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Pleasant Point Sewer Extension

City of Portsmouth

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Pleasant Point Sewer Extension

A Final Report to
The New Hampshire Estuaries Project

Submitted by
City of Portsmouth
Portsmouth, New Hampshire

July 5, 2007

This project was funded in part by a grant from the New Hampshire Estuaries Project as authorized by the U.S. Environmental Protection Agency's National Estuary Program.



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Executive Summary

The City of Portsmouth (City) is located in Rockingham County at the mouth of the Piscataqua River in the seacoast area of New Hampshire. The City of Portsmouth's sewerage system consists of approximately 115 miles of sewers (excluding the Pease International Tradeport), 19 pumping stations, and a 4.8 million gallon per day (mgd) primary wastewater treatment facility (WWTF) located on Peirce Island. The City has an inter-municipal agreement with the Town of New Castle, an island to the northeast of Portsmouth, to treat their wastewater at the City's Peirce Island WWTF. Additionally, the City has entered into a long-term Municipal Services Agreement (MSA) with the Pease Development Authority (PDA) to maintain and operate the wastewater collection and treatment facilities at the Pease International Tradeport (Pease), the former Pease Air Force Base, and has other agreements with Rye, New Hampshire on behalf of Adams Mobil Home Park and with a private entity located in Greenland, New Hampshire. The Pease facilities include approximately 15 miles of sewers, one pumping station, and a secondary WWTF.

The purpose of this project was to extend the city sewer to the Pleasant Point area which is adjacent to the Back Channel area of the Piscataqua River. Seventeen homes in the area were using septic systems to treat wastewater. Several of these septic systems were failing and several more were near failing and contributing to water quality problems. The project included the installation of a low pressure sewer in the Pleasant Point area connecting to an existing gravity sewer on New Castle Avenue. Homeowners are responsible for tying into the sewer services at the edge of their property line. This project helps implement the NHEP Action Plan WQ-7 related to the elimination of failing septic systems.

In addition, this project was identified as an MS4 Permittee Action Item in the Total Maximum Daily Load (TMDL) Study for Bacteria in Little Harbor, New Hampshire.

This project was funded in part by a grant from the New Hampshire Estuaries Project, a State Revolving Fund loan, Sewer system revenues and private participation.

Introduction

The City of Portsmouth (City) is located in Rockingham County at the mouth of the Piscataqua River in the seacoast area of New Hampshire. The City of Portsmouth's sewerage system consists of approximately 115 miles of sewers (excluding the Pease International Tradeport), 19 pumping stations, and a 4.8 million gallon per day (mgd) primary wastewater treatment facility (WWTF) located on Peirce Island. The City has an inter-municipal agreement with the Town of New Castle, an island to the northeast of Portsmouth, to treat their wastewater at the City's Peirce Island WWTF. Additionally, the City has entered into a long-term Municipal Services Agreement (MSA) with the Pease Development Authority (PDA) to maintain and operate the wastewater collection and treatment facilities at the Pease International Tradeport (Pease), the former Pease Air Force Base, and has other agreements with Rye, New Hampshire on behalf of Adams Mobil Home Park and with a private entity located in Greenland, New Hampshire. The Pease facilities include approximately 15 miles of sewers, one pumping station, and a secondary WWTF.

The purpose of this project was to extend the city sewer to the Pleasant Point area which is adjacent to the Back Channel area of the Piscataqua River. Figures 1 and 2 show the project area. Seventeen homes on Moebus Terrace, Robin Lane and Pleasant Point were using septic systems to treat wastewater. Several of these septic systems were failing and several more were near failing and contributing to water quality problems.

Existing Conditions

The planning area included Pleasant Point Drive, Moebus Terrace, and Robin Lane, off Newcastle Avenue in the City of Portsmouth (Appendix A). All homes in the area are on municipal water. Four homes on Boyan Place and two homes on Moebus Terrace were previously served by municipal sewers. The remaining 17 homes in the planning area had individual subsurface disposal (septic) systems.

Three of the existing septic systems were reported to be not functioning properly. The small lot sizes of some locations prevented building new subsurface systems that are in conformance with the NHDES subsurface disposal rules. Eight homes in the area have water frontage to a salt

water estuary adjacent to Portsmouth Harbor. Several residences have written to the City expressing interest in connecting to the municipal sewer system.

Based on 17 homes with 3 bedrooms each at 150 gpd/bedroom, the total design flow (maximum daily) is 7,650 gpd. The estimated peak flow is 32 gpm (peaking factor of 6 assumed).

Sewer System Evaluation

To address this problem the City Hired Underwood Engineers to perform a feasibility study to determine the most cost effective means of extending sewer to these properties. This study utilized a previous design done by Wright-Pierce-Barnes-Wyman in 1978 which was never constructed. This design effort showed borings that indicated there was a significant amount of shallow ledge in all areas of the proposed project.

Underwood Engineers evaluated the following alternatives:

- Alternative 1 - Gravity sewers.
- Alternative 2 - Gravity sewers and main pumping station.
- Alternative 3 - Low pressure sewers with private grinder pumps.
- Alternative 4 - Gravity and low pressure sewers combination.

For each alternative, a preliminary design drawing was prepared and a detailed opinion of cost was prepared.

Alternative 1 - Gravity Sewers

This alternative uses 8" PVC gravity sewer mains. Service laterals would be installed from the property line to the sewer main for each home, and are included in the opinion of cost. Service connections from the home to the property line would be the responsibility of each homeowner, and are not included in the opinion of cost.

Advantages

- Lower maintenance

Disadvantages

- Deep excavation of up to 14 feet are required which would shut down sections of the road to emergency vehicles for extended periods of time
- Significant ledge excavation is required
- Water and drainage pipe relocation may be needed to accommodate sewer
- High cost for ledge removal work

Alternative 2 - Gravity Sewers and Pumping Station

This alternative uses 8" PVC gravity sewer mains similar to Alternative 1. However, a pumping station at the low area near the end of Pleasant Point Drive is used to convey sewage over the high point in the area. The costs for constructing and maintaining the pumping station would be the responsibility of the City.

Advantages

- Sewer mains are not as deep compared to Alternative 1
- Reduced ledge excavation compared to Alternative 1

Disadvantages

- Pumping station requires additional O&M
- Higher capital and O&M costs
- Land acquisition required
- High cost for ledge removal work
- Requires easements for cross country work on private property

Alternative 3 – Low Pressure Sewers (Selected Alternative)

This alternative uses a low pressure sewer system (LPSS). Smaller force mains (2") would be used instead of larger (8") gravity sewer lines. The low pressure force mains can be routed with flexibility around interferences at a common depth (5' – 6'). Service connections to the force mains would be made through individual grinder pump stations would be installed at each home, on private property.

Advantages

- Deep cuts for sewer mains not required
- Less ledge excavation required
- Less disruptive to install than gravity sewers
- More flexible installation
- Least expensive option overall

Disadvantages

- Grinder stations require O&M
- Force mains may require flushing
- Potential odors where force main discharges to the manhole
- Home owners have responsibility for owning and maintaining grinder pumps
- Higher direct cost to homeowner for work on private property

Alternative 4 – Gravity Sewers and Low Pressure Sewers Combination

This alternative includes a gravity sewer main from Newcastle Road to the highest point on Pleasant Point Drive, at the intersection with Moebus Terrace. Six (6) homes would be served directly by the gravity sewer. The remaining eleven (11) homes would be served by individual grinder pumps and low pressure force mains, connecting to the gravity sewer.

Advantages

- Deep cuts for sewer mains not required
- Less ledge excavation required
- Fewer grinder pumps required than for Alternative 3

Disadvantages

- Grinder pumps require O&M
- Force mains may require flushing
- Potential odors where force main discharges to the manhole
- Home owners have responsibility for owning and maintaining grinder pumps
- Higher direct cost to homeowner for work on private property, where pumps used

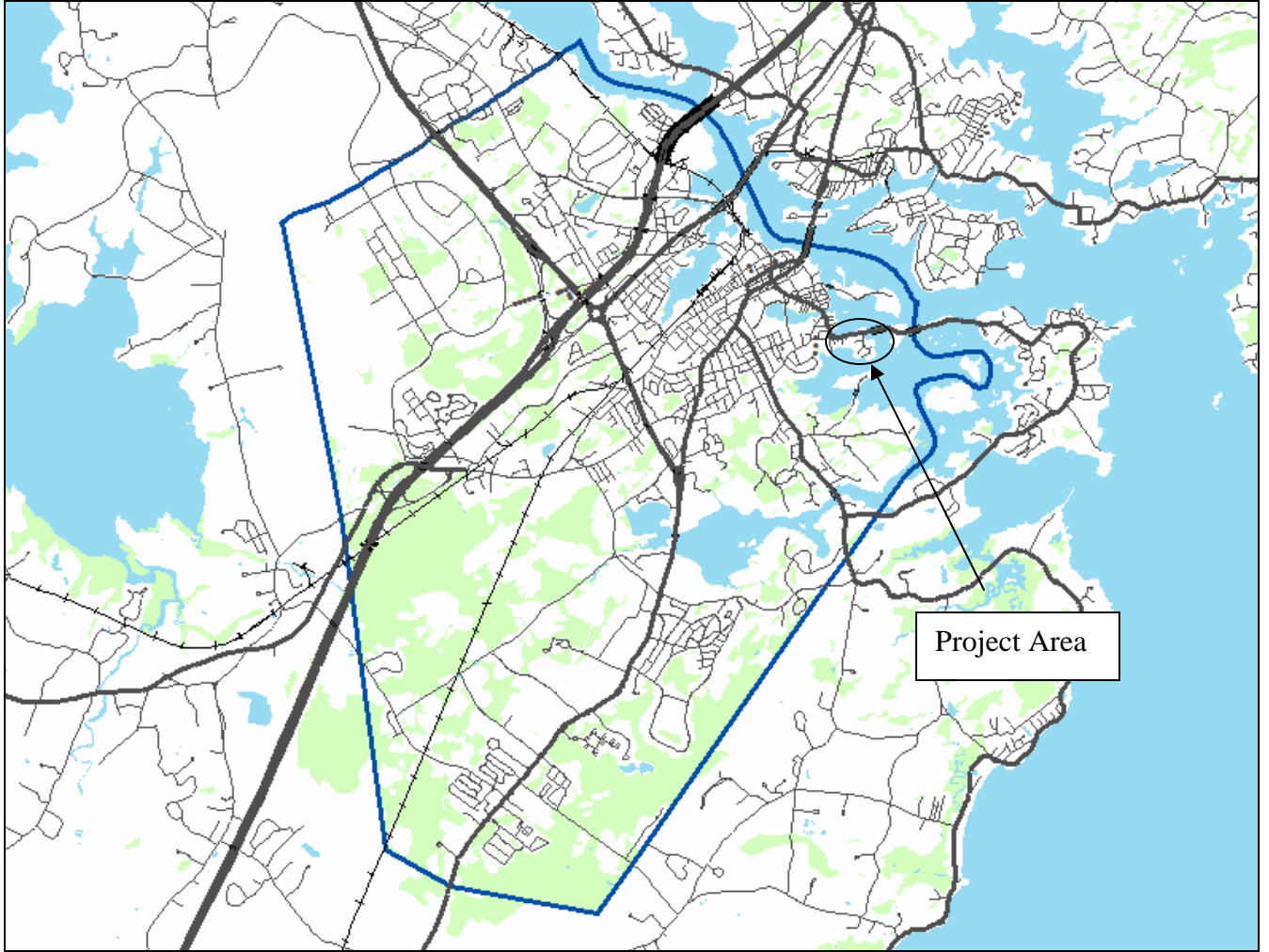


Figure 1
Locus Map



Figure 2
Project Area

Project Goals and Objectives

The goal of this project was to extend the city sewer to the Pleasant Point area to eliminate wastewater discharging to the Back Channel area of the Piscataqua River due to failed septic systems. Seventeen homes in the area were using septic systems to treat wastewater. Several of these septic systems were failing and several more were near failing and contributing to water quality problems. The project included the installation of a low pressure sewer in the Pleasant Point area connecting to an existing gravity sewer on New Castle Avenue. Homeowners are responsible for tying into the sewer services at the edge of their property line. This project helps implement the NHEP Action Plan WQ-7 related to the elimination of failing septic systems.

Activities

This project involved the design and construction of a low pressure sewer system to provide sewer service to 17 homes that were previously on subsurface septic systems.

Results (or Outcomes) and Discussion

The project was designed and constructed.

Conclusions and Recommendations

Based on a cooperative effort between the City and home owners, as well as funding assistance from the New Hampshire Estuaries Project and the NHDES, this was a successful project.

No further work is recommended at this time.