		✓
Allen's Point/ Harbor East	Low	✓	✓		✓
Converse Point	Low	✓	✓		✓

Marion's Collection System



Marion CWMP

Collection System Needs

Ongoing Annual Program to Remove Infiltration & Inflow

– Work prioritized based on known problem areas and physical characteristics
  - Known Problem Areas
  - Sewers within Village Area (Oldest, VC)
  - Areas within 100 Flood Zone
  - Remaining or Recently Repaired

Marion CWMP
Collection System Needs
Ongoing Annual Program to Remove Infiltration & Inflow

Sewershed	Rank	Program Year	Estimated Sewer Length (LF)	Estimated Remaining (LF)	% Sewer in 100-Year Flood Zone
F-1	1	3	5,359	236	91%
F-3	3		9,716	6,545	13%
F-2	2	4	5,922	1,572	96%
F-8	4		3,397	2,524	11%
S-1	6		5,034	4,148	72%
S-2	5	5	8,958	6,639	66%
F-7	7		3,138	2,716	52%
F-5	8	6	8,803	8,445	97%
F-6	11	7	3,028	3,028	27%
C-6	9		7,599	6,566	93%
C-1	10	8	7,509	6,716	61%
C-5	13		3,846	3,846	94%
C-7	12	9	4,850	4,850	100%
C-2	15		6,864	6,864	31%
C-3	14	10	3,775	3,775	90%
C-4	16		7,119	7,119	22%
F-4	17	Complete (1&2)	2,113	0	58%
		Overall	97,030	75,589	63%

Marion CWMP

Collection System Needs

Ongoing Annual Program to Remove Infiltration & Inflow

Program Year	Program Dates	Problem Area Sewersheds	Work Completed	Estimated I/I Removed
Year 1	June – Nov. 2019	C-1, C-6, F-1, F-3, F-4, F-7, S-1, S-2	Inspected and/or Repaired 7,500 LF of 8-inch Sewer	4,680 GPD
Year 2	May 2020 – Mar. 2021	F-1, F-2, F-3, F-4, F-5, F-8	Inspected and/or Repaired 10,000 LF of 8 to 15-inch Sewer	8,200 GPD
			Total Removed	12,880 GPD

Marion CWMP

Existing Collection System

- Private Sewers
  - Policy
  - O&M
- Grinder Pumps
  - Policy
  - O&M

Private System	Sewershed	Tributary Pump Station
Rezendes Terrace	C-3	Creek Road PS
Rebecca Drive	C-4	Creek Road PS
Barros Drive	C-6	Creek Road PS
Whynot Court	C-6	Creek Road PS
Jerei Lane	C-7	Creek Road PS
Hammets Cove Road @ Point Road	LP-3	Creek Road PS
Cross Neck Road @ Point Road	LP-4	Creek Road PS
Point Road	LP-4	Creek Road PS
Pawkechatt Way	F-1	Front Street PS
Cottage Lane	F-4	Front Street PS
Tabor Academy (multiple discharge locations)	F-6	Front Street PS
Industrial Park/ Lockheed Martin	F-6	Front Street PS
Intersection of Front Street and Route 6	F-5 ? F-8?	Front Street PS
Marion Villages Estates	LP-1	Front Street PS
Old Knoll Road	LP-5	Front Street PS
Bell Guzzle Lane	S-2	Front Street PS

Marion CWMP
Pump Stations

Front Street Pump Station

Creek Road Pump Station

Silvershell Pump Station

Point Road Pump Station

Littleneck Pump Station

Oakdale Pump Station Wet Well

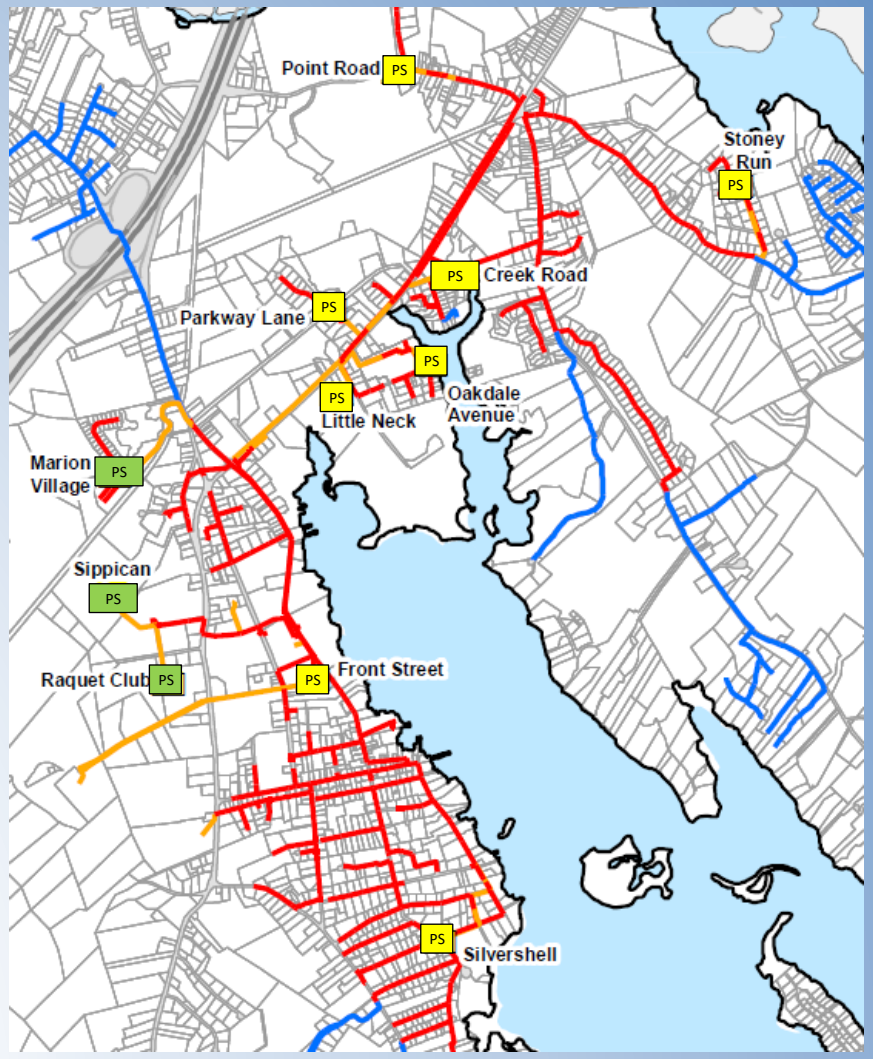
Stoney Run Pump Station Hatches

Parkway Lane Pump Station Wetwell

Marion CWMP

Pump Stations

Pump Station	Approx. Age (years)	Approx. No. Properties Served
Front Street	50 *2005 Update	1,700
Creek Road	50	500
Silvershell	60	500
Oakdale Avenue	30	70
Littleneck	10	10
Parkway Lane	35	15
Point Road	50	70
Stoney Run	25	30



Marion CWMP

Pump Station Alternatives

Preliminary Screening

Pump Station	No Action	Minor Renovation	Major Renovation	Complete Replacement	Eliminate/ Abandon
Front Street			✓	✓	
Creek Road			✓	✓	
Silvershell			✓	✓	
Oakdale Avenue			✓	✓	
Littleneck	✓	✓			
Parkway Lane			✓	✓	✓
Point Road		✓	✓		
Stoney Run	✓	✓			

Marion WPCF Needs

- Nature of WPCF Needs
  - Modernization Needs (Condition, Technology, etc.)
  - Capacity Needs
  - Regulatory and Permit Needs
  - Sustainability (Resiliency/Efficiency/Safety) Needs
- WPCF Needs Categories
  - 'Big Picture' Needs
  - Specific Needs
    (Process, System or Structure)

Marion CWMP

Marion WPCF 'Big Picture' Needs

- WPCF Treatment Capacity

General Need	General Alternatives for Screening
WPCF Capacity How much wastewater can the WPCF treat and discharge. Current permit limits discharge to 588,000 gpd.	Water Conservation
	Infiltration/Inflow Removal
	WPCF Process Rerating
	WPCF Process Improvements
	Permit Modification
	Effluent Reuse
	Groundwater Discharge
	Outfall Relocation
	Regionalization

Marion CWMP

Marion WPCF 'Big Picture' Needs

- Nitrogen Treatment and Discharge Limit

General Need	General Alternatives for Screening
Nitrogen Facility is designed to remove nitrogen in the effluent. Current permit includes limit of 4.0 mg/l total nitrogen.	WPCF Process Improvements
	Permit Modification
	Effluent Reuse
	Groundwater Discharge
	Outfall Relocation
	Regionalization
	Non-Point Source Mitigation

Marion CWMP

Marion WPCF 'Big Picture' Needs

- Phosphorus Treatment and Discharge Limit

General Need	General Alternatives for Screening
Phosphorus Facility is not presently designed to remove phosphorus in the effluent. Current permit limit of 200 ug/l total phosphorus is currently deferred by AO.	WPCF Process Improvements
	Permit Modification
	Effluent Reuse
	Groundwater Discharge
	Outfall Relocation
	Regionalization
	Non-Point Source Mitigation

Marion CWMP

Marion WPCF 'Big Picture' Needs

- Copper Treatment and Discharge Limit

General Need	General Alternatives for Screening
Copper Facility is not presently designed to remove copper in the effluent. Current permit limit of 7.7 ug/l total copper is currently deferred by AO.	WPCF Process Improvements
	Permit Modification
	Groundwater Discharge
	Outfall Relocation
	Regionalization
	Source Control

Marion CWMP

Marion WPCF 'Big Picture' Needs

- Waste Solids (a.k.a. 'Sludge') Disposal

General Need	General Alternatives for Screening
Solids Disposal Waste solids historically disposed to on-site lagoons.	WPCF Process Improvements
	Regionalization
	Continue Disposal to Lagoon
	Thicken Solids & Haul Away
	Dewater Solids & Haul Away

Marion CWMP

Marion WPCF Specific Needs

General Need	Process Areas with Specific Needs
WPCF Needs for Process, System and Structures Specific needs exist throughout the WPCF. Many of these systems would require action to address 'big picture' needs (e.g. capacity).	Headworks
	SBR / Biological Treatment
	Chemical Feed & Ancillary Systems
	Effluent Filtration
	UV Disinfection
	Lagoon Systems
	Discharge Outfall
	Operations Buildings and Site
	Electrical & Control Systems

Questions / Discussion

Marion CWMP

Next CAC Meeting

Late June (TBD)

Potential WPCF Site Visit & Discussion

Weston & Sampson℠

Thank You

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

TOWN OF MARION, MASSACHUSETTS
Comprehensive Wastewater Management Plan (CWMP)

Citizen's Advisory Committee (CAC) Meeting

Location – Marion WPCF

July 7, 2021; 2:00 pm

MEETING SUMMARY

This meeting of the CAC was scheduled as a site tour of the WPCF. The following were in attendance:

- Nathaniel Munafo, Director, Marion DPW
- Rebecca Tilden, Marion DPW
- Don Anderson, CAC
- Dot Brown, CAC
- Ray Cullem, CAC
- Gil Hilario, Marion Planning Dept.
- Kent Nichols, Weston & Sampson

The grouped walked the site of the Marion WPCF, discussing each of the general process areas and facilities. The status of the ongoing lagoon improvements were viewed from the headworks platform. Questions were asked by the CAC members at various locations, with answers provided by Marion staff.

Frank Cooper, Marion Wastewater Superintendent, joined the group for part of the tour and discussion.

The tour finished in the operations building, including discussion of the laboratory and control systems. Following discussions on site, the meeting concluded at approximately 4:15 pm.

55 Walkers Brook Drive, Suite 100, Reading, MA 01867
Tel: 978.532.1900

TOWN OF MARION, MASSACHUSETTS
Comprehensive Wastewater Management Plan (CWMP)

Citizen's Advisory Committee (CAC) Meeting

Location – Virtual

August 11, 2021; 2:00 pm

AGENDA

1. Observations Since Last Meeting

    a. Follow-up Questions from WPCF Tour
    b. Other Wastewater Discussions

2. Discussion of Alternatives for Unsewered Needs Areas

    a. Summary of the Needs Areas & Alternatives
    b. CAC Discussion of Alternatives – Area by Area
    c. CAC Recommendations for Alternatives

3. Other Questions and Discussion Points

4. Next CAC Meeting

Comprehensive Wastewater Management Plan

Town of Marion, Massachusetts

Citizens Advisory Committee Meeting

August 11, 2021

Weston & Sampson

Marion CWMP

Presentation Agenda

- Observations Since Last Meeting
- CAC Discussion of Alternatives for Unsewered Needs Area
  - Area by Area Discussion
- CAC Recommendations for Sewer Extensions
- Other Questions & Discussion
- Next CAC Meeting

Marion CWMP

Observations Since Last Meeting

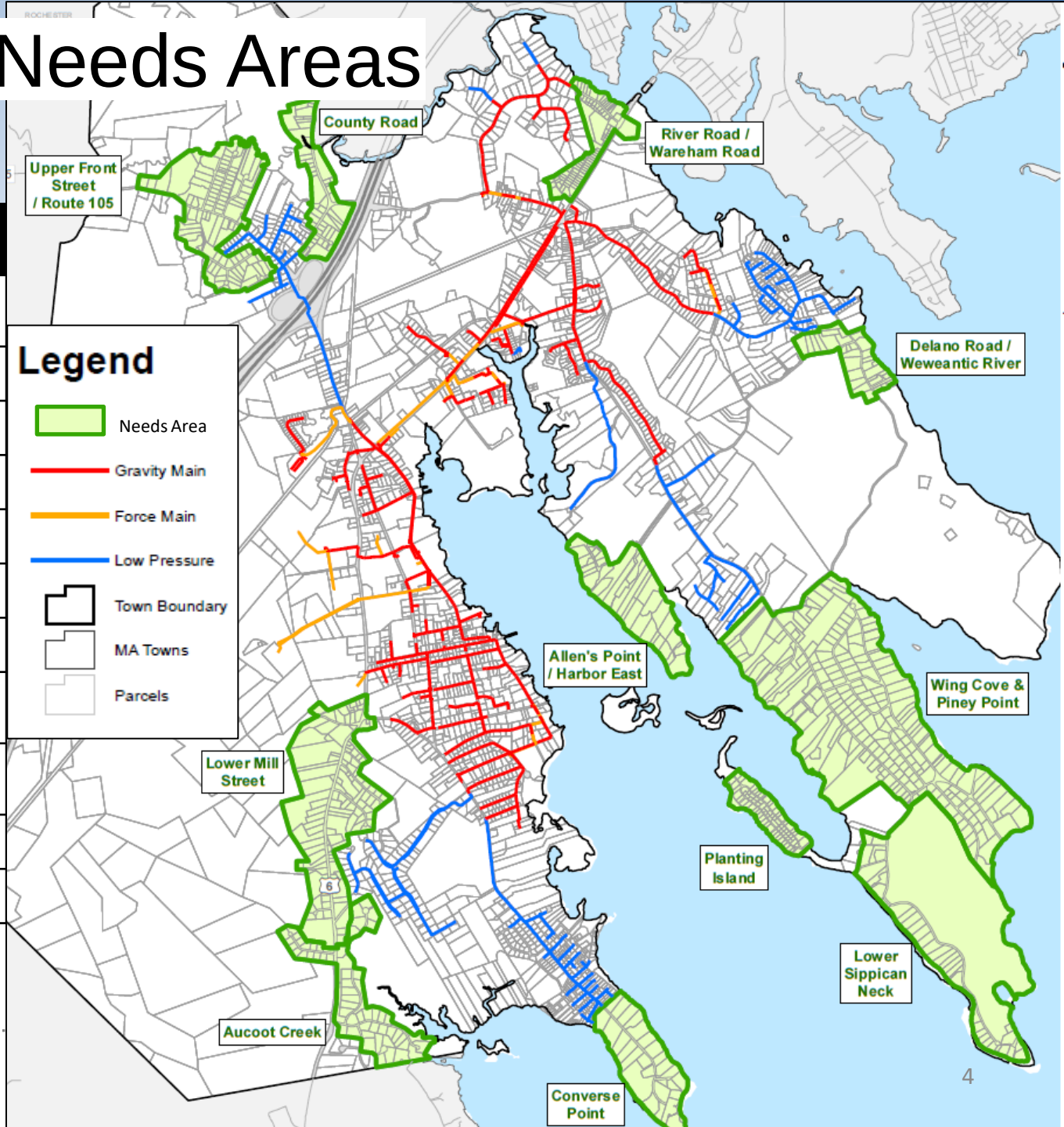
Follow Up Questions -

- CAC Meeting #3
- WPCF Plant Tour (#4)

Other Observations/Input Since Last Meeting

Unsewered Needs Areas

Needs Areas
River Road/ Wareham Road
Delano Road/ Weweantic River
Wing Cove/ Piney Point
Lower Sippican Neck
Planting Island
Allen's Point/ Harbor East
Converse Point
Aucoot Cove
Lower Mill Street
Upper Front Street/ Route 105
County Road



Marion CWMP

Unsewered Areas Alternatives

Needs Area	Priority Rank	No Action	Enhanced On-site Program	Localized Treatment	Sewer Extension
Planting Island	High		✓	✓	✓
Lower Sippican Neck	High		✓	✓	✓
Upper Front Street	High	✓	✓		✓
Aucoot Creek	High		✓		✓
River Road/ Wareham Street	High		✓		✓
Lower Mill Street	Medium		✓		✓
County Road	Medium	✓	✓		✓
Wing Cove/ Piney Point	Medium	✓	✓		✓
Delano Road/ Weweantic River	Low	✓	✓		✓
Allen's Point/ Harbor East	Low	✓	✓		✓
Converse Point	Low	✓	✓		✓

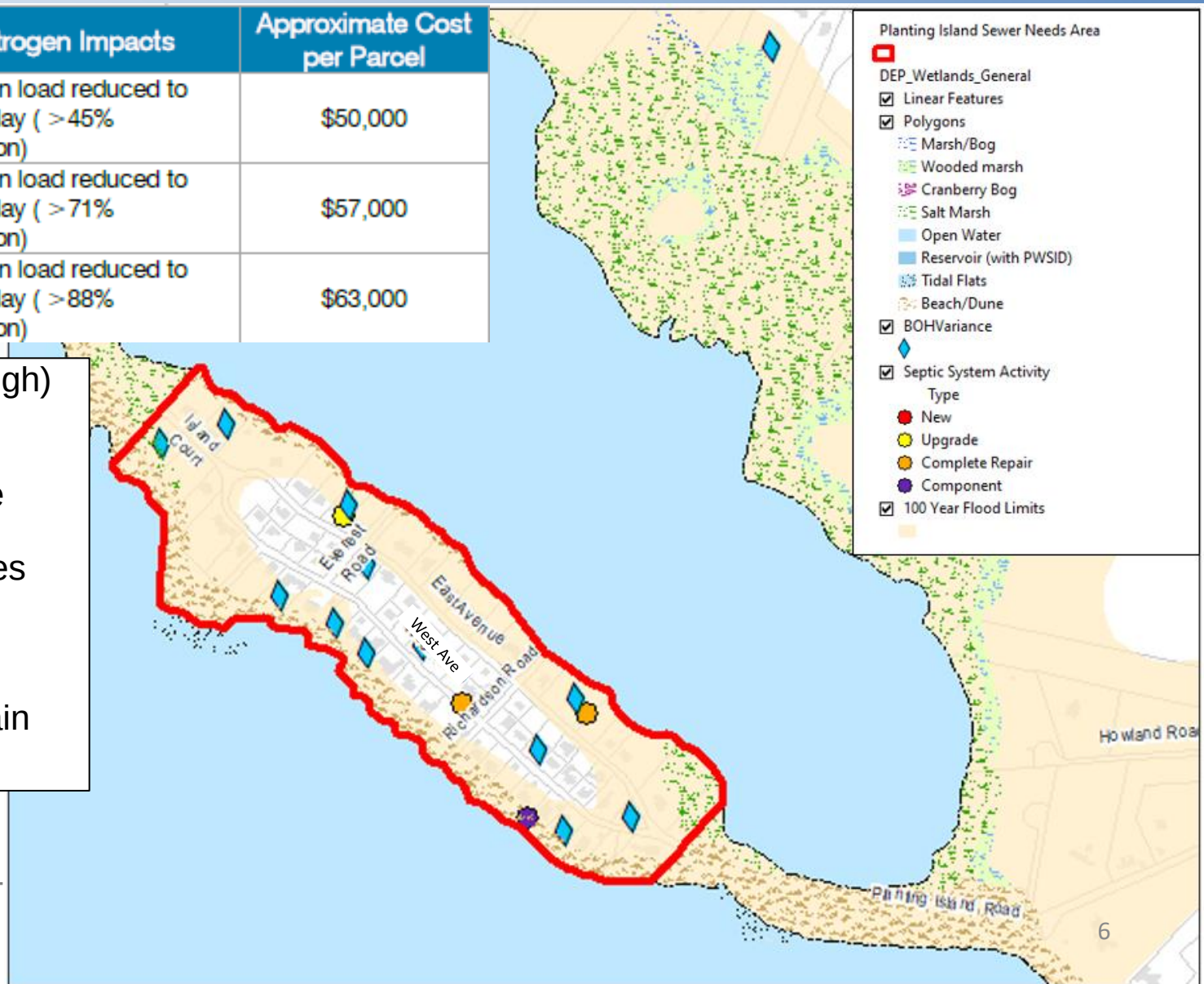
Unsewered Areas

Planting Island

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 2.0 lb/day (>45% reduction)	$50,000
Localized (Cluster) Treatment	Nitrogen load reduced to 1.0 lb/day (>71% reduction)	$57,000
Sewer Extension	Nitrogen load reduced to 0.4 lb/day (>88% reduction)	$63,000

Priority Concerns (High)

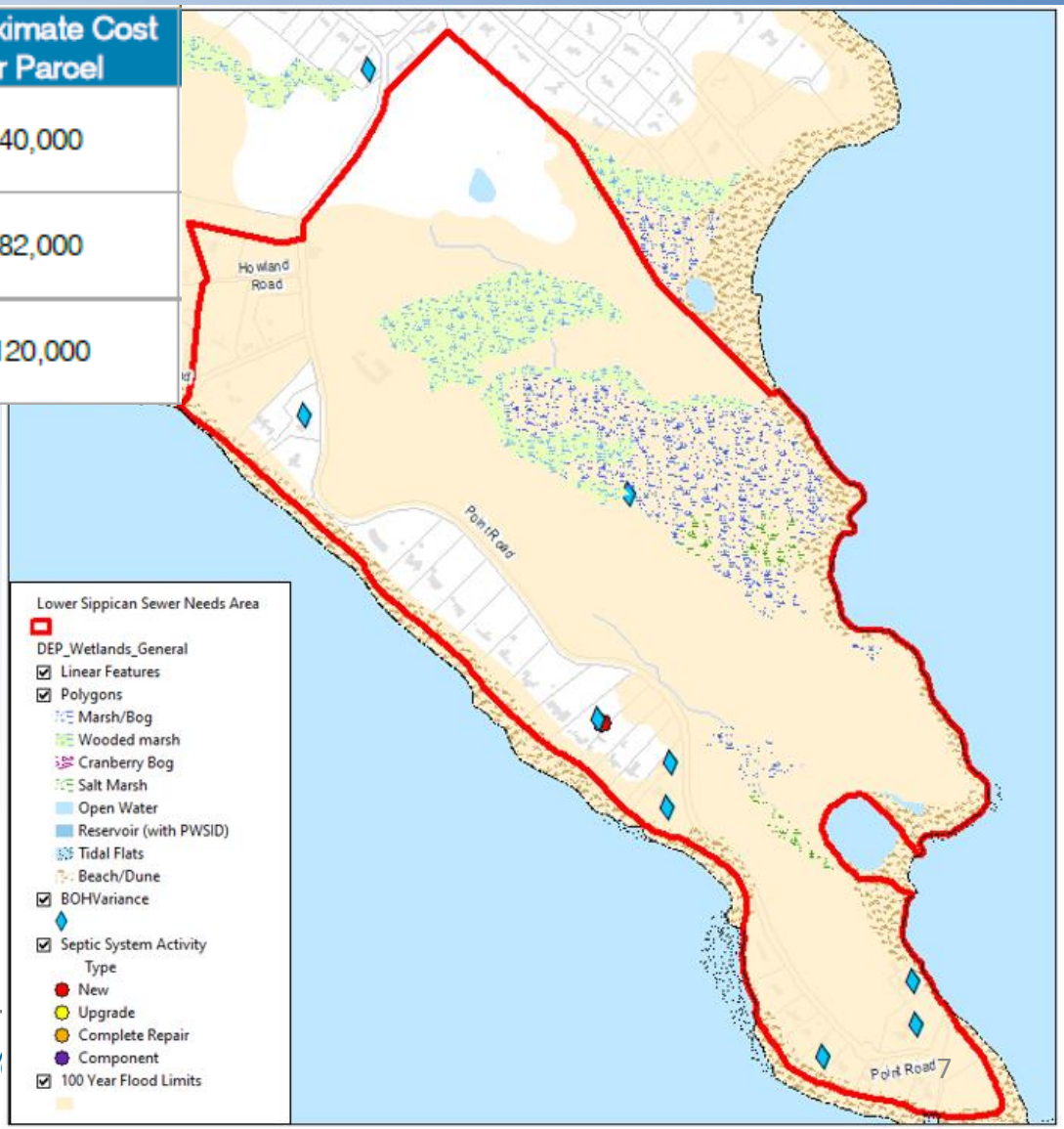
- 80 Total Parcels
  - 75 Built
- Average Lot Size
  - 0.33 Acre
- 12 BOH Variances (16%)
- 81% Excessive Draining Soils
- 71% in Flood Plain



Unsewered Areas

Lower Sippican Neck

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 0.9 lb/day (>45% reduction)	$40,000
Localized (Cluster) Treatment	Nitrogen load reduced to 0.5 lb/day (>71% reduction)	$82,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$120,000



Priority Concerns (High)

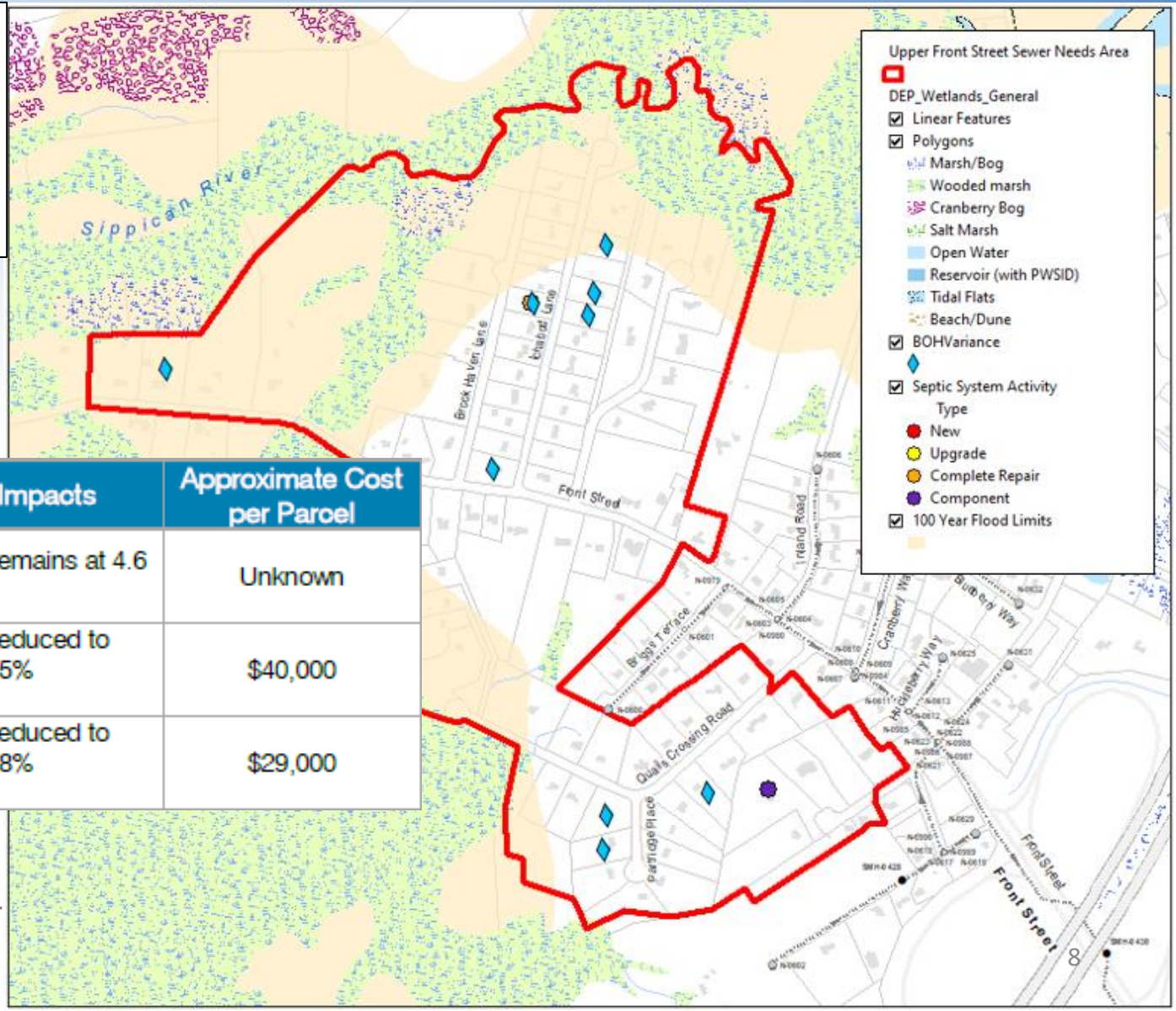
- 39 Total Parcels
  - 34 Built
- Average Age
  - 68 years
- 7 BOH Variances (21%)
- 83% in Flood Plain

Unsewered Areas

Upper Front Street

Priority Concerns (High)

- 102 Total Parcels
  - 96 Built
- 10 BOH Variances (10%)
- Well Protection Zone



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 4.6 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 2.5 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.5 lb/day (>88% reduction)	$29,000

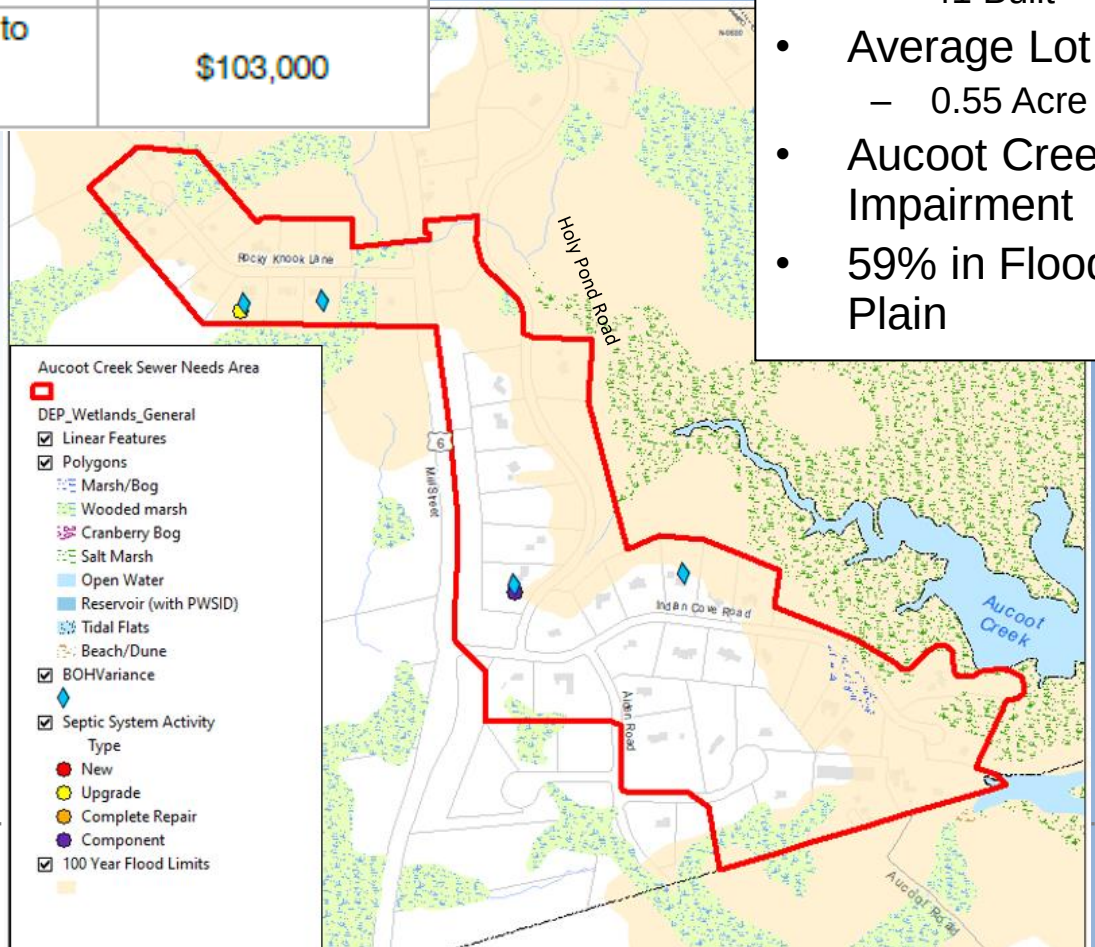
Unsewered Areas

Aucoot Creek

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 1.1 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$103,000

Priority Concerns (High)

- 52 Total Parcels
  - 41 Built
- Average Lot Size
  - 0.55 Acre
- Aucoot Creek N Impairment
- 59% in Flood Plain

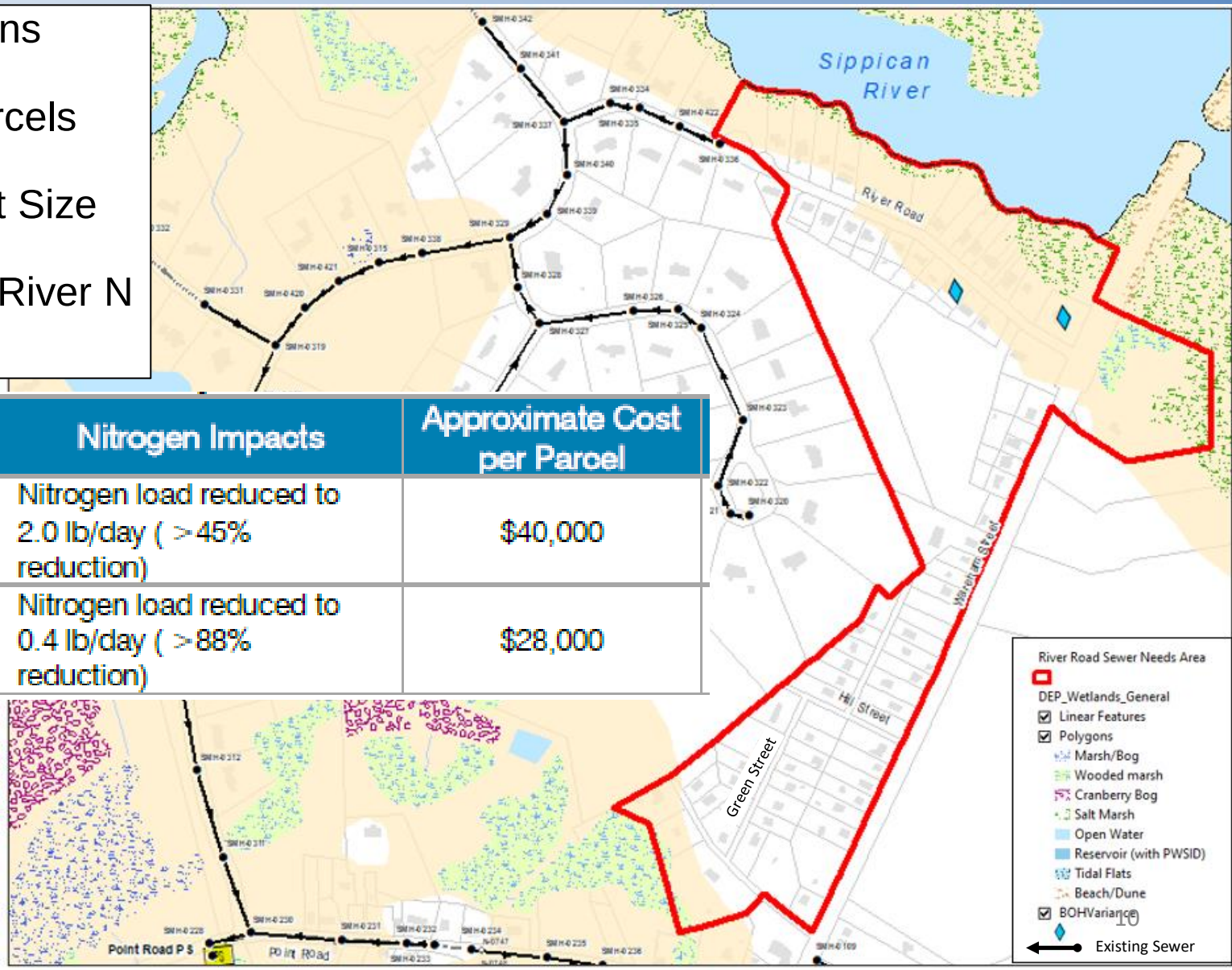


Unsewered Areas

River Road/ Wareham Street

Priority Concerns (High)

- 84 Total Parcels
  - 77 Built
- Average Lot Size
  - 0.55 Acre
- Weweantic River N Impairment

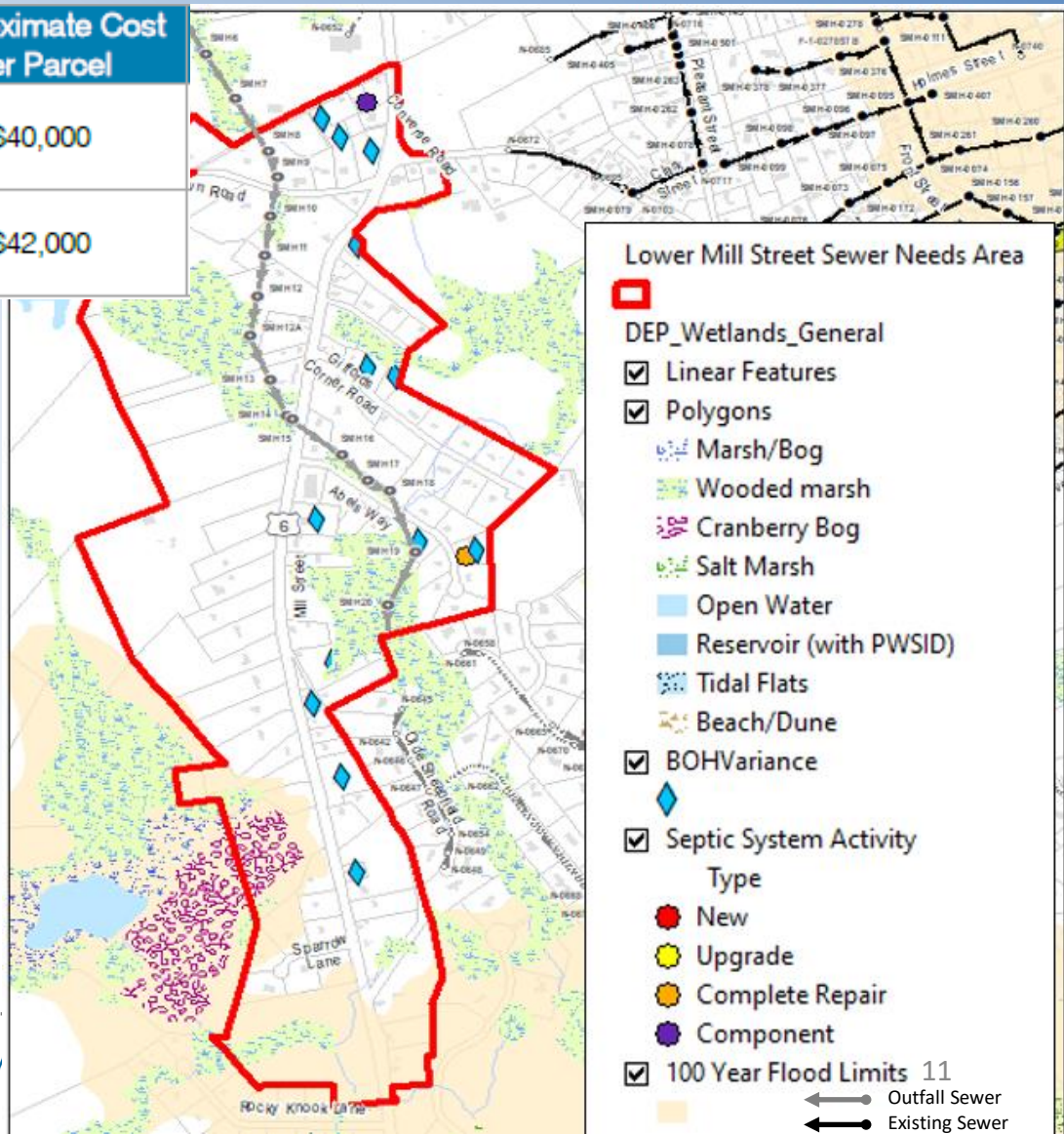


Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 2.0 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.4 lb/day (>88% reduction)	$28,000

Unsewered Areas

Lower Mill Street

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
Enhanced On-Site Treatment	Nitrogen load reduced to 0.6 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.1 lb/day (>88% reduction)	$42,000



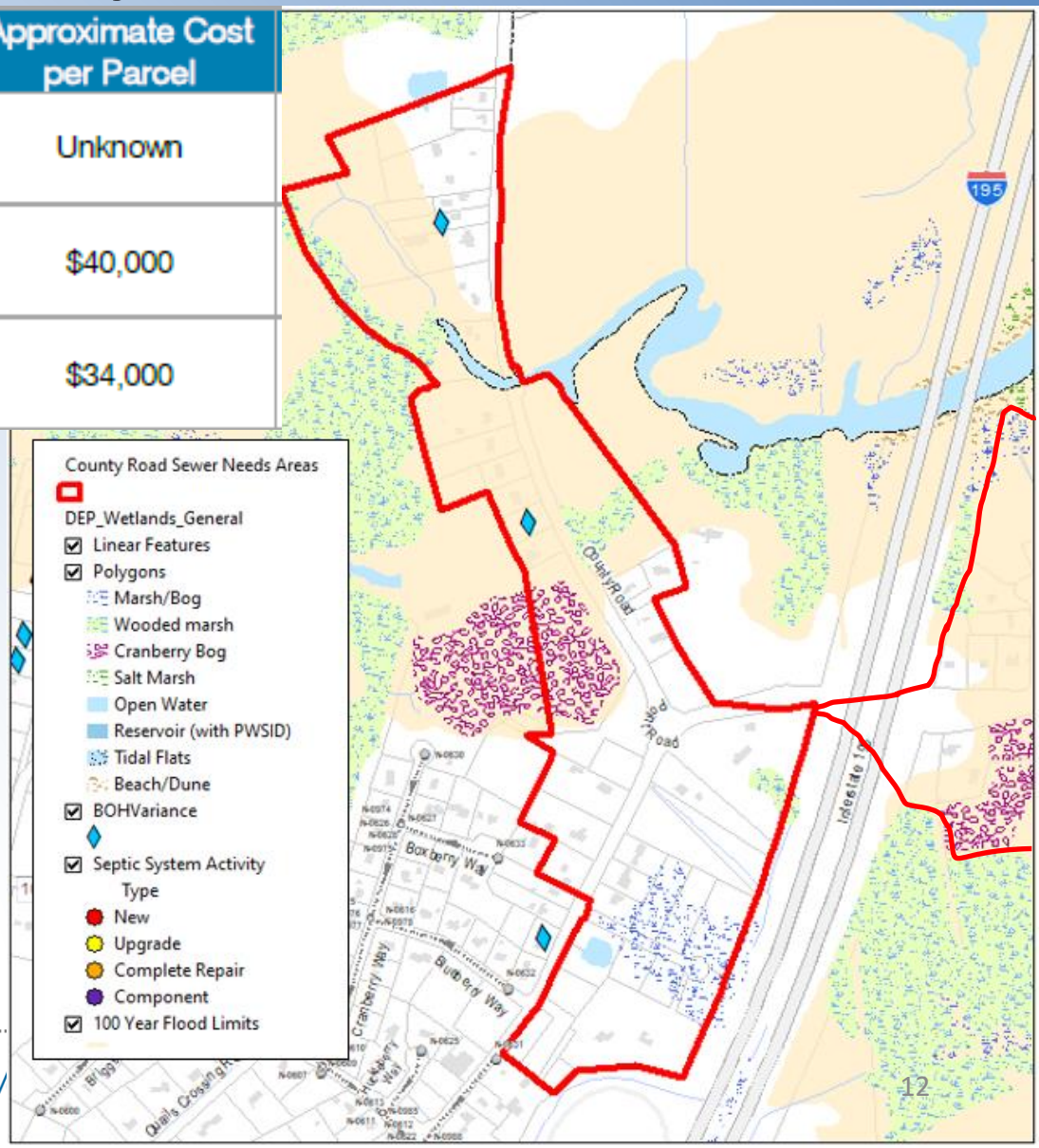
Priority Concerns (Med)

- 116 Total Parcels
  - 104 Built
- 13 BOH Variances (13%)

Unsewered Areas

County Road

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.9 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 1.0 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$34,000



Priority Concerns (Med)

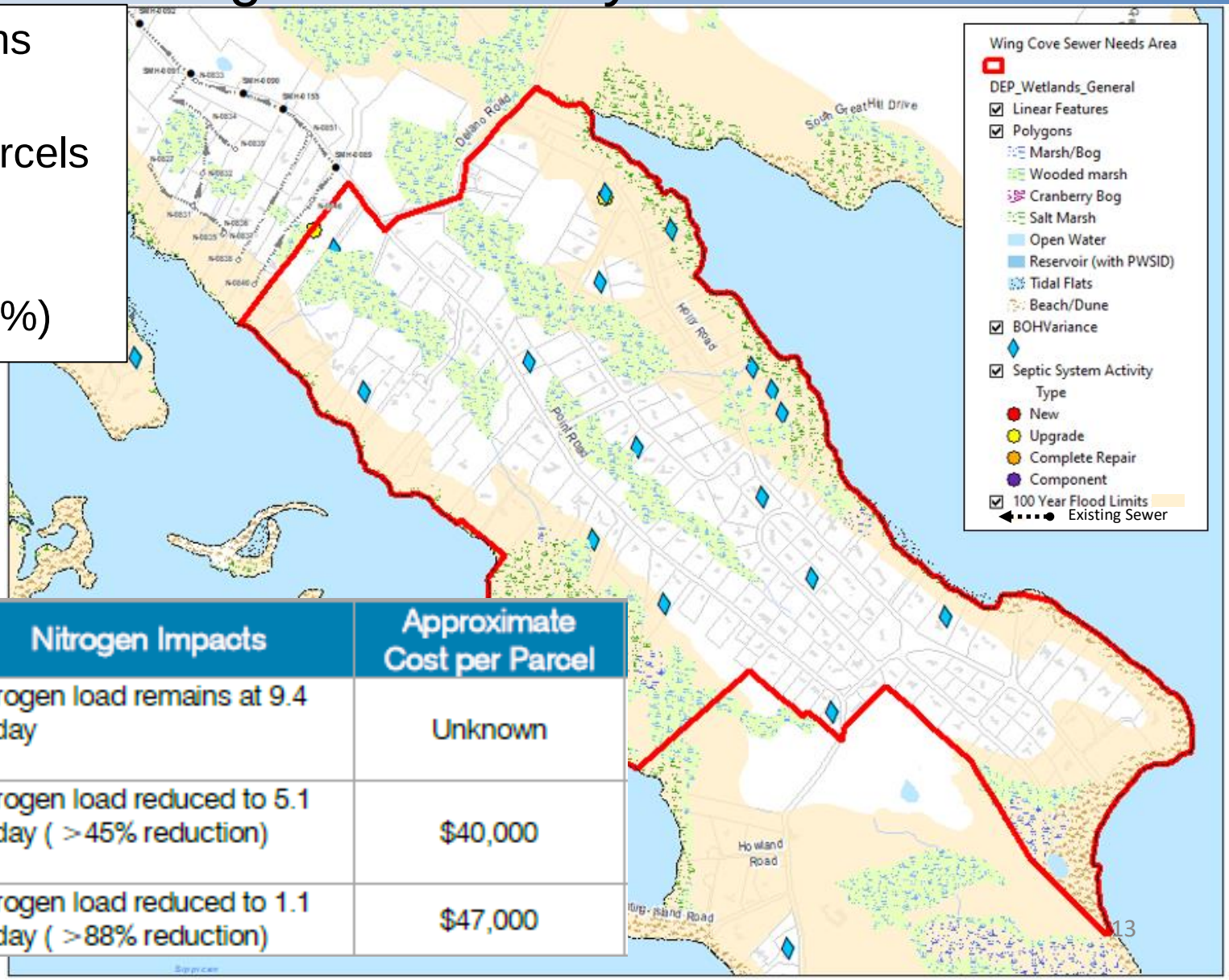
- 67 Total Parcels
  - 39 Built
- Average Age
  - 61 years

Unsewered Areas

Wings Cove/ Piney Point

Priority Concerns (Med)

- 217 Total Parcels
  - 180 Built
- 16 BOH Variances (9%)



Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 9.4 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 5.1 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 1.1 lb/day (>88% reduction)	$47,000

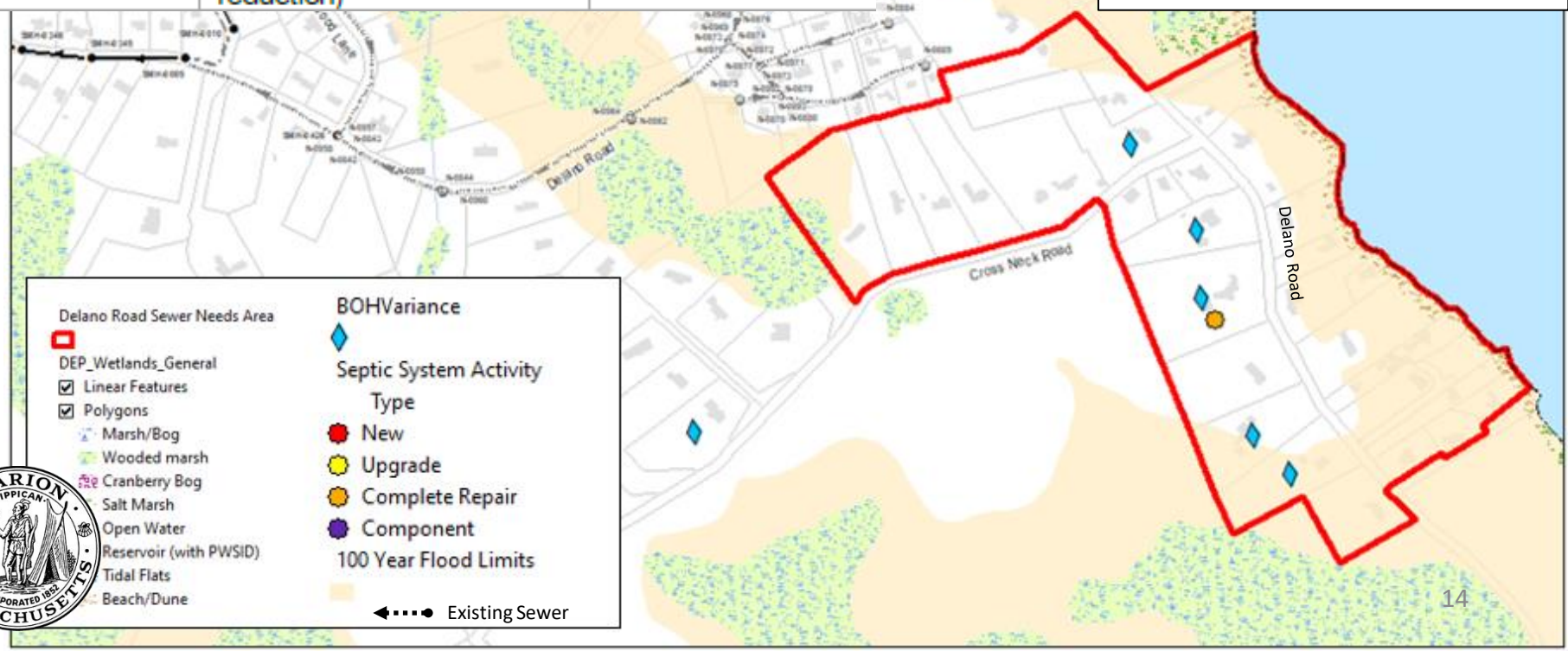
Unsewered Areas

Delano Road/ Weweantic River

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.5lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 0.8 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$36,000

Priority Concerns (Low)

- 33 Total Parcels
  - 31 Built
- 5 BOH Variances (16%)
- Weweantic River N Impairment

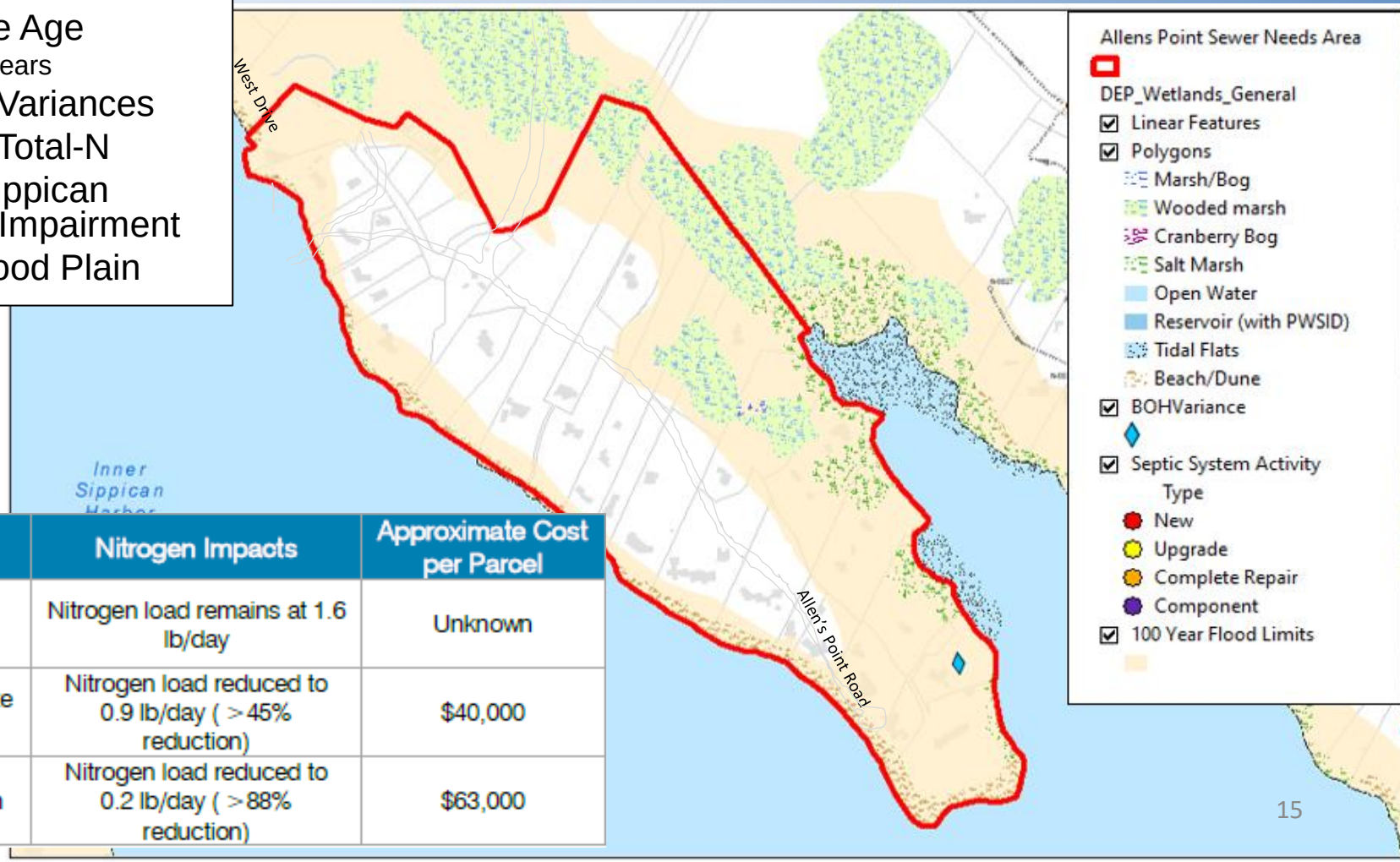


Unsewered Areas

Allens Point/ Harbor East

Priority Concerns (Low)

- 35 Total Parcels
  - 29 Built
- Average Age
  - 86 years
- 1 BOH Variances
- 2.0lb/d Total-N
- Inner Sippican Harbor Impairment
- 57% Flood Plain

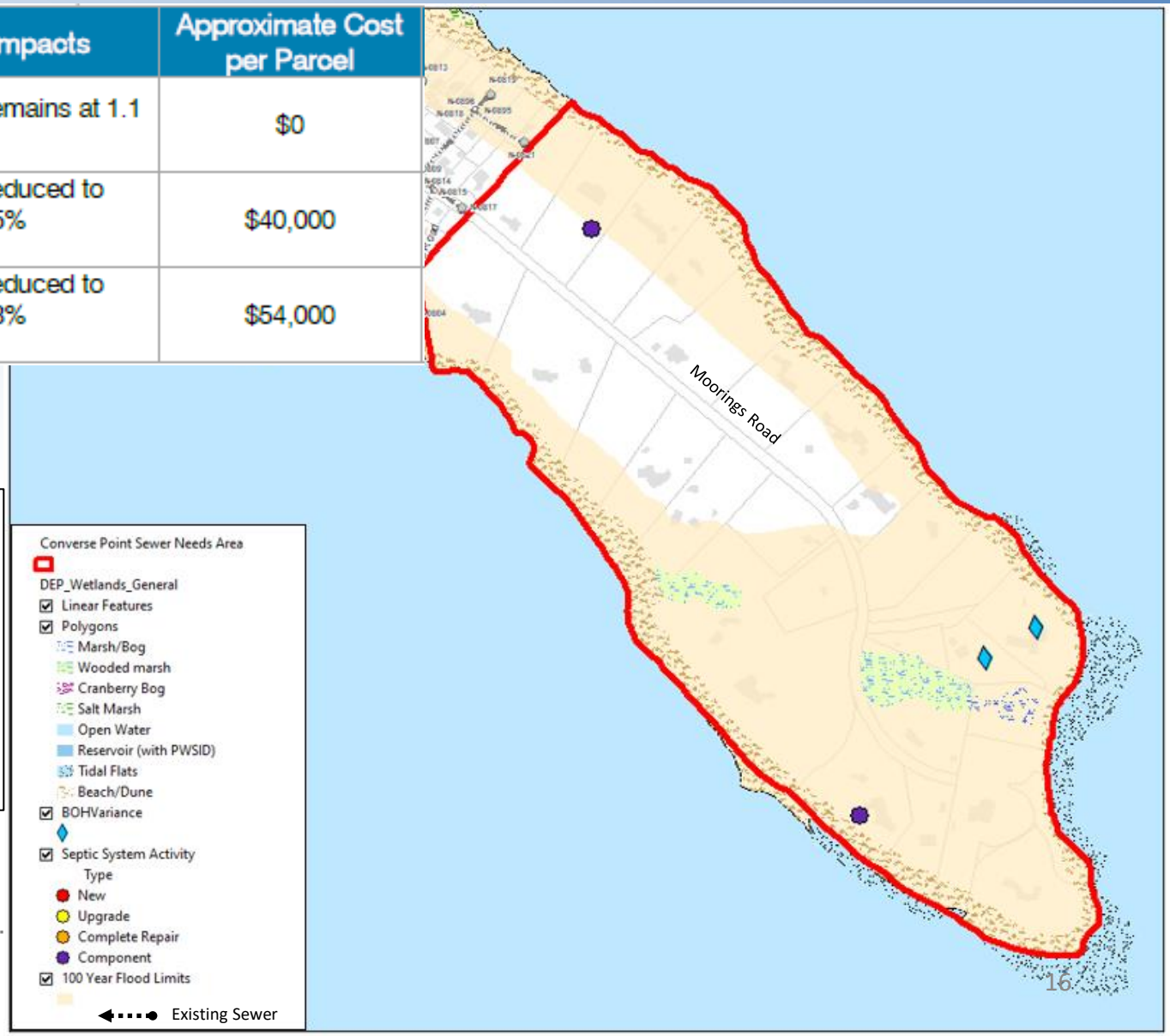


Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.6 lb/day	Unknown
Enhanced On-Site Treatment	Nitrogen load reduced to 0.9 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.2 lb/day (>88% reduction)	$63,000

Unsewered Areas

Converse Point

Alternative	Nitrogen Impacts	Approximate Cost per Parcel
No-Action	Nitrogen load remains at 1.1 lb/day	$0
Enhanced On-Site Treatment	Nitrogen load reduced to 0.6 lb/day (>45% reduction)	$40,000
Sewer Extension	Nitrogen load reduced to 0.1 lb/day (>88% reduction)	$54,000



Priority Concerns (Low)

- 27 Total Parcels
  - 23 Built
- 72% in Flood Plain

Marion CWMP

Sewer Extension Alternative Summary

Needs Area	Priority Rank	Total Area Cost *	Area Cost per Parcel*	Combined Area Cost per Parcel*
Planting Island	High	$5.0M	$63,000	Planting Island + Lower Sippican Neck $60,000**
Lower Sippican Neck	High	$4.6M	$120,000	Planting Island + Lower Sippican Neck + Wing Cove/Piney Point $44,000
Upper Front Street	High	$2.8M	$29,000	-
Aucoot Creek	High	$4.6M	$103,000	Aucoot Creek + Lower Mill Street $45,000
River Road/ Wareham Street	High	$2.3M	$28,000	-
Lower Mill Street	Medium	$4.4M	$42,000	Aucoot Creek + Lower Mill Street $45,000
County Road	Medium	$1.8M	$34,000	-
Wing Cove/ Piney Point	Medium	$69.2M	$47,000	Planting Island + Lower Sippican Neck + Wing Cove/Piney Point $44,000
Delano Road/ Weweantic River	Low	$1.2M	$36,000	-
Allens Point/ Harbor East	Low	$2.1M	$63,000	-
Converse Point	Low	$1.4M	$54,000	-

*costs are approximate and only represent those associated with sewer construction

Weston & Sampson

** decentralized treatment alternative cost for combined area is $60,000, dependent on identifying an appropriate site

CAC Recommendation for Sewer Extensions

Questions / Discussion

Marion CWMP

Next Meeting

Select Board Worksession – August/September (TBD)

CAC Meeting - September (TBD)

Public Meeting on CWMP Findings (TBD)

Weston & Sampson℠

Thank You

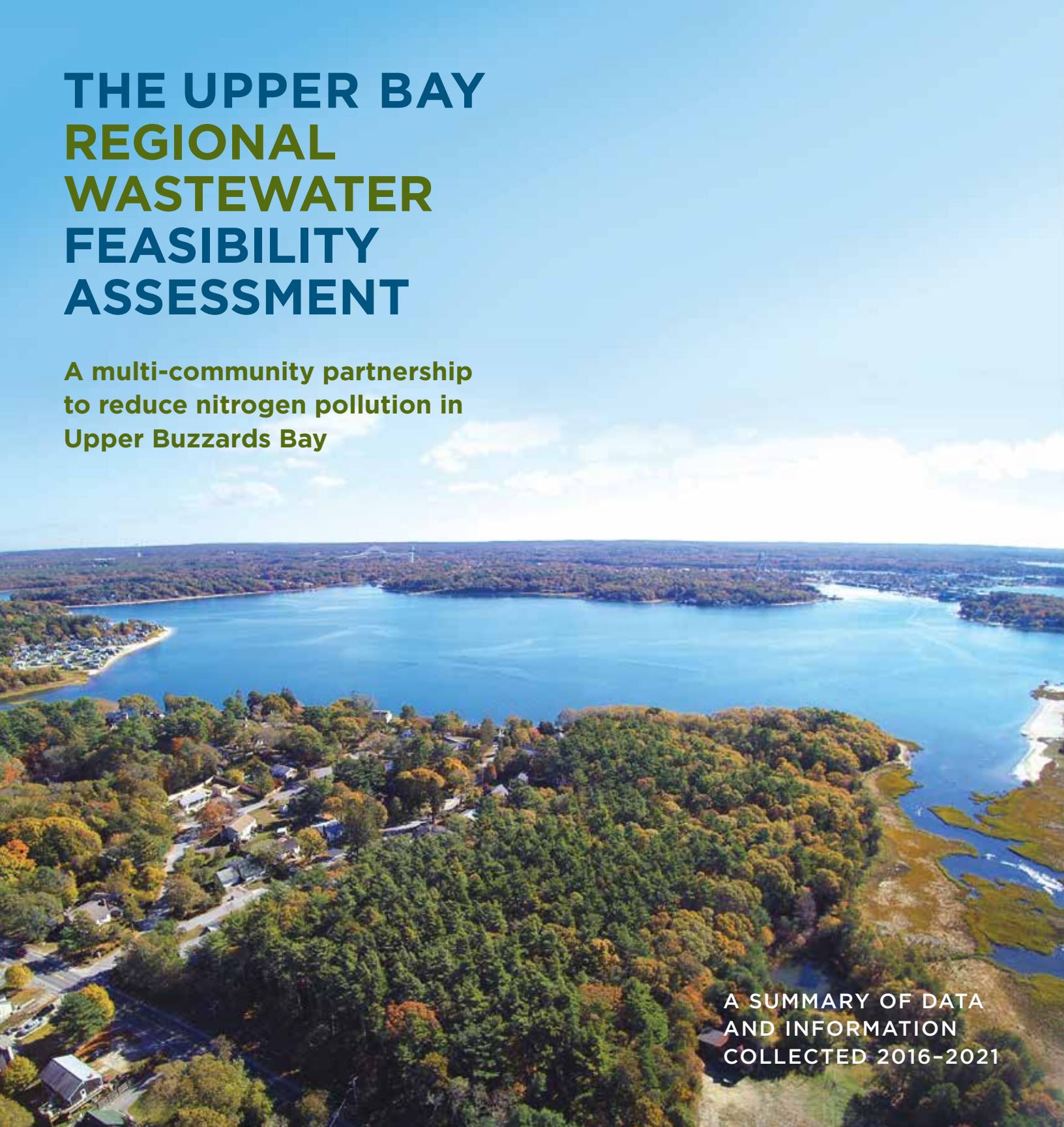
DRAFT

APPENDIX G

The Upper Bay Regional Wastewater Treatment Feasibility Assessment

THE UPPER BAY REGIONAL WASTEWATER FEASIBILITY ASSESSMENT

A multi-community partnership to reduce nitrogen pollution in Upper Buzzards Bay



A SUMMARY OF DATA AND INFORMATION COLLECTED 2016–2021

PROJECT PARTNERS

KEY FINDINGS

- Nitrogen pollution from septic systems, including those installed in recent years under Title 5, are the primary source of pollution degrading our coastal waters and harming our fish, shellfish and marine habitats.
- The Wareham Water Pollution Control Facility (WPCF) currently reduces nitrogen pollution from wastewater **by more than 90% and has space available to be expanded** to meet the current and future sewer needs of Marion, Wareham, Bourne, South Plymouth and the Massachusetts Maritime Academy (MMA).
- Relocating the Wareham WPCF discharge to the location of MMA's existing discharge at the Cape Cod Canal is a viable alternative that **could be implemented today** with technology such as horizontal directional drilling.
- The extraordinary volumes of water flowing through the Cape Cod Canal make it a suitable location for discharge of highly-treated wastewater effluent. Scientists at the Woods Hole Oceanographic Institution concluded that an Upper Bay Regional Wastewater Solution, as described in their report, would **not have an adverse impact** on water quality in the canal or surrounding waters.
- A regional Upper Bay Wastewater Treatment Plant solution would **reduce pollution** to the entire upper Buzzards Bay area by an estimated 100,000 lbs/year – the equivalent of eliminating the pollution from 3,457 septic systems and 3 existing wastewater discharges.
- Total capital cost of an Upper Bay regional wastewater solution is estimated at **$150 Million**: $100 Million to expand the size of the current Wareham WPCF to serve all communities and $48 Million to relocate the discharge.
- Completion of **Comprehensive Wastewater Management Plans (CWMPs)** in Bourne, Wareham and Marion are critical to allow for cost/benefit comparisons between town 'go it alone' alternatives or a regional solution such as the Upper Bay Project.
- Massachusetts is slated to receive $1 Billion through the 2021 federal Infrastructure Bill for wastewater projects. The **next five years** will be a critical period for communities to settle on wastewater strategies and secure these funds.

The Upper Bay Project was made possible with the financial support of the Southeast New England Program Watershed Grants. SNEP Watershed Grants are funded by the U.S. Environmental Protection Agency through a collaboration with Restore America's Estuaries.

INTRODUCTION

COMMUNITIES THROUGHOUT southeastern Massachusetts and Cape Cod depend on coastal water quality to support their quality of life, fish and wildlife habitats, and local economies. It is why so many of us choose to live on or near the shores of upper Buzzards Bay. Yet, nitrogen pollution from conventional septic systems is currently driving significant declines in the health of our coastal waters, and Bay communities struggle with how to reduce nitrogen in an effective, affordable, and sustainable way. The Upper Bay Regional Wastewater Feasibility Assessment (aka Upper Bay Project) joined all of the communities in upper Buzzards Bay – Marion, Wareham, Bourne, and South Plymouth – together with the Massachusetts Maritime Academy (MMA) and the Buzzards Bay Coalition (Coalition) – to evaluate whether a regional wastewater solution to reduce nitrogen pollution in upper Buzzards Bay was feasible.

The Upper Bay Project hypothesized that if these communities worked together, they may be able to expand wastewater treatment, reduce pollution and restore water quality, and support the economic needs of their communities at a lower cost and better environmental outcome than taking on municipal wastewater projects individually.

Since 2015, the Project secured $737,000 in federal funding through grants from the US Environmental Protection Agency's Southeast New England Program to complete the preliminary engineering, science and economic analysis to answer the feasibility question. This report summarizes work completed to date on determining project feasibility and provides important information each community needs in order to evaluate whether a regional wastewater project is preferred over an individual community's investment in, and long term management of, its own individual wastewater solutions.

As of the date of this report, Bourne and Marion are both engaged in the development of detailed Comprehensive Wastewater Management Plans (CWMPs) to determine all of the present and long-term wastewater needs of their communities and assess alternatives. In the absence of final CWMPs, the Upper Bay Project was required to make assumptions using the best information from each of the communities available at the time. Final CWMPs will allow for critical refinement of the information contained in this report.

Each community should evaluate this information carefully to determine whether a regional option is in its best interest. This report does not seek to answer every question about this concept, rather it is a summary of work completed to date.

All reports completed by this project and cited in this report are available at **savebuzzardsbay.org/upper-bay-project/**

Nitrogen pollution from wastewater threatens our coastal waters. Communities need a solution to restore water quality that people can afford.

Nitrogen pollution is the greatest long term threat to the health of Buzzards Bay.

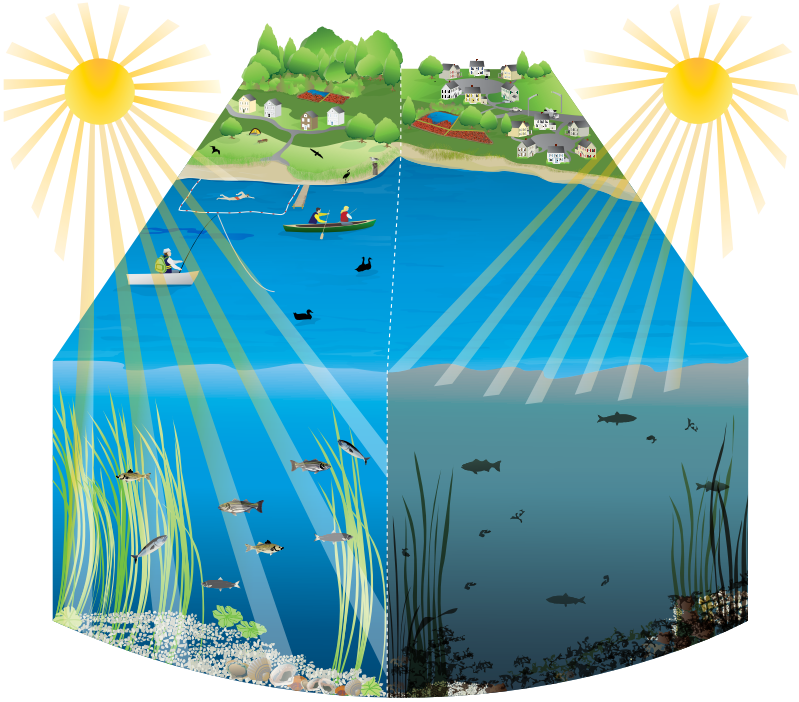
Thirty years of data collected by the Coalition, the Woods Hold Oceanographic Institution, Marine Biological Laboratory, and the UMass School for Marine Science and Technology, document how increasing levels of nitrogen are decreasing the quality of coastal ecosystem habitat. The data show high levels of nitrogen and chlorophyll and low levels of dissolved oxygen and water clarity – symptomatic of nitrogen pollution. Nearly all of the more than 30 harbors and coves around Buzzards Bay suffer from the ill effects of too much nitrogen including the Agawam/Wareham River, Buttermilk and Little Buttermilk Bay, Aucoot Cove, Sippican Harbor and the Weweantic River, all the upper Bay estuaries.

Bay Health scores for upper Bay near shore estuaries rank as only fair or poor.

Upper Bay waters are so polluted by nitrogen that they do not meet state water quality standards and are listed on the state's 303(d) integrated list of impaired waters, otherwise known as the federal dirty waters list.

Such federal designation compels the state and towns to take action to reduce pollution and restore water quality and protect important natural resources.

Combined, the subwatersheds to these upper Bay estuaries make up 35% of the entire Buzzards Bay watershed. Reducing nitrogen for these waters reduces nitrogen to the Bay overall and solves the nitrogen pollution problem for an entire third of all of Buzzards Bay.



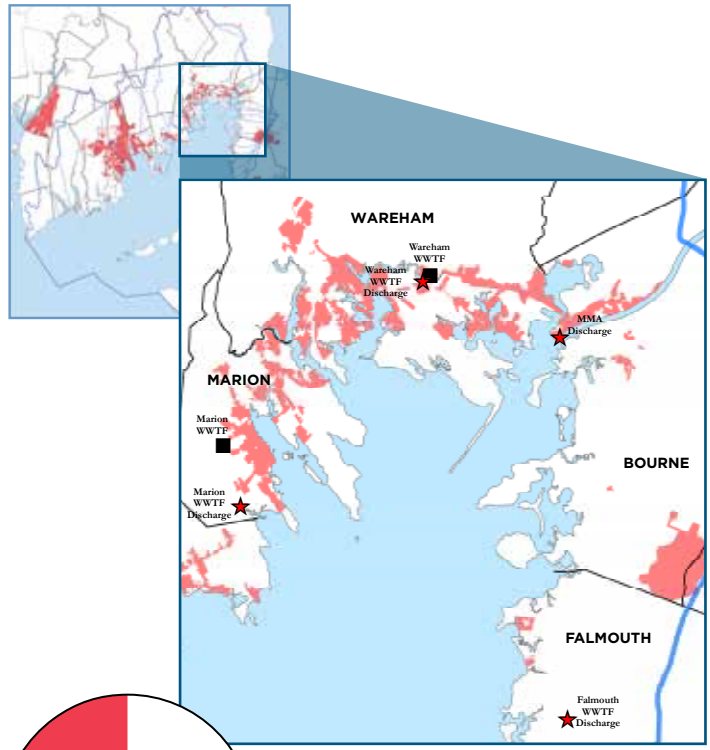
In clean water (left), fish and shellfish thrive, and people can enjoy the water. But when the water is polluted with nitrogen (right), it becomes cloudy and murky. Eelgrass can't grow, and fish and shellfish disappear.

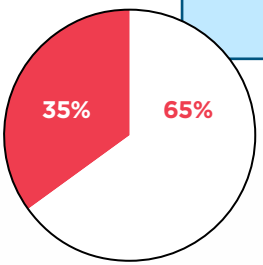
SEPTIC SYSTEMS ARE THE MAJOR SOURCE OF NITROGEN POLLUTION

It is widely understood that nitrogen from residential wastewater is the predominant source of pollution adversely impacting our coastal waters. Approximately 65% of the Buzzards Bay watershed is served by on-site septic systems. These more than 50,000 septic systems are the major source of nitrogen to our coastal waters. Conventional Title 5 septic systems, which are not designed to remove nitrogen, discharge pollution through their leaching fields into groundwater where it moves directly to our sensitive water resources.

Wastewater treatment facilities, on the other hand, can reduce nitrogen pollution by as much as 95%. Expanding municipal sewer is the single most effective way to reduce nitrogen pollution. While many communities around the Bay are devoid of any municipal sewer infrastructure, the upper Bay communities are fortunate in that they have existing sewer infrastructure that can be expanded to eliminate on-site septic systems.

Constructing and expanding sewer infrastructure can be costly. The Upper Bay Project was developed to determine whether the upper Bay communities could capitalize on shared assets to restore water quality for all the communities.



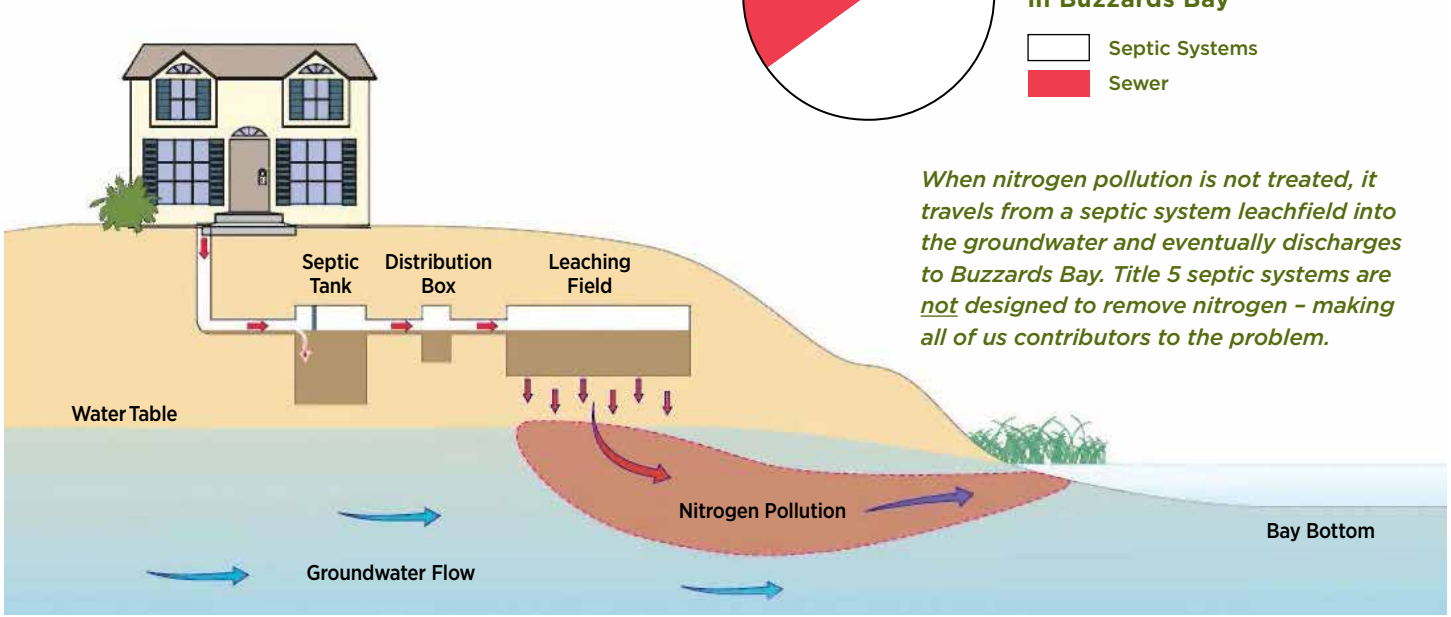


Wastewater Treatment in Buzzards Bay

Septic Systems

Sewer

When nitrogen pollution is not treated, it travels from a septic system leachfield into the groundwater and eventually discharges to Buzzards Bay. Title 5 septic systems are not designed to remove nitrogen – making all of us contributors to the problem.



EXISTING WASTEWATER INFRASTRUCTURE IN UPPER BUZZARDS BAY

The following section provides a brief description of the existing wastewater infrastructure in the towns of Marion, Wareham, Bourne and the Massachusetts Maritime Academy.

Wareham

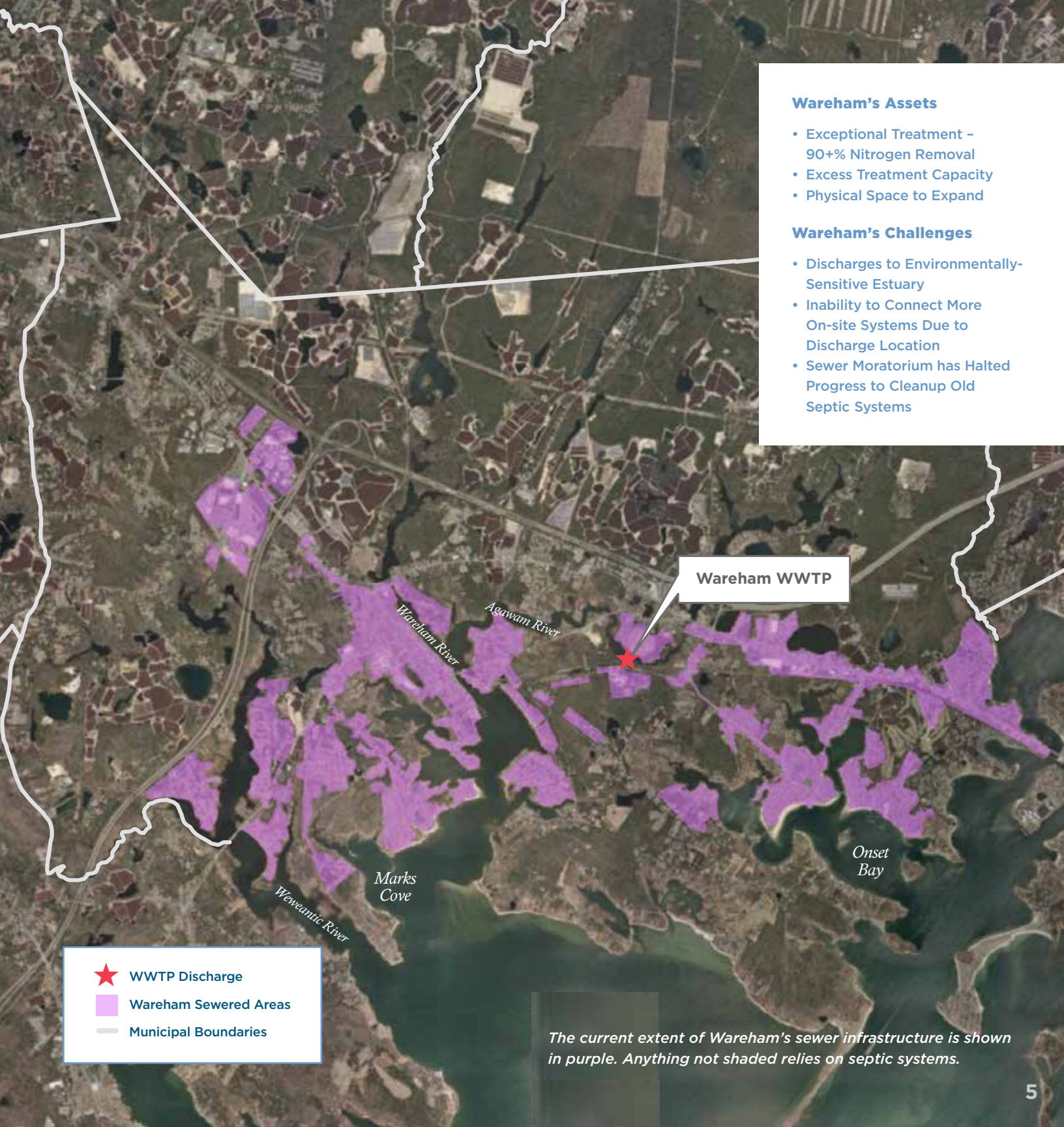
The town of Wareham owns and operates the Wareham WPCF located at Tony's Lane in Wareham. It has the design capacity to treat an average of 2 million gallons of wastewater each day and regularly achieves 90%+ nitrogen removal.[1] The average daily flow to the Wareham WPCF is made up of approximately 1,070,000 gallons per day (gpd) from the estimated 6,800 customers in the town of Wareham paying approximately $646/year in sewer fees.[2] An intermunicipal agreement between the town of Bourne and town of Wareham allows the town of Bourne to send 200,000 gpd of untreated wastewater to the Wareham WPCF for treatment and disposal into the Agawam River.[3] As of this report, it was estimated that Bourne generates an estimated 101,000 gpd from 1,070 users from the Main Street area in Buzzards Bay Village and Hideaway Village.[4]

While the WPCF has the design capacity to treat 2 million gallons per day (mgd), it is limited by its federal discharge permit from the US Environmental Protection Agency (EPA) to 1.56 mgd due to the sensitive nature of its discharge location. The WPCF discharges to the Agawam River – a shallow and poorly flushed estuary. While a 2005 upgrade to the WPCF significantly reduced the amount of nitrogen discharged from the WPCF to the Agawam River, the river is simply too sensitive to receive additional nitrogen discharges even at the WPCF's high level of treatment. If an alternative discharge location could be identified and pursued, it would immediately create 440,000 gpd of treatment capacity available to connect existing septic systems.

Agawam River at Wareham's 1.56 mgd discharge

Wareham's WPCF provides exceptional treatment. This image shows raw sewage on the left, Wareham's treated discharge is center, drinking water on right.

The limitation on Wareham's discharge location has resulted in a sewer hookup moratorium, slowed economic development, and most importantly, prevented the extension of the collection system to densely developed areas currently relying on on-site septic systems to dispose of wastewater – septic systems that do not treat for nitrogen and continue to degrade waters.



Wareham's Assets

- Exceptional Treatment – 90+% Nitrogen Removal
- Excess Treatment Capacity
- Physical Space to Expand

Wareham's Challenges

- Discharges to Environmentally-Sensitive Estuary
- Inability to Connect More On-site Systems Due to Discharge Location
- Sewer Moratorium has Halted Progress to Cleanup Old Septic Systems

The current extent of Wareham's sewer infrastructure is shown in purple. Anything not shaded relies on septic systems.

Bourne

Pursuant to the 2010 intermunicipal agreement with Wareham, Bourne can send 200,000 gpd to Wareham for treatment and disposal at the Agawam River. At the time of this report, it is estimated that only about 101,000 gpd flow from Bourne to Wareham, leaving Bourne with approximately 99,000 gpd of sewer capacity available at the Wareham WPCF.[5] Bourne recently completed the construction of a new wastewater treatment plant on Armory Road to treat 100,000 gpd of wastewater from new commercial growth in the downtown area. Downtown Bourne, also known as Buzzards Bay Village, is a Cape Cod Commission designated economic development district where investment in commercial growth and revitalization is a priority. The new plant is designed to remove approximately 75% of the nitrogen from new sources of wastewater. The wastewater is discharged to the ground where it flows to the Cape Cod Canal. This discharge is permitted by the Massachusetts Department of Environmental Protection (Mass DEP).

Bourne's Assets

- Existing Sewer Connections to Wareham
- Location Along Well-flushed Cape Cod Canal
- New Small Wastewater Treatment Facility Completed in 2020

Bourne's Challenges

- Inability to Increase Flow to Wareham Due to Wareham's Discharge Location
- Needs More Treatment Capacity to Provide Sewer Service to Existing Septic Systems

Among the many coastal assets in Bourne are Buttermillk and Little Buttermilk Bay – coastal waters polluted by nitrogen. There are 858 unsewered homes within the Buttermilk Bay watershed in Bourne. Many of these systems are failed, creating a public health concern in addition to a coastal water quality issue.

The town of Bourne has an estimated 1,070 ratepayers paying an average of $902/year in annual sewer rates.[6]

In 2020 the town of Bourne hired Environmental Partners to complete a town-wide CWMP, a process which is expected to be completed by 2023.

Massachusetts Maritime Academy

The Massachusetts Maritime Academy (MMA) is a Commonwealth of Massachusetts State University and owns and operates a wastewater treatment facility (WWTF) serving the campus. The WWTF is permitted by the US EPA to treat and discharge up to 77,000 gpd through a pipe directly to the Cape Cod Canal, but the average discharge is about 35,000gpd.[7] MMA eliminates bacteria in their discharge through treatment with an array of Ultraviolet (UV) disinfection lights but does not remove nitrogen.

MMA's Assets

- Permitted Discharge to Cape Cod Canal

MMA's Challenges

- Need to Expand Treatment Capacity to Accommodate Student Body

In order to grow the campus and student body, MMA needs additional treatment capacity.

Plymouth

The neighborhood in south Plymouth on the banks of Buttermilk Bay and directly adjacent to the Wareham/Bourne existing sewer network is miles away from Plymouth's municipal sewer system and includes 475 homes.

The on-site septic systems in south Plymouth are old and many are failing, creating both a public health concern as well as discharging nitrogen directly to Buttermilk Bay.

Plymouth's Assets

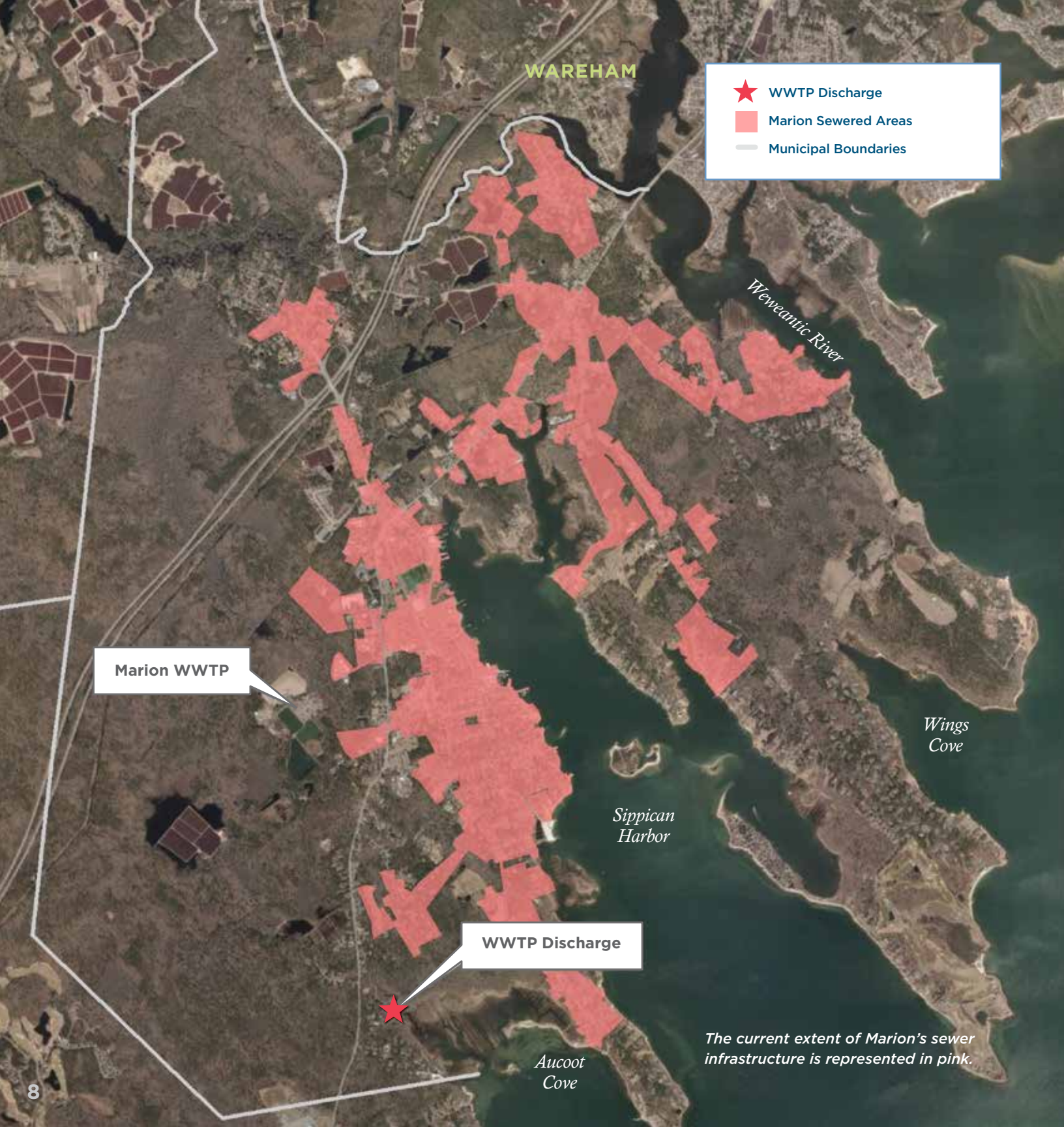
- Adjacent to Existing Sewer Infrastructure in Wareham

Plymouth's Challenges

- Need to Expand Sewer to Reduce Public Health Risks from Failed Septic systems and Reduce Nitrogen to Buttermilk Bay

In order to reduce or eliminate pollution from these septic systems and provide municipal sewer to this neighborhood, the town could consider connecting to the Wareham/Bourne sewer network.

The current extent of Bourne's sewer infrastructure is represented in yellow. Bourne can send up to 200,000 gpd to Wareham for treatment and discharge. Bourne's new WWTP can treat and discharge up to 100,000 gpd to the groundwater which discharges to the Cape Cod Canal. MMA is identified in blue.



The current extent of Marion's sewer infrastructure is represented in pink.

Marion

Marion currently owns and operates a WWTF permitted by the US EPA and Mass DEP to treat and discharge an average of 588,000 gpd to a freshwater creek flowing to Aucoot Cove.[8]

Marion's current wastewater collection system provides wastewater treatment for an estimated 1,700 users with a rolling average daily discharge in 2018 of 571,000 gpd.[9] The average sewer user pays an estimated $1,532/year in sewer fees.

In 2018, EPA required Marion to meet a nitrogen limit of 4mg/L total nitrogen (90+% nitrogen removal). EPA also required Marion to reduce the amount of phosphorus discharged to the freshwater creek. In order to comply with the federal discharge permit, Marion must consider the following alternatives:

1. Upgrade the WWTF to meet a phosphorus limit and continue to discharge into the creek,
2. Relocate the wastewater outfall to a location that is beyond the freshwater stream, deeper into Aucoot Cove, or
3. Connect to a regional facility.

In 2020, the town of Marion hired Weston & Sampson to complete a CWMP and evaluate treatment and discharge alternatives, a process which is expected to be completed by 2022.

Marion's Assets

- WWTP Achieves 90%+ Nitrogen Removal
- Immediately Adjacent to Wareham Sewer Infrastructure

Marion's Challenges

- Discharges to Sensitive Stream
- Required to Upgrade Treatment for Phosphorus or Relocate Outfall
- At Treatment Capacity and Must Consider WWTP Expansion to Expand Sewer
- Limited Ratepayers Makes it an Expensive System to Operate

ESTIMATING THE SIZE OF A REGIONAL FACILITY

In order to restore water quality and coastal habitats, communities need to reduce dependency on conventional on-site septic systems. The Upper Bay Project evaluated how these communities could expand existing infrastructure, enhance treatment, and evaluated a discharge location to achieve potentially historic reductions in nitrogen pollution.

In order to estimate the size of the wastewater treatment facility needed to accommodate all communities. The project used best available information from each community to estimate future sewer needs.

The Project hired GHD to estimate sewer flows. GHD worked with each of the partners to develop potential future wastewater flows within Bourne, Wareham, Marion and Plymouth and MMA. The project intentionally used conservative wastewater volume assumptions in order to overestimate the need. These numbers will be refined as each community completes the CWMP process.

Initial flow estimates were completed in 2017 by GHD in an April 21, 2017 Technical Memorandum "Projected Wastewater Flows."

Flow Estimates by Community:

Bourne

GHD reviewed the 2012 buildout analysis completed by the Cape Cod Commission and CH2MHill, which projected theoretical build-out wastewater flows for downtown Bourne at 222,000 gpd from residential use and 943,000 gpd from future commercial use.[11]

Later, using Bourne's 2019 Long Term Management Plan, downtown Bourne sewer needs were reduced to 243,138 gpd. In addition to the downtown area, GHD estimated the wastewater flows from the 858 parcels in the potential sewer expansion area in the Queen Sewell Neighborhood.[12] Using 90% of the town of Bourne's average daily water use per residential property of 135 gpd, GHD estimated a potential average daily wastewater need from the Queen Sewell Neighborhood of 104,000 gpd. The total estimated sewer need for Bourne (existing and new) is 448,138 gpd. Assuming 100,000 gpd is treated at Bourne's new treatment plant, Bourne may send about 348,000 gpd to a regional WWTP.

Estimated Need:
348,000 gpd

Massachusetts Maritime Academy

MMA is considering growing the student body by about 250 students which would require additional wastewater treatment capacity. MMA would be looking to increase treatment capacity from 77,000 gpd to 100,000 gpd. MMA could consider abandoning its wastewater treatment facililty and instead send 100,000 gpd to a regional WWTP.

Estimated Need:
100,000 gpd

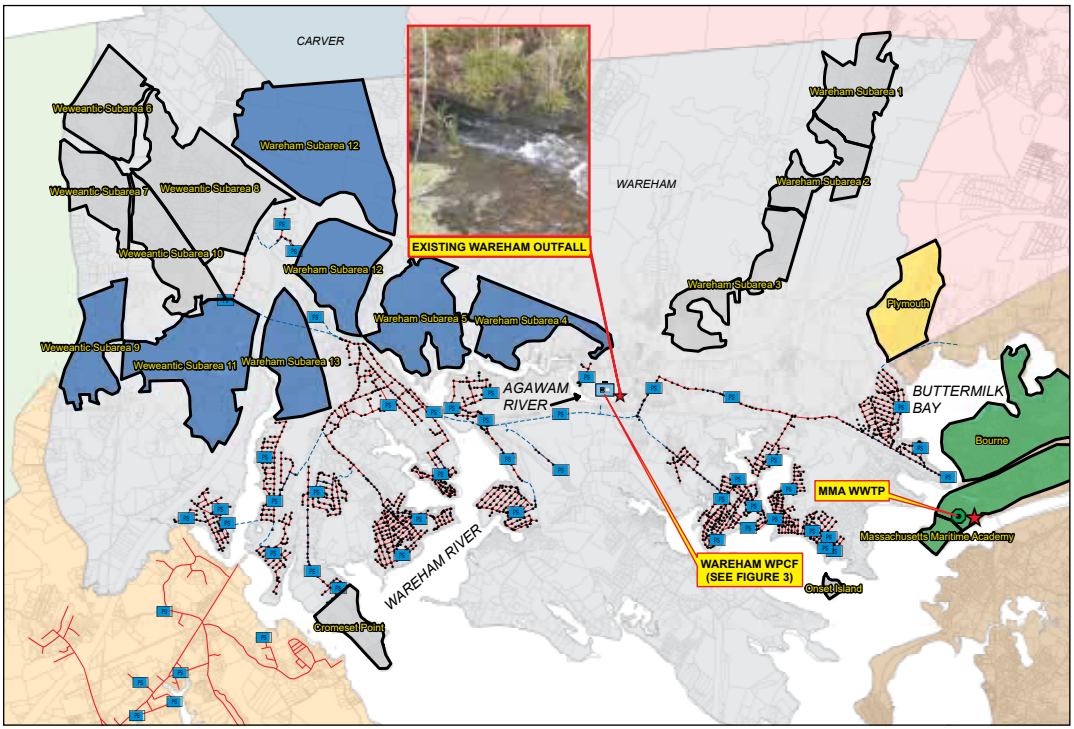
Plymouth

Working closely with the town of Plymouth, GHD estimated wastewater flows from the south Plymouth expansion area in 2016. GHD identified 475 parcels with on-site septic systems. No water use data exists for this neighborhood because these properties are on private wells. GHD used water use information from the town of Bourne and the town of Wareham to estimate water use. The average water use was calculated to be approximately 137 gpd per residential property. Using 90% of the water flow, the wastewater flow from Plymouth was estimated at 63,000 gpd.[13]

Estimated Need:
63,000 gpd

above *Sewer expansion area outlined in orange, with approximately 475 homes. Wareham sewer infrastructure shaded in purple.*

right *Existing sewer area shaded in yellow. Sewer expansion area outlined in orange, which includes approximately 858 homes. The blue line represents the Buttermilk Bay watershed.*



Wareham

In preparation for a future CWMP, in 2015 the town of Wareham hired BETA Inc., to complete a study of potential sewer areas. Thirteen sub areas were identified for future potential sewer expansion. Using water use records to estimate average daily flow, BETA estimated an average daily wastewater flow of 500,000 gpd for subareas 1-11 and 13.[14] Subarea 12, the Business Development Overlay District, was estimated to have a future wastewater flow of 500,000 gpd. Average daily wastewater flows were estimated by GHD in 2017 for Cromeset Point, 7,200 gpd, and Onset Island, 8,400 gpd, as well. Wareham later revised the priority sewer expansion areas estimating a new total flow of 726,000 gpd for a total need of 1,796,000 gpd.[15]

Estimated Need:
1,796,000 gpd

above *Wareham priority sewer expansion area in blue generating approximately 726,000 gpd of new flow to a regional facility.*

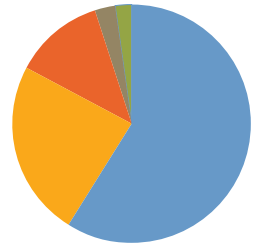
Marion

In 2017 GHD completed a flow estimate analysis to determine the maximum long-term sewer needs in the town of Marion and estimate how much flow Marion may send to a regional WWTP. This analysis estimated that if each buildable parcel was developed, Marion would require an additional 152,000 gpd for residential development and 112,000 gpd for commercial development beyond its existing flow.[16] In 2018, the rolling average daily flow from the town of Marion was 571,000 gpd, for a total estimated need of approximately 835,000 gpd. GHD presented these figures to the Marion Board of Selectmen on October 9, 2019. It was determined during that meeting, that the 835,000 gpd was likely too high. In early 2020, after Marion had hired Weston & Sampson to complete the CWMP, Marion estimated a future need of only 150,000 gpd for a revised total need of 721,000 gpd.[17] The final CWMP will better refine these estimates. In early 2020, Marion had not yet determined the location of additional sewer areas.

Estimated Need:
721,000 gpd

Total Estimated Regional Wastewater Treatment Need From All Partners:

ESTIMATED EXISTING AND FUTURE AVERAGE DAILY FLOWS*				
PARTNER	**EXISTING AVG DAILY FLOW (GDP)**	**NEW AVG DAILY FLOW (GDP)**	**TOTAL AVG DAILY FLOW (GDP)**	**% OF TOTAL REGIONAL DAILY FLOW**
Wareham	1,070,000	726,000	1,796,000	59%
Marion	571,000	150,000	721,000	25%
Bourne	101,000	247,000	348,000	12%
MMA	35,000	65,000	100,000	3%
Plymouth	0	63,000	63,000	2%
Regional Total			**3,028,000**	



*Figures rounded.

The table above shows existing average daily flows from each of the partners together with the estimated new flows from each partner for a total regional wastewater flow need of 3,028,000 gpd.

Further details on the original needs analysis completed in 2017 can be found in **GHD's April 21, 2017 Technical Memorandum "Projected Wastewater Flows"**.

The flow numbers used in this report are not the result of town-specific analysis completed by CWMPs, but were estimates taken from the best available information at the time. More refined CWMP estimates from each of the towns will likely continue to change future estimates of sewer needs. As those estimates evolve, the size of a wastewater treatment facility and the volume of discharge of treated water may also evolve.

POTENTIAL ESTIMATED NITROGEN REDUCTIONS

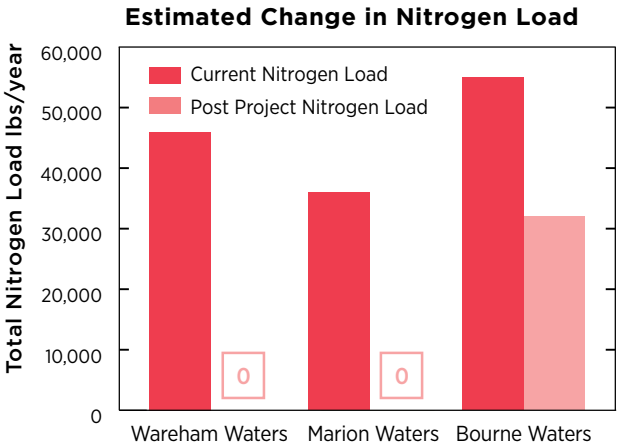
If the Wareham WPCF served as the regional WWTP for existing and future needs, the Project could eliminate nitrogen from an estimated 3,400 existing septic systems based on the analysis described above.

If the treated wastewater pipe was relocated from the Agawam to the Cape Cod Canal and sewer expanded to the estimated needs areas discussed above to discontinue the use of on-site septic systems, **an estimated 100,000 lbs of nitrogen pollution could be reduced from Buzzards Bay waters.**

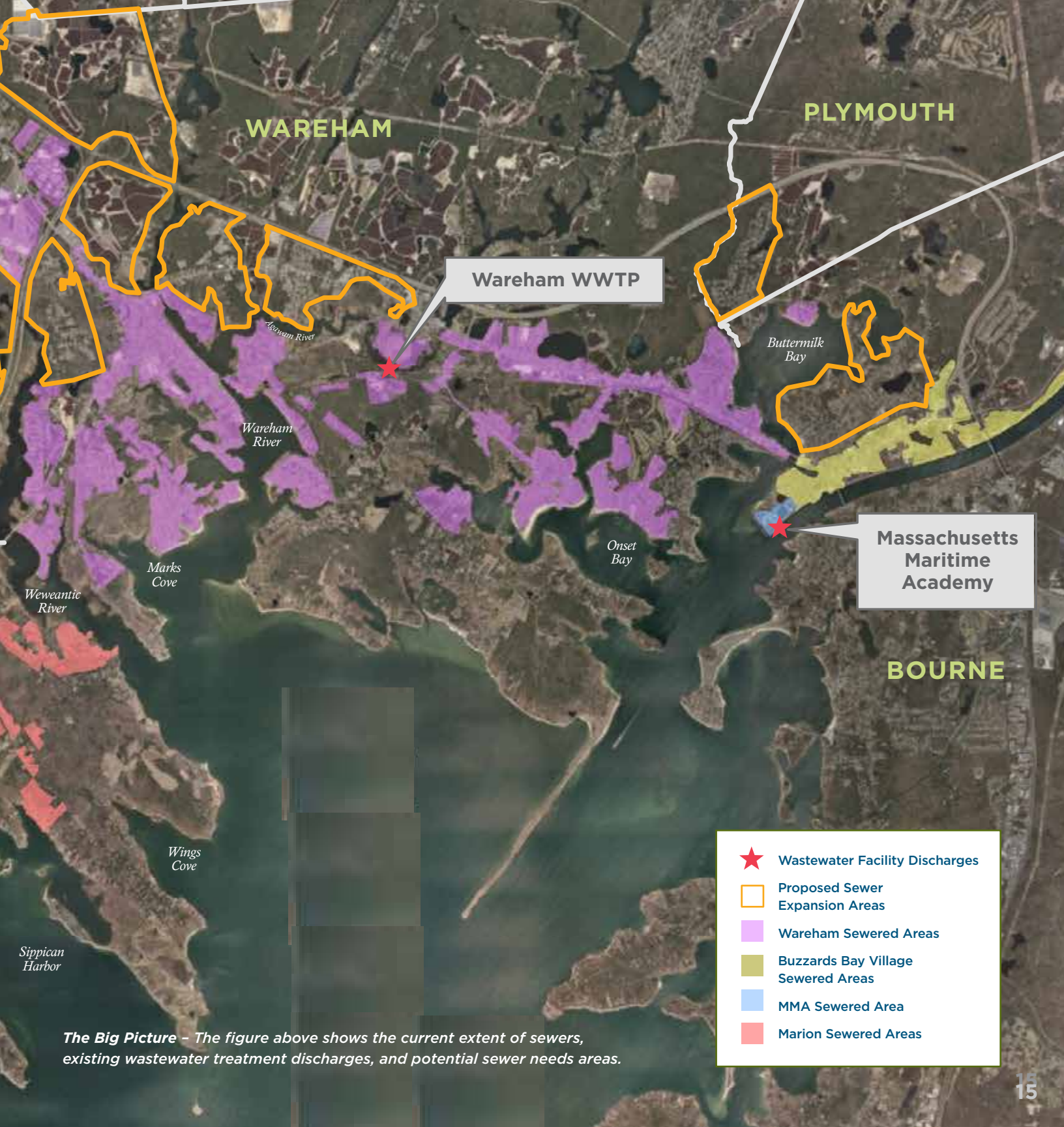
The following table provides the current load of nitrogen from existing wastewater treatment facilities and septic systems in the assumed needs areas.

	Estimated Nitrogen Load from Current Outfalls (LBS/YEAR)	Estimated Number of Existing Septic Systems in Needs Area Adding Nitrogen to Sensitive Waters	Estimated Nitrogen Load from Existing Septics (LBS/YEAR)	Total Nitrogen to Impaired Estuaries WWTP and Septics (LBS/YEAR)
Wareham	13,000	926	24,000	37,000
Marion	7,000	1,216	29,000	36,000
Plymouth	0	457	12,000	12,000
Bourne	0	858	20,000	20,000
MMA	1,000	0	0	1,000
TOTAL		**3,457**		**106,000**

If the current outfalls and existing 3,400 septic systems were all connected to one WWTP that reduced nitrogen by 95% and discharged to a less vulnerable location, an estimated 100,000 lbs of nitrogen would be eliminated from upper Buzzards Bay.



This graph shows the nitrogen reduction in each community with the Upper Bay Project.



The Big Picture *– The figure above shows the current extent of sewers, existing wastewater treatment discharges, and potential sewer needs areas.*

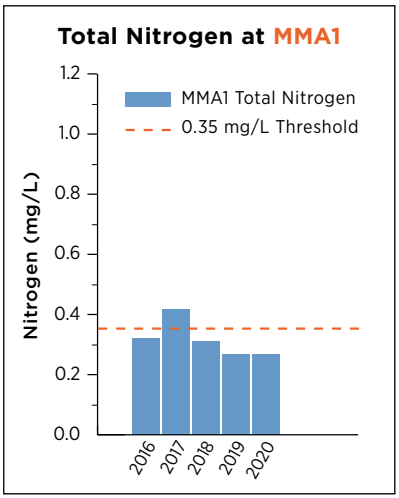
EVALUATING THE CAPE COD CANAL AS A DISCHARGE LOCATION

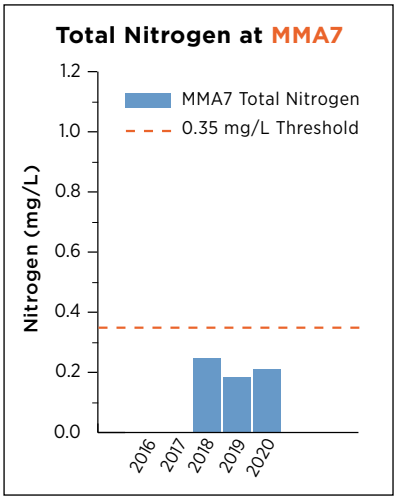
With potential flows estimated, the Project focused on the threshold question of whether the Cape Cod Canal is an appropriate discharge location for the estimated volume of treated wastewater.

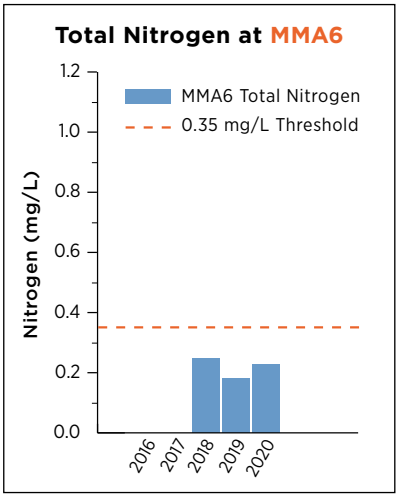
The purpose of the Project was to solve nitrogen pollution problems and not relocate nitrogen to a place where it would have an adverse impact. Understanding whether relocating Wareham's treated discharge pipe from the Agawam River to the Cape Cod Canal would have an impact on water quality in the Canal and surrounding nitrogen impaired estuaries was a critical evaluation.

The Massachusetts State Ocean Sanctuaries Act requires a robust suite of scientific studies to be performed to determine whether a wastewater outfall is environmentally sound.[18] The project worked with state agencies to design and carry out the necessary studies.

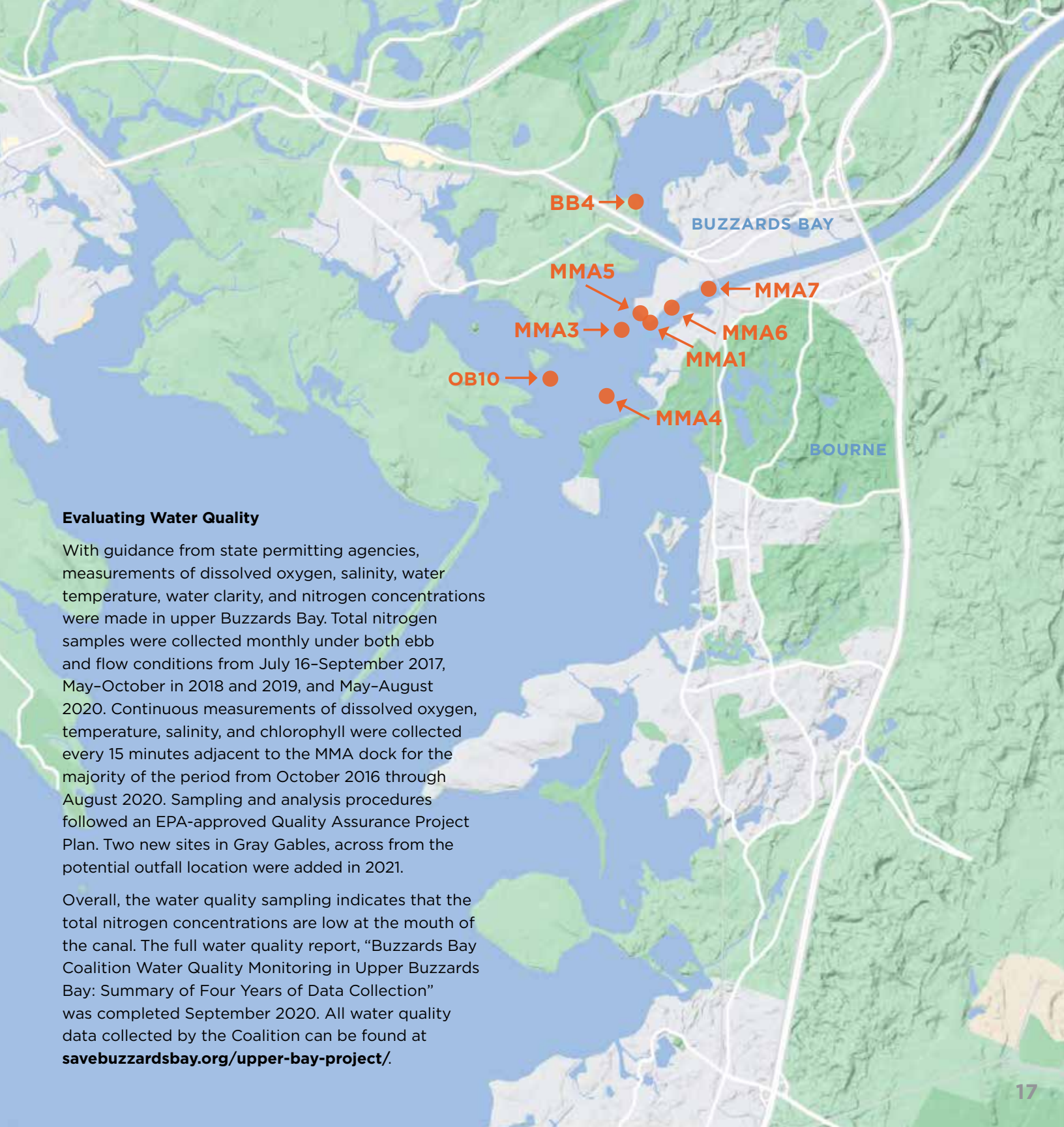
The project began collecting water quality data in 2016, completed an eelgrass survey in 2019, a finfish assessment in 2020, and an analysis of bottom habitat in 2020.







Nitrogen levels below .35 mg/L are considered healthy and contribute to good water clarity and fish and shellfish deversity.



Evaluating Water Quality

With guidance from state permitting agencies, measurements of dissolved oxygen, salinity, water temperature, water clarity, and nitrogen concentrations were made in upper Buzzards Bay. Total nitrogen samples were collected monthly under both ebb and flow conditions from July 16–September 2017, May–October in 2018 and 2019, and May–August 2020. Continuous measurements of dissolved oxygen, temperature, salinity, and chlorophyll were collected every 15 minutes adjacent to the MMA dock for the majority of the period from October 2016 through August 2020. Sampling and analysis procedures followed an EPA-approved Quality Assurance Project Plan. Two new sites in Gray Gables, across from the potential outfall location were added in 2021.

Overall, the water quality sampling indicates that the total nitrogen concentrations are low at the mouth of the canal. The full water quality report, "Buzzards Bay Coalition Water Quality Monitoring in Upper Buzzards Bay: Summary of Four Years of Data Collection" was completed September 2020. All water quality data collected by the Coalition can be found at **savebuzzardsbay.org/upper-bay-project/**.

Benthic Analysis – Bottom Habitat

The sediment characteristics and the organisms present in the sediments at the bottom of the ocean provide valuable information about overall ecosystem health.

Sediments with a high number of many different species typically indicate healthy habitats. Sediment samples were collected at five stations in Upper Buzzards Bay; MMA3, MMA4, MMA5, MMA6, and MMA7. The seafloor located in the fast current of the Cape Cod Canal, was predominately a mussel bed and cobble. The seafloor at site MMA4 consisted of eelgrass and coarse and medium sand bottoms, whereas MMA3, had a coarse sand bottom without eelgrass present. Lastly, the seafloor at MMA5 was covered with a slipper shell community and was where the highest number of species and individual organisms were present.

While each area is unique, stations located outside of the canal (MMA3, MMA4, MMA5) had higher species diversity compared to stations located within the canal (MMA6 and MMA7). This is consistent with the extremely strong currents through the canal that can scour sediments making it a challenging environment for many species to survive despite the excellent water quality.

The full Benthic Analysis was completed in January 2020.

FinFish Resource Assessment

The goal of this study was to document the baseline conditions with respect to finfish in the area of a potential discharge. This baseline analysis is required by state law before any approval of an ocean discharge can occur. To assess the baseline conditions of finfish resources near the proposed discharge, trawl data from the Massachusetts Division of Marine Fisheries was compiled for a 10-year period from Upper Buzzards Bay and Cape Cod Bay near the Canal exits. Data from 250 trawls were analyzed. The study found that with vigorous currents and tidal flows and an estimated 56-80 billion gallons of water flowing through the canal every day, the Canal environment serves primarily a short-term habitat used by fish, with migrating fish passing through the Canal and the type of fish in the Canal changing over the course of the year. Establishing this finfish baseline under current conditions is important to assess whether any changes occur to finfish populations with any potential future changes in wastewater discharges.

Eelgrass

Eelgrass beds are highly productive underwater areas that act as a nursery, habitat, and feeding ground for many fish, waterfowl, and invertebrates. The Buzzards Bay National Estuary Program's Comprehensive Conservation and Management Plan identifies loss of eelgrass due to excess nitrogen as a priority concern. The sensitivity of eelgrass to nitrogen pollution also make it an ideal indicator species for changes in water quality. The Project assessed two eelgrass beds, one in close proximity to a potential new discharge and one in an area considered out of the area of influence of a potential new discharge location.

The location in close proximity to the discharge (off Taylor's Point) was mapped in order to have a baseline near the potential discharge. The location out of the area of influence (off of Mashnee Island) could provide a control bed for comparison in order to account for impacts unrelated to the discharge (e.g., temperature, disease).

The Eelgrass Survey was completed by the MA Division of Marine Fisheries from 2018-2019.

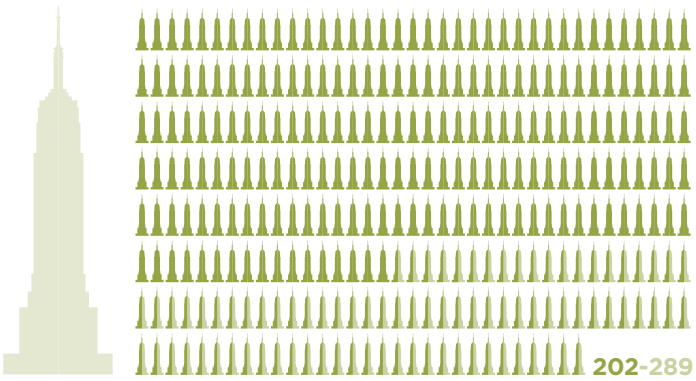
Benthic Stations
Existing MMA Outfall
Eelgrass
Massachusetts Maritime Academy
Taylor Point
MMA7
MMA6
MMA5
MMA3
MMA4
Onset Bay
Cape Cod Canal
Widows Cove
Phinneys Harbor
Mashnee Island
Tobys Island

Will an increase discharge at the canal adversely impact water quality?

Hydrodynamic Study

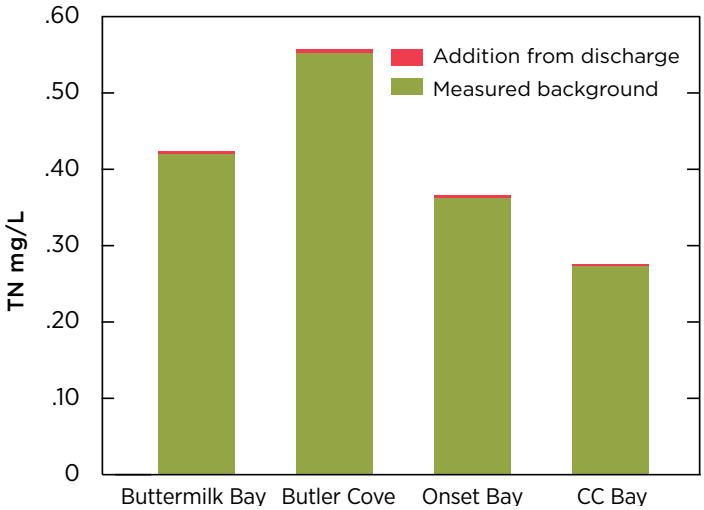
To answer this question the Project retained the Woods Hole Oceanographic Institution (WHOI) in 2017 to build a model to determine the effect an increased discharge of treated wastewater at an outfall at MMA would have on water quality. The analysis was completed in two parts. First, WHOI estimated how the nitrogen is currently distributed in the water at the MMA discharge location. Second, they used hydrodynamic and plume-tracking models to estimate how increased nitrogen at this location will impact water quality.

Even though the estimated treated discharge is 3.5 mgd, the hydrodynamic and plume-tracking model used a high flow estimate of 10 mgd and a low end flow estimate of 3 mgd to measure a range of impacts. WHOI estimates the Canal moves approximately 56-80 billion gallons of water each day – a staggering volume equal to filling 202-289 Empire State buildings every day.



After running the model with a hypothetical discharge of 10 mgd and 3 mgd, the model results consistently show that the discharge would not adversely impact the coastal environment.

The Hydrodynamic Analysis, "Assessing the Impact of Increased Effluent Discharge into Cape Cod Canal" was completed in 2017.



This graph illustrates the small addition of nitrogen from a 3.5 mgd discharge at MMA's Cape Cod Canal discharge location. This table does not reflect the reduction in nitrogen due to the expansion of sewer and elimination of approximately 100,000 lbs of nitrogen currently being discharge to Buzzards Bay.

CONCLUSION

The science completed to date indicates that an increased discharge of highly treated wastewater at an estimated volume of 3.5 mgd at the canal will not have an adverse impact on existing water quality in the surrounding area. In fact, the overall nitrogen load to the upper Bay will be reduced by an estimated 100,000 lbs yielding anticipated large improvements to water quality and fisheries.

ALTERNATIVES FOR MOVING THE DISCHARGE PIPE

The next question the Project sought to answer was how to relocate the discharge pipe from the Agawam River to the Cape Cod Canal. Two separate environmental engineering firms were consulted to evaluate the pipe realignment. Those reports are summarized here.

The BETA Group Report

The project engaged BETA Group based in Lincoln, Rhode Island in 2018 to complete the preliminary realignment evaluation. BETA assessed three primary routing alternatives including a roadway (Route-6/Route-28), a railway, and Hybrid approach together with a variety of construction techniques to relocate a new treated effluent force main. In order to evaluate whether the Railway line was a feasible alternative, BETA relied on a survey completed by the Project in 2016 by Green Seal Environmental which provided a right-of-way (ROW) survey of the rail line between Wareham and Bourne. This 2016 survey provided an update to an 1878 survey of the rail line.

BETA concluded that relocating the discharge from the Agawam River to the Cape Cod Canal will require construction of approximately 4.4 miles of new 24 inch force main and a new outfall to the Cape Cod Canal.

BETA evaluated the estimated 4.4 mile stretch in 3 different segments:

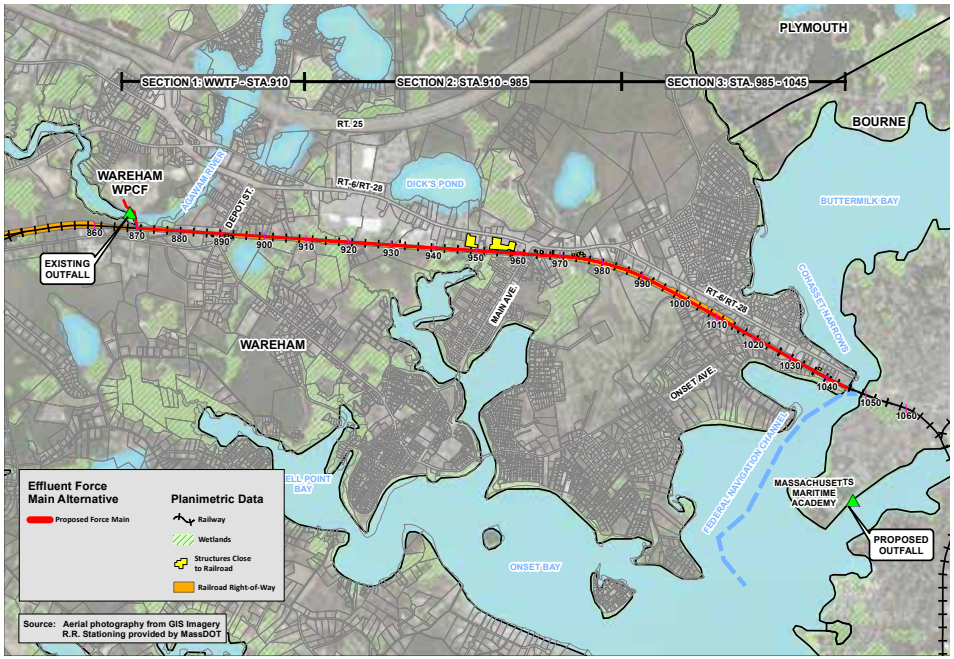
Segment 1: Wastewater Treatment Facility to Cohasset Narrows (a total of 3.8 miles).

Segment 2: Cohasset Narrows Crossing.

Segment 3: Cohasset Narrows to the Canal at MMA's current discharge location.

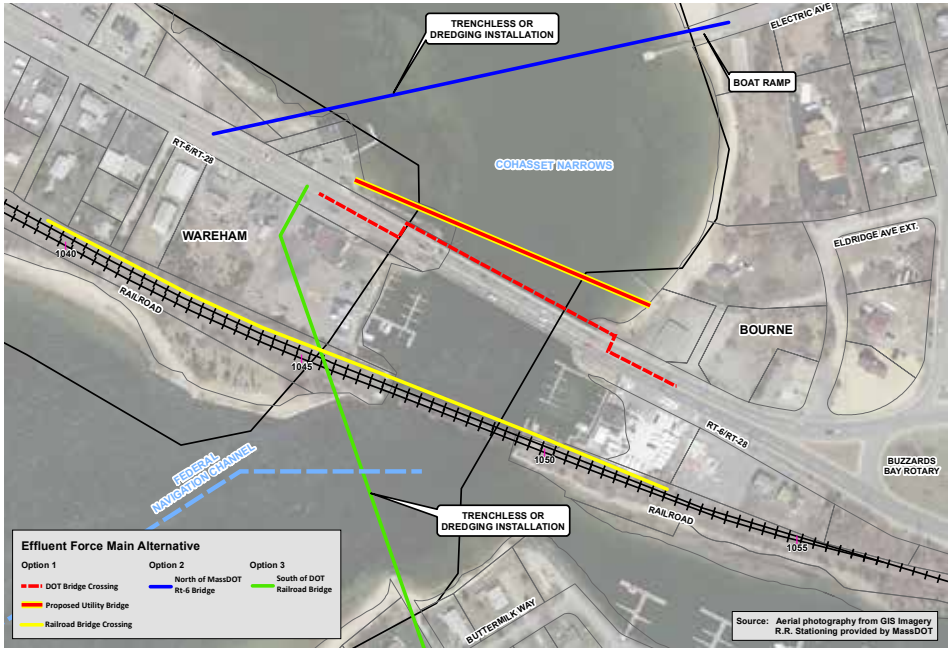
Segment 1

BETA recommended routing the effluent force main along Route-6/Route-28 through open cut construction. This alternative avoids construction within wetlands and their jurisdictional areas. While open-cut construction along Route-6/Route-28 will call for lane closures and traffic disruptions, BETA concluded that the benefits of installation within this route outweigh the challenges associated with approvals, permitting, construction and cost for the installation of the pipeline with the railway ROW.



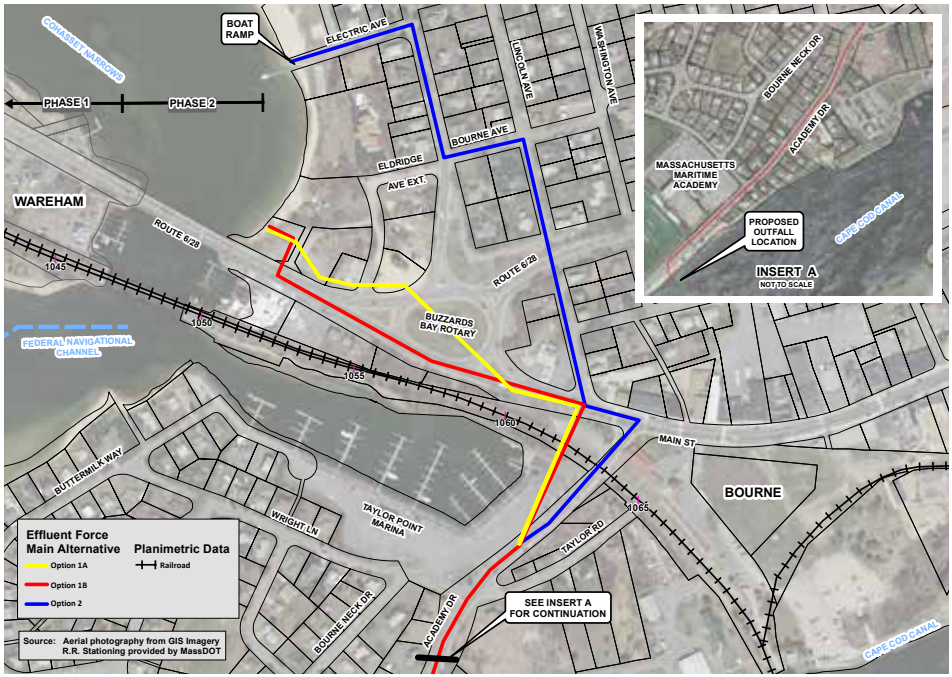
Segment 2

Unfortunately, the existing bridges were not designed to carry the weight of a 24-inch force main. BETA evaluated whether a sub-aquatic crossing could occur via dredging or trenchless directional drill north or south of the existing bridges. BETA was reluctant to recommend trenchless without a more thorough subsurface investigation to determine whether the presence of boulders would present challenges. Ultimately, BETA recommended that a new utility bridge be constructed. BETA concluded that a utility bridge proposes fewer risks, challenges, and permitting restrictions, and provides an opportunity to provide a dedicated pedestrian crossing of the narrows.



Segment 3

BETA evaluated three routes from Cohasset Narrows to the proposed outfall location in the Cape Cod Canal off Academy Drive. BETA's preferred alternative continues from the hypothetical utility bridge, passes through the middle of the Buzzards Bay Rotary (thereby avoiding Rt-6/ Rt-28 and work hour restrictions) with less impact on traffic.



BETA Opinion of Probable Cost

The total estimated cost for construction of a treated force main for all 3 segments, a new pump station at the Wareham WPCF and the reconstruction of the MMA Outfall at the Cape Cod Canal, including engineering is $64,100,000.

Preliminary opinion of probable costs are based on 2018 dollars and includes a planning level contingency of 30%. If the project progresses it is critical that the costs are updated at each stage of the planning and design process.

The BETA report, "WPCF Effluent Force Main Routing Alternatives Analysis" was completed in September 2020.

Overall Project Opinion of Cost
Concept Plan Level

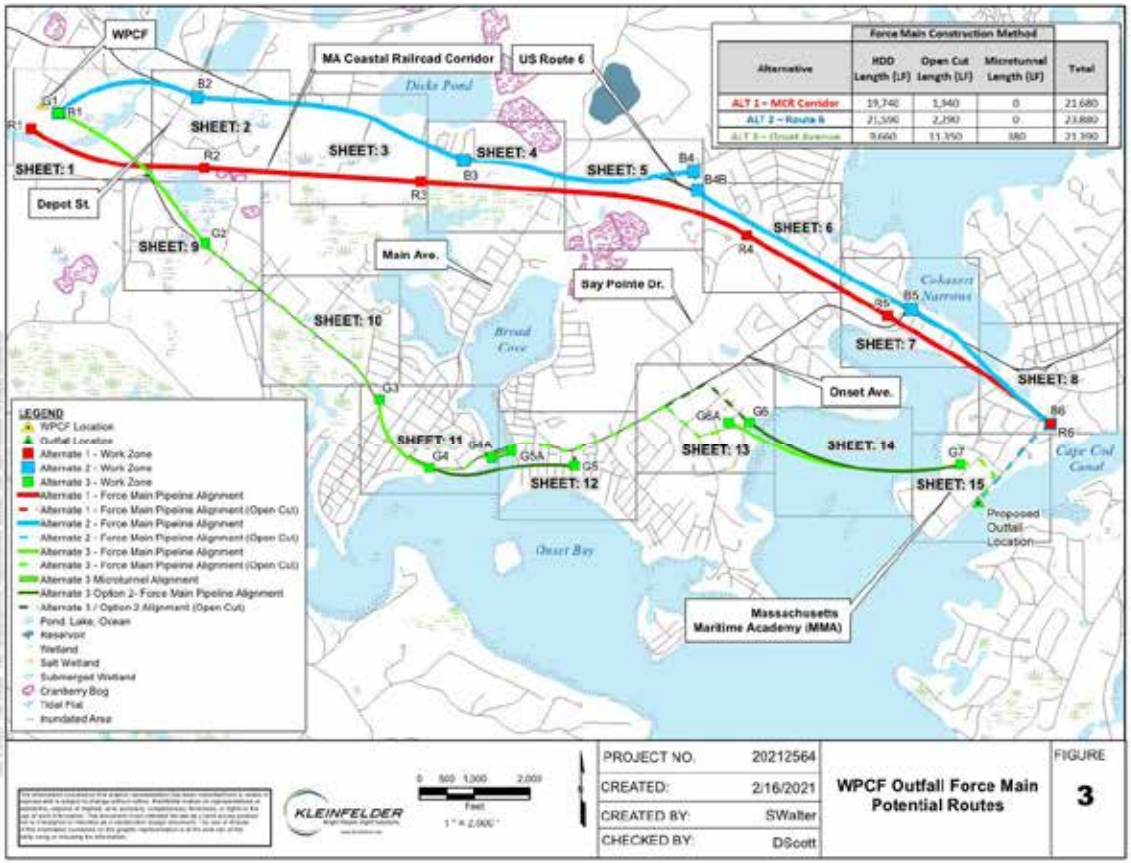
CONSTRUCTION COSTS	
Phase I Construction	$22,400,000
Phase 2 Construction	$4,300,000
Phase 3 Construction	$10,300,000
Effluent Pump Station	$10,000,000
Effluent Force Main Outfall	$4,000,000
Construction Subtotal	**$51,000,000**
ENGINEERING	
Design (10%)	$5,300,000
Construction – Resident Inspection (15%)	$7,800,000
Project Total	**$64,100,000**

Kleinfelder Report

In 2020 the town of Wareham hired the engineering firm, Kleinfelder, to do a further evaluation on constructing a force main for treated wastewater from the Wareham WPCF to the Cape Cod Canal through horizontal directional drilling. Horizontal directional drilling is a trenchless method of installing underground pipe where a directional drilling machine drills a deep hole (approximately 100 feet underground) to install pipe. Kleinfelder assessed three alternatives including, the railway, route 6/28 and Onset Avenue. Kleinfelder reviewed the boring logs from MassDOT plans for the existing Bourne-Wareham bridge over Cohasset Narrows as well as boring data from the reconstruction of route 6 and 28 to better understand subsurface conditions. Klenifelder concluded that the railway route was the best alternative for subsurface drilling as the majority of the construction can be completed with minimal impact to the public and has the most advantages from a constructability standpoint. Kleinfelder anticipates that construction would take approximately 29 months including planning and permitting with actual construction lasting approximately 11 months.

The estimated cost of horizontal directional drilling is $48 million or 24% cheaper than the over land option evaluated by BETA.

Kleinfelder produced a Technical Memorandum in 2021 for Wareham "WPCF Outfall Force Main Feasibility and Routing Analysis". The town of Wareham continues to work with Kleinfelder in refining the potential costs of this alternative.



Alternative	Force Main Construction Method			Total
	HDD Length (LF)	Open Cut Length (LF)	Microtunnel Length (LF)	
ALT 1 – MCR Corridor	19,740	1,940	0	21,680
ALT 2 – Route 6	21,590	2,290	0	23,880
ALT 3 – Onset Avenue	9,660	11,350	380	21,390

CONSTRUCTION COSTS	
Mobilization/Demobilization (5% less Outfall and Pump Station)	$786,300
HDD Related Costs	$14,885,270
Open Cut Related Costs	$273,000
Microtunnel Costs	$0
Outfall (24-inch and including mobilization)	$4,000,000
Pump Station (7 MGD and including mobilization)	$10,000,000
Misc. Costs (Restoration, Traffic Management, Utility Relocation, etc.)	$567,800
Construction Total Cost (Rounded)	**$30,512,000**
Trenchless Risk Contingency (30%)	$3,101,400
General Construction Contingency (20%)	$6,102,400
Total Construction Cost Including Contingencies (Rounded)	**$39,716,000**
ENGINEERING COSTS	
Preliminary and Final Design (12%)	$4,765,900
Engineering Services During Construction (10%)	$3,971,600
Total Engineer Cost (Rounded)	**$8,738,000**
Total Construction and Engineering Costs (Rounded)	**$48,454,000**

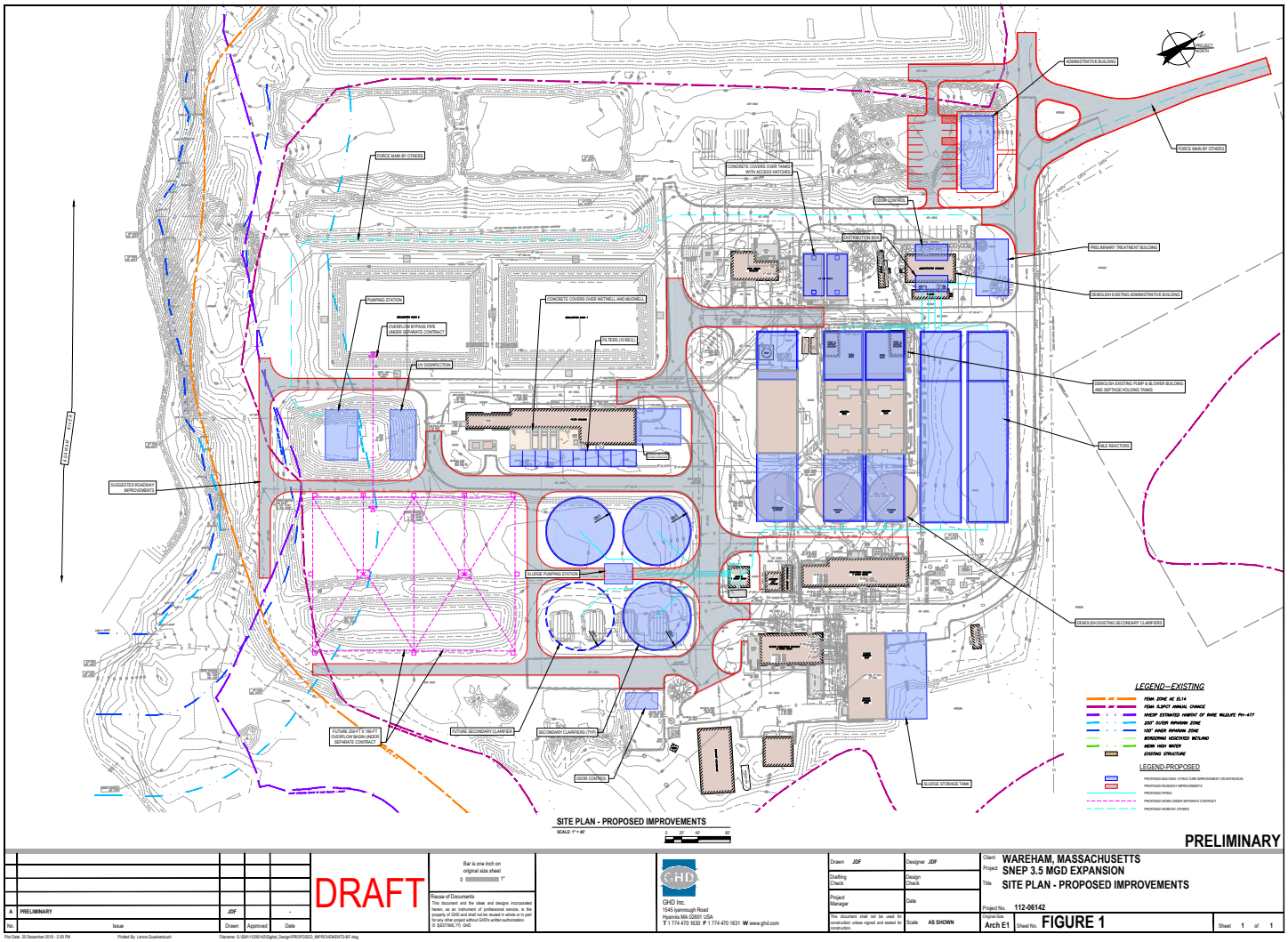
WASTEWATER TREATMENT EXPANSION REQUIREMENTS

While the Wareham WPCF has excess capacity of approximately 440,000 gpd, the WPCF would need to be expanded by 1.5 mgd to accommodate the sewer needs of all the partners. This estimate assumes that all partners elect to participate in a regional solution and that the sewer needs estimated in this report are close to those needs determined through each town's CWMP process. The entire project needs a wastewater treatment facility capable of treating 3.5 mgd average daily flow.

Fortunately, the Wareham WPCF site has space for expansion outside of the flood zone.

In 2018 the project contracted with GHD to complete a plant expansion alternatives analysis to determine the best way to provide the best treatment to meet the needs of all communities.

Three separate treatment options were considered for the WPCF expansion including; alternative technology,



Conceptual layout of 3.5 mgd WWTP

a new treatment plant, or additional tanks and processes to the existing facility. GHD concluded that adding tanks and process to the existing facility was the preferred alternative as the existing technology has shown to operate well and meet treatment limits. The current treatment system has moderately lower capital construction costs as well as lower operating and maintenance costs compared to other technologies.

Alternatives for solids treatment were also considered. Ultimately, flexibility to switch between thickened and dewatered sludge was required due to the volatility in the sludge disposal market and a shortage of disposal locations. This gives the plant the flexibility to dispose of thickened sludge when the thickened sludge market is favorable and dewatered sludge when the dewatered sludge market is favorable. One of the major disadvantages of the other alternatives considered was the cost to construct the additional processes.

Engineers' Opinion of Probable Costs for infrastructure were developed as part of this initial planning process and are based on 2018 dollars. It is important to note that as the project progresses, it is critical that these costs are refined and updated. The total capital costs to upgrade the existing 2 mgd plant to 3.5 mgd is estimated at $100,000,000.

Engineers' Opinion of Probable Construction Costs for MLE

COMPONENT	INCREMENTAL COST EXISTING PLANT TO 2.5 MGD	INCREMENTAL COST EXISTING 2.5 MGD TO 3 MGD	INCREMENTAL COST 3 MGD TO 3.5 MGD	TOTAL UPGRADE PROBABLE COST EXISTING PLANT TO 3.5 MGD
Preliminary Treatment	$2,100,000	$0	$0	$2,100,000
MLE Reactors	$8,700,000	$2,300,000	$2,300,000	$14,100,000
Clarifiers	$4,400,000	$1,700,000	$0	$6,000,000
Denitrification Filters	$3,200,000	$400,000	$400,000	$4,000,000
UV Disinfection	$1,800,000	$200,000	$200,000	$2,200,000
Effluent Pump Station	$3,600,000	$100,000	$0	$3,600,000
Solids Treatment	$3,300,000	$200,000	$200,000	$3,600,000
Septage Receiving Building Rehab	$400,000	$0	$0	$400,000
Odor Control	$900,000	$900,000	$0	$1,800,000
Process & Filter Building	$1,500,000	$700,000	$0	$2,200,000
Operations Building Allowance	$0	$0	$500,000	$500,000
Administration Building	$0	$1,100,000	$0	$1,100,000
Electrical & Instrumentation	$4,500,000	$1,100,000	$500,000	$6,200,000
HVAC	$900,000	$200,000	$100,000	$1,200,000
Yard Piping	$1,500,000	$400,000	$200,000	$2,100,000
Site Work	$1,500,000	$400,000	$200,000	$2,100,000
Plumbing, Painting	$600,000	$100,000	$100,000	$800,000
General Conditions	$3,600,000	$900,000	$400,000	$5,000,000
Subtotal of Construction Costs	**$42,000,000**	**$11,000,000**	**$5,000,000**	**$59,000,000**
Contingency	$12,700,000	$3,200,000	$1,500,000	$17,700,000
Total Construction (ENR – Oct 2019 = 11326)	**$55,000,000**	**$14,000,000**	**$7,000,000**	**$77,000,000**
Fiscal, Legal, Engineering Allowance	$16,500,000	$4,200,000	$2,100,000	$23,100,000
Total Capital Costs (ENR – Oct 2019 = 11326)	**$72,000,000**	**$18,000,000**	**$9,000,000**	**$100,000,000**

It is possible, and even probable, that not all communities decide to pursue a regional partnership as an option. Changes in participation will change the amount of wastewater required to be treated and therefore may change the size of the plant constructed. In order to take those contingencies into account, the cost estimates to expand the WPCF were broken down into increments.

The design phase is approximately 16 months, the bidding is approximately 5 months, and the construction is approximately three and a half years. Notably, this is an ambitious schedule and assumes all partners complete their individual CWMPs.

If this project moves forward, the design of the wastewater treatment facility will include redundant treatment measures in order to avoid discharges that would impact receiving waters and the natural resources contained therein.

Operating Costs

The current operations and maintenance costs of the Wareham WPCF are $5,700,000. That cost would increase by $1,200,000 (2025 dollars) with an expansion to 3.5 mgd. These costs could be spread among all the partners in proportion of partner usage.

THIRD PARTY REVIEW

While the Project had every confidence in the contract engineers selected, the magnitude of this project warranted a third party review of the work completed. In 2020, the Project selected Wright Pierce to review the BETA and GHD reports. Wright Pierce offered comments and questions on both reports and concluded that the alternatives analysis, cost assumptions, and overall recommendations presented in the reports are consistent with industry practice, reasonable, and sound.

COSTS

The cost to each community will depend on several factors including but not limited to, which communities decide to move forward with this wastewater alternative and how much wastewater treatment each community needs.

The estimated costs presented here assume all partners participate and the sewer needs estimated are accurate. The total costs include the costs generated by GHD for the expansion of the existing WPCF to 3.5 mgd and Kleinfelder for the pipe relocation. Kleinfelder's estimated costs were used as horizontal directional drilling is the preferred construction method at this point in the Project's evaluation due to the low environmental construction impact, quick construction timeframe, and cost.

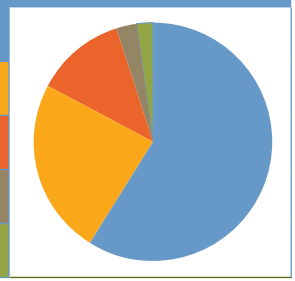
The cost assumptions developed for the Project have been developed over the course of the last three to four years and do not necessarily reflect actual inflation. Communities should escalate the costs provided in this report for inflation when comparing a regional solution to independent wastewater solutions.

Assuming that all partners participate and estimated capital costs are allocated proportionally to the estimated volume of wastewater flow from each partner, costs for relocating the discharge pipe using Kleinfelder's directional drilling costs and upgrading the wastewater treatment facility are as follows:

Estimated Project Capital Costs

Pipe Realignment	$48,454,000
WPCF Upgrade to 3.5 mgd	$100,000,000
Total Cost	**$148,454,000**

PARTNER	COST	% OF TOTAL
Wareham	$87,600,000	59%
Marion	$35,600,000	24%
Bourne	$17,800,000	12%
MMA	$4,500,000	3%
Plymouth	$3,000,000	2%



The costs are allocated to each community based on the percentage of flow treated at the WPCF and include engineering and contingencies. All costs are rounded to the nearest $100,000.

Operating Costs

GHD estimates 2025 operating costs for a 3.5 mgd WWTP at $6,900.000/year. Operating costs should be based on the amount of flow treated at the WWTP from each of the communities on an annual basis. For the purposes of this report, the project assumes that each of the communities contributes their maximum allotment, the operating costs would be apportioned as follows:

Estimated Annual Operation and Maintenance of Regional WWTP

	Wareham	Marion	Bourne	Mma	Plymouth
Plant Operation	$4,071,000	$1,656,000	$828,000	$207,000	$138,000

These operating costs cover the shared infrastructure. These costs do not include the existing and on-going operation and maintenance costs of each partners' individual existing sewer collection systems and pump stations or any future collection systems.

Important Note On Relative Costs: It is important to understand that if the volume of wastewater that needs to be treated changes through refined numbers from CWMPs or if some partners decide to purse this option and others do not, the relative cost to each partner will change.

Additional Future Cost Considerations

How neighboring communities connect to Wareham's existing infrastructure to send wastewater to a WWTP will result in additional costs. The partnership received a grant in 2020 to develop a model of all the existing sewer infrastructure in the town of Wareham to clearly understand the available capacity to existing pipes in the ground. This model will allow the partners to identify suitable connection points and estimate the cost of connection.

This model can be run to evaluate whether Bourne's existing connection has sufficient capacity to transport increased flow to the WPCF as well as determine where in Wareham's infrastructure Marion could connect in order to transport Marion's existing flow.

RATEPAYER ANALYSIS

Understanding the impact to ratepayers is a critical detail communities will evaluate.

The Project created a financial model for partners to use to evaluate the impact wastewater capital projects, together with on-going operations and maintenance, will have on new and existing ratepayers and tax base over time. The model allows communities to compare how current sewer rates may be impacted by the costs of a regional project or an independent "go-it-alone" solution. The model will help determine whether it is more economical to participate in a regional solution or upgrade individual wastewater treatment facilities to attain the same environmental benefit. Finally, the model allows communities to compare different financing opportunities.

The project contracted with Abrahams Group in 2019 to create the model. The Abrahams Group has worked with several of the communities in the SNEP Region including developing sewer financing plans for Orleans and Provincetown, and served as a consultant to the Cape's 208 Area Wide Management Plan.

The Project provided the Abrahams Group with current wastewater budgets as well as current and planned capital projects, and debt service schedules for all partners. This information was used to populate a model for each partner with their current funding information including current sewer rates, tax rates, annual operation and maintenance budgets as well as current and known debt service for capital projects.

The model was created in such a way as to provide sufficient flexibility for partners to amend cost estimates, projected grant revenues and financing assumptions. Once each community has a final CWMP with more refined cost estimates, those new costs can be input into the model to run the cost comparison.

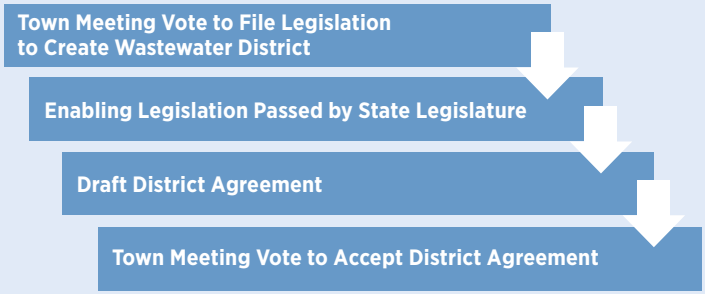
In an effort to verify the utility of the model, it was presented to three municipal financial experts, former Dartmouth, Fairhaven, and Mattapoisett Town Administrators, Jeff Osuch and Michael Gagne, and former Executive Director of the Boston Water & Sewer Commission and Water Resource Financial Consultant to the Cape Cod Commission, Robert Ciolek, for review and feedback. All agreed that the financial model was an asset to communities determining ratepayer level impact of the project. The model is now available to each community together with a tutorial.

HOW TO WORK TOGETHER – The Creation of a Wastewater District

Multiple communities and a state university sharing a regional wastewater treatment facility and outfall requires consensus on how such a partnership might operate. The Project evaluated whether the group might create a regional wastewater district or negotiate multiple inter-municipal agreements. Between 2018 and 2020 representatives from all the partners met to consider whether the communities should work through separate inter-municipal agreements or create a separate regional wastewater district. Ultimately, the creation of a regional wastewater district was considered the preferred approach as it evenly distributes the authority among participating communities.

A regional sewer district is created by an act of the state legislature. The purpose of a District is to manage and control the wastewater treatment plant, interceptors, discharge locations and to provide for the collection, treatment, discharge of effluent for the member towns. The district is a body politic and corporate and political subdivision of the Commonwealth. The duties, powers, and liabilities of the District are defined by the enabling legislation and through a District Agreement. A District Authority is not bound by proposition 2½ and includes its own borrowing authority.

Process to Create a Wastewater District



The project evaluated Mansfield-Foxborough-Norton (MFN) Regional Wastewater District as a model and met with the MFN Executive Director. The MFN was established in 2015 and contained the mix of infrastructure assets, including a wastewater treatment facility located in one town and a discharge located in a neighboring community, providing an analogous model to the mix of assets and ownership for the upper Bay communities.

In the case of MFN, the District Agreement includes but is not limited to:

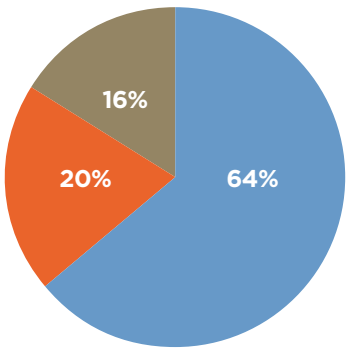
- **Defining the common sewer infrastructure owned by the District.**
- **Defining the make-up of the governing Commission including representation from each of the communities, the terms of those representatives, the process for member resignation or removal, vacancy management, quorum definition, and officer selection.**
- **The budgetary process including when the draft budget of the District presents to member towns and how each town is billed by the district.**
- **How to incur debt.**
- **How to amend the Agreement and add or remove a member town.**

The creation of a regional District would require at least two town meeting votes from each of the participating communities. The first vote would be to authorize the filing of special legislation to create a regional wastewater district. If successful, a second town meeting vote would be required to approve a District Agreement. While no community has committed to creating such a District, the Project drafted hypothetical legislation and a hypothetical District Agreement based largely on the successful MFN model. These documents are currently in draft form and can serve as a starting point if partners decide to move forward with a regional District.

MAKING IT HAPPEN.

Mansfield–Foxborough–Norton Regional Wastewater District

AFTER MANY YEARS of working towards regionalization, in 2019 the Mansfield–Foxborough–Norton Regional District cut the ribbon on an upgraded regional wastewater treatment facility that treats 3.14 million gallons of wastewater each day from the towns of Mansfield, Norton, Foxborough, Easton and Wheaton College. While the idea for the project was over 20 years in the making, after the legislation was passed in 2010 the final district agreement was signed in 2014. It took 3 years and $38M to complete the construction of the expanded wastewater treatment facility.



Ownership of the MFN Wastewater District is based on each town's sewage capacity allocation to the regional plant.

- Mansfield
- Foxborough
- Norton

Learn more at **www.mfndistrict.com**

List of Studies Completed by the Upper Bay Project

All available for download at **savebuzzardsbay.org/UpperBay**

Massachusetts Year 2016 Integrated List of Waters; Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Available at: http://www.mass.gov/eea/agencies/massdep/water/watersheds/total-maximum-daily-loads-tmdls.html

Inter-municipal Agreement for Wastewater Collection, Treatment and Disposal between the town of Wareham, Massachusetts and Town of Bourne, Massachusetts Signed February 23, 2010

Projected Wastewater Flows, GHD Technical Memorandum, April 21, 2017

Marion Projection of Wastewater Flow, GHD Memorandum, March 29, 2017

Wastewater Management Planning for Bourne's Downtown, Cape Cod Commission and CH2MHill Report, June 20, 2012

Assessing the Impact of Increased Effluent Discharge into Cape Cod Canal, Woods Hole Oceanographic Institution. 2017

Green Seal Survey 2017

WPCF Effluent Force Main Routing Alternatives Analysis, BETA, September 2020

Draft Agreement Establishing the Bourne Marion Wareham Regional Wastewater District, September 2020

Draft Legislation Establishing a Regional Wastewater Partnership, September 2020

Wright Pierce Third Party Review, September 2020

Buzzards Bay Coalition Water Quality Monitoring in Upper Buzzards Bay, September 2020

Upper ay Benthic Report 2020

Massachusetts Division of Marion Fisheries, Eelgrass Surveys, Annual Report to Buzzards Bay Coalition, 2018-2019

Upper Buzzards Bay Fisheries Resource Analysis, September 2020

Kleinfelder, Technical Memorandum, WPCF Outfall Force Main Feasibility and Routing Analysis, February 17, 2021

Bourne Local Comprehensive Plan 2019

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1 Town reported average nitrogen discharge of 1.5mg/L from the Wareham WPCF from April 2018 to October 2018. NPDES Permit No. MA 0101893. Assuming an influent concentration of 40mg/L, this results in a 95% reduction in nitrogen.

2 Town reported average daily flow to the Wareham WPCF from January 2018 to July 2019 was 1.18MGD. The town reports 6,800 customers paying $646/year/EDU.

3 Inter-Municipal Agreement for Wastewater Collection, Treatment and Disposal between the town of Wareham, Massachusetts and Town of Bourne, Massachusetts Signed February 23, 2010 for a 20-year term.

4 Town reported on July 10, 2020 – 263 users in Hideaway Village from the Bourne Water District, 630 downtown residential users and 177 commercial users for a total of 1,070 users.

5 The 101,000 gpd was estimated by taking 90% of the water use from Hideaway Village and residential and commercial water use from Downtown Bourne.

6 Number of current sewer users reported by town of Bourne on July 13, 2020. Sewer rates reported by town August 26, 2019.

7 Average flow from 2016-2017 was approximately 35,000 gpd for NPDES Permit No. MA0024368.

8 NPDES No. MA 0100030

9 2018 rolling annual average flow was approximately 571,000 gpd.

10 Calculated based on average water use of 132 gpd at $164.05 cubic ft/day and a basic charge of $475.16.

11 2012 CH2MHill Report

12 Projected Wastewater Flows, GHD Technical Memorandum, April 21, 2017

13 Projected Wastewater Flows, GHD Technical Memorandum, April 21, 2017

14 Projected Wastewater Flows, GHD Technical Memorandum, April 21, 2017

15 Estimates provided by town staff

16 March 29, 2017 GHD Memorandum

17 Town consultant correspondence July 10, 2020

18 Chapter 259 of the Acts of 2014

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