PAS

EXCELLENCE IN ENGINEERING

PRELIMINARY WASTEWATER FACILITIES STUDY

AQUIDNECK ISLAND, RHODE ISLAND

Prepared For
Newport County Chamber
Of Commerce
35 Valley Road
Middletown, RI 02842

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TABLE OF CONTENTS

1.0 INTRODUCTION

The main purpose of this study is to mitigate wastewater treatment problems in the Portsmouth Park and Island Park sections of Portsmouth, Rhode Island and to develop regional treatment solutions for Aquidneck Island. After issuing shellfish closing and swimming advisories in the Portsmouth Park and Island Park areas in 2005, the Rhode Island Department of Environmental Management (RIDEM) published a report titled, "Total Maximum Daily Load (TMDL) for the Sakonnet River and the Cove". The report identified associated causes of environmental problems in the area. These problems included existing housing density and lot sizes, high groundwater table, the proximity of private septic systems to coastal waters, poor soil properties and aged septic systems. The TMDL recommended that properties in this area should not discharge any wastewater via private septic systems but did not indicate a solution for an alternative wastewater treatment method.

Various options to improve wastewater treatment within the TMDL area have been studied and reported on for several years. Metcalf & Eddy prepared a Wastewater Facilities Plan for the Town of Portsmouth in 1981. Since that study was completed, Louis Berger (2002), Lombardo Associates (2003), and Woodard & Curran (2007) have all prepared reports addressing various aspects of this issue. Various solutions have been proposed, including alternative/innovative on-site wastewater treatment upgrades; wastewater management districts (WMDs); wastewater cluster systems; and a regional wastewater treatment facility (WWTF).

Northeast Engineers & Consultants (NE&C), as well as the Town of Portsmouth, concluded that improving individual septic disposal systems (ISDS) would not be a viable option in the short- or long-term due to various environmental conditions. NE&C recognized that WMDs would not properly serve the long-term interest of the Town due to the same environmental conditions. NE&C recommends that the permitting and locating of multiple cluster systems for wastewater treatment in the area is not a feasible option and thus has recommended a regional approach of a WWTF.

NE&C reviewed and agreed with Woodard & Curran's recommended solution of a WWTF that would treat flows from Portsmouth Park, Island Park and the west side of Portsmouth. NE&C reviewed the recommended locations of the existing Raytheon WWTF, Navy WWTF and the area within the State Route 24 onramp. Due to grade and wastewater discharge location issues associated with the onramp, NE&C proceeded to investigate the Raytheon and Navy locations. Both provide the needed land and are outfall locations. During NE&C's investigation, NE&C discovered that the Navy RIPDES outfall permit had expired; therefore, they continued to evaluate the Raytheon WWTF location for further study as the best viable option.

The remainder of this report will discuss the viability and logistics of developing a public, regional WWTF at the Raytheon location. Unlike other studies, NE&C will consider a regional WWTF approach and investigate additional possible contributing areas which include the US Navy and parts of Middletown. This approach will increase the number of contributing areas to reduce sewer user fees and help alleviate the current strain on the Newport WWTF.

In addition to anticipated service areas and flow rates, NE&C will also determine the criteria and suggest recommendations for the type of upgraded WWTF, possible funding options and issue an opinion of probable construction and yearly maintenance costs.

2.0 PROJECT BACKGROUND

The subject of wastewater treatment in Portsmouth has been studied and reported on for several years. The recommendations made by previous studies have varied. The options include: one or more WWTFs; implementation of improved on-site treatment and enforcement through a Wastewater Management District; cluster systems located within the Town; and innovative and alternative approaches as an upgrade to at-risk ISDS systems.

This study has taken into account other reports that, while not specifically related to wastewater treatment, may have relevance to the study. These additional reports typically relate to land use practices, and may have an impact on the amount of wastewater flow, as well as recommended areas for initial and future connection to the proposed system. These reports also provide background information that must be accounted for in the design of a new wastewater treatment system and alignment of the proposed sewer mains. Much of the information previously compiled and discussed in these reports is still valid. NE&C acknowledges the time and effort that the various boards, agencies and consulting firms have expended in studying wastewater issues and possible solutions to problems.

2.1 PREVIOUS WASTEWATER TREATMENT REPORTS

The following brief summaries are intended to highlight the particular findings and recommendations of these various reports. Our summaries will refer to information contained within these reports that is relevant to the current approach and which may be applicable to this study.

2.1.1 REPORT TO THE TOWN OF PORTSMOUTH, RHODE ISLAND, WASTEWATER FACILITIES, JANUARY 1981 – METCALF & EDDY

Metcalf and Eddy conducted its report as directed by the Water Pollution Control Act and studied the Aquidneck Island portion of Portsmouth. The purpose of the report was to identify environmentally and economically-sound alternatives to address the wastewater disposal issues facing the Town of Portsmouth and to develop future alternatives and.

Metcalf and Eddy found that all of the Town's ISDS systems were potential hazards, with the greatest hazards located along the eastern shore and northern end of the island. Metcalf & Eddy concluded that the areas of Common Fence Point, Island Park and Portsmouth Park were not suitable for use of on-site ISDS systems due to various factors such as small lot sizes, undersized systems, high groundwater table, proximity to coastal waters and unsuitable soil conditions. The report recommended a WWTF located at Arnold's Point with an anticipated cost of $32 million. Funding options recommended by Metcalf and Eddy were that 90% of the capital cost would be

covered by the Environmental Protection Agency through state grants. Metcalf & Eddy did not discuss the viability of outfall locations, total flow and number of users or anticipated users' fees.

2.1.2 DRAFT WASTEWATER FACILITIES PLAN UPDATE FOR ISLAND PARK, PORTSMOUTH PARK, AND THE HUMMOCK, TOWN OF PORTSMOUTH, RHODE ISLAND, OCTOBER 2002 – LOUIS BERGER GROUP

The Louis Berger Group study focused on Portsmouth Park, Island Park and the Hummocks. Their report in accordance with others, indicated that ISDS systems in these areas are subject to frequent failure due to age, lack of maintenance, soil conditions, high groundwater table, small lot sizes and the nature of cesspools.

Louis Berger identified six alternatives for consideration:

- Alternative 1: Connect to Fall River Sewer System
- Alternative 2: Wastewater Treatment System with Discharge to Sakonnet River
- Alternative 3: Wastewater Treatment System with Subsurface Discharge
- Alternative 4: Two Wastewater Treatment Systems with Subsurface Discharges
- Alternative 5: Upgrade Individual On-Site Wastewater Systems
- Alternative 6: Cluster On-Site Wastewater Treatment and Disposal Systems

Using a unique evaluation criteria, Louis Berger found Alternatives 1, 2, 3, 4 and 6 impractical or unfeasible for either economic or land use requirements. Thus the recommendation by the Louis Berger Group was Alternative 5: Upgrade Individual On-Site Wastewater Systems through innovative and/or advanced on-site technologies, depending on the lot size and soils. The Louis Berger Group also recommended the establishment of a Wastewater Management District as a means to enforce ISDS systems in the affected and studied area.

The Town of Portsmouth does not support the solution of upgrades to existing ISDS systems as a short- or long-term solution as many of the system checks and monitoring involve mechanical failure and not system failure. Many parts of Portsmouth have highly conductive soils meaning that failure of on-site systems is hard to detect and/or identify in a cost-efficient manner.

2.1.3 ON-SITE WASTEWATER MANAGEMENT FOR PORTSMOUTH, MAY-AUGUST 2003 – LOMBARDO ASSOCIATES

Lombardo Associates created a needs evaluation for the various neighborhoods of Portsmouth and focused wastewater treatment recommendations for Portsmouth Park, Island Park, Common Fence Point and the Hummocks. Lombardo Associates' ranking of neighborhoods in need of alternative solutions was those that had lots sizes less than 5,000 square feet or were within high groundwater tables and/or shallow bedrock areas. The highest priority areas identified by Lombardo Associates were Island Park, Portsmouth Park, Common Fence Point and the Hummocks.

Lombardo Associates proposed a cluster wastewater collection, treatment and disposal system for Common Fence Point, Portsmouth Park and Island Park in addition to 11 other cluster

systems for unspecified neighborhoods with a medium ranking. The cluster areas were not located in its report nor were specific collection and treatment technology or disposal locations selected. The Lombardo Associates report also indicated that an on-site wastewater management approach for the entire town with cluster system could be a viable option in need of further investigation.

The Town of Portsmouth determined that multiple cluster systems in the Island Park, Portsmouth Park, Common Fence Point and Hummocks were impractical both for discharge outlet permitting into SA classified waters and for cluster location issues since these areas are built-out with no open space for such systems. The Town of Portsmouth did agree that ISDS systems in these areas, specifically Island Park and Portsmouth Park, would not solve the short- or long-term issues and decided to continue its investigation of regional (non-individual) approaches.

2.1.4 TOTAL MAXIMUM DAILY LOAD, THE SAKONNET RIVER – PORTSMOUTH PARK AND THE COVE – ISLAND PARK, MARCH 2005 - RIDEM

Per the Clean Water Act, Section 303(d) and Federal Regulation 40CFR 130.7(c)(1), the State of Rhode Island had to develop a Total Maximum Daily Load (TMDL) report for waterbodies that are not meeting water quality standards, with a goal of reducing pollutant loading and improving water quality to meet federal standards. In Rhode Island's investigations in 1998 and 2000, the Sakonnet River and the Cove of Island Park were identified as Group 1 waterbodies with the highest priority of areas with environmental pollution. The primary pollutant of concern indicated by the reports was fecal coliform, a parameter used by Rhode Island as an indicator of human pathogens.

Based on monitoring data from RIDEM's Shellfish Program, these two waterbodies were closed to shell fishing due to the potential public health risk associated with direct contamination by human waste. In addition to shellfish closures, the Rhode Island Department of Health (RIDOH) issued a swimming advisory relative to these two shoreline areas. The following photograph illustrates the two waterbodies of concern.

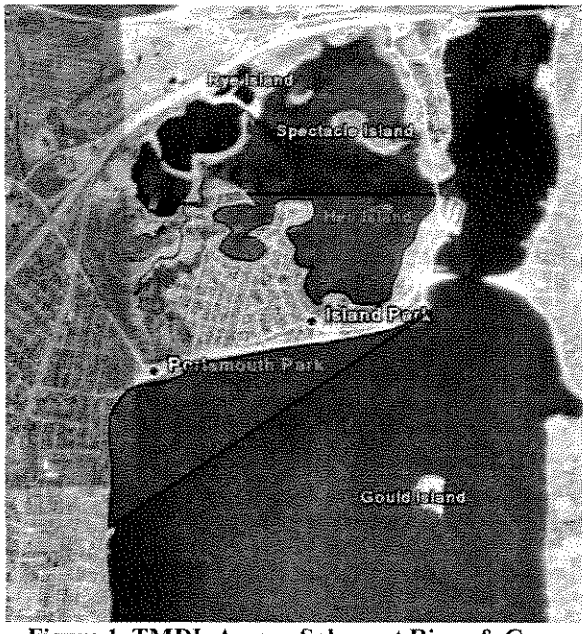


Figure 1. TMDL Areas - Sakonnet River & Cove

The Sakonnet River and Cove are designated as Class SA waters (saltwater). Class SA waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreation activities, and fish and wildlife habitat. These waters shall also be suitable for aquaculture uses, navigation and industrial cooling and have good aesthetic value.

The fecal coliform standard for Class SA waters, established by Rule 8.D of the Water Quality Regulations, specifies that the maximum allowable level of fecal coliform bacteria may not exceed a geometric mean value of 14 and not more than 10% of all the samples shall exceed a geometric mean value of 49. For the two waterbodies studied, the geometric mean value was greater than 23,000 and exceeded the allowable limit at all testing locations during the 1998 and 2000 investigations. The TMDL agreed with other studies that environmental conditions have contributed to many ISDS failings.

In addition to environmental conditions, the development of beachfront communities in Portsmouth Park and Island Park pre-dates the inception of current ISDS regulations. Due to the small lot size, conventional septic system design parameters are unattainable in many cases. In addition, cottages were initially designed for summer use only and not their current function as year-round housing. Dense housing and under-sized ISDS systems, in addition to excess flows from abundance of groundwater springs and heavy rainfall, have prompted some residences to tap into storm drains with residential French drains and/or laundry hoses in order to remove pooled water from around homes or to discharge graywater away from ISDS.

The overall conclusion was that the loading rate (water use) of the ISDS systems most likely exceeds the design capacity when installed in densely-developed, old neighborhoods, which contain soils with unsuitable assimilative capability and high groundwater, within close proximity to waterbodies. The report provides general suggestions to the Town of Portsmouth to

use a regional/community wastewater disposal system, either clusters or a large WWTF, or institute a strict WMD to monitor the situation.

2.1.5 DRAFT WASTEWATER FACILITIES PLAN – PHASE 2, NOVEMBER 2007 – WOODARD & CURRAN

The Woodard & Curran report focused on solving wastewater disposal needs in Island Park and Portsmouth Park, the TMDL area, and addressed wastewater needs related to economic growth on the west side of Portsmouth, the area defined as south of the Mount Hope Bridge and west of Bristol Ferry and West Main Roads. The report also indicated additional criteria that influence the ability to implement a solution such as "maintaining community and neighborhood character by controlling development of vacant parcels and redevelopment of existing parcels, long term costs, feasibility of technical solutions, optimization of existing pump stations and sewer infrastructure, probability of successful permitting, aesthetic concerns due to large mounded septic systems and/or local cluster treatment systems, maintaining property values, construction impacts, and overall conformance with the Comprehensive Community Plan (CCP)."

Woodard & Curran Recommendations

The Woodard & Curran report expanded on the Lombardo Associates recommendations and focused on five alternatives for further consideration in Phase 1. These alternatives were as follows:

- Alternative 1A: Collection and treatment for TMDL area only
- Alternative 1B: Wastewater Management District for the TMDL area only
- Alternative 2A: Wastewater Management District for the TMDL area plus Common Fence Point & Hummocks, East Central North, Sprague North, Bristol Ferry – Bay View, Bristol Ferry & Sunny Acres, comprised of approximately 2,200 parcels
- Alternative 2B: Collection and treatment for the TMDL area plus Common Fence Point & Hummocks, East Central North, Sprague North, Bristol Ferry – Bay View, Bristol Ferry & Sunny Acres
- Alternative 3: Collection and treatment from the TMDL area, Common Fence Point & Hummocks, East Central North, Sprague North, Bristol Ferry – Bay View, Bristol Ferry & Sunny Acres, and the West Side

Through further evaluation with the Town, Wastewater Advisory Board and various stakeholders, such as Raytheon Corporation, O'Neill Property Group, RIDEM and the Newport Chamber of Commerce, Woodard & Curran revised its recommendations in its Phase 2 report. Based on new evaluation criteria such as total cost, how costs would be apportioned for each solution, whether residents with new on-site systems would have to pay for an alternative solution, construction impacts, coastal water quality impacts, impact on potential use of private property, potential to regain the use of natural resources and likelihood of eliminating or reducing pollution, Woodard & Curran determined that Wastewater Management Districts were of the lowest priority and developed the following refined recommendation for further consideration by the Town:

- Alternative 1: One Wastewater Treatment Facility for the TMDL Area – Island Park, Portsmouth Park
- Alternative 4: One Wastewater Treatment Facility to serve both the West Side and TMDL Area
- Alternative 5: Two Wastewater Treatment Facilities, one each for the West Side and TMDL Area

Woodard & Curran Flow Methodology

Woodard & Curran evaluated the flow required for the West Side and TMDL area. Woodard & Curran's methodology for determining flow in these areas was based on many different scenarios, which included by-right development, likely development, practical development and all parcel development. After determining the number of parcels, Woodard & Curran calculated the average daily flow for the WWTF using TR-16 (based on 70 gallons per capita residential water use time 2.53 persons per parcel) and flows for the collection system using ISDS design flows of 300 gpd per residential parcel and 1,000 gpd for industrial and commercial parcels. Woodard & Curran assert that the flow derived from ISDS standards can be considered a maximum daily flow for collection system design and therefore the peaking factor normally selected in TR-16 and other standard references to peak the average daily flow should be reduced to the ratio of maximum daily to peak flow when using ISDS values. NE&C concurs with the methodology used by Woodard & Curran and has used all available flow data as part of this study.

A copy of Woodard & Curran's wastewater flow calculations can be found in Appendix D – Woodard & Curran Flow Calculations.

Woodard & Curran Conclusion

The Woodard & Curran Report's final recommendation was Alternative 4. Woodard & Curran developed existing and built-out flow conditions for the sewered area of Portsmouth Park, Island Park and the West Side. This alternative includes:

- Construction of a WWTF on the West Side at or near the proposed Raytheon location
- Construction of low pressure sewers within Island Park
- Construction of gravity sewers and some low pressure sewers in Portsmouth Park
- Construction of pump station within the TMDL area
- Construction of a pump station near Arnold Point / Carnegie Heights
- Installation of a force main from the TMDL pump station to the Arnolds Point pump station
- Installation of a force main from the Arnold Point pump station to the WWTF
- Redirection of the force main from the Navy-owned pump station 988 to the WWTF

- Construction of a gravity line from the pump station 988 force main to the WWTF

Woodard & Curran also recommended the continued study of Common Fence Point and the Hummocks area of Portsmouth as potential critical areas to be sewered. Woodard & Curran identified Common Fence Point and the Hummocks as comparable areas to Island Park and Portsmouth Park yet at higher elevations. If not sewered, Woodard & Curran recommended a stringent WMD for the area with advanced on-site ISDS systems.

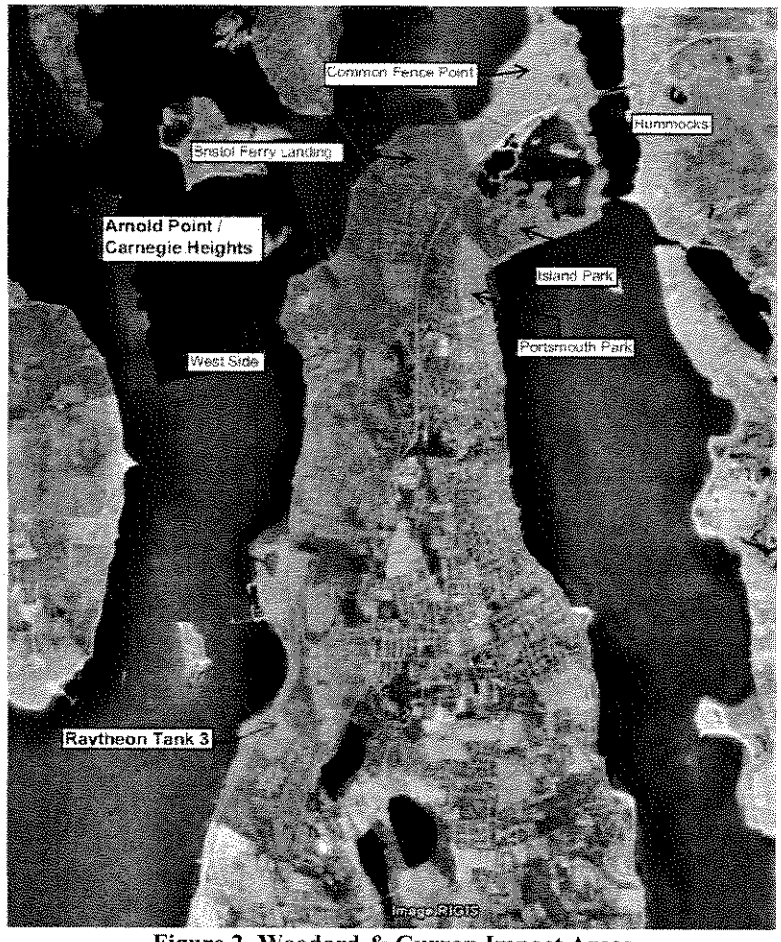


Figure 2. Woodard & Curran Impact Areas

To mitigate construction for the miles of sewer pipeline needed for the implementation of this project, Woodard & Curran recommended horizontal drilling as opposed to open-cut excavation.

Woodard & Curran also recognized the greatest chance for subsurface contaminants and wetland impact would be located along the railroad right-of-way, its suggested alignment along the West Side. Environmental parameters of concern include, but are not limited to, coastal and freshwater wetlands, flood hazard areas and potential hazardous material. Woodard & Curran believes that the long-term benefits of solving long-standing environmental degradation far outweighs any temporary detrimental impacts.

NE&C used this study as a platform and expanded on the recommendations and conclusions from Woodard & Curran. This study takes a more regional approach, including parts of Middletown. This study also expands on the anticipated flow rates, serviceable area, permitting issues, and discharge requirements not explained by Woodard & Curran.

2.2 OTHER REPORTS

Proper growth management on Aquidneck Island has also been studied. The ability to implement many of the goals and recommendations of these reports is contingent upon adequate wastewater treatment facilities. The following summaries are intended to highlight the relevant information contained within these various reports, either as it pertains to future development and redevelopment or as it could impact the location/development of a regional wastewater treatment solution. NE&C's WWTF has been proposed in compliance with all of the reports and studies listed below.

2.2.1 CITY OF NEWPORT - COMPREHENSIVE LAND USE PLAN (APPROVED AUGUST 6, 2004)

The Citizen's Advisory Committee identified key components to guide the creation of the Newport Comprehensive Land Use Plan. These components are:

- Newport must preserve and protect citizen participation and self determination for all citizens.
- Newport must continue to preserve and enhance access to the community's natural and cultural resources for all citizens.
- Newport must safeguard the opportunity for all citizens to fully participate in the economic life of the city.
- Newport must create and continue opportunities for decent, safe, sanitary and affordable housing for all citizens.
- Newport must preserve and protect its public facilities and services in order to maintain a high quality of life.
- Newport must control development to the extent that growth does no exceed the city's ability to preserve and protect natural resources and quality of life.
- Newport is bound to the larger Aquidneck Island community and must forge partnerships with neighboring communities in order to protect quality of life for the entire region.

The committee then identified seven goals for the town with implementation, both short-term and long-term, to accomplish its goal. The goals are:

1. Preserve Newport's History and Natural Resources and Enhance the City.
2. Protect and Enhance the Newport Neighborhoods.
3. Celebrate Newport's Historic and Cultural Diversity.
4. Create a Cooperative Partnership between Newport Citizens and Government.
5. Share Resources and Responsibility with Other Communities on Aquidneck Island Community.

6. Allow for the Orderly, Balanced and Responsible Growth of the Economic and Residential Uses within Newport.
7. Provide for the General Welfare of the Community: Assure Residential and Economic Vitality through Maintenance of Municipal Infrastructure.

Due to the built-out nature of Newport, significant development and zoning changes are not anticipated. The Town would like to review more low-to-moderate income housing projects but due to real estate prices, land constraints and other factors, these types of project are not very prominent. The following figure shows the existing and future zoning of Newport.

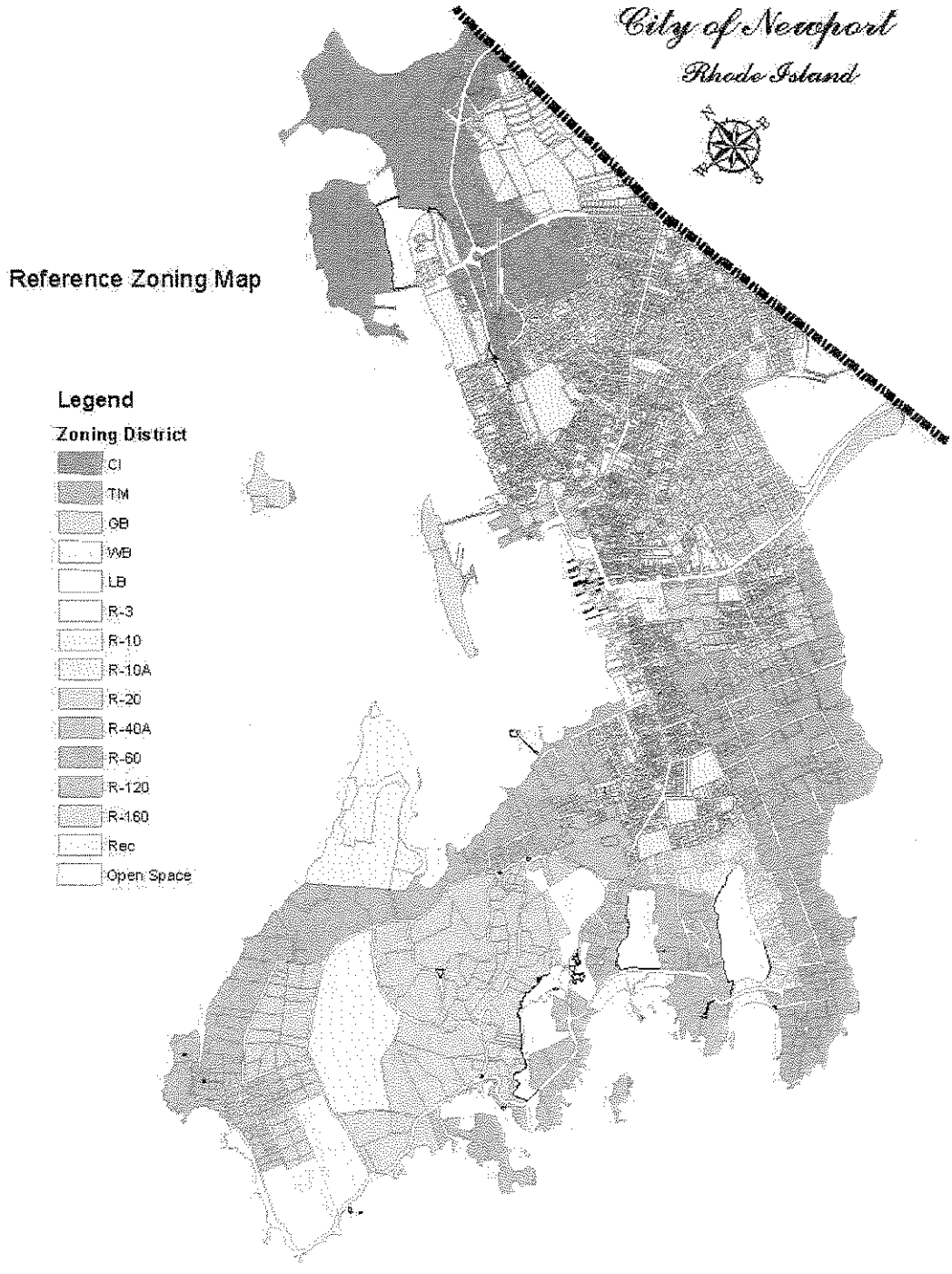


Figure 3. Newport Zoning Map

2.2.2 TOWN OF MIDDLETOWN -COMPREHENSIVE COMMUNITY PLAN (AMENDMENTS THROUGH DECEMBER 1, 2006)

The Town of Middletown has identified 11 goals with implementation strategies as part of the Comprehensive Community Plan. Those goals are as follows:

1. Sewer services the majority of the town, but because of development pressures, which occurred as the sewer system was extended into the eastern area of the town, a moratorium was placed on sewer extensions. This moratorium has curbed development of the town's eastern agricultural land to some extent. However, the control of development cannot rest on the temporary nature of the moratorium. Development should be controlled through the Zoning Ordinance.
2. Expand permitted uses in those zones where agriculture is permitted in order to provide incentives to keep land in agriculture.
3. Work closely with the City of Newport, the Town of Portsmouth and the Navy to protect and preserve the quality and quantity of drinking water supply.
4. Determine and protect the right-of-way of the shoreline.
5. Protect and preserve the air quality of the island.
6. Establish bicycle/walking paths and greenways in conjunction with the other island communities.
7. Support the upgrade of East and West Main Road and the development of multi-modal transportation for Aquidneck Island.
8. The town should develop zoning standards to address commercial sprawl in the West Main Road corridor. Significant parcels of currently undeveloped land should be rezoned to a new zoning district that will permit a mixture of certain types of residential and/or non-residential uses in Planned Village Developments with significant open space areas.
9. Maintain the current housing mix including, at least 10% of the inventory in the affordable housing category.
10. Reinvigorate the Economic Development Advisory Committee to guide the town in economic matters.
11. Enact impact fees to ensure adequate funding for services and capital facilities linked to new development, both commercial and residential. Fees will be waived for low-to-moderate income housing units.

The Town of Middletown wants to encourage economic development projects, but limit the amount of urban sprawl specifically along West Main Road. The following figure illustrates the Town's future land use plan.

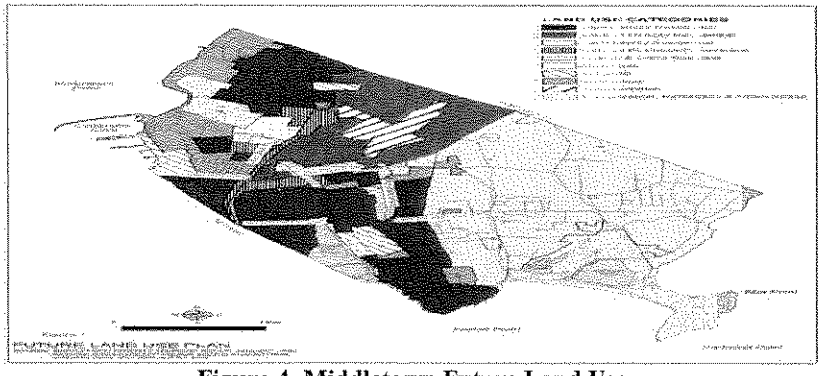


Figure 4. Middletown Future Land Use

2.2.3 TOWN OF PORTSMOUTH – COMPREHENSIVE COMMUNITY PLAN (REVISED JULY 2002)

The Town of Portsmouth has identified ten goals as part of the Comprehensive Community Plan which includes:

1. Land Use: Provide a guide for future land use and propose implementation of land use control regulations.
2. Housing: Encourage a diversity of housing options for present and future residents of all income levels.
3. Economic Development: Attain a balance structure of population, environment, job opportunities, service and facilities, and recreational and cultural resources.
4. Natural and Cultural Resources: Guide land development with respect and to protect the environment, water quality and soils, while reducing air pollution.
5. Facilities and Services: Plan for future support of facilities and services for the Town.
6. Open Space and Recreation: Preserve Portsmouth's rural and country atmosphere.
7. Circulation: Provide transportation facilities and operating procedures that will continue to meet Town population growth needs and area regional population/living pattern changes. Provide for future circulation in the safest and most direct means possible.
8. Agriculture: Maintain agriculture as a vital part of the community as a way of life, open space value, land use and economic activity.
9. Prudence Island: To maintain the unique nature while providing a reasonable level of Town services.
10. Hog Island: To maintain the unique nature while providing an appropriate level of Town services.

The following figure is the Town's current Land Use (Zoning) Regulations.

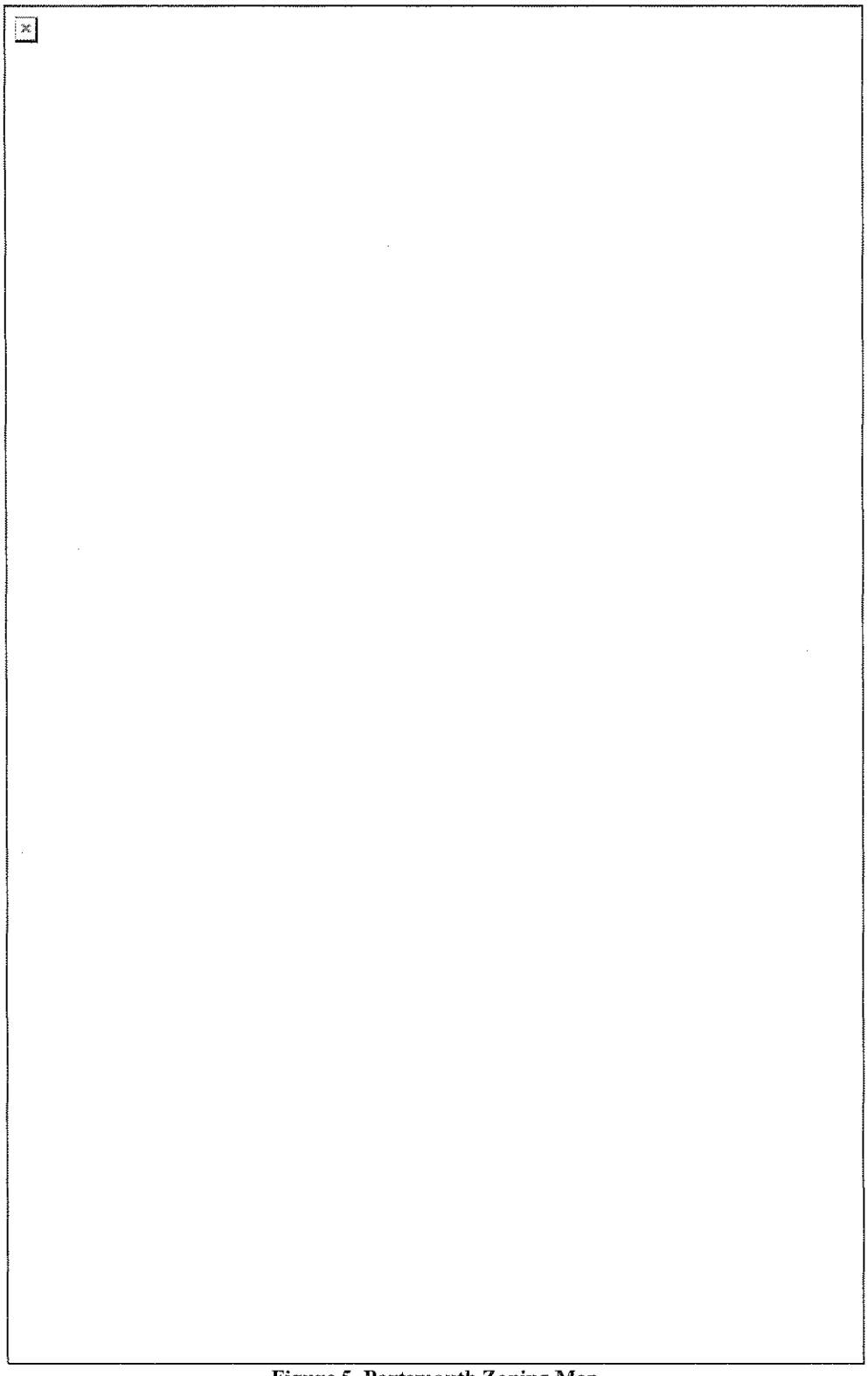


Figure 5. Portsmouth Zoning Map

2.2.4 AQUIDNECK ISLAND: OUR SHARED VISION, 1999

The members of Aquidneck Island Partnership developed the following goals and objects to preserve the existing open space on the island, relieve traffic congestion and increase high-skilled employment opportunities for the residences of Aquidneck Island.

The Partnership developed the following goals:

1. Creating a Livable Landscape
2. Fostering Social Well-Being
3. Creating a Strong Local Economy
4. Creating Multiple Modes of Transportation

This publication does not have any specific implementations or funding plans associated with it and is merely focused to get citizens in the area involved and cognizant of issues which affect many of the citizens.

2.2.5 AQUIDNECK ISLAND WEST SIDE MASTER PLAN, NOVEMBER 2005

The Aquidneck Island West Side Master Plan was developed from a task force of town officials, state offices and professional interest firms. Similar to other studies, the Aquidneck Island West Side Master Plan (WSMP) discusses land use, economic development, transportation and utilities. The plan also proposes various methods of implementation for all identified areas of concern.

The WSMP suggests a municipal WWTF at the former Tank Farm #3 with an approximate size of 10 acres for future development and treatment. The WSMP identified that while this area is not convenient to Portsmouth Park and Island Park, a cost savings may be realized by an increase in municipal sewer usage with the anticipated development in the Melville area.

Tank Farm #3 is owned by the United States Military and the WSMP suggested a "hot transfer" of the area to the Town of Portsmouth and wastewater discharge into SB classified waters. From further inquiries, not included in the WSMP, NE&C discovered that the Navy RIPDES permit has expired and therefore this option would require full permitting by RIDEM and other associated agencies. NE&C believes the permitting process would be very difficult and suggests that the use of existing permits, such as at the Raytheon Facility, would be substantially more economically feasible.

2.2.6 IMPLEMENTING THE AQUIDNECK ISLAND MASTER PLAN, PROMOTING GROWTH CENTERS, SEPTEMBER 2006

The report "Implementing the Aquidneck Island Master Plan" focuses on the growth of Portsmouth, Middletown and Newport in conjunction with topics discussed in the WSMP. The report also discusses the West Main Road and Coddington Highway Corridor and suggested changes.

The report discusses environmental issues but avoids the topic of wastewater treatment altogether as it focuses more on housing, retail, traffic circulation and overall feel of newly-developed communities.

2.2.7 AQUIDNECK ISLAND PASSENGER RAIL/BICYCLE PATH PROJECT, TOWNS OF TIVERTON, MIDDLETOWN, AND PORTSMOUTH AND CITY OF NEWPORT, RHODE ISLAND, SEPTEMBER 2002 – RIDOT

The Aquidneck Island Passenger Rail/Bicycle Path Project proposes to relieve congestion along Aquidneck Island roads and preserve the under-utilized rail corridor. The corridor extends for 16.3 miles along the Newport Secondary Rail corridor from the Gateway Visitor Center in Newport to the Rhode Island – Massachusetts state line in Tiverton.

The rail is currently used for the Dinner Train and National Foundation/Old Colony trains and the railroad tracks are maintained for speeds up to 15 miles per hour. The current alignment goes through the Newport Naval Base and due to events of September 11, 2001, the corridor and Navy station need to be secure and separate.

In addition to expanded rail services, the project also proposes a 12-foot wide bicycle path and boardwalk abutting public property. Construction costs of the rail and bicycle path / boardwalk are estimated at $6.9 million.

The bicycle path and rail alignment coincide with the recommended alignment for the sewer conveyance system. The proposed sewer conveyance system will be a combination of underground force and gravity mains, which should not impose any additional environmental hazards.

Figure 6 illustrates the railroad and bicycle path alignment.

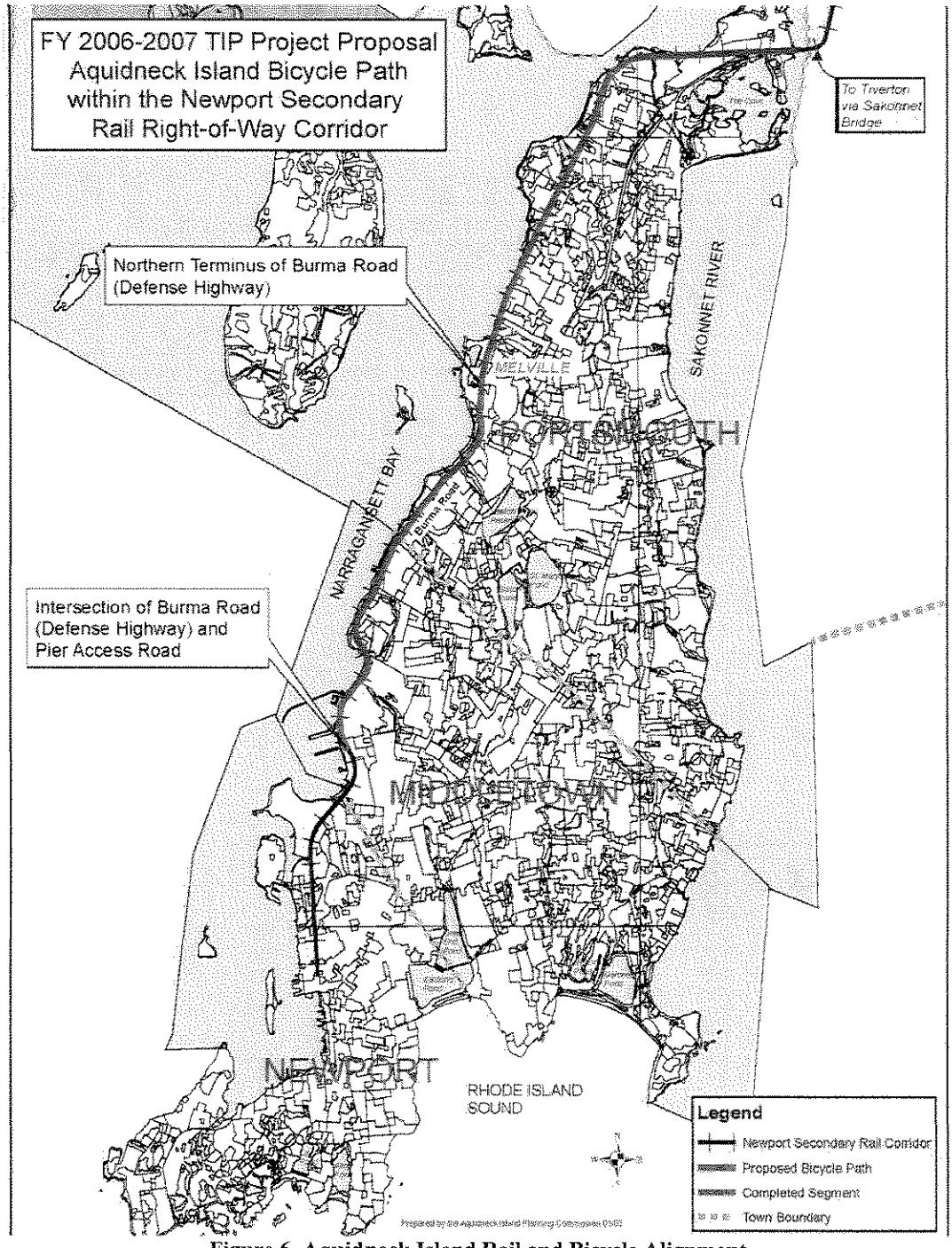


Figure 6. Aquidneck Island Rail and Bicycle Alignment

2.3 THE RHODE ISLAND CESSPOOL ACT OF 2007

The Rhode Island Cesspool Act becomes effective in June 1, 2008. The purpose of the Act is to phase out use of cesspools that present the highest risk to public health and/or the environment.

Cesspools will be required to be inspected if they are within the following areas:

1. Two hundred feet (200') of the shore;
2. Two hundred feet (200') of a public drinking water well; or
3. Two hundred feet (200') of a surface drinking water supply.

All cesspools located in the areas described above must be abandoned by January 1, 2013. Cesspools may be required to be replaced earlier than January 1, 2013, if within one year of the inspection date the cesspool fails inspection or prior to the one year anniversary of the sale of property if a connection to the public sewer is available. All abandoned cesspools must be replaced with an approved ISDS system or connect to a public sewer system.

3.0 EXISTING AQUIDNECK ISLAND FACILITIES

Aquidneck Island's wastewater facilities range by town. Newport WWTF treats wastewater flow from the Navy / Melville area (Portsmouth), 75% of Middletown and all of Newport. The following map illustrates the existing wastewater conveyance and outfall system.

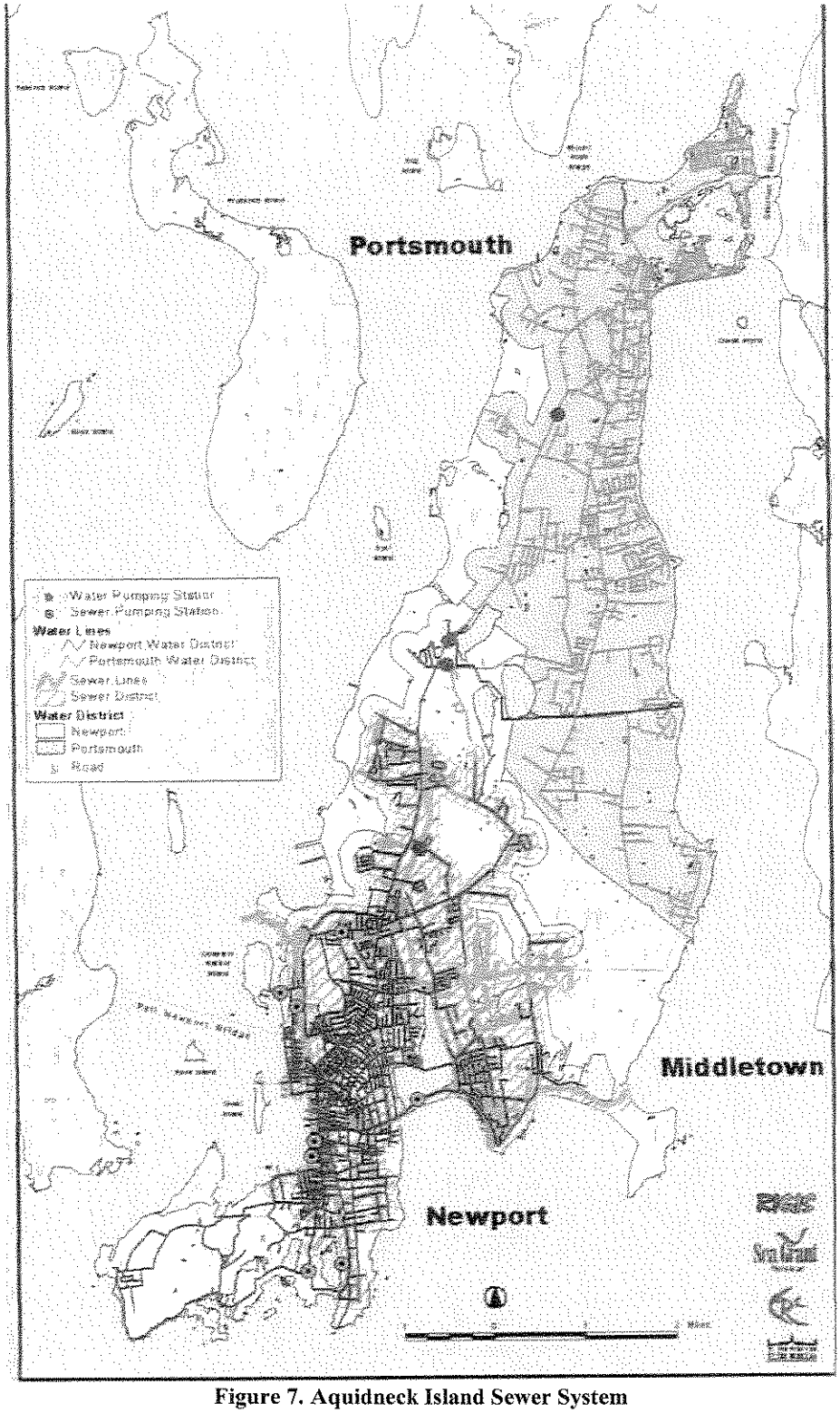


Figure 7. Aquidneck Island Sewer System

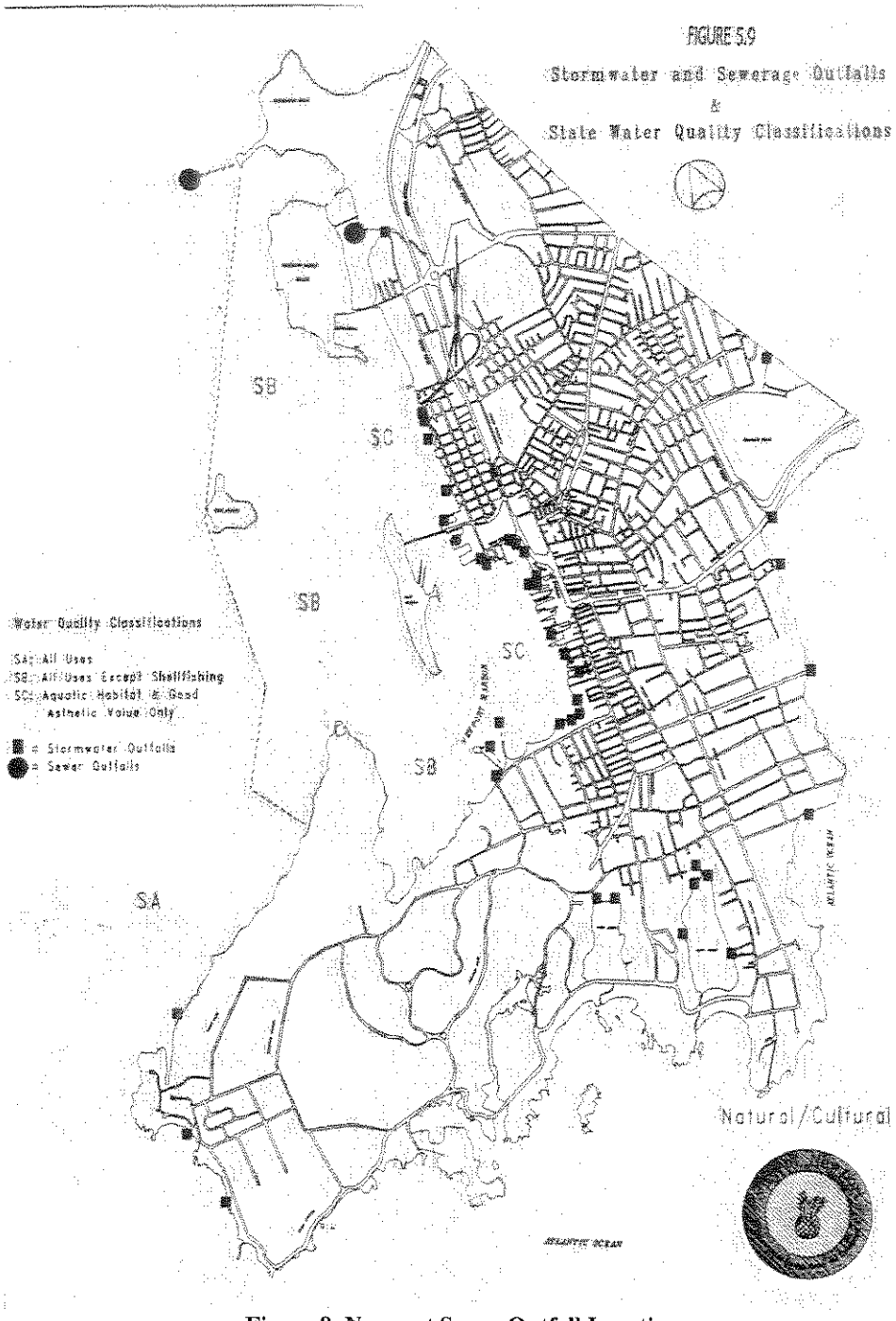


Figure 8. Newport Sewer Outfall Location

3.1 TOWN OF PORTSMOUTH

The Town of Portsmouth is completely self-served for wastewater treatment and most units/parcels have their own ISDS system. The Town of Portsmouth Comprehensive Community Plan identified that minimizing pollution by ensuring that existing septic systems are properly maintained and ensuring that new septic systems are properly set back from environmentally sensitive resources are town goals. The town has identified the following objects to implement its goals: (1) Incorporating specific environmental standard in Town regulations, (2) Working with RIDEM to plan and design "community sewerage systems" in area of existing failed systems, (3) Continuing the study of a Wastewater Management District, (4) Requiring development plan review for all developments in resource protected areas, (5) Increasing enforcement on failed septic systems and (6) Increasing water consumption with a direct result of producing less sewage needed for treatment.

There are some establishments such as the Navy, Carnegie and Weyerhaeuser developments which own and operate their own small scale WWTF. The following figure illustrates the current sewering and water network in the Town of Portsmouth.

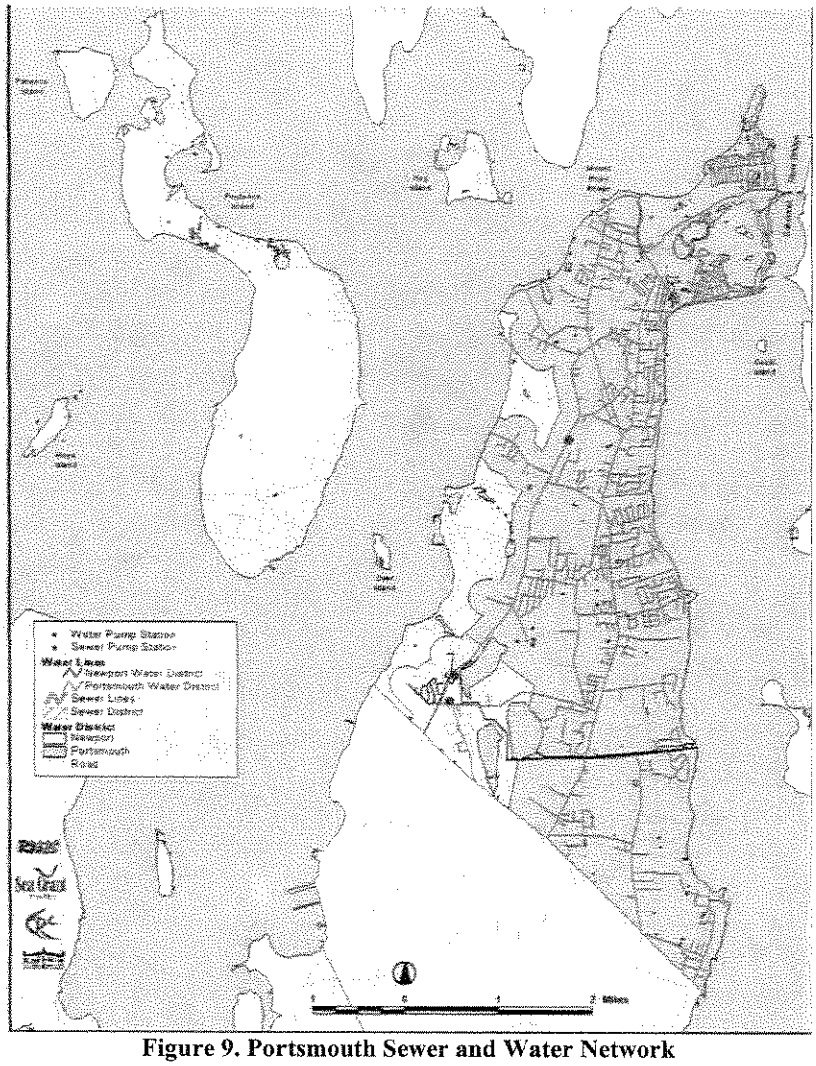


Figure 9. Portsmouth Sewer and Water Network

Navy / Melville WWTF & Outfall

The Navy had a WWTF, but due to low flow volumes, the Navy decided to abandon their facility and allowed their RIPDES discharge permit to expire. The Navy now has a long-term contract with the Newport WWTF to treat 100% of its flows.

The Navy is allocated 2.85 million gallons per day (MGD) by Newport from three major areas: Coaster Harbor Island and Navy Health Care; Coddington Point; and Melville to Coddington Cove. Over the last 5 years, the combined average daily flow from these three areas was approximately 1.1 MGD, with a maximum quarterly average of 1.8 MGD based on the metered rate found by the Newport WWTF. A portion of these flows are from the larger Middletown areas, which were formally Navy housing units. The Navy and Middletown, however, have an agreement where these flows will be treated by and paid for by the Navy.

Part of the Navy sewer flows has industrial/chemical wastewater, but these flows are pre-treated prior to discharge. The Navy also admitted that a negligible portion of flow is attributed to a mixture of stormwater and wastewater.

An option of reversing the Navy flow from Newport's WWTF to the Raytheon site was investigated but NE&C decided that Navy flows would not be considered as part of the flow going to the Raytheon WWTF. Specifics on this decision will be discussed in section 4.0 Service Areas.

For additional information of the Navy system, see Appendix F – Navy Response Letter.

Raytheon

Raytheon has an existing RIPDES Permit (No. RI0000281) issued on February 20, 1992 by RIDEM for 77,000 gallon per day of wastewater discharge. A copy of the permit can be found in Appendix A – Raytheon RIPDES Permit. The discharge outfall design drawings can be found in Appendix B – Raytheon Outfall Drawings. Woodard & Curran has indicated that the Town may be able to purchase the WWTF facility (and land) along with the outfall pipe and current RIPDES permit from Raytheon. Upon approval of this Draft Preliminary Wastewater Facilities Study, NE&C along with the Town of Portsmouth will contact and negotiate this possibility to be included in the final study.

In a conversation with RIDEM on April 14, 2008, RIDEM maintained that the permit was still valid although Raytheon currently is not using its discharge outlet and instead is using the primary clarifiers to temporarily store wastewater and then transports it to Newport's WWTF for treatment. RIDEM confirmed that 77,000 gallons of effluent may be discharged daily and an increase in the permitted flow rate is possible if wastewater treatment is provided to maintain the same dilution factor and mass loads as required by the permit.

RIDEM acknowledges that it feels a new WWTF will be needed at the Raytheon site as the existing WWTF is outdated and probably not functional. RIDEM also questioned the stability of the 50-year old cast iron discharge pipe. Meeting notes from this meeting can be found in Appendix C – RIDEM Meeting Notes.

Lawton Valley

The Lawton Valley residual wastewater flow is approximately 34,000 to 68,000 gallons per day (GPD). The maximum discharge is 400,000 GPD needed for tank cleaning. The residuals currently go to the new Residuals Pump Station located on Old West Main road near Lawton Brook. The flows are then conveyed via a force main to the Middletown sewer on Jepson Lane at a maximum rate of 100 GPM and ultimately conveyed to the Newport WWTF.

3.2 TOWN OF MIDDLETOWN

The Town of Middletown does not have any WWTFs and thus has an intermunicipal agreement between itself and the City of Newport specifying that a maximum annual average discharge of 2.1 MGD may be discharged to the Newport WWTF. According to the Middletown Comprehensive Community Plan, 78% of the Town is currently sewered, but Middletown has reached its allotted capacity at the Newport WWTF and typically exceeds its allocation by 2 or 3 percent resulting in a surcharge paid at the end of the year to the City of Newport. The remaining areas are serviced by ISDS but poor sites, design, installation and/or lack of maintenance can result in a system failure and affect both surface and groundwater supplies.

The Town is primarily concerned with two point sources of pollution at Easton's Bay and Narragansett Bay when sewage overflows from the Wave Avenue and Coddington Avenue Pump Station. The Town attributed the cause of these overflows due to stormwater mixing and pipe infiltration, which results in spills in these two areas after rain events.

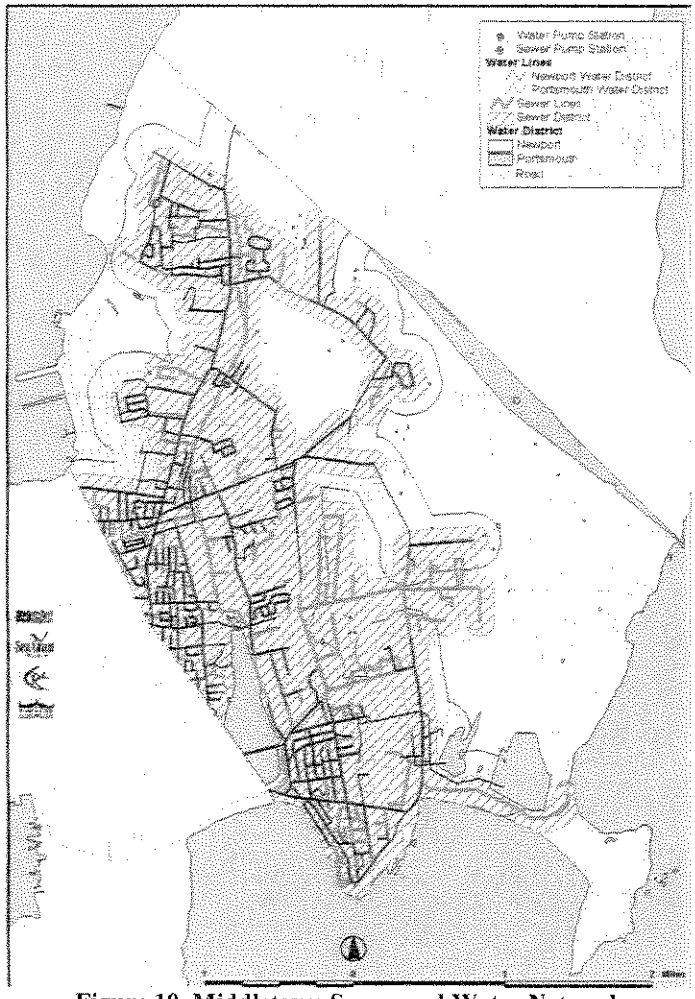


Figure 10. Middletown Sewer and Water Network

Middletown's Community Comprehensive Plan recommended the establishment of a sewer overlay protection district for existing ISDS structures until they can be sewered. This recommendation seems similar to the initial recommendations of Portsmouth but Newport may have more suitable soil conditions, lot sizes and proximity to water bodies that may produce vastly different results than the Portsmouth Park and Island Park areas.

3.3 CITY OF NEWPORT

Similar to many cities and towns of Rhode Island, Newport is facing problems of deteriorating infrastructure and a dwindling revenue base, which make upgrades to existing facilities difficult and slow. Currently Newport's WWTF services 75% of Middletown and 100% of the Navy / Melville area.

Newport's WWTF began operation in May of 1991. In 2000, the City of Newport contracted Earth Tech Corporation to maintain the sewage system treatment system so that all distribution, management and monitoring of the system has now been privatized.

Newport has identified the need for an adequate public facilities ordinance to ensure that growth and development do not exceed the capacity of the city's infrastructure to adequately meet the needs of the City's present and future residents.

The Newport WWTF is designed for a capacity of 10.7 MGD with a maximum daily flow of 19.7 MGD. Currently, capacity is allocated as follows: Newport 53.3 percent (5.7 MGD); Navy 27.1 percent (2.9 MGD); and Middletown 19.6 percent (2.1 MGD). As of calendar year 2003, usage was as follows: Annual average daily flow (ADF), 10.36 MGD [6.9 Newport, 2.4 Middletown, 1.06 Navy]; Dry Weather ADF 9.217 MGD [6.19 Newport, 2.04 Middletown, 0.99 Navy]; Wet Weather ADF, 11.622 MGD [7.7 Newport, 2.8 Middletown, 1.12 Navy]. Both Middletown and Newport exceed allocated capacity and rely upon the Navy to not use its full capacity. Infiltration may be a concern as wet weather flow exceeds that of dry weather. Currently, there are no plans to expand the Newport WWTF.

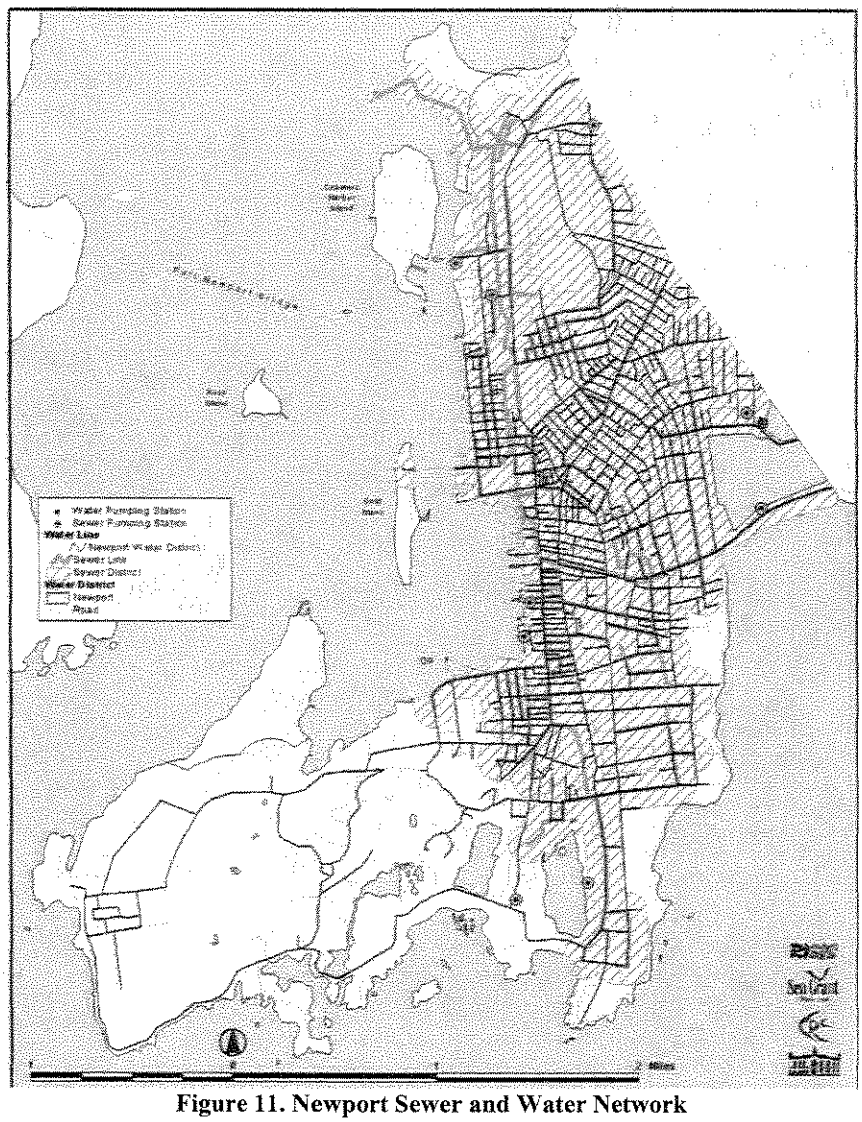


Figure 11. Newport Sewer and Water Network

4.0 SERVICE AREA

The service areas in Portsmouth are Island Park, Portsmouth Park, West Side and Raytheon. The Island Park and Portsmouth Park area were determined to have the highest priority of service due to the TMDL report and existing environmental conditions. The West Side is the second area of concern as identified by Woodard & Curran and the West Side Master Plan due to future planned developments in the area. The service areas in Middletown include parts of the larger Middletown area and the Navy/Middletown overlap area currently services by the Navy structure. The larger Navy/Melville area has been excluded for various reasons described in the next section.

A combination of gravity and force mains have been included to allow options for future connections via gravity flow for multiple areas on the west and north sides of Portsmouth. Possible future connection, if deemed necessary and financially feasible by the Town, may include the Hummocks, Common Fence Point and other portions of Town's west side.

4.1 MIDDLETOWN & NAVY/MELVILLE AREA

Middletown

As previously discussed, Middletown currently exceeds its annual average discharge capacity of 2.1 MGD into the Newport WWTF. In the wet weather season, NE&C learned that high rates of infiltration into the sewer systems and mixing of stormwater with wastewater often generates spills at the Easton Pumping Station. Middletown also pays a high premium to Newport for all excess discharge above its allocation.

The result of this situation has forced Newport and Middletown to stop developments in Middletown because there is no further wastewater discharge capacity. Newport development is also restrained since it is also over capacity and both towns rely on the Navy to not use its entire discharge allocation to avoid major wastewater facility spills.

In conversations with Middletown, specifically the Director of Public Works and the Town Engineer, NE&C learned that Middletown is interested in diverting up to 900,000 gallons of wet weather flow to another WWTF. A portion of the Middletown could be collected and pumped via a force main to the Raytheon WWTF location. The specific area of Middletown is shown below.

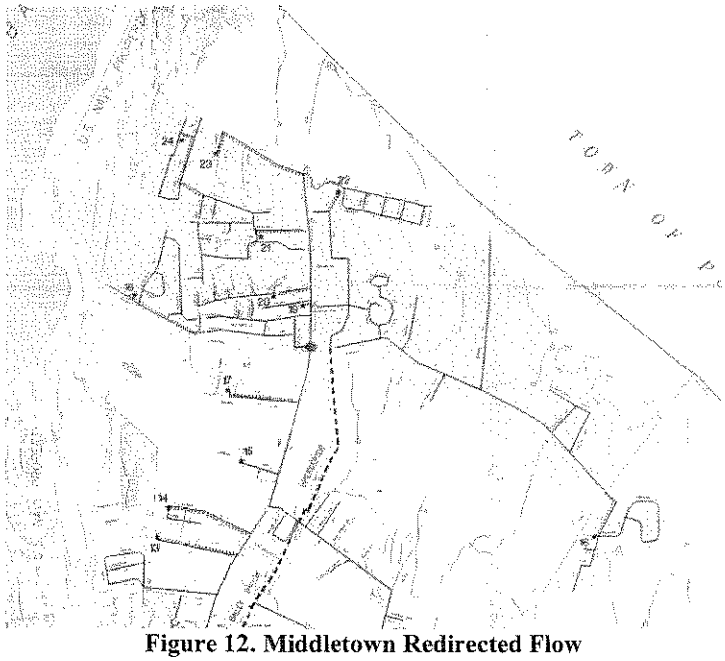


Figure 12. Middletown Redirected Flow

The area shown represents 920 lots with an estimated average daily flow of 163,000 gallons per day.

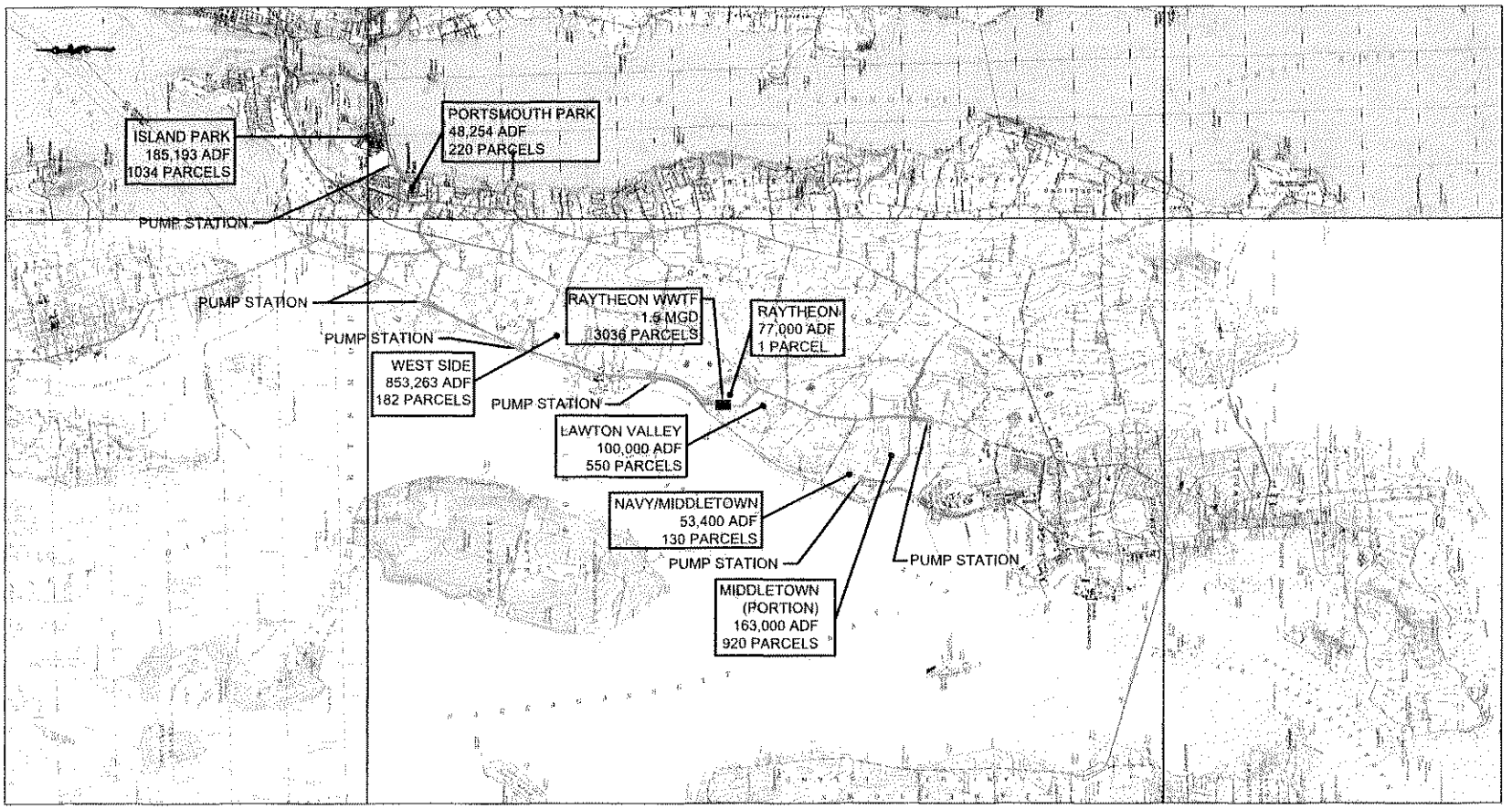
Navy / Melville

The Navy area was considered for redirection to the Raytheon WWTF but since the Navy has an existing contract with Newport and is well below the allotted capacity, NE&C does not believe the Navy would be willing to negotiate redirection of flow for issues of reconstructing and possible paying a higher wastewater discharge fee. NE&C would not advise the Town of Portsmouth to accept flows from the Navy as it would entail upgrading the Navy's system and also accepting flows with chemical and industrial contaminants.

NE&C and Middletown did discuss redirecting part of the flows from the Middletown area currently served by the Navy for political reasons. The Town of Middletown would like the Middletown area to be separate from the Navy system since Middletown has not authority or jurisdiction in the area in terms of level of service provided and these areas are serviced by contract with the Navy. To avoid future issues with the Navy, the Town would like the area redirected to the Raytheon WWTF along with flows from its larger area. The redirected flows from the Navy (Middletown) would be residential in nature and with average daily flow of 100,000 GPD.

4.2 AREAS TO BE SERVICED

As consistent with the previous studies and reports, NE&C proposes services to Island Park, Portsmouth Park and the West Side of Portsmouth and redirecting flow from Lawton Valley through a combination of gravity, force and environmental one sewer options. The following map shows NE&C's recommended alignment through the Portsmouth area.



LEGEND

- LOW PRESSURE FORCE MAIN
- GRAVITY SEWER MAIN
- FORCE SEWER MAIN
- PUMP STATION
- EXISTING GRAVITY MAIN
- EXISTING PUMP STATION

GRAPHIC SCALE

(in feet)

1 INCH = 3,000 FEET

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No.	Revision	Date	App.
Designed by: RMU	Drawn by: RMU	Checked by: PAS	
Scale: 1 INCH = 3,000 FEET	Date: MAY 31, 2006		

Project Title:

AQUIDNECK ISLAND PRELIMINARY WASTEWATER FACILITIES STUDY

Client/Owner:

AQUIDNECK ISLAND
PLANNING COMMISSION
3211 EAST MAIN ROAD

Issued for:

PRELIMINARY

Drawing Title:

PRELIMINARY ALIGNMENT

NOT FOR CONSTRUCTION

Drawing Number: 1

Sheet 1 of 1

Project Number: 08004.0

Survey Index: - -

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As part of NE&C's regional WWTF approach for Aquidneck Island, NE&C propose to redirect parts of the Middletown flow and overlap area between Middletown and the Navy to the Raytheon WWTF. The following alignment is NE&C's recommendation through the Middletown area.

NE&C used the following criteria in determining the appropriate alignment:

1. Service identified problem areas of Portsmouth Park and Island Park
2. Provide viable economic growth options on the West Side via public sewer connection services
3. Use recommended alignment along railroad right-of-way as proposed by the West Main Master Plan
4. Create alignment which allows for future area connections via gravity flow sewer lines or environmental one system
5. Service parts of Middletown for Newport & Middletown relief on WWTF
6. Remove Navy/Middletown overlap area from the Navy

Railroad Right-of-Way Alignment

The Town of Portsmouth continues to prefer using the railroad right-of-way for a force main route along the West Side as indicated in Woodard & Curran's study. As identified in the study, the route facilitates the areas of targeted economic growth, while avoiding sprawl associated with sewer service and also has the advantage of a potential joint effort with bicycle path advocates. Although there are potential environmental concerns associated with the location including but not limited to drainage conditions, flood hazard zones, wildlife threatened and endangered species, water quality issues and adverse soil conditions, the benefits of this alignments outweigh the detriments of other locations.

The railroad corridor is currently owned by RIDOT and is leasing the area to firms that operate the dinner train. This route is approximately 16 miles in length starting at Newport and ending in the Town of Tiverton.

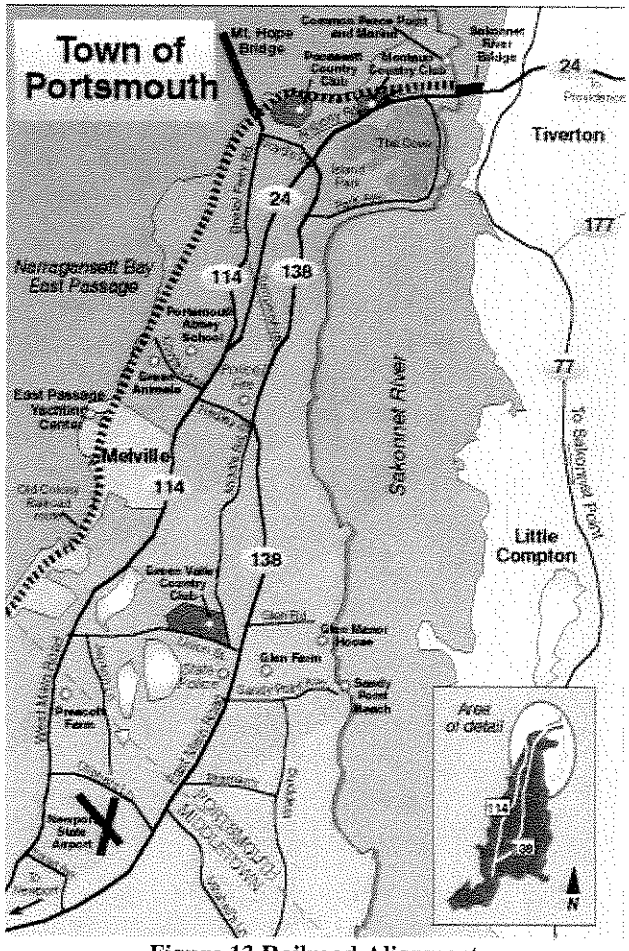


Figure 13 Railroad Alignment

The following is a summary of environmental issues identified by Woodard & Curran regarding the railroad corridor:

- Wetlands: There are 27 freshwater and coastal wetland areas identified between the Gateway Center in Newport and the Sakonnet Bridge in Portsmouth, the most identifiable wetland being Boyd's Marsh. Permitting would be needed to proceed with RIDEM and CRMC.
- Drainage: Currently stormwater drains towards the ocean and a lot of ponding can be found covering the railroad tracks creating non-biological wetlands and areas subject to storm flooding. Upgrading existing swales and drainage ditches may alleviate this problem, but may also prove inadequate to handle the further increased runoff.
- Flood Hazards: The majority of the railroad corridor lies within the flood zone. Design and construction activities in the right-of-way will necessitate considerations for flood hazard areas and proposed fill. Construction within these areas will require review and approval from CRMC.

- Wildlife Threatened and Endangered Species: RIDEM initially found no endangered or threatened species in the study area, but this status could change in the future and require permitting approval by RIDEM.
- Water Quality: There is a potential for the installation of a sewer main to negatively affected surface and groundwater quality, but there are no Community and/or Non-Community Wellhead protection areas located in the immediate vicinity of the right-of-way. The waterbodies adjacent to the sewer main are classified as SA waters or those which are suitable for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities and fish and wildlife habitat. CRMC and RIDEM will require Best Management Practices (BMPs) for erosion and sediment control during construction.
- Soil Condition: The soils are typically Pittstown and Urban Dredge with small areas of Merrimac, Walpole, Enfield and Scarboro. These soils are typically poorly suited for many uses because of slope, erosion and exposure to wind and salt spray.
- Environmental Phase 1 Assessment: There are a number of oil pipe and tanks along the roadway corridor with evidence of leakage. The Melville North Landfill may pose a risk of contamination from BTEX compounds, acids, waste oil, PCBs, pesticides and metals. The sludge drying bed located at this landfill has reported waste oil contamination. In various places along the corridor, there were observed illegal dumping of metal parts, cars, batteries, electrical equipment, oil drums, etc. None of these situation or assessed hazards has ever had any remedial action taken to correct them.

Environmental One Low Pressure Sewer Force Mains

Due to the lack of sufficient elevation change in the Island Park area, NE&C recommends using a low pressure sewer force main to service the area. NE&C also recommends considering this option for possible future connections to the public wastewater treatment system for areas such as the Hummocks and Common Fence Point. Some of the advantages and benefits of a low pressure sewer main system are:

Homeowners

- Safe - protects water quality and enhances quality of life
- Reduces cost of housing - both initial and ongoing
- Visually benign- only evidence is a low-profile cover that is easily camouflaged
- Does not disrupt the beauty of the landscape or damage built structures
- No preventive maintenance required of homeowner
- Central sewer increases value of home

Municipalities/Developers

- Permits freedom to sewer anywhere in any kind of terrain
- Low initial costs make central sewers economically feasible
- Central sewer increases value of development units
- High reliability — maintenance is minimal
- Reduces operating costs
- Protective of public health

- Permits regulatory compliance

Engineers/Operators
- Proven engineering and design
- Ideal for every terrain and building environment
- Cost-effective central sewering solution for new construction or retrofits
- Engineering and technical support during design, construction, installation and operation
- Reliable performance means reduced O&M costs
- When needed, E/One pumps are easy and safe to access and service
- Designed to keep maintenance to absolute minimum

Contractors/Construction Managers
- Installation follows contour of the land — does not require major excavation
- Needs only shallow trenches — increases ease and safety of installation procedures
- Labor and material costs are much less than gravity sewer systems

For more information on E/One low pressure sewer force main, see Appendix E – E/One Low Pressure Force Main or refer to http://www.eone.com/.

4.3 TOTAL FLOW RATES

There are identifiable flows from six key areas: Island Park, Portsmouth Park, West Side, Lawton Valley, a portion of Middletown and the Navy/Middletown overlay area. The following table provides the estimated flow rates from each area and number of lots served.

Serviced Area	Number of Parcels or Units	Total Average Daily Flow (GPD)
Island Park (1)	1,034	185,193
Portsmouth Park (1)	220	48,254
West Side (1)	182	853,263
Raytheon	1	77,000
Lawton Valley (2)	550	100,000
A Portion of Middletown	920	163,000
Navy/Middletown Overlay (3)	130	53,400
TOTAL	**3,036**	**1,480,110**

(1) Flow information referenced from Woodard & Curran
(2) Flow information referenced from design drawings from Maguire Group
(3) Flow information referenced from the Navy

5.0 PROPOSED CONVEYANCE SYSTEM IMPROVEMENTS & CONSIDERATIONS

NE&C is proposing the following improvements in terms of sewer mains:

- Environmental One (low pressure force main): 6,480 feet
- Gravity Main: 17,610 feet
- Force Main: 34,170 feet
- Pump Stations: 7

Gravity section of the gravity main will be a maximum of 15 to 20 feet below grade. The majority of the pipe will be within 5 feet of the surface and therefore NE&C recommends open-trench construction.

Location of all pipe work shall be within the highway right-of-way so as to not interfere with private land rights. The pump stations will also be located within the highway or railroad right-of-way.

The following pictures illustrate areas of the proposed pump stations and typical condition of the corridor and vegetation.

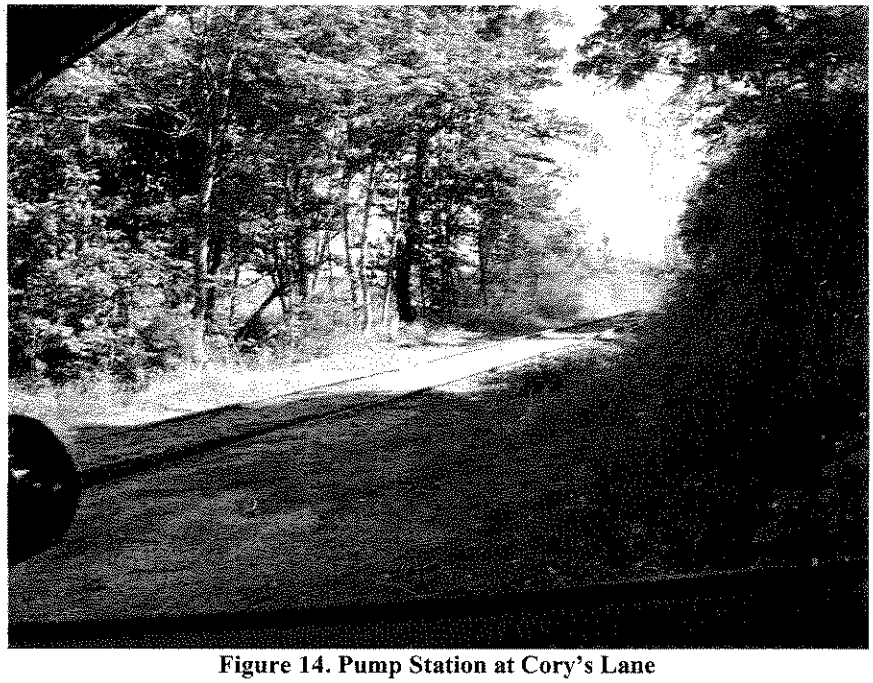


Figure 14. Pump Station at Cory's Lane

Figure 15. Pump Station along Defense Highway

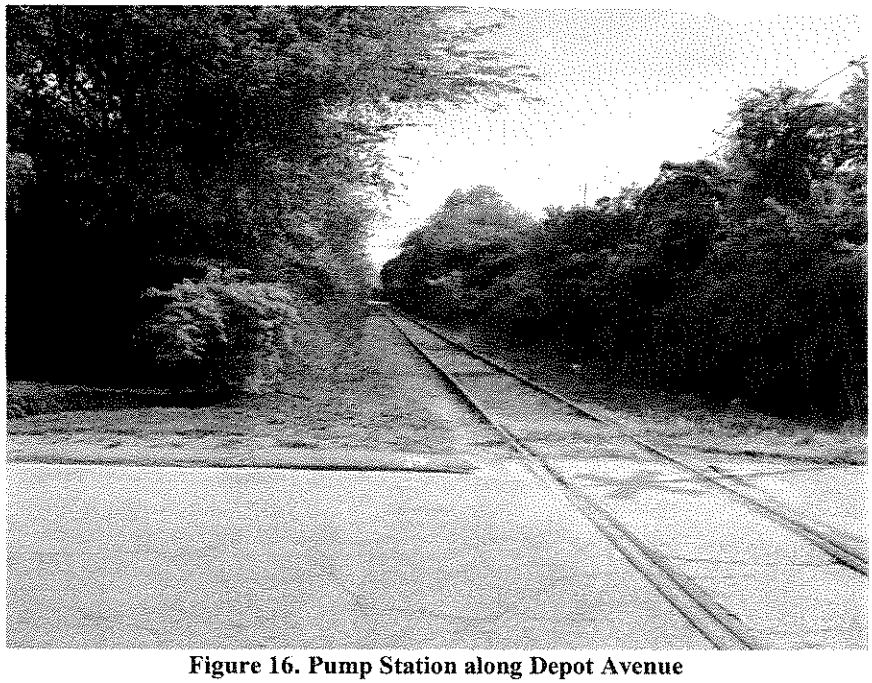


Figure 16. Pump Station along Depot Avenue

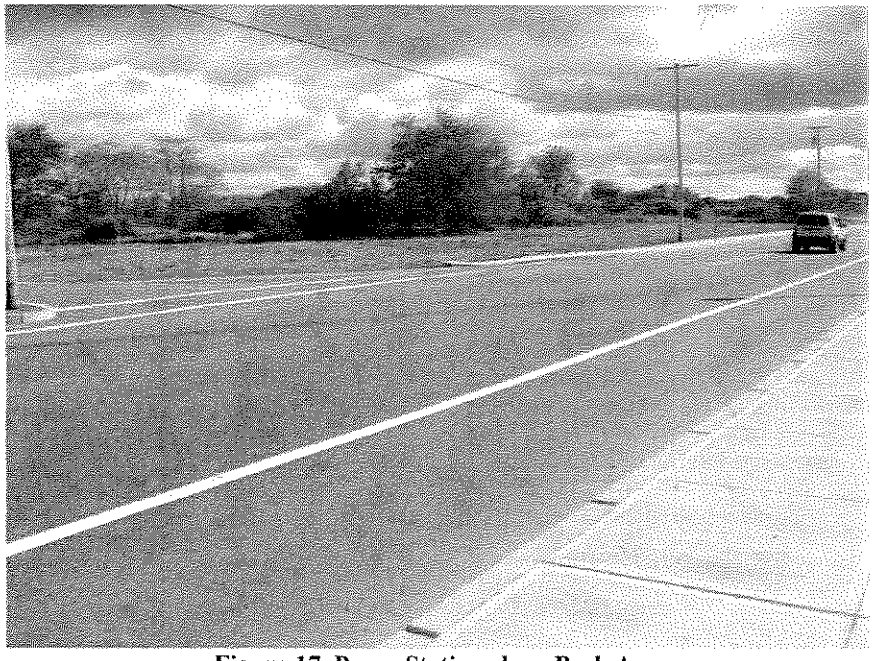


Figure 17. Pump Station along Park Ave

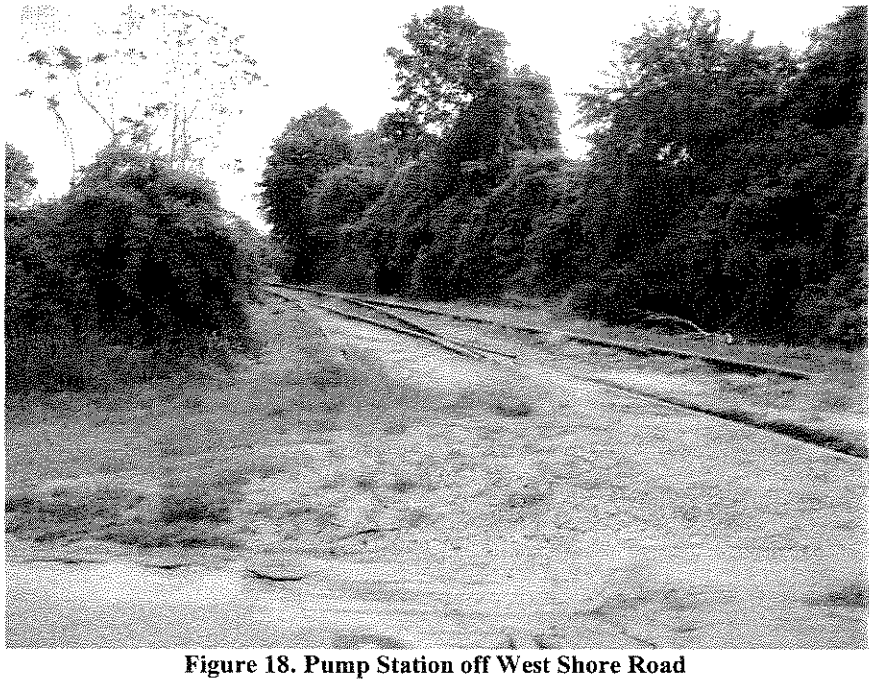


Figure 18. Pump Station off West Shore Road

6.0 PROPOSED WASTEWATER TREATMENT FACILITY IMPROVEMENTS & CONSIDERATIONS

From meetings and correspondences with the Rhode Island Department of Environmental Management (RIDEM) in regards to potential NPDES permit limits the regional WWTF would be required to be a state of the art facility with advanced wastewater treatment. Specifically, RIDEM has expressed that the potential effluent permit limits as shown below in Table 1 would have to be met.

Table 1. Effluent Permit Limits

Parameter	Unit	Influent	Effluent
Flow	MGD	1.5	1.5
BOD	mg/L	220	5
	Lbs/day		
TSS	mg/L	220	5
	Lbs/day		
Total Nitrogen	mg/L	40	3
	Lbs/day		
Phosphorus	mg/L	8	N/A
	Lbs/day		

The concentrations of the various influent wastewater parameters listed above were based on typical values for medium strength wastewater. The potential effluent permit limits imposed by RIDEM are stringent limits, which will require a very high level of treatment for it to be consistently met. Options for the proposed WWTF would include the following:

- Membrane Bioreactors (MBRs)
- Sequencing Batch Reactors (SBRs) followed by Denitrification Filters

Other emerging and proprietary treatment technologies, such as BioMag may be capable of meeting these limits, however additional development and testing would be require before they become utilized.

For this study the MBR treatment process will be the only technology to be further evaluated, since it is a proven technology as demonstrated by its ability to meet stringent effluent permit limits similar to those listed above in Table 1 at numerous WWTF.

A preliminary process flow diagram for a typical MBR treatment facility is shown in Figure 19. As shown by the process flow diagram a state of the art treatment facility is required to meet the effluent permit limits. As with the majority of membrane manufacturers a fine screen (<1mm) is required to remove smaller fine particles (i.e. fine hair) from clogging the membranes. A new process building would also need to be constructed at the site to house the process equipment (i.e. blowers, pumps, chemical storage tanks, etc.). Treated effluent from the new facility will be

discharged through the existing 16-inch diameter outfall pipe that currently exists at the Raytheon WWTF.

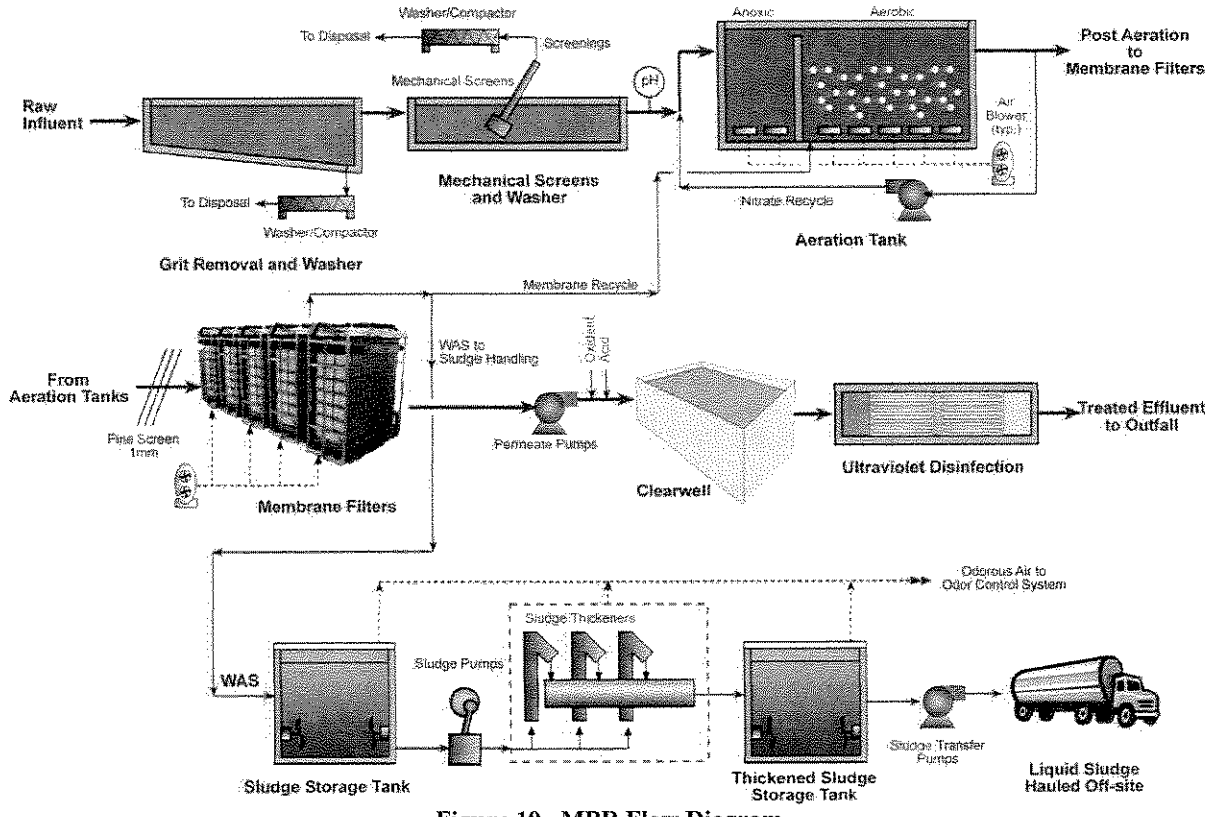


Figure 19. MBR Flow Diagram

The solids produced from this facility will be thickened on site to produce an approximately 5%-6% solid. The thicken solids will be stored and eventually transported off site by a contracted sludge hauler to a regional sludge disposal facility. In order to help minimize transportation cost it is anticipated that the solids will ultimately be disposed of at either the Cranston, RI or Woonsocket, RI regional sludge disposal facilities.

6.1 UPGRADE TO RAYTHEON WASTEWATER TREATMENT FACILITY

The exiting Raytheon WWTF is designed to treat only 77,000 gpd, therefore it is not of adequate size to provide the project flow rates with the required level of treatment. However, it is possible that the existing Raytheon WWTF could be incorporated into the solids handling side as sludge storage tanks or other potential uses would be evaluated.

6.2 LAND AVAILABILITY SURVEY

Upon reviewing aerial maps of the Raytheon WWTF it appears that the site has sufficient land for a larger WWTF. Figure 20 shows a conceptual layout of the 1.5-MGD MBR Treatment Facility located adjacent to the existing Raytheon WWTF. As you can see from this figure with

some site work there is sufficient room to locate the new facility as well as expand it in the future if required.

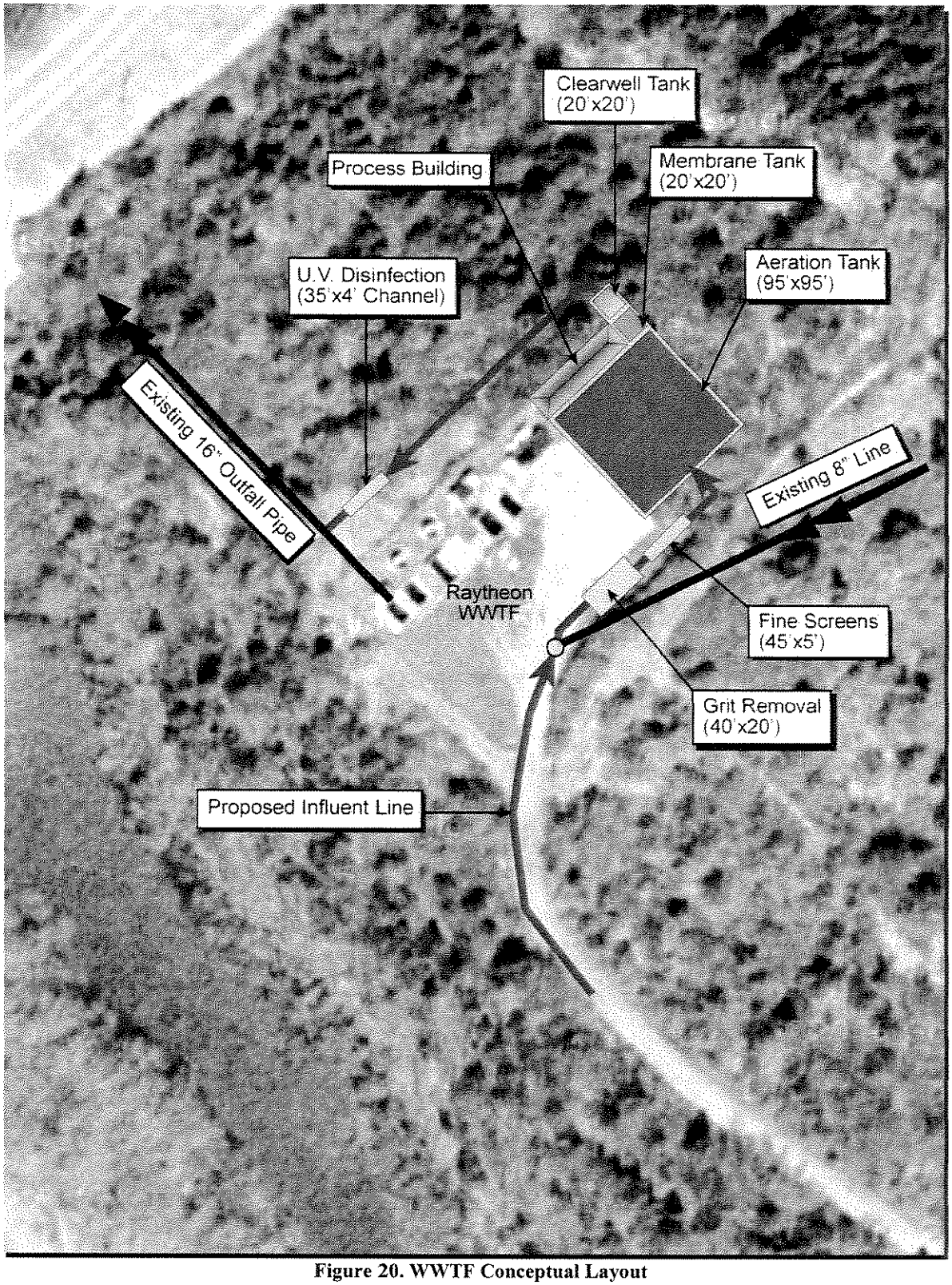


Figure 20. WWTF Conceptual Layout

6.3 EVALUATION OF RAYTHEON OUTFALL

A preliminary evaluation of the hydraulic capacity for the existing 16-inch gravity outfall pipe at the Raytheon WWTF resulted in the determination that the pipe has sufficient capacity to discharge the proposed flow rates. There also exists a section of 8-inch pipe located prior to the outfall pipe transitions to 16-inch, which would have to be replaced with a new 16-inch pipe.

7.0 OPINION OF PROBABLE COST

The 2007 Woodard & Curran (W&C) report, which was prepared for the Town of Portsmouth estimated its cost for an approximately 1 MGD MBR Treatment Facility at $23-Million. This corresponds to $14.70 per gallon of influent wastewater. After reviewing the Woodard & Curran cost information, our own discussions with vendors, and researching the latest published literature we are of the opinion that the cost appears to be reflective of today's market and for this stage of conceptual design. Therefore, as shown in Table 2 we have estimated the cost for a 1.5 MGD MBR Treatment Facility at $34-Million

Table 2. WWTF Opinion of Probable Cost

AQUIDNECK ISLAND REGIONAL WWTF PROJECT CONCEPTUAL CONSTRUCTION COST ESTIMATE			
			Total Cost:
MBR Wastewater Treatment Facility (WWTF)			**$22,000,000**
Standard Construction Contingency =	**30%**	**Contingency:**	$ 6,600,000
		Sub Total:	**$28,600,000**
Engineering/Design/Admin/Soft Costs =	**20%**	**Contingency:**	$5,700,000
		Project Total:	**$34,300,000**

7.1 OPINION OF PROBABLE CONVEYANCE COST

NE&C anticipates the average cost per linear foot of sewer line to be $150. There is 60,700 linear feet of sewer main (force, environmental one and gravity) proposed for the conveyance system. The following table shows NE&C opinion of probable conveyance construction cost for the proposed project.

Table 3. WWTF Conveyance Opinion of Probable Cost

AQUIDNECK ISLAND REGIONAL WWTF PROJECT CONCEPTUAL CONVEYANCE COST ESTIMATE			Total Cost:
Wastewater Conveyance System @ $150/lf (60,700 total linear feet) Wastewater Pump Stations @ $500,000 each (7 pump stations)			**$12,605,000**
Standard Construction Contingency =	**30%**	**Contingency:**	$ 3,780,000
		Sub Total:	**$16,385,000**
Engineering/Design/Admin/Soft Costs =	**20%**	**Contingency:**	$3,277,000
		Project Total:	**$19,662,000**

7.2 OPINION OF PROBABLE TREATMENT COST

The 2007 W&C report estimated an annual O&M cost for the proposed 1 MGD MBR Treatment Facility at 1.16-Million. Again, for this stage of the conceptual study we would estimate that the annual O&M cost for a 1.5 MGD Treatment Facility to be approximately one and a half the figure reported in the W&C report, or $1.74-Million.

7.3 OPINION OF PROBABLE USER FEES (FOR OPERATION & MAINTENANCE)

Typical user fees for Rhode Island are between $200 and $350 dollar per mouth per household. Woodard & Curran estimate the single dwelling unit fee of $200 per month for this WWTF and conveyance system. NE&C estimates users fees will be in the $200 to $250 per month range.

8.0 FUNDING OPTIONS

NE&C has identified two types of funding needed for this project: construction (short-term) and operation and maintenance funding (long-term). Short term funding is available through public financing, but long-term funding is typically funded through the Town budget.

8.1 FUND FOR CONSTRUCTION COSTS

In NE&C's research, there are three public funding methods available to the Town for the initial construction of the WWTF and sewer mains and pump stations. The three methods are the State Revolving Fund, State Bond Fund (Interceptor Bond Fund) or Federal Special Appropriations.

The State Revolving Fund can pay for the construction of the WWTF and sewer mains of Portsmouth and Middletown. The fund has the approval, if funds are available, to finance the entire portion of the construction. The flows from O'Neill and Raytheon are not eligible for

funding through this source so the percentage of flows from these two entities will be subtracted from the total funding percentage of the project.

The State Bond Fund (Interceptor Bond Fund) will fund a matching portion up to $500,000 for "areas which should no longer be services by ISDS systems and should be serviced by sewers." Portsmouth is the only area which qualifies for this fund. The matching portion that needs to be provided by Portsmouth can be from the State Revolving Fund.

A Federal Special Appropriations may be available if initiated by a Rhode Island Senator but this option may be unlikely.

8.2 PUBLIC VS PRIVATE OWNERSHIP

RIDEM is hesitant to allow private WWTFs and prefers public WWTFs. The reasoning for their hesitation is that when a Private WWTF is abandoned by the owner and bequeathed to the State, the State cannot foresee the needed capital to sustain the WWTF and faces the issue of raising the capital or not allowing the existing residents to continue discharging to the facility.

NE&C proposes that the Town of Portsmouth negotiate an agreement with Raytheon for the ownership or maintenance and operation right to the WWTF if on Raytheon land. NE&C believes that Raytheon is willing to negotiate with the Town once a regional wastewater treatment solution is agreed upon and accepted by all concerned parties.

9.0 PROBABLE PROJECT SCHEDULE

It is NE&C's opinion that the project, as described elsewhere in this facilities study, will take five (5) years to implement. The following represents a probable project schedule that begins with the formation of a sewer authority and concludes with the completion of all construction for the project. Note that this schedule is preliminary and subject to substantial variability depending on funding availability, permitting, land acquisition, etc.

This project, and associated schedule, includes: the construction of the proposed 1.5 MGD WWTF at the Raytheon site; construction of main interceptors comprised of gravity pipe lines, pumping stations, and forced mains; construction of sewage collection systems for the communities identified in the W&C report as Alternative 4A, Alternative 4B, and Alternative 5B; construction of a sewer connection from the Lawton Valley water treatment facility to the new interceptor system; construction of collection systems as necessary to redirect flows from Middletown, presently flowing to Navy facilities, to the new interceptor system. Subsequent sewer construction phases are not considered in this schedule.

July 1 to December 31, 2008 – Acceptance of the recommendations contained in this facilities study, and any amendments hereto, by all parties concerned including, but not limited to, Town of Portsmouth, Town of Middletown, Raytheon Corp., City of Newport, RIDEM, and the US Navy.

January 1, 2009 to June 30, 2010 – (18 Months)

1. Formation of a sewer authority to administer all aspects of the project including funding procurement, establishment of a sewer ordinance, determining construction and operations and maintenance budgets, purchase or lease land from Raytheon for new WWTF, establish sewer user fees and betterment charges, set up a pretreatment program, hiring design and construction management consultants, hiring contractors, land and easement acquisition, permitting, etc.;
2. Determine budgets and procure funding for project;
3. Purchase or lease land from Raytheon for new WWTF;
4. Hire engineering design consultants;
5. Establish preliminary design, locations, and layout for new piping, pumping stations, etc. to facilitate land acquisition for easements;
6. Determine preliminary design for WWTF;
7. Coordinate permitting and approval processes through RIDEM and other Federal, State, and local agencies having jurisdiction over project.

July 1, 2010 to December 31, 2011 – (18 Months)

1. Finalize design for all proposed facilities including WWTF, interceptors, pumping stations, collection systems, etc.;
2. Obtain all required permitting and approvals;
3. Acquire all land and easements necessary to construct the project;
4. Prepare bidding and construction documents for all proposed work. Note: Design and bidding may be done in phases to facilitate the project funding and requirements. For example, it may be desirable to complete the design of the WWTF, and solicit bids for it first, while the interceptor and sewers are being designed.
5. Receive all construction bids and award contracts for all new facilities and construction work by December 31, 2011.

January 1, 2012 to January 1, 2014 – (24 Months)

1. Construct all new WWTF facilities, interceptors, pumping stations, sewage collection systems, etc.;
2. Obtain all required permitting and approvals;
3. Hire staff to operate and maintain WWTF and collection system;
4. Sewer authority reverts from construction mode to management mode entire operations and maintenance of collection system;
5. Establish procedure and time table for sewer connections to new collection system. Sewage in sufficient quantities must be available to operate and test facilities. This task will require cooperation among all parties who will be building, using, managing, and operating the new facilities;
6. Implement pre treatment program;
7. Test and place on line all new facilities;
8. Test and certify performance of new WWTF and place it on line.

Note that this is a general outline of the major steps required to implement the proposed sewer program. There are many intermediate steps, and other considerations, that will be necessary; some will not become apparent until the project begins. In NE&C's opinion, the vital element to getting this project off the ground will be consensus among the various parties involved as to the appropriate course of action.

10.0 PROJECT BENEFITS

The opinion of NE&C is that there must be a consensus among Portsmouth, Middletown, Newport, the Navy, and Raytheon that the proposed wastewater facilities program is beneficial to each of these entities that could potentially be involved. Although a project serving only Portsmouth is feasible, the inclusion of the other named entities will provide overall benefits for Aquidneck Island including: improved quality of the water around the Island; reduced cost per gallon of sewage treated; greater potential for economic growth; reduce reliance on ISDS in Portsmouth and Middletown; open up areas to controlled development that are presently off limits due to high water table and/or poor soil conditions; reduce flow to the Newport WWTF.

The proposed project involves the construction of a new 1.5 MGD WWTF to be located at the site of the present Raytheon WWTF in Portsmouth, an interceptor system comprised of gravity sewers, pumping stations and forced mains to convey sewage to the proposed WWTF, and piping networks within designated areas to collect sewage for conveyance to the proposed interceptor system. The specific benefits derived from the construction of the proposed sewage facilities are as follows:

For Portsmouth:

The problems with ISDS and associated water pollution are well documented; most recently in the Woodard & Curran report, the findings of which have been summarized in Section 2.0 of this study. The implementation of the proposed wastewater facilities program will eliminate the need for ISDS on the West Side, Island Park, and Portsmouth Park. As a result, these areas will cease subsurface disposal of wastewater and subsequent pollution of the water table, Mt. Hope Bay, Narragansett Bay, and the Sakonnet River. Further, said areas will be open to more controlled development and economic growth, which has been stymied due to the inability to obtain permitting for ISDS construction. Without implementation of the wastewater facilities program: water pollution will continue; it will become even more costly and difficult to construct ISDS, which will result in zero economic growth and development.

For Middletown:

Most of the wastewater from Middletown flows directly into the Newport collection system, with a portion entering indirectly via the Navy's collection system. In total, approximately .663 MGD could be diverted from Newport's collection system to the proposed 1.5 MGD WWTF at Raytheon. If said WWTF is expanded to 2.0 MGD even more flow from Middletown could be treated at this facility. The benefit to Middletown is that a commensurate amount of excess

capacity would become available at the Newport WWTF which could be used for development in those areas closer to Newport. As would be the case with Portsmouth, Middletown would experience additional economic growth and development. In terms of water quality, extra wastewater treatment capacity would reduce the number of wet weather overflows that the Middletown collection system experiences, from time to time, during some rain storms.

For the Navy:

The Navy has made it perfectly clear to NE&C that it would prefer not to have to treat wastewater from other than Navy facilities. Accordingly, the diversion of approximately .1 MGD (Flow rate estimated by Middletown) from the Navy's collection system to the proposed WWTF at Raytheon would be welcomed by the Navy. The removal of .1 MGD would reduce the Navy's operating costs and free up additional capacity for its own development. The Navy indicated that, at this time, it has no intentions of selling off any of its property or wastewater facilities.

For Newport:

The benefits of the proposed wastewater facilities program for Newport are similar to those for Middletown in that approximately .663 MGD could be diverted from the Newport system to the proposed 1.5 MGD WWTF at Raytheon. Presently, the capacity of Newport's WWTF is 10.7 MGD. The removal of .663 MGD represents 6.1% of the available treatment capacity, which could be used for development in Middletown and/or Newport.

For Raytheon:

Presently, Raytheon's sanitary wastewater is transported to Newport for treatment. Raytheon's treatment facilities are no longer in operation and are used for temporary storage of wastewater, waiting to be hauled to Newport's WWTF. Raytheon has a permitted outfall for up to 77,000 GPD. This outfall will continue to be utilized by the proposed 1.5 MGD WWTF, to be built at the present Raytheon WWTF site. The proposed wastewater facilities program would provide the means to treat Raytheon's sanitary wastewater, at a cost assumed to be less than what Raytheon pays now for hauling and treating wastewater at Newport's WWTF. An additional benefit is that Raytheon will be able to divest itself of the WWTF and associated property. Raytheon will also be making provision for the future should Newport decide not, or become unable, to accept its wastewater.

Arguments can always be made against some, or all, of the benefits described above, particularly when the cost of the proposed wastewater facilities program is taken into account. However, given the facts that the cost to implement the program will increase with time, water quality standards are becoming more stringent, and that economic growth and development are being stymied, arguments against the program may in reality be arguments against the long term quality of life on Aquidneck Island.

11.0 RECOMMENDATIONS

Based on NE&C's review of previous studies, discussions and correspondence with Portsmouth, Middletown, the Navy and RIDEM officials, site observations, and an engineering analysis of all available data, the following recommendations for a regional wastewater facilities program are made:

1. A regional approach to include wastewater from Portsmouth and Middletown is recommended. Included in the 1.5 MGD (million gallons per day) average daily flow rate for the proposed regional facilities program is wastewater from 1.) West Side of Portsmouth; 2.) Portsmouth Park; 3.) Island Park; 4.) Raytheon: 5.) Portion of Middletown; 6.) Navy/Middletown Overlay area; 7.) Lawton Valley WTP. The benefits of this approach include the provision of wastewater treatment for the critical areas of Portsmouth, in addition to providing some relief to the Newport WWTF. This benefit to Newport will result from the diversion of a portion of Middletown's wastewater to the proposed WWTF to be constructed at the Raytheon site. (See Project Benefits section of this report).

2. At this time NE&C does not recommend accepting any flow from Navy facilities. The Navy has indicated that its wastewater may contain industrial/commercial flow as well as I/I (infiltration/inflow). These flows could prove disruptive to the operations of the proposed WWTF at Raytheon. It is recommended that wastewater flows from Middletown and Portsmouth developments, other than Navy facilities, be diverted to the proposed WWTF. Discussions with the Navy have confirmed that it would support the elimination of these flows from its system. Further, at this time, the Navy is not inclined to sell off any of its land or wastewater facilities.

3. It is recommended that a new WWTF be located at the site of the present, though out of use, WWTF at the Raytheon site in Portsmouth. This site offers the advantage of a permitted outfall pipe with more than sufficient capacity to handle the flow from the proposed WWTF. Initially, the proposed WWTF would have an average daily flow treatment capacity of 1.5 MGD, and it would employ the latest in membrane treatment technology. The existing facilities at the Raytheon WWTF will be evaluated and, if possible, incorporated with the new WWTF design. There is sufficient land available at the Raytheon site to accommodate the proposed WWTF, with room for expansion in the future. Discussions to purchase, or lease, the land from Raytheon should begin as soon as there is consensus to move ahead with the project. The procurement of the Raytheon site, and outfall, is a crucial element of this project.

4. Constructing a WWTF on Navy property was considered. At one time the Navy had its own WWTF, and a permitted outfall, both of which have since been abandoned. Presently, the Navy has an agreement to convey all of its wastewater to Newport for treatment. The fact that the Navy no longer has a permitted outfall makes this site less attractive than the Raytheon site and, therefore, it is not recommended as an option for the proposed WWTF. In NE&C's opinion, having a permitted outfall available, as does

Raytheon, is a tremendous advantage. We have discussed this matter with RIDEM and they agree that, to attempt to obtain a permit for another site, would be time consuming, with no guarantee of success.

5. NE&C recommends the formation of a public sewer authority as a first step toward implementing the proposed wastewater facilities program. This authority would handle all phases of the project from procurement of funding, land, etc. to operations and maintenance of all wastewater treatment facilities. It is recommended that the authority (Aquidneck Island Water Pollution Control Authority?) be comprised of members of Portsmouth, Middletown, Newport, and perhaps other entities that may have suitable interest in the project. RIDEM supports a public authority to oversee the operation and maintenance of the proposed WWTF as opposed to a private entity.

6. NE&C recommends the construction of a new interceptor system, comprised of gravity sewer pipelines, forced mains and pumping stations, to be located within existing State and local rights-of-way as proposed in the Woodard & Curran report. There will still be a need to acquire land for easements and pumping stations, but the route shown on page 29 of this report appears to be the most cost effective. It is further recommended that the interceptor be gravity flow, as opposed to forced main, wherever possible to facilitate future connections. It is far easier to connect collection sewers, such as from subdivisions, to gravity sewers than to forced mains. This "user friendly" approach will promote expansion of the sewer system, resulting in more system users and lower per capita user fees. The installation of wastewater flow rate metering stations is recommended at strategic locations. These stations will be used to determine how much wastewater is contributed by each entity using the WWTF, and will provide a means to levy additional fees for excessive I/I.

7. NE&C's opinion of probable construction cost for the proposed wastewater facilities program (WWTF, interceptor, collection sewers) will be $54 million. Of course, this cost is subject to wide variability depending on when the program is implemented, land acquisition costs, and the final design features of all facilities. Note that this cost does not include the purchase of the Raytheon site and WWTF facilities. The recommendation is to fund the project through available State grants, local bond referenda, and user and betterment fees. Included is a list of sewer user fees charged by various communities and authorities in Rhode Island. The proposed user fee is consistent with those being charged elsewhere in the State.

12.0 LIMITATIONS AND SPECIAL TERMS AND CONDITIONS

1. NE&C's evaluation was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area, and NE&C observed the degree of care and skill generally exercised by other consultants under similar circumstances and conditions. No warrantee expressed or implied is made.

2. Any additional research conducted should be reviewed by Northeast Engineers & Consultants, Inc., such that the conclusions presented herein may be modified.

3. This report was prepared within the budgetary constraints imposed in the contract between NE&C and the Client.

4. All observations documented in this report were performed under the existing conditions at the time of the assessment.

5. This report has been prepared on the behalf of and is for the exclusive use of the Client. This report and findings contained herein shall not, in whole or in part be disseminated or conveyed to any party, nor used by any other party in whole or in part, without the written consent of NE&C.

Prepared by:

Robyn M. Underwood, PE
Senior Engineer _____ Signature _____ Date

Reviewed by:

Paul A. Sylvia, PE
Senior Project Manager _____ Signature _____ Date

APPENDICES

APPENDIX A RAYTHEON RIPDES PERMIT

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
DIVISION OF WATER RESOURCES
291 Promenade Street
Providence, R.I. 02908 - 5767

277-6519

CERTIFIED MAIL

February 20, 1992

Mr. C. Dale Reis
Raytheon Company
Submarine Signal Division
1847 West Main Road
Portsmouth, RI 02871

Dear Mr. Reis:

RE: RIPDES No. RI0000281

Enclosed is your final Rhode Island Pollutant Discharge Elimination System (RIPDES) Permit Modification issued pursuant to the referenced application. State regulations, promulgated under Chapter 46-12 of the Rhode Island General Laws of 1956, as amended, require this permit modification to become effective on the date specified in the permit modification.

Also enclosed is information relative to hearing requests and stays of RIPDES Permits.

We appreciate your cooperation throughout the development of this permit modification. Should you have any questions concerning this permit modification, feel free to me at 401-277-6519.

Sincerely,

Angelo S. Liberti

Angelo S. Liberti
Interim Associate Supervising Sanitary Engineer
Division of Water Resources
Department of Environmental Management

ASL:iam
Enclosure

cc: EPA Permits Branch, Region I
George Seavey, CRMC
James Mason, Raytheon Company

rwreis.iam

MODIFICATION

AUTHORIZATION TO DISCHARGE UNDER THE
RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 46-12 of the Rhode Island General Laws, as amended,

The Raytheon Company Permit No. RI0000281 is modified as follows:

1. For outfall 001, the final effluent limitation for copper, as specified on page 3 of 14 of the permit, shall be 436 ug/l for both the monthly average and the daily maximum.

2. For outfall 001, the final effluent limitations for silver, as specified on page 3 of 14 of the permit, shall be 10 ug/l for the monthly average and 20 ug/l for the daily maximum.

3. Outfall 100 and the associated effluent limitations and monitoring requirements shall be terminated.

4. For outfall 001, the BOD_5 effluent limitation and monitoring regiment shall be terminated.

5. For outfall 001, CBOD shall be sampled for two times per month as a 24 hr composite and have a monthly average limitation of 25 mg/l and a daily maximum of 45 mg/l.

The remaining effluent limitations, monitoring requirements and other conditions in the original permit are unchanged and in effect.

This modification shall become effective on the date of signature.

This permit and the authorization to discharge expire at midnight, April 30, 1995.

This change modifies the permit issued on March 30, 1990.

This modification consists of one (1) page.

Signed this 20th day of February, 1992.

Alicia M. Good

Alicia M. Good, P.E., Chief
Division of Water Resources
Rhode Island Department of Environmental Management
Providence, Rhode Island

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF WATER RESOURCES
291 PROMENADE STREET
PROVIDENCE, RHODE ISLAND 02908

STATEMENT OF BASIS

RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE

RIPDES PERMIT NO. RI0000281

NAME AND ADDRESS OF APPLICANT:

Raytheon Company
Submarine Signal Division
1847 West Main Road
Portsmouth, RI 02871

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Raytheon Company
Submarine Signal Division
1847 West Main Road
Portsmouth, RI 02871

RECEIVING WATER: Narragansett Bay - East Passage

CLASSIFICATION: SC

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has applied to the Rhode Island Department of Environmental Management for modification of its RIPDES Permit to discharge into the designated receiving water.

II. Limitations and Conditions

The effluent limitations of the draft permit modification, the monitoring requirements, and any implementation schedule (if required) may be found in the permit following attachments:

Draft Modification

III. Permit Modification Basis and Explanation of Effluent Limitation Derivation

The permit issued on March 30, 1990 required Raytheon to develop a Compliance Plan. In that Plan, Raytheon questioned development and establishment of the final permit limits. Review of the final permit limits for copper, silver and cyanide has revealed that they were not established in accordance with Section IV, Appendix B, of the RI Water Quality Regulations for Water Pollution Control. Raytheon's Compliance Plan consisted of meeting cyanide by elimination of outfall 100. Attainment of the copper limit would be possible upon revising the limit based on new information. Attainment with the silver limit was based upon installation of a silver recovery and ion exchange unit and modification of the final limitation. Water quality-based effluent limitations which reflect the water quality standards and allowable pollutant loadings to the Bay were established in this permit modification. Limitations were based on dilution of the plume as it rises until it reaches the surface. Consistent with Division policy, the dilution which occurs as the plume rises to the surface is used to calculate the allowable limits. This dilution area is extremely small and is limited to the area occupied by the plume itself. Therefore, the pollutant concentrations in the area outside of the plume (in the SC zone) are well within the acceptable criteria levels. Calculation of the maximum allowable discharge concentration is based on the following mass balance:

(Parts receiving water x Receiving Water conc.) + (Parts Raytheon effluent x Raytheon conc.) =

(Parts receiving water + Parts Raytheon effluent) x criteria x 0.9 (or 0.80)

Where,
Raytheon's dilution factor = 120:1, where there are 119 parts receiving water and 1 part Raytheon effluent.

To be consistent with Division policy, the allowable discharge concentrations were calculated based on allocating 90% of the criteria for metals where instream data is available. Instream, or background, data for silver and copper were available from the Narragansett Bay Project's 1985 and 1986 SINBADD cruises. Average background concentrations used for silver and copper were 0.004 ug/l and 0.874 ug/l, respectively. Instream, or background, data were not available for cyanide. To be consistent with Division policy, the allowable discharge concentrations were calculated based on allocating 80% of the criteria for metals where instream data is unavailable. Table 1 shows the criteria used and permit limits derived. The original final permit limits for copper, silver, and cyanide were not established in accordance with Section IV, Appendix B, of the Rhode Island Water Quality Regulations for Water Pollution Control. Section IV states that if the criteria is below the method detection limit (MDL), the MDL is set as the criteria and used in the calculation of the permit limit.

For the acute silver limits a comparison was made with the value of the chronic limit multiplied by 2 (Table 2). This is to account for sampling 2 times a month and to alleviate the possibility of incurring a daily maximum concentration which is within the acute permit limit but which would cause a violation of the monthly average (chronic) limit. A comparison was made between these two sets of acute limits. The more stringent of the two, 20 ug/l, was established as the final acute limit.

Section 402 (o)(2)(B)ii of the Clean Water Act (CWA) allows these limits to be changed (increased) from the previous waste load allocation-based limits,

without violating anti-backsliding regulations. For water quality-based effluent limitations, correct use of the anti-backsliding regulations requires an assessment of the attainment of the water quality standards in the receiving waterbody, in accordance with Section 303 (d)(4) of the CWA. Instream, or background, data for copper and silver indicate that the water quality standards for these parameters are being attained. Instream, or background, concentrations of cyanide were assumed to be zero and, therefore, it was assumed that the water quality standard for cyanide was also being attained. For waters identified as attaining the water quality standard, the permit limits may be revised only if such revision is subject to and consistent with the antidegradation policy. The State's Antidegradation Policy only applies to High Quality Waters (HQW) which would include the SB area outside of Raytheon's SC or discharge zone. An exercise to demonstrate that the SB zone would not be impacted by an increase in Raytheon's permit limits for copper, silver and cyanide was conducted.

To demonstrate the impact on the surrounding SB zone, the changes in concentrations at the edge of the SC zone (concentration with discharge vs. concentration without discharge) were determined using the following assumptions:

- SC volume = SC area x low tide depth = 4288 MG
- Raytheon design flow = 0.077 MGD
- Complete mixing occurs between the low tide volume and a day's worth of effluent flow
- SC background conc: Cu = 0.874 ug/l, Ag = 0.004 ug/l, CN = 0 ug/l
- Effluent chronic conc: Cu = 436 ug/l, Ag= 10 ug/l, CN = 960 ug/l

The following equation was used to solve for the concentration of each parameter in the SC zone after mixing:

(Effluent conc) (Effluent Q) + (SC background conc) (SC volume) = (SC volume + Effluent Q) (SC conc. after mixing)

The percent of the remaining assimilative capacity of the receiving water that this SC concentration after mixing represents, was then calculated (Table 3). According to the RIDEM Policy on the Implementation of the Antigradation Provisions of the Rhode Island Water Quality Regulations, any activity which is projected to increase the level of a parameter by greater than 20% of the remaining accumulative capacity, must go through the demonstration of important economic or social benefit. For these 3 parameters, less than 1% of the remaining assimilative capacity is used due to the increased discharge from Raytheon. It is apparent that the increase of Raytheon's permit limits for copper, silver and cyanide will have a minimal effect on the receiving water and is in compliance with anti-backsliding and antidegradation regulations.

While the calculations indicate that the original cyanide permit limits could be increased, the Department has decided to retain the 80 ug/l monthly average and daily maximum limits. Discussions with Raytheon, evaluation of past data and Raytheon's Compliance Plan indicate that this lower limit should be attainable (data collected between 11/90 - 11/91 has ranged from 6-30 ug/l). Table 4 shows the final permit limits as established by this permit modification.

Outfall 100 (Metal Treatment Rinse -- Chromating) was permanently discontinued by Raytheon, therefore, the associated effluent limitations and monitoring requirements were terminated by this permit modification.

Since the nitrogenous oxygen demand exerted by the nitrification process can result in an inaccuracy of the BOD test, EPA promulgated regulations (40 CFR 133.102 (a)(4)) to allow the carbonaceous biochemical oxygen demand test (CBOD) to be used, instead of the BOD test, for secondary treatment plants with a nitrification problem. Therefore, RIDEM has approved Raytheon's request to base their effluent limits on CBOD. As authorized under 40 CFR 133.102 (a)(4), the CBOD limit was established in this permit modification as a 25 mg/l monthly average. The Regulations also establish a weekly average of 40 mg/l. Since Raytheon's permit has a daily maximum rather than a weekly average, the daily maximum limit (50 mg/l) was decreased by 5 mg/l, consistent with the reduction in the monthly average, to 45 mg/l.

IV. DEM Contact

Additional information concerning the permit may be obtained between the hours of 8:30 a.m. and 4:00 p.m., Monday through Friday, excluding holidays, from:

Angelo S. Liberti
Permits Section
Division of Water Resources
Department of Environmental Management
291 Promenade Street
Providence, Rhode Island 02908
Telephone: (401) 277-6519

1/13/92
Date

Angelo S. Liberti
Interim Supervising Sanitary Engineer
Permits and Planning Section
Division of Water Resources
Department of Environmental Management

rmraytheon.iam

Table 1

Calculation of Effluent Limitations for Raytheon Company

Parameter	Monthly Average (ug/l) (chronic)		Daily Maximum (ug/l) (acute)	
	Criteria	Limit	Criteria	Limit
Copper	5*	436	5*	436
Silver	0.1*	10	2.3	248
Cyanide	10*	960	10*	960

* Denotes that the criteria was changed to the RIDOH Lab method detection limit.

Table 2

Determination of Daily Maximum Limits

Parameter	Daily Maximum (ug/l)	
	acute limit	chronic limit x 2
Silver	248	20

Table 3

Instream Effects Due To Increase in Permit Limits

Parameter	Instream conc. ug/l	SC zone conc. after mixing with effluent ug/l	Instream criteria ug/l	Remaining Assimilative Capacity* ug/l	Increase in SC zone conc due to dischg ug/l	% of Remaining Assimilative Capacity used
Copper	0.874	0.882	5	4.126	0.008	0.19%
Silver	0.004	0.0042	0.1	0.096	0.0002	0.21%
Cyanide	0.0	0.017	10	10	0.017	0.17%

* Remaining Assimilative Capacity = Instream Criteria - Instream Conc.

Table 4

Final Permit Limits

Parameters	Monthly Average (ug/l)	Daily Maximum (ug/l)
Copper	436	436
Silver	10	20
Cyanide	80	80

AUTHORIZATION TO DISCHARGE UNDER THE
RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 46-12 of the Rhode Island General Laws, as amended,

RAYTHEON COMPANY
SUBMARINE SIGNAL DIVISION

is authorized to discharge from a facility located at

1847 West Main Road
Portsmouth, Rhode Island 02871

to receiving waters named

Narragansett Bay - East Passage

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

This permit shall become effective 30 days from date of signature.

This permit and the authorization to discharge expire at midnight, 5 years from the date of signature.

This permit supersedes the permit issued on July 22, 1985.

This permit consists of 14 pages in Part I including effluent limitations, monitoring requirements, etc. and 13 pages in Part II including General Conditions.

Signed this 30 day of March, 1990

Edward S. Szymanski

Edward S. Szymanski, P.E., Chief
Division of Water Resources
Rhode Island Department of Environmental Management
Providence, Rhode Island

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning effective date and lasting through expiration, the permittee is authorized to discharge from outfall serial number 001. (Secondary Treatment Plant Effluent)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations						Monitoring Requirement	
	Quantity - lbs. only			Concentration - specify units				
	Average Monthly	Average Weekly	Maximum Daily	Average Monthly	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Flow				77,000 GPD			continuous	recorder
BOD_5				30 mg/l		50 mg/l	2/month	24 hr comp.
TSS				30 mg/l		50 mg/l	2/month	24 hr comp.
Settleable Solids				--- ml/l	0.1 ml/l	0.3 ml/l	2/day	grab
Fecal Coliform				200 MPN 100 ml	400 MPN 100 ml	400 MPN 100 ml	2/month	grab
Chlorine Residual				0.6 mg/l		1.0 mg/l	2/day	grab

--- signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Testing for TSS and BOD shall be performed and reported on influent and effluent with appropriate allowances for hydraulic detention time (flow-through time). The percent removal for TSS and BOD shall be reported based on monthly average values.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: outfall 001

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. During the period beginning effective date and lasting through expiration, the permittee is authorized to discharge from outfall serial number 001. (Secondary Treatment Plant Effluent)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations						Monitoring Requirement	
	Quantity - lbs. only			Concentration - specify units				
	Average Monthly	Average Weekly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily (Maximum)	Measurement Frequency	Sample Type
Copper, Total				<10 ug/l		<10 ug/l	2/month	24 hr comp.
Silver, Total				4 ug/l		8 ug/l	2/month	24 hr comp.
Cyanide, Total				80 ug/l		80 ug/l	2/month	Grab[1]
Nitrite, Total (as N)						--- mg/l	1/month	24 hr comp.
Nitrate, Total (as N)						--- mg/l	1/month	24 hr comp.
Ammonia, Total (as N)						--- mg/l	1/month	24 hr comp.
Phosphorus, Total (as P)						--- mg/l	1/month	24 hr comp.
pH					(See Part I.A.6.a.)		2/day	grab

[1] Three grab samples to be taken during the course of the working day, separated by at least 2 hours. All three (3) samples shall be composited, then analyzed.

--- signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

*Values in parentheses ( ) are to be reported as Minimum/Average/Maximum for the reporting period rather than Average Monthly/Average Weekly/Maximum Daily.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: outfall 001

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

3. During the period beginning effective date and lasting through expiration date, the permittee is authorized to discharge from outfall serial number(s) 002. (Noncontact cooling water)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations						Monitoring Requirement	
	Quantity - lbs. only			Concentration - specify units				
	Average Monthly	Average Weekly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
Flow						20,000 GPD	1/month	estimate
Temperature						83°F	1/month	8 grabs
pH				(See part I.A.6.a.)			1/month	8 grabs

Values in parentheses () are to be reported as Minimum/Average/Maximum for the reporting period rather than Average Monthly/Average Weekly/Maximum Daily.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: Outfall 002

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

4. During the period beginning effective date and lasting through expiration, the permittee is authorized to discharge from outfall serial number 100. (Metal Treatment Rinse-Chromating)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations						Monitoring Requirement	
	Quantity - lbs. only			Concentration - specify units				
	Average Monthly	Average Weekly	Maximum Daily	Average Monthly	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Flow				350 GPD			1/quarter	estimate
Cadimum, Total				260 ug/l		260 ug/l	1/quarter	24 hr comp.
Chromium, Total				1710 ug/l		1710 ug/l	1/quarter	24 hr comp.
Copper, Total				2070 ug/l		2070 ug/l	1/quarter	24 hr comp.
Lead, Total				430 ug/l		430 ug/l	1/quarter	24 hr comp.
Nickel, Total				2380 ug/l		2380 ug/l	1/quarter	24 hr comp.
Silver, Total				240 ug/l		240 ug/l	1/quarter	24 hr comp.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: outfall 100 (Metal Treatment Rinse - Chromating - prior to dilution with any other wastestream).

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

5. During the period beginning effective date and lasting through expiration, the permittee is authorized to discharge from outfall serial number 100. (Metal Treatment Rinse-Chromating)

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations						Monitoring Requirement	
	Quantity - lbs. only			Concentration - specify units				
	Average Monthly	Average Weekly	Maximum Daily	Average Monthly *(Minimum)	Average Weekly *(Average)	Maximum Daily *(Maximum)	Measurement Frequency	Sample Type
Zinc, Total				1480 ug/l		1480 ug/l	1/quarter	24 hr comp.
Cyanide, Total				650 ug/l		650 ug/l	1/quarter	Grab
Total Toxic Organics				--- mg/l		2.13 mg/l	1/quarter	Grab
Oil & Grease				26 mg/l		26 mg/l	1/quarter	Grab
TSS				31 mg/l		31 mg/l	1/quarter	24 hr comp.
pH				(6.0 S.U.)		(9.0 S.U.)	1/week	Grab

--- signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

*Values in parentheses ( ) are to be reported as Minimum/Average/Maximum for the reporting period rather than Average Monthly/Average Weekly/Maximum Daily.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: outfall 100 (Metal Treatment Rinse - Chromating - prior to dilution with any other wastestream).

6. a. The pH of the effluent shall not be less than 6.0 nor greater than 8.5 standard units at any time, unless these values are exceeded due to natural causes or as a result of the approved treatment processes.

   b. The discharge shall not cause visible discoloration of the receiving waters.

   c. The effluent shall contain neither a visible oil sheen, foam, nor floating solids at any time.

   d. When the effluent discharged for a period of 90 consecutive days exceeds 80 percent of the designed flow, the permittee shall submit to the permitting authorities a projection of loadings up to the time when the design capacity of the treatment facility will be reached, and a program for maintaining satisfactory treatment levels consistent with approved water quality management plans.

7. All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director as soon as they know or have reason to believe:

   a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

      (1) One hundred micrograms per liter (100 ug/l);

      (2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitro-phenol; and one milligram per liter (1 mg/l) for antimony;

      (3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R. s122.21(g)(7); or

      (4) Any other notification level established by the Director in accordance with 40 C.F.R. s122.44(f) and Rhode Island Regulations.

   b. That any activity has occurred or will occur which would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 ug/l);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 C.F.R. s122.21(g)(7); or

(4) Any other notification level established by the Director in accordance with 40 C.F.R. s122.44(f) and Rhode Island Regulations.

c. That they have begun or expect to begin to use or manufacture as an intermediate or final product or by-product any toxic pollutant which was not reported in the permit application.

8. The permittee may waive the requirement for total toxic organics (TTO) sampling provided the requirements of 40 CFR Part 433.12 (a) and 433.12 (b), are fulfilled.

9. As specified in 40 CFR Part 433. 12 (c), the self-monitoring for cyanide required on outfall 100 shall be conducted after cyanide treatment (where applicable) and before dilution with any other wastestream.

10. a. The permittee shall analyze its effluent semi-annually for the EPA Priority Pollutants as listed in 40 CFR 122, Appendix D, Tables II and III. The results of these analyses shall be submitted to the Department of Environmental Management. The State user fee samples may be utilized. All sampling and analysis shall be done in accordance with EPA Regulations, including 40 CFR, Part 136; grab and composite samples shall be taken as appropriate.

b. The permittee shall perform bioassays on the effluent. The procedures are described in Part I, Section C of this permit.

B. DETECTION LIMITS

The permittee shall attain minimum detection limits (MDL) of at least the following:

Parameter	MDL (ug/l)
Cadmium, Total	0.5
Chromium, Total	3.0
Copper, Total	10.0
Lead, Total	3.0
Nickel, Total	20.0
Silver, Total	1.0
Zinc, Total	20.0
Tetrachloroethylene	1.0
Trichloroethylene	1.0
1,1,1, - Trichloroethane	1.0
Cyanide	10.0
Antimony	5.0
Arsenic	5.0
Beryllium	1.0
Selenium	5.0
Thallium	5.0
Acrylonitrile	5.0
Chloroform	1.0
Methylene Chloride	1.0
Xylene	2.0
1,2-dichlorobenzene	1.0
1,2,4-trichlorobenzene	1.0
trans-1,2-dichloroethylene	1.0
bis(2-ethyl hexyl)phthalate	1.0
Di-n-butyl-phthlate	1.0
Phenol	50.0

Reference: Current Detection Limits of the Rhode Island Department of Health Laboratories.

C. BIOMONITORING REQUIREMENTS AND INTERPRETATION OF RESULTS

1. The permittee shall conduct or arrange to have conducted on an annual basis, four sets of bioassays on the permitted wastewater (Outfall 001) according to the protocol given below. One set of bioassays will be conducted during each quarter of the calendar year (January to December). The first, second, and fourth quarterly sets of bioassays will be defined as acute range finding toxicity tests according to the protocol below. The third quarter set shall include an acute definitive bioassay test conducted during dry weather periods (no rain within 48 hours) according to the EPA protocol below. In addition, a priority pollutant scan shall be conducted on the final effluent during the third quarter. Test results will be interpreted by the State. The State may require additional screening, range finding, or definitive bioassays as deemed necessary based on the results of the initial bioassays required herein.

GENERAL

A "set" of bioassays for permittees with chlorinated effluents is defined as a representative 24-hour composite effluent sample collected prior to chlorination.

For chlorinated effluents, the first, second, and fourth quarter toxicity tests will include an acute range finding test to be performed on the pre-chlorinated sample. For chlorinated effluents, the third quarter toxicity tests will include an acute definitive toxicity test to be performed on the pre-chlorinated sample. The protocol for each test is defined herein.

The protocol and methods for interpreting test results given in Sections 2 and 3 below reflect requirements and procedures established in the State's Water Quality Regulations for Water Pollution Control (1988), Appendix C.

2. Bioassay Protocol

A. General

a. Facilities which discharge into sea waters perform the test on mysids (Mysidopsis sp.) age 1-5 days, and Atlantic Silverside (Menidia sp.) age less than 30 days, or other species as required by the Director.

b. The test may be static unless loss of dissolved oxygen due to high BOD or loss of potentially toxic volatile pollutants warrants use of a replacement or flow-through test procedure.

c. Dilutions of wastewater required in conducting bioassays will be made using waters from the end of the dock at the University of Rhode Island's Narragansett Bay Campus on South Ferry Road or a dilution water approved by the Director. It is noted that the University claims no responsibility for personal safety on this dock. The permittee shall observe rules posted at the dock.

d. The report of test results shall include a No Observed Acute Effect Level (NOAEL) which is defined as the highest concentration of the effluent (in percent effluent) in which 90% or more of the test animals survive, and a LC_{50} which is statistically determined as the concentration of effluent (in percent effluent) which is lethal to 50% of the test organisms. The report shall identify the statistical technique(s) used to calculate the LC_{50} and the 95% confidence limits for the LC_{50}. The raw bench data shall be submitted with the report.

e. A representative 24-hour composite effluent sample (equal aliquots collected hourly) shall be collected prior to chlorination. This sample should be kept cool and testing should begin within 24 hours after the last sample of the composite is collected. The average total residual chlorine (TRC) recorded in the final effluent during the same 24-hour sampling period as the pre-chlorinated composite, shall be submitted in the report to RIDEM.

f. The 24 hour composite shall be analyzed for ammonia and the results submitted in the report to RIDEM. If applicable, this ammonia analysis may be submitted on the Discharge Monitoring Report to fulfill the permit ammonia monitoring requirement for that month.

g. Time and date of sampling, receipt of sample at the testing laboratory and initiation of testing shall be submitted in the report to RIDEM.

h. Acute bioassay tests shall be conducted in accordance with protocols listed in the latest edition of Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms (EPA-600/4-85-013), incorporating any deviations from protocol listed herein, or additional methods if approved by the Director.

B. Acute Definitive Tests

a. Dischargers or their consultants shall test a representative 24 hour composite sample of the pre-chlorinated effluent for acute toxicity during the third quarter.

b. The duration of the test shall be 48 hours for daphnia and 96 hours for all other species.

c. A 24 hour composite of the final effluent shall be sampled simultaneously with the 24 hour pre-chlorinated effluent mentioned above. The 24 hour composite of the final effluent shall be analyzed for priority pollutants (as listed in Table II and III of Appendix D of 40 CFR 122). The bioassay priority pollutant scan may be coordinated with the User Fee Program and/or other permit conditions to fulfill any priority pollutant scan requirements. In addition, the Department shall require chemical analysis of the dilution water if it is suspected to contain significant levels of pollutants.

C. Acute Range Finding Tests

a. Dischargers or their consultants shall test a representative 24 hour composite sample of their effluent for acute toxicity.

b. The duration of the test shall be 48 hours for all species tested.

c. Acute Range Finding Toxicity Tests will be limited to ten organisms per 6 effluent concentrations and dilution water as a control. The six effluent concentrations will consist of 100, 75, 50, 25, 10, 1% dilutions.

3. Interpretation of Bioassay Results

The purpose of bioassay protocol in the RIPDES program is to obtain additional data to be used as a monitoring tool in the continued evaluation of the toxic effects of permitted discharges. The bioassay test results will be evaluated for potential toxicity using the EPA proposed criteria. Indications of toxicity could result in requiring additional monitoring including conducting a Toxicity Reduction Evaluation (TRE) to identify the specific toxic parameter(s) which needs to be limited in the effluent.

The State's evaluation of the significance of the bioassay results shall include:

a. the frequency and consistency of test results;

b. the test protocol including:

   a. number of species tested
   b. survivability of the control group
   c. test method (static, replacement, flow-through)
   d. quality assurance and quality control used by the laboratory

c. representativeness of the effluent sample used in the bioassay; complexity and variability of the effluent;

d. similarity of dilution water used in the test to the anticipated composition of the receiving water under worst case conditions;

e. relative certainty of the R.I. DEM Ambient Water Quality Guideline.

4. Reporting of Bioassay Testing

Bioassay Testing shall be reported as follows:

Quarter Testing to be Performed	Report Due No Later Than
January 1 - March 31	May 15
April 1 - June 30	August 15
July 1 - September 30	November 15
October 1 - December 31	February 15

Bioassay testing following the protocol described herein shall commence during the second quarter (April 1 - June 30) of 1990, and the first report shall be submitted to RIDEM no later than August 15, 1990.

Signed copies of these, and all other reports required herein, shall be submitted to:

Edward S. Szymanski, P.E.
Chief, Division of Water Resources
Rhode Island Department of Environmental Management
291 Promenade Street
Providence, Rhode Island 02908-5767

D. MONITORING AND REPORTING

1. Reporting

Monitoring results obtained during the previous month shall be summarized and reported on Discharge Monitoring Report Form(s) postmarked no later than the 15th day of the month following the completed reporting period. The first report is due on June 15, 1990.

Signed copies of these, and all other reports required herein, shall be submitted to:

Chief, Division of Water Resources
Rhode Island Department of Environmental Management
291 Promenade Street
Providence, Rhode Island 02908

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
DIVISION OF WATER RESOURCES
291 PROMENADE STREET
PROVIDENCE, RHODE ISLAND 02908

FACT SHEET

DRAFT RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE

RIPDES PERMIT NO. RI0000281

NAME AND ADDRESS OF APPLICANT:

Raytheon Company
Submarine Signal Division
1847 West Main Road
Portsmouth, R.I. 02871

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Same as above

RECEIVING WATER: Narragansett Bay - East Passage

CLASSIFICATION: SC

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has applied to the Rhode Island Department of Environmental Management for reissuance of its RIPDES Permit to discharge into the designated receiving water.

II. Description of Discharge
A quantitative description of the discharge in terms of significant effluent parameters based on DMR monitoring data is shown on Attachement A.

III. Limitations and Conditions

The effluent limitations of the permit, the monitoring requirements, and any implementation schedule (if required) may be found on the following attachments: Draft Permit, Compliance Order.

IV. Permit Basis and Explanation of Effluent Limitation Derivation

The Raytheon Company, Submarine Signal Division, is engaged in the design, manufacture and testing of electronic equipment, primarily for sonar applications. Wastewater generated in the plant is mainly sanitary sewage. Operations contributing process waste are photographic processing, and metal finishing (Outfall 100). Process wastewater (Outfall 100, and photo processing) and sanitary wastes generated in the plant are treated by an activated sludge secondary treatment facility. Wastewater from the degreasing operation (deionized water rinse) is properly disposed of off site, and is no longer discharged. Although the photo processing lab waste stream is not covered by the effluent guidelines and standards listed in 40 CFR Part 459.10 (the quantity of material processed is too low), it is pretreated for the recovery of silver prior to discharge to the WWTF.

This permit incorporates Raytheon Company's request to upgrade the capacity of the existing secondary wastewater treatment facility. Effluent limits have been established for the metal treatment rinse (Chromating), (which are discharged into the secondary treatment plant), and the secondary treatment plant effluent, based on RI Water Quality Regulations for Pollution Control, RI Regulations for the RI Pollution Discharge Elimination System, Federal Regulations for the metal finishing point source category (40 CFR, Part 433), information supplied by the applicant and Best Professional Judgement. Permit limits were not established, nor is monitoring required for Chromium or Zinc since the highest sampling results were several times lower than the water quality based limits would allow. In addition, limitations for the metal treatment rinse effluent are at least as stringent as the applicable limits contained in 40 CFR Part 433.12 and 433.14.

This permit also requires that the permittee implement a new bioassay protocol and nutrient testing. The purpose of the new bioassay protocol is to obtain additional data to be used as a monitoring tool in the continued evaluation of the toxic effects of permitted dischargers. Briefly, the new protocol requires four bioassay sets to be conducted per year; one per quarter of the calendar year. An acute range finding toxicity protocol has been developed as a cost effective measure to provide the much needed data at a minimal cost. The acute range finding tests are to be performed during the first, second, and fourth quarters of the calendar

year. Definitive bioassay tests, which also require chemical analyses, are to be performed during the third quarter. For chlorinated effluents, the third quarter toxicity tests will include an acute definitive toxicity test to be performed on the pre-chlorination sample.

The requirement of testing for nutrients; phosphorus, nitrate, nitrite and ammonia, is necessary to make a determination on nutrient loading in the receiving water. This information will aid the Department in decision making on the necessity of nutrient removals from the treatment plant wastewater. All nutrient monitoring results shall be reported monthly on the Discharge Monitoring Report.

V. Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the Rhode Island Department of Environmental Management, Division of Water Resources, 291 Promenade Street, Providence, Rhode Island, 02908-5767. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to the Rhode Island Department of Environmental Management. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Director finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit the Director will respond to all significant comments and make these responses available to the public at DEM's Providence Office.

Following the close of the comment period, and after a public hearing, if such hearing is held, the Director will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the final permit decision any interested person may submit a request for a formal hearing to reconsider or contest the final deci- sion. Requests for formal hearings must satisfy the requirements of Rule 49 of the Regulations for the Rhode Island Pollutant Discharge Elimination System (16 July 1984).

VI. DEM Contact

Additional information concerning the permit modification may be obtained between the hours of 8:30 a.m. and 4:00 p.m., Monday through Friday, excluding holidays, from:

Angelo Liberti
Permits Section
Division of Water Resources
Department of Environmental Management
291 Promenade Street
Providence, Rhode Island 02908
Telephone: (401) 277-6519

February 23, 1990
Date

Carlene B. Newman
Carlene B. Newman
Senior Sanitary Engineer
Permits & Planning Section
Division of Water Resources
Department of Environmental Management

ATTACHMENT A

DESCRIPTION OF DISCHARGE: Secondary Treatment Plant Effluent

DISCHARGE: Outfall 001

AVERAGE EFFLUENT CHARACTERISTICS AT POINT OF DISCHARGE:

PARAMETER	AVERAGE	MAXIMUM
Flow	32,000 GPD	39,000 GPD
Fecal Coliform	18 fc/100 ml	400 fc/100 ml
BOD_5	16.3 mg/l	35 mg/l
TSS	15.5 mg/l	30 mg/l
Copper[2]	30 ug/l	60 ug/l
Silver[1]	<10 ug/l	25 ug/l
Cyanide[1]	<20 ug/l	<20 ugl
Chromium[1]	<50 ug/l	80 ug/l
Zinc[1]	150 ug/l	250 ug/l
Cadmium[2]	3 ug/l	5 ug/l
Lead[2]	39 ug/l	50 ug/l
Nickel[2]	17 ug/l	20 ug/l

[1]DMR data 1985 - 1986.
[2]Sherlock sampling for priority pollutants; 1985 - 1986.

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

RE: RIPDES Permit No. RI0000281 Order No. RI-046

COMPLIANCE ORDER

In the above entitled matter wherein Raytheon Company has filed an application for a Rhode Island Pollutant Discharge Elimination System Permit (RIPDES) (Permit No. RI0000281) to allow their wastewater treatment facility to discharge effluents into the Narraganset Bay and in accordance with Chapters 46-12 and 42-17.1 of the Rhode Island General Laws and the rules and regulations promulgated thereunder, the Department of Environmental Management issues the following order:

1) Raytheon Company shall achieve compliance with the effluent limitations and or conditions in accordance with Attachment "A" which is attached hereto and incorporated herein.

2) Raytheon Company shall comply with the interim effluent limitations and monitoring requirements as specified in Attachement "B" which is attached hereto and incorporated herein.

3) This order shall supplement the terms and conditions contained in RIPDES Permit No. RI0000281.

4) This order may be modified or revoked in accordance with the provisions of Section 46-12-12 of the Rhode Island General Laws, as amended.

ENTERED as an order of the Department of Environmental Management this 30 day of March, 1990.

BY: Edward S. Szymanski
Edward S. Szymanski, P.E., Chief
Division of Water Resources
Department of Environmental Management

B. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations and/or conditions specified for discharges in accordance with the following schedule:

a. Within four (4) months from the effective date of the permit, install chlorine dosing equipment which will allow the effluent to meet the total residual chlorine limit listed on page 2 of the permit. In order to allow an adequate period of time for equipment calibration interim total residual chlorine limits are established as follows:

	Average Monthly	Maximum Daily
Effective Date - 4 months after the effective date	---ug/l	---ug/l
4 months - 6 months after the effective date	---ug/l	2.0 ug/l

---signifies that data must be reported; no limit has been established.

Grab samples for total residual chlorine must be taken twice a day.

Within one (1) year from the effective date of the permit, submit a compliance plan to the Division of Water Resources, Permits Section. This plan shall address how the Raytheon Company will come into compliance with the final limits for; Cyanide, Copper and Silver (Outfall 001).

b. Upon DEM approval of the compliance plan, Raytheon Company shall implement the plan in accordance with the approved schedules developed in the compliance plan. The implementation period shall be limited as outlined in the approved compliance plan, and shall include:

i. monthly progress reports to DEM which shall accompany the discharge monitoring reports (DMR) and be due at the same time as the DMR.

ii. submittal of any and all data generated during and as a result of implementation of the plan.

c. DEM shall certify that Raytheon Company has completed implementation of the compliance plan. At that time a decision will be made as to whether construction will be necessary to attain compliance with the permit limits. If construction is necessary, DEM will enter into a consent agreement with the Raytheon Company to address construction schedules. If construction is not necessary, within three (3) months from DEM's certification that the plan was implemented, the Raytheon Company must meet the final limits found on page 3 of the permit or any modification, or any modification to those limits that may have occurred.

d. From the effective date of the permit until 1. c above occurs, meet the effluent limits for Cyanide, Copper, Silver, and Fecal Coliforms, as found on Attachment B of this order in place of the final limits for these parameters found on page 3 of the permit.

2. No later than 14 calendar days following a date identified in any schedule of compliance, the permittee shall submit to the Director, either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period as specified in Attachment A, the permittee is authorized to discharge from outfall serial number 001 (Secondary Treatment Plant Effluent).

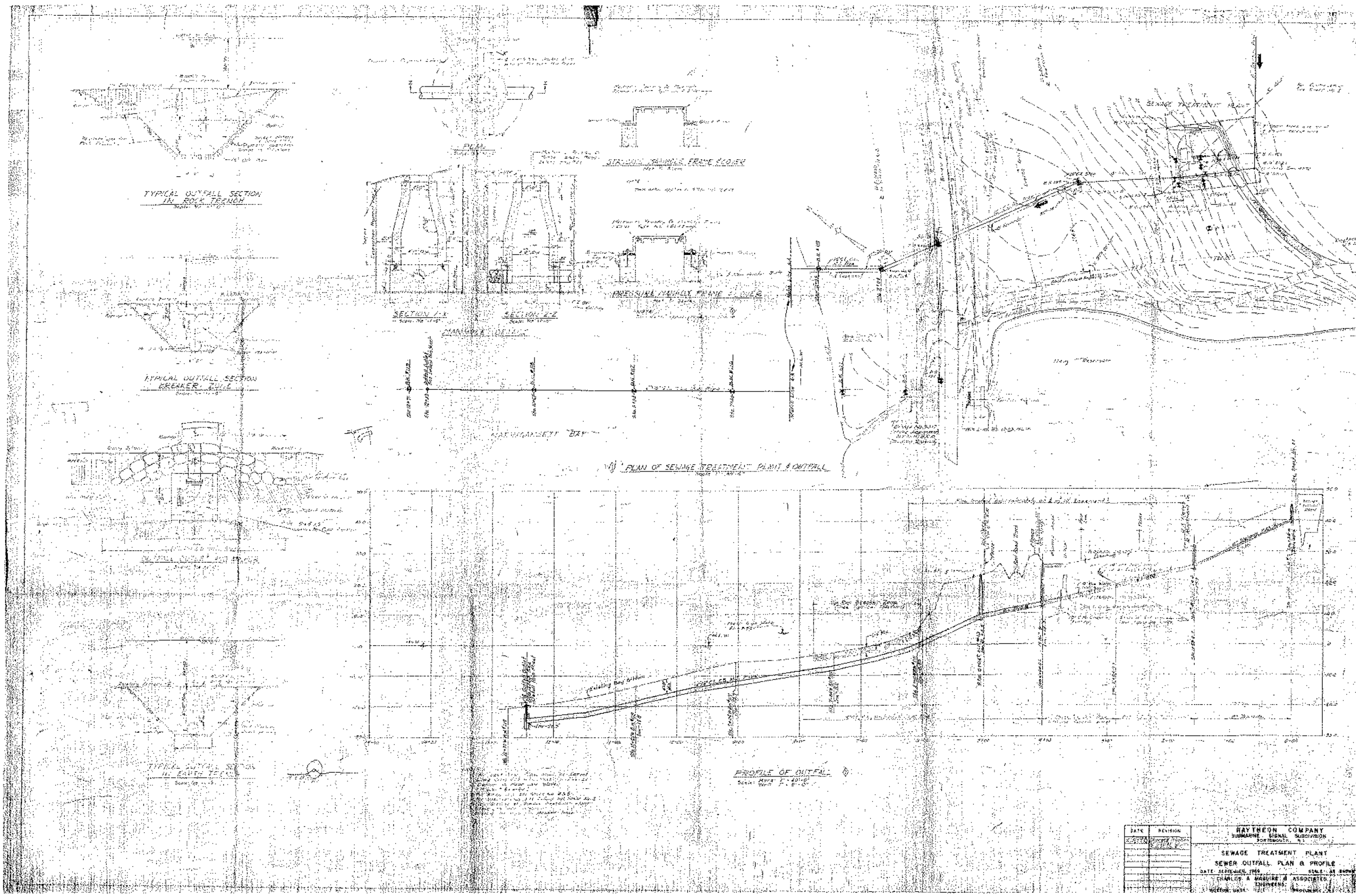
Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations						Monitoring Requirement	
	Quantity - lbs. only			Concentration - specify units				
	Average Monthly	Average Weekly	Maximum Daily	Average Monthly	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Cyanide				80 ug/l		120 ug/l	2/month	grab[1]
Copper, Total				100 ug/l		200 ug/l	2/month	24 hr comp.
Silver, Total				30 ug/l		60 ug/l	2/month	24 hr comp.
Fecal Coliforms (IN EFFECT THRU 10/90 - SEE 2/18/91 LTR.)				200 MPN 100 ml		400 MPN 100 ml	2/week Changed to once a week see letter to James Mason dated 4/24/90	grab

[1]Three (3) grab samples to be taken during the course of the working day, separated by at least 2 hours. All three (3) samples shall be composited, then analyzed.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: outfall 001

APPENDIX B RAYTHEON OUTFALL PIPE



TYPICAL OUTFALL SECTION IN ROCK TRENCH
TYPICAL OUTFALL SECTION BREAKER ZONE
PLAN
SECTION 1-1
SECTION 2-2
MANHOLE DETAILS
STANDARD MANHOLE FRAME & COVER
PRESSURE MANHOLE FRAME & COVER
NARRAGANSETT "BAY"
PLAN OF SEWAGE TREATMENT PLANT & OUTFALL
SEWAGE TREATMENT PLANT
PROFILE OF OUTFALL
TYPICAL OUTFALL SECTION IN EARTH TRENCH
DATE
REVISION
RAYTHEON COMPANY
SUBMARINE SIGNAL SUBDIVISION
SEWAGE TREATMENT PLANT
SEWER OUTFALL PLAN & PROFILE
SCALE: AS SHOWN
CHARLES A. MAGUIRE & ASSOCIATES
ENGINEERS

APPENDIX C RIDEM MEETING NOTES

Northeast Engineers
& Consultants, Inc.
"A Knowledge Corporation"®

MEMO

To: Paul A. Sylvia

From: Robyn M. Underwood

CC: 08004.0 Project Folder

Date: April 14, 2008

Re: Summary of Rhode Island Department of Environmental Management

---

Meeting Attendees:

- Jon W. Hume, PE, Maguire Group, jhume@maguiregroup.com
- Joseph B. Haberek, PE, RIDEM josepf.haberek@dem.ri.gov
- Arthur G. Zeman, PE, RIDEM, art.zeman@dem.ri.gov
- Robyn M. Underwood, PE, Northeast Engineers, underwood@northeastengineers.com

Summary:

- The pipe capacity wasn't known but NE&C received the pipe design drawing and can figure out the capacity based off of the drawing.
- The pipe location can be seen on the drawing received from DEM.
- The permitted capacity is 77,000 gallons per day.
- The user may increase the flow if mass loads remain the same as permitted
- The discharge pipe DEM says is corroded and should be replaced. Options include the following
    - Replacing the pipe (may upgrade or downgrade line)
    - Putting in a slip pipe and creating a force main.
    - Replacing pipe is not a RIDES issue but will need permitting by CRMC to avoid damage during replacement/construction.
- Navy no longer has outfall anymore.
- DEM's main concern is antidegredation requirements (not increasing approved loads)
- May allow some relaxation for TMDL area for "compelling public purpose."
- Portsmouth has been notified of the Cesspool Phase-Out Initiative

Hand Written Notes have been attached to this file.

NORTHEAST ENGINEERS & CONSULTANTS, INC.
55 JOHN CLARKE ROAD
MIDDLETOWN, RHODE ISLAND 02842
PHONE (401) 849-0810 FAX (401) 846-4169

JOB 08004.0 DEM Meeting
SHEET NO. 1 OF
CALCULATED BY DATE 4/13/08
CHECKED BY DATE
SCALE

Q's: 1. Pipe Capacity - name
2. Drawings - have (yrs)
3. Location - yes (on map)
4. Permit Capacity - 77,000 gal / day
5. Permit Process & man
6. Pipe Characteristics (slope, material)
7. Known concerns

1960s - construction

Russ Hillman - has pipe slope, materials, etc. sent from RIDEM

Navy doesn't have RE outfall anymore (Fort Adams)

16" cast iron

→ anti degredation requirements
- no adverse impacts
- holding mass load constant
  → i.e. BOD needs to remain constant

⇒ get copy of permit & drawing

DOP, TSS_{32} (Mass load) & develope mass limit (77,000 g/day)
metal limits
phosphorous, total nitrogen (5 a 3 mg/L), ammonia
↳ May - October

→ Relaxation for TMDL area - no.
↳ only if technological limitations
↳ if reduce/fix metal at plant
↳ compelling public purpose

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JOB 08004.0 DEM Meeting
SHEET NO. 2 OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

- try to get plans for Raytheon
- activated sand filter w/ sludge at end
- everything needs to be completely rebuilt @ Raytheon
- currently pumping 10,000 gpd & truck to Newport
- primary clarifiers are holding tanks
- don't have enough flow to maintain system.
- Raytheon admit have to rebuild all w/E /s? to properly ~~[illegible]~~ use.
- Portsmouth people can't decide
- Cesspool phase out initiative !!! (5 years, no cesspools)
  - told Portsmouth would [illegible] phase out
- Use existing outfall configuration & model dilution (Cormicks model) then look at baseline loads (80% x dilution x pollution factor)
- Think larger pipe, increase outfall
  force main w/ slip pipe
  physical changes are okay but no SA/SB Δ
  ↳ CRMC permit issue 4 construction
  ↳ DEM approves okay.

APPENDIX D WOODARD & CURRAN FLOW CALCULATIONS

Table 1

TR-16 Estimates - WWTF - Average Daily Flow and Maximum Daily Flow

	Total Res Parcels	Res Flow	Total Comm Parcels	Total Comm Acres	Comm Flow	Total	Max Day Factor	Max Day Sanitary Flow	Infiltration	Max Day Flow GPD
Developed/By Right Parcels										
Island Park	504	89,258	73	15	15,000	104,258			0	
Portsmouth Park	209	46,014	4	1	1,000	47,014			5,500	
						151,272	2.9	438,690		**440,000**
"Likely" Parcels										
Island Park	632	111,927	73	15	15,000	126,927			0	
Portsmouth Park	216	47,254	4	1	1,000	48,254			5,500	
						175,181	2.8	490,506		**500,000**
"Practical" Parcels										
Island Park	759	134,419	73	15	15,000	149,419			0	
Portsmouth Park	216	47,254	4	1	1,000	48,254			5,500	
						197,673	2.7	533,716		**540,000**
All Parcels										
Island Park	961	170,193	73	15	15,000	185,193			0	
Portsmouth Park	216	47,254	4	1	1,000	48,254			5,500	
						233,447	2.6	606,961		**610,000**

Table 2

ISDS Estimates - Collection System - Max Day Flow and Peak Hourly Flow

	Total Res Parcels	Res Flow	Total Comm Parcels	Total Comm Acres	Comm Flow	Total	Peak Factor	Peak Sanitary Flow	Infiltration	Peak Hourly Flow (GPD)
Developed/By Right Parcels										
Island Park	504	151,200	73	15	15,000	166,200	2	332,400	0	332,400
Portsmouth Park	209	71,700	4	1	1,000	72,700	2	145,400	5,500	150,900
						238,900				480,000
"Likely" Parcels										
Island Park	632	189,600	73	15	4,500	194,100	2	388,200	0	388,200
Portsmouth Park	216	73,800	4	1	1,000	74,800	2	149,600	5,500	155,100
						268,900				540,000
"Practical" Parcels										
Island Park	759	227,700	73	15	15,000	242,700	2	485,400	0	485,400
Portsmouth Park	216	73,800	4	1	1,000	74,800	2	149,600	5,500	155,100
						317,500				640,000
All Parcels										
Island Park	961	288,300	73	15	15,000	303,300	2	606,600	0	606,600
Portsmouth Park	216	73,800	4	1	1,000	74,800	2	149,600	5,500	155,100
						378,100				760,000

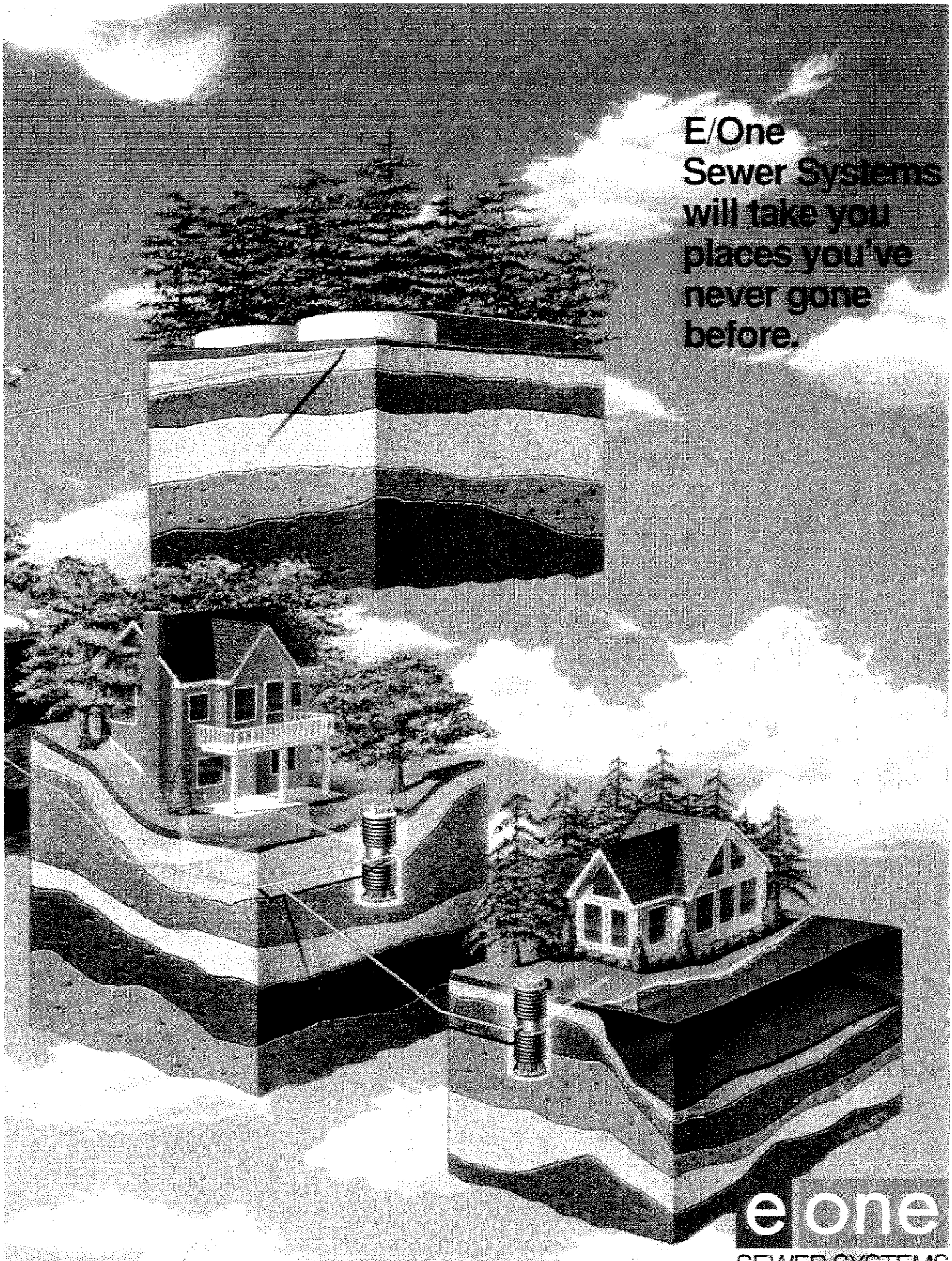
Summary of West Side Flow Estimates

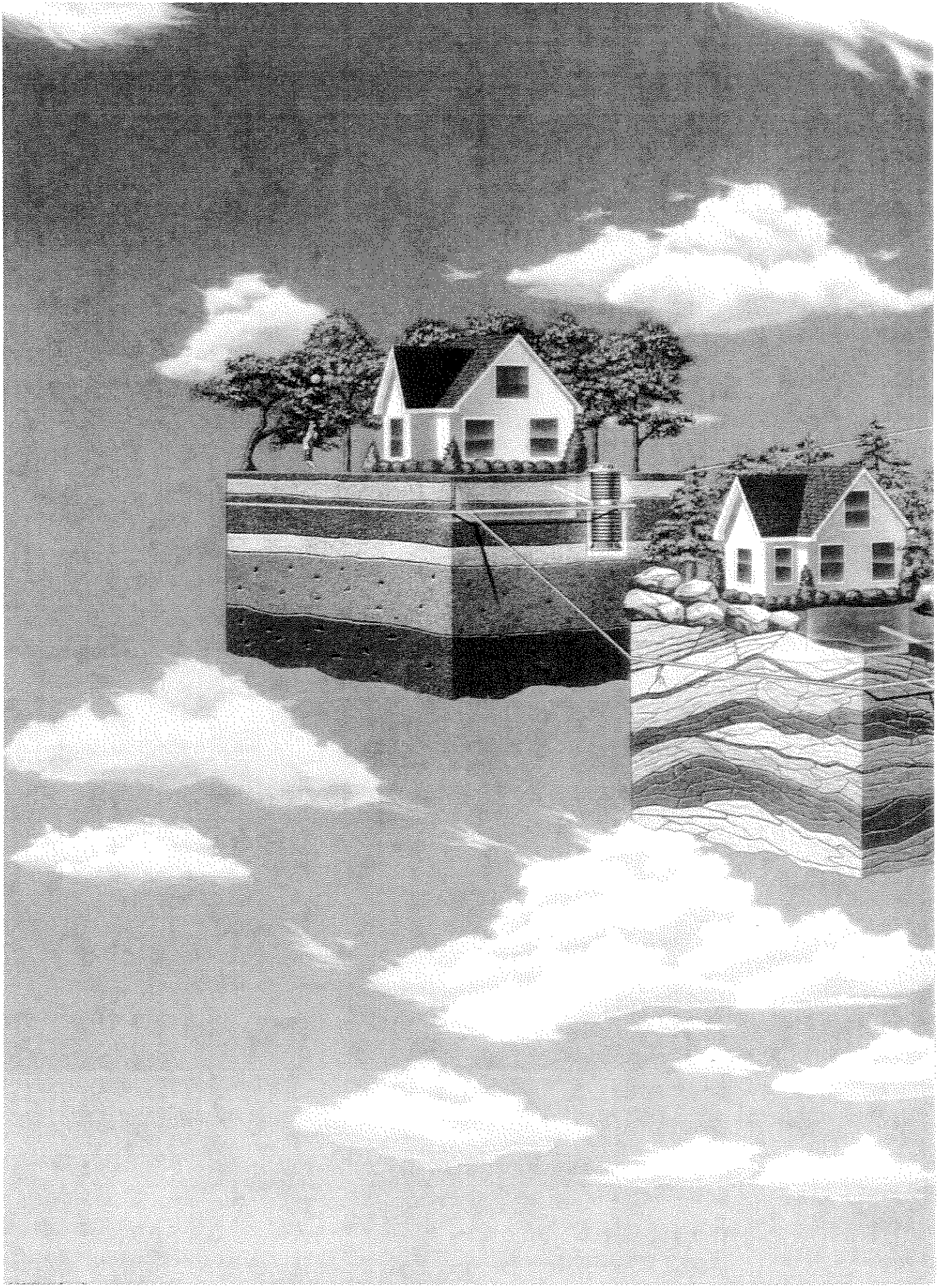
Best Case	TR-16 Estimates - WWTF (gpd)	Maximum Day WWTF (gpd)	Max Day Sanitary Flow	ISDS Estimates - Collection System (gpd)	Peak Factor	Peak Hourly Flow - Collection System (gpd)
Expected to Initially Connect						
Abbey - Industrial / Arnold's Point	32,469			51,150	3	153,450
Remainder of West Side	344,787			488,457	2	976,914
Intial Connection Total (gpd):	377,256	2.5	943,140	539,607	2	1,079,214
Expected to Connect within 20 Years						
Abbey - Industrial / Arnold's Point	7,084			12,000	4	48,000
Remainder of West Side	279,683			307,083	2	614,165
20 Year Connection Total (gpd):	286,767	2.6	745,594	319,083	2	638,165
Total Expected to Connect						
Abbey - Industrial / Arnold's Point	39,553			63,150	3	189,450
Remainder of West Side	624,470			795,540	2	1,591,079
Total Expected to Connect (gpd):	664,023	2.3	1,527,253	858,690	2	1,717,379

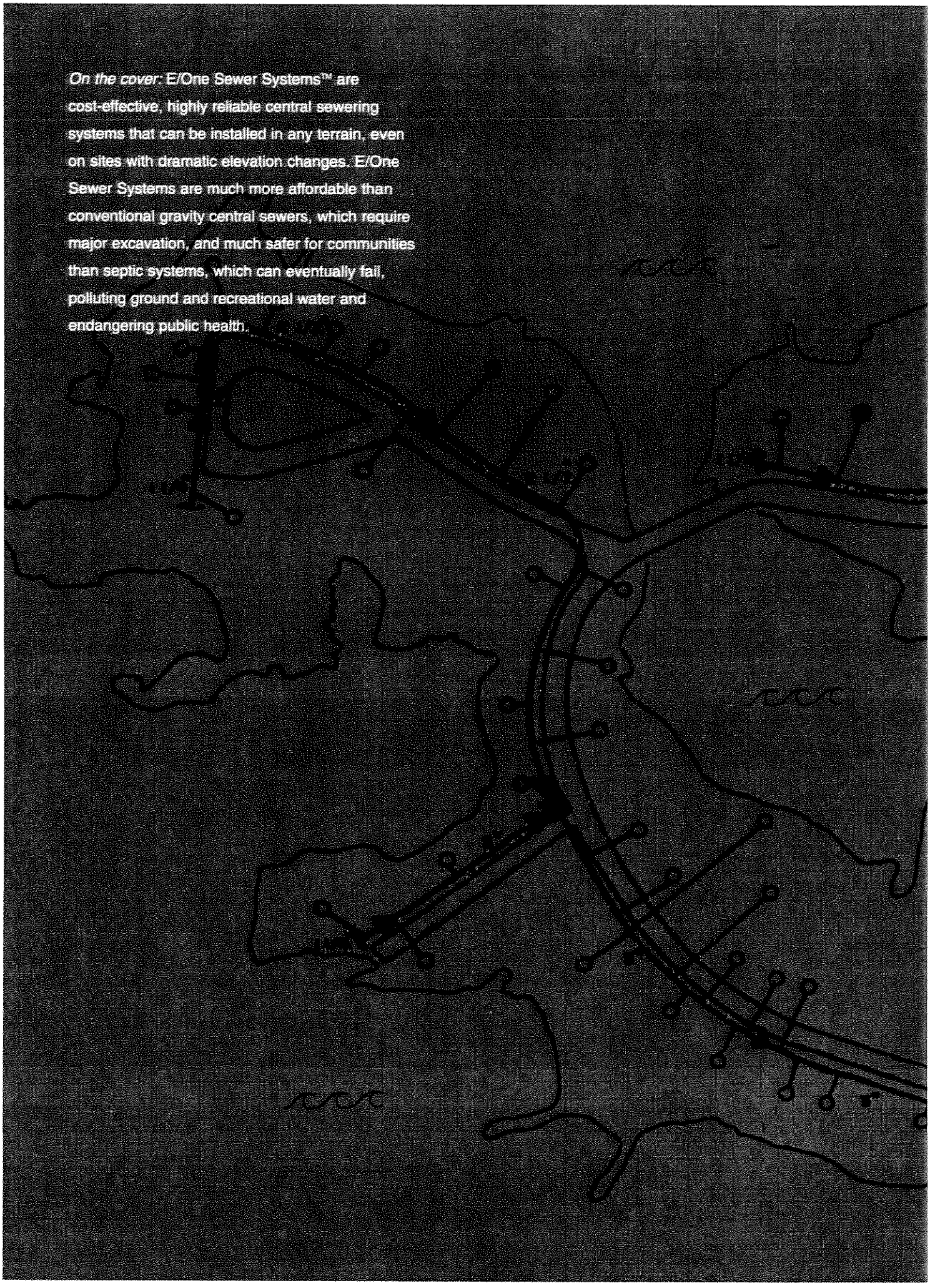
Worst Case	TR-16 Estimates - WWTF (gpd)	Maximum Day WWTF (gpd)	Max Day Sanitary Flow	ISDS Estimates - Collection System (gpd)	Peak Factor	Peak Hourly Flow - Collection System (gpd)
Expected to Initially Connect						
Abbey - Industrial / Arnold's Point	32,469			51,150	3	153,450
Remainder of West Side	416,100			567,390	2	1,134,780
Intial Connection Total (gpd):	448,569	2.4	1,076,566	618,540	2	1,237,080
Expected to Connect within 20 Years						
Abbey - Industrial / Arnold's Point	7,084			12,000	4	48,000
Remainder of West Side	397,610			414,570	2	829,140
20 Year Connection Total (gpd):	404,694	2.5	1,011,735	426,570	2	853,140
Total Expected to Connect						
Abbey - Industrial / Arnold's Point	39,553			63,150	3	189,450
Remainder of West Side	813,710			981,960	2	1,963,920
Total Expected to Connect (gpd):	853,263	2.2	1,877,179	1,045,110	2	2,090,220

Note: Due to the conceptual nature of the flow estimates, infiltration/inflow is not considered.

APPENDIX E E/ONE LOW PRESSURE FORCE MAIN


E/One
Sewer Systems
will take you
places you've
never gone
before.
e one
SEWER SYSTEMS





On the cover: E/One Sewer Systems™ are cost-effective, highly reliable central sewering systems that can be installed in any terrain, even on sites with dramatic elevation changes. E/One Sewer Systems are much more affordable than conventional gravity central sewers, which require major excavation, and much safer for communities than septic systems, which can eventually fail, polluting ground and recreational water and endangering public health.

E/One Sewer Systems™ give you the freedom to sewer anywhere–at up to half the cost of gravity sewers.

Rugged hills. Isolated flatlands. Coastal areas. Or sites with high water tables. With E/One behind you, you can sewer where no one has sewered before.

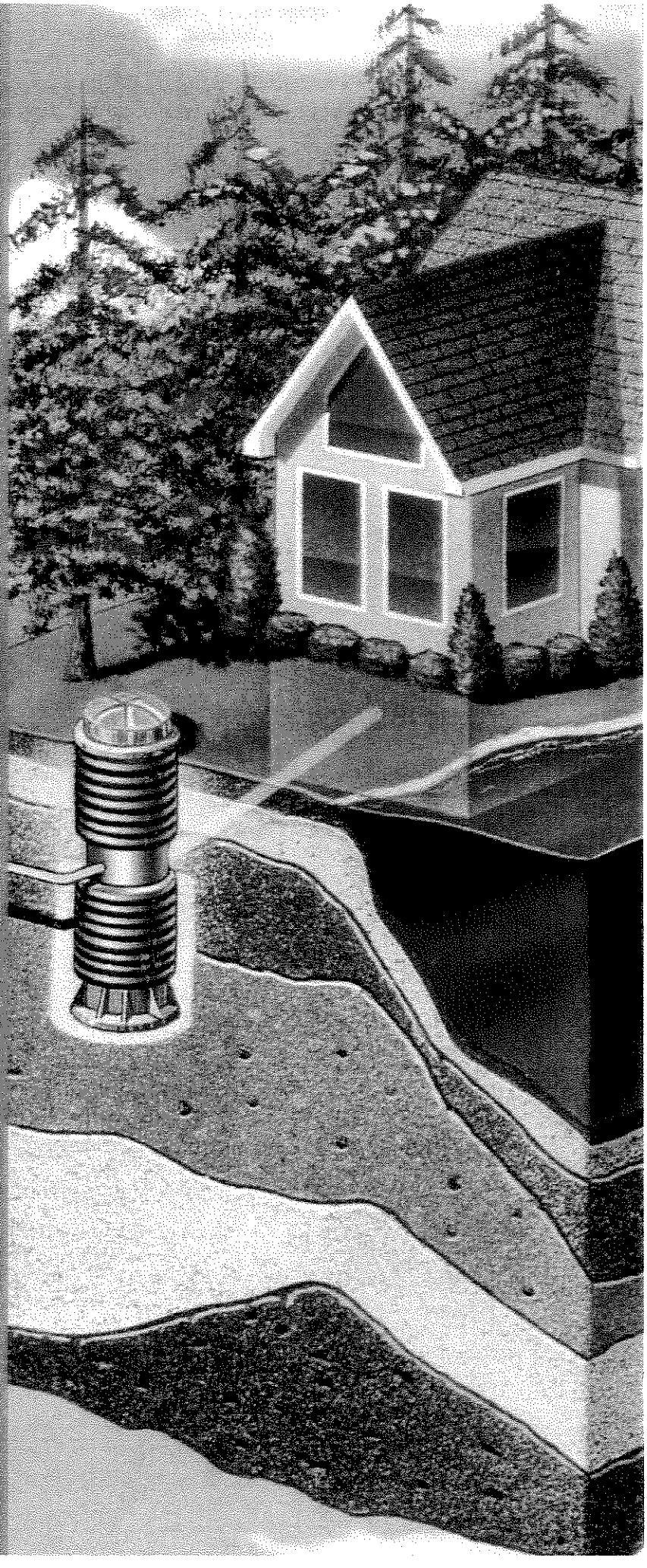
That's because E/One Sewer Systems™ follow the contour of the land. So they can go anywhere. Without destroying the landscape.

They're easier to install than conventional gravity sewers, so they greatly reduce the high cost of sewering. And they're highly reliable. So they lower operating costs.

They're also safer than septic systems, which are environmental time bombs threatening ground and recreational water.

Cost-efficient. Reliable. Goes anywhere. And safer for the whole community.

Isn't that the direction you want to go?



The E/One Sewer System.

In the world of sewer system technology, less is more. The E/One Sewer System requires only a shallow trench and small 2- to 4-inch diameter piping. So, unlike conventional gravity central sewers, which use a 24-inch pipe and require deep excavation, the E/One Sewer System is not destructive to the landscape's natural or built features. It also costs significantly less to install and operate than a gravity system. It requires less maintenance. But it guarantees big results.

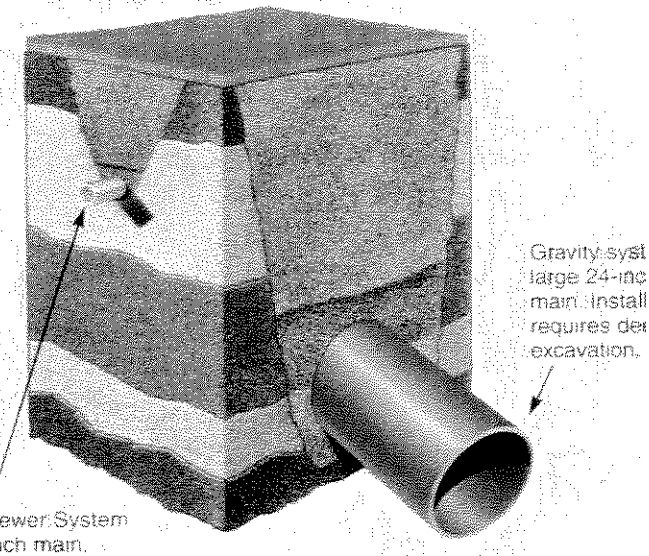
Here's the idea behind the E/One Sewer System: Both the gravity sewer system and the E/One Sewer System are known as central sewer systems. (Septic systems fall into a whole other category of waste disposal—see "The High Cost of Septic Systems" on the following page.) Most cities and many villages use central sewering, which simply means that waste is transferred, usually by a pipe or main, to a central treatment plant.

Gravity sewers are the "original" central sewers, with origins in the Roman aqueducts. Unfortunately, the technology behind gravity sewers is also centuries-old: they're bulky systems using a large main and can require major excavation to install. They must be accurately placed and bedded along a continuous downward grade. Plus they're expensive and not entirely efficient in transporting waste because they can tend to leak.

The more advanced E/One Sewer System employs highly sophisticated technology and has become known for its reliability, minimal maintenance, low upfront costs, reduced operating expenses, and ability to be installed at any site, regardless of the challenges of topography. And only the E/One Sewer System with its GP 2000 grinder pump overcomes the challenges of low-pressure systems, performing dependably day in and day out.

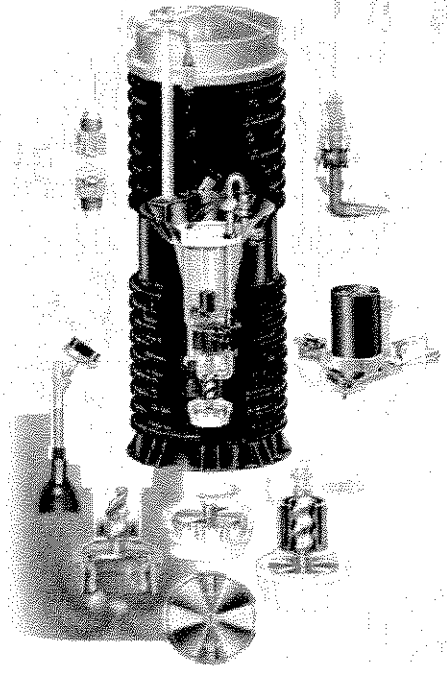
Small Is Beautiful.

Conventional gravity sewers use a 24-inch large-diameter pipe, or main, which requires major excavation and severely disrupts the landscape and any built structures such as lawns, driveways, and plantings. The E/One Sewer System uses an unobtrusive small-diameter 2- to 4-inch main installed right below the frostline, following the natural topography of the land.



Gravity syst
large 24-inc
main. Install
requires de
excavation.

E/One Sewer System 2- to 4-inch main, installed to follow the contour of the land.



engineered to do one job perfectly.™

The GP 2000 grinder pump, the heart of the E/One Sewer System, provides wastewater storage, grinding, and pumping in a single unit. Translation: it lowers operating costs, the cost of waste collection, and reduces maintenance.

The E/One Sewer System grinder pump is engineered to do one thing perfectly and in the process will help communities manage their growth and maintain quality of life.

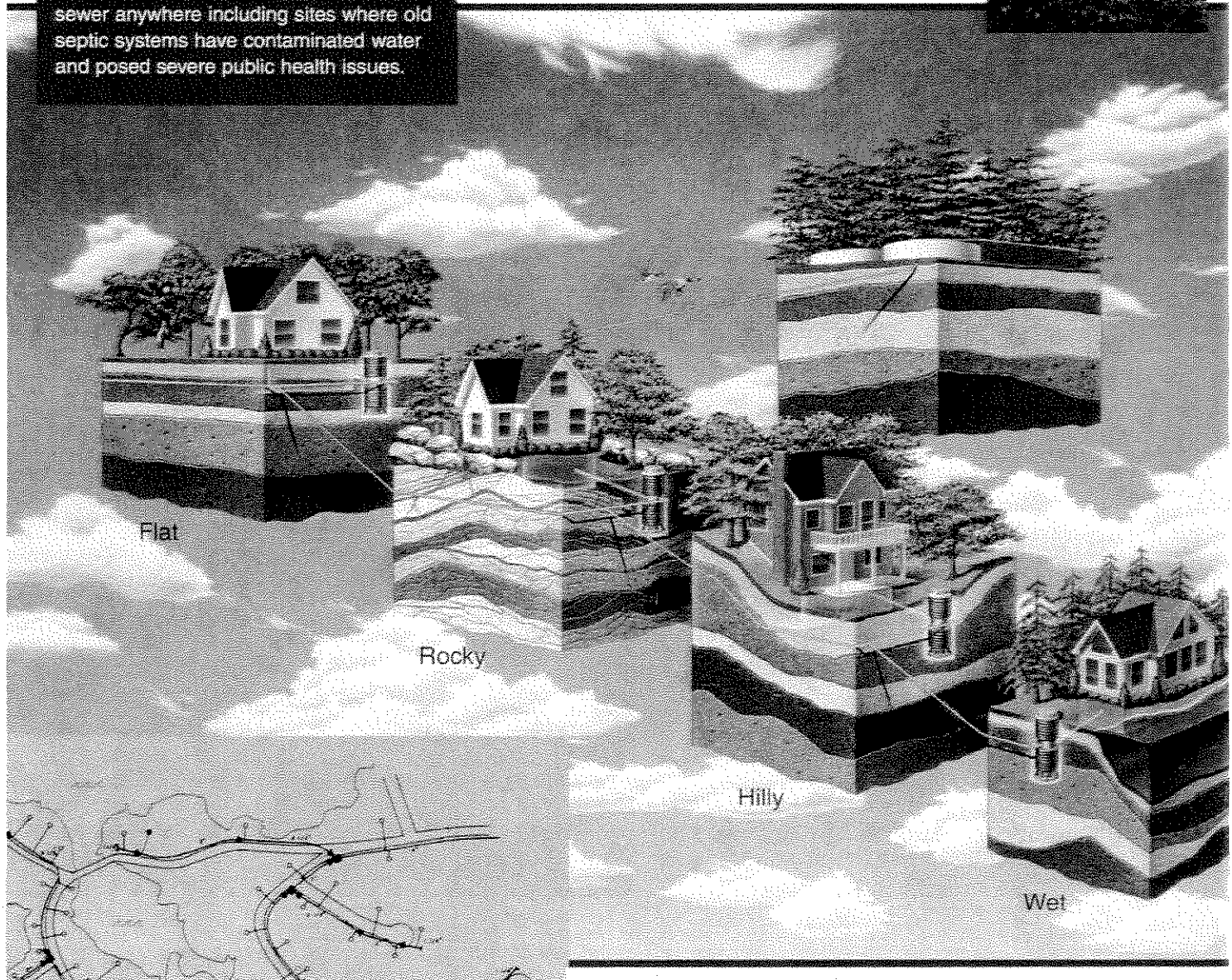
What it is. How it works. Why it's

Defy Gravity with E/One.

The beauty of the E/One Sewer System is that, unlike conventional central sewers, it defies gravity. Because installation follows the natural contour of the land, it is ideal for all terrain, including land that is flat, wet, rocky, or hilly. It gives the freedom to sewer anywhere including sites where old septic systems have contaminated water and posed severe public health issues.

How Does It Look From Where You Are?

Aesthetics are a major consideration for homeowners. The E/One Sewer System is virtually out of sight—the only visible part is a low-profile cover that blends seamlessly into the environment but provides easy access for servicing operations.



A Sense of Site.

Multi-branch E/One Sewer Systems serve the entire community and give engineers, developers, community planners, and homeowners the freedom to sewer anywhere, on any kind of site.

better.

The Advantages of the E/One Sewer System.

Homeowners

- Safe—protects water quality and enhances quality of life
- Reduces costs of housing—both initial and ongoing
- Visually benign—only evidence is a low-profile cover that is easily camouflaged
- Does not disrupt the beauty of the landscape or damage built structures
- Virtually no preventive maintenance required of homeowner
- Central sewer increases value of home

Municipalities/Developers

- Permits freedom to sewer anywhere in any kind of terrain
- Low initial costs make central sewers economically feasible
- Low initial costs make development economically feasible
- Central sewer increases value of development units
- High reliability—maintenance is minimal
- Reduces operating costs
- Protective of public health
- Permits regulatory compliance

Engineers/Operators

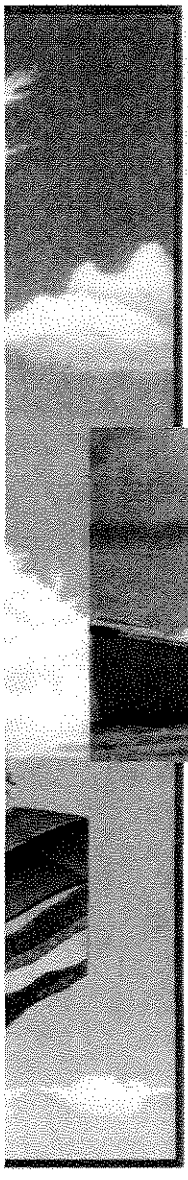
- Proven engineering and design
- Ideal for every terrain and building environment
- Cost-effective central sewering solution for new construction or retrofits
- Engineering and technical support during design, construction, installation, and operation
- Reliable performance means reduced O&M costs
- When needed, E/One pumps are easy and safe to access and service
- Designed to keep maintenance to absolute minimum

Contractors/Construction Managers

- Installation follows contour of the land—does not require major excavation
- Needs only shallow trenches—increases ease and safety of installation procedures
- Labor and material costs are much less than gravity sewer systems

The Price Is Right.

E/One can solve sewering problems and replace failing septic systems at approximately half the cost of conventional gravity sewers. E/One Sewer Systems sharply reduce both front-end costs and ongoing maintenance costs.



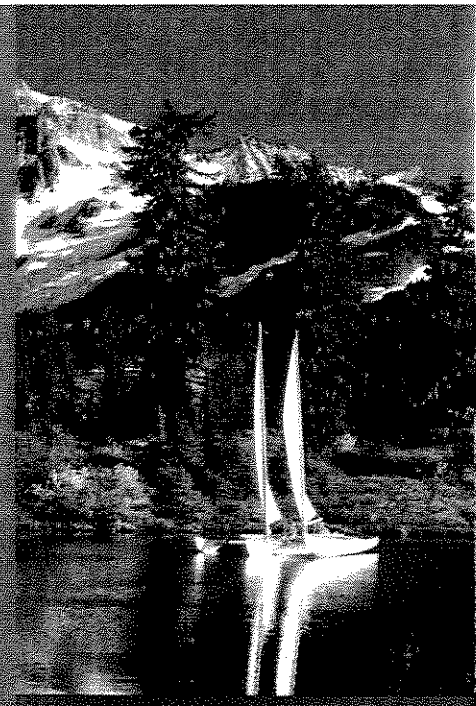
The High Cost of Septic Systems.

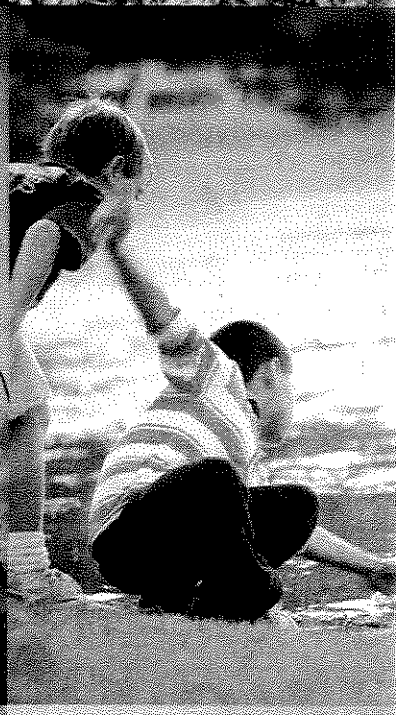
While septic systems may be a common way of disposing of residential sanitary waste, they are, at best, a temporary solution and come at a high cost to public health. All over America, septic systems have degraded ground and recreational water, creating serious safety problems. Because of failing septic systems, water is not safe to drink. Children are not free to play near contaminated lakes and streams. Outbreaks of waterborne disease become common. Quality of life is eroded. In addition, failing septic systems decrease real estate values. E/One Sewer Systems can go wherever septic systems were initially used, reclaiming water quality and quality of life while providing an efficient, cost-effective solution to wastewater disposal and treatment. In fact, communities retrofitting with E/One Sewer Systems have reported dramatic improvements in coliform levels in as little as 30 days after installation.

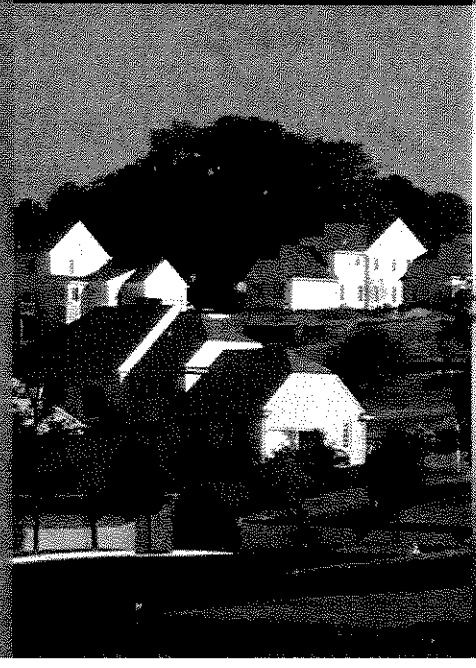
E/One Sewer Systems are at home in communities all over the country.

Many communities have been made possible because of the E/One Sewer System idea and hundreds more have been made safe once again after failing septic systems created serious public health problems by contaminating ground and recreational water.

The E/One Sewer System delivers safe, cost-effective, reliable performance and enables controlled growth, permitting communities to maintain their quality of life at a cost they can afford.







Representative Projects

Over a half million users worldwide

Weatherby Lake, an established municipality in Missouri, installation start date 1977.

Pierce County, a community in the Lakes Area of Washington state, installation start date 1983.

Fairfield Glade, a lakefront and golf course community in the Cumberland Mountains of Tennessee, installation start date 1975.

Riverview Landing, 160-acre wooded site overlooking the historic Mohawk River, Albany, New York, installation start date 1967.

Quaker Lake, a small lakefront community in Pennsylvania, installation start date 1976.

Catawba Island, a resort community in Ohio, installation start date 1989.

There's no limit to where you can go with E/One Sewer Systems behind you.

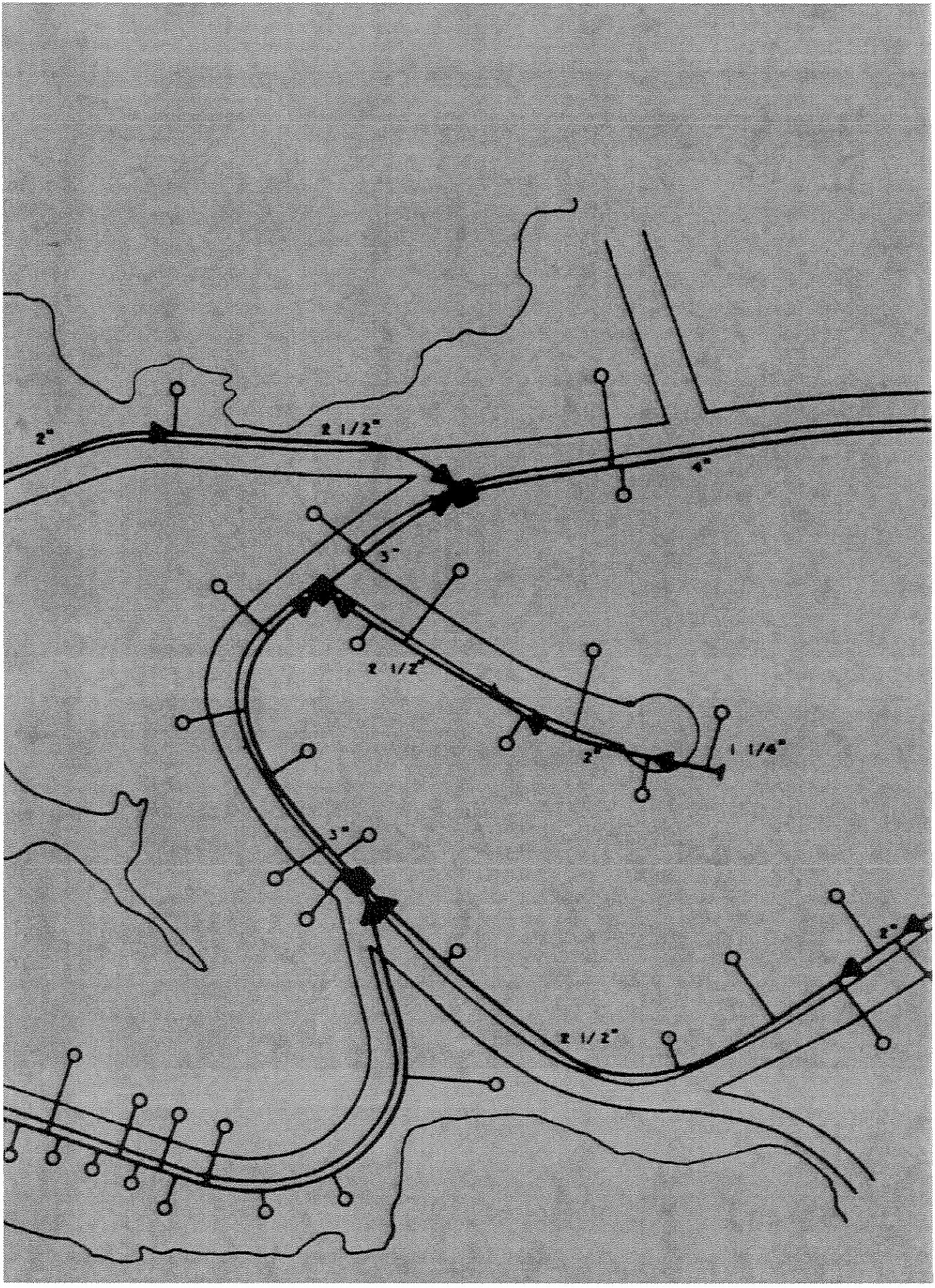
We hope this brochure has served as a useful introduction to how the E/One Sewer System works and why it is a cost-effective, reliable central sewering solution.

Of course, there's more to E/One than our highly engineered product. The people behind the product are here to answer your questions, keep you informed, and work with you on your project every step of the way from concept through design and construction.

For more information, call, fax, or visit us at:

Environment One Corporation
2773 Balltown Road
Niskayuna, NY USA 12309-1090
Voice (01) 518.346.6161
Fax 518.346.6188
www.eone.com

We'll help you get wherever you want to go.


2"
2 1/2"
4"
3"
2 1/2"
2"
1 1/4"
3"
2"
2 1/2"

APPENDIX F NAVY RESPONSE LETTER

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND, MID ATLANTIC
PUBLIC WORKS DEPARTMENT, NAVAL STATION NEWPORT
ONE SIMONPIETRI DRIVE
NEWPORT, RHODE ISLAND 02841-1711

IN REPLY REFER TO:
11345
Ser PRPD/412
2 May 2008

Mr. Paul A. Sylvia, PE
Senior Project Manager
Northeast Engineers and Consultants
55 John Clarke Road
Middletown, RI 02841

Dear Mr. Sylvia:

SUBJECT: REQUEST FOR INFORMATION ABOUT NAVY SEWERAGE SYSTEM

In response to your letter of 18 April 2008, the following enclosure has been developed to provide the information you requested:

Encl. (1) Responses to your questions
Exhibit (A) Plans of the sewer collection system between Melville and Newport WWTF
Exhibit (B) Information on Lift Station 988

If you have any additional questions, please contact my Utility Branch Head, Mr. James Carlson. Mr. Carlson can be reached at (401) 841-7626.

Sincerely,

CDR C. A. Fulton
Public Works Officer
Naval Station Newport

Enclosure

RESPONSE TO QUESTIONS:

Question 1: *What is total daily flow from Navy to Newport WWTF?*

Navy response: The Navy is allocated 2.85 MGD from three major areas: Coaster Harbor Island and Navy Health Care; Coddington Point; and Melville to Coddington Cove. Over the last five years, the combined average daily flow from these three areas has been about 1.1 MGD, with a maximum quarterly average of 1.8 MGD. Note that these flows are based on the amount of sewerage metered and billed by Newport WWTF and that during any period, and especially during that maximum quarter, a peak day for the quarter could exceed a flow of 2 MGD. A further breakdown of the flows from the various areas may be available through the City of Newport; but it is estimated that the breakout is 26%, 14%, and 60%, respectively.

Questions 2: *Of this total flow, what percentage is from other than Navy sources (i.e. Middletown development)?*

Navy response: Other sources besides Navy in Middletown, Portsmouth and Newport are shown in the below table along with the maximum allocation, if they have one, and the average daily flow based on a five year period. To date, none of these sources have yet to exceed their allocations. Also, Newport passes the sewerage from establishments along Third and Sycamore/Cypress Streets through the Navy system for which we are credited. Total flows are historic flows; an exact percentage is not available but it is estimated that non-Navy flows constitute less than 1% of the current total flows.

Source	Max. Allocated Amount (000 GPD)	Five Year Ave. Flows (000 GPD)
Middletown (non-Navy)		
Landings Group	none	53.4
State Community House	none	1
Portsmouth (non-Navy)		
Melville Elementary School	3	1.1
Portsmouth Camp Ground	8	1.4
Melville Marine Industries	100	6.3
Hinckley Yacht (prime)	(40 direct, 60 off-peak)	
Alden Yachts		
O'Neill Properties, Etc.		
EPYC	12	2.1
Greenwich Group (formerly Rainbow Heights)	14.2	no data yet
Backyard Area (Under Negotiation)	8	no data yet
Newport		
Third Street Area	none	30.7
TOTAL AVE. FLOWS:		96.0

RESPONSE TO QUESTIONS:

Question 3: *Is the 988 pumping station the sole source of flow from the Navy to the Newport WWTF?*

Navy response: No, 988 pump station is near the beginning of the Melville-Coddington Cove run and only services Melville Marine Industries (Hinckley Yacht which includes O'Neill Properties and others), East Passage Yachting Center, Melville Housing, Melville Elementary School, Portsmouth Campground, Greenwich Group (formerly Navy's Rainbow Heights), Navy Backyard area and the infiltration from these areas. It is estimated that less than 25% of the flows going to the Newport WWTF from the Melville-Coddington Cove run passes through this pump station. This station pumps the sewerage via a force main to a manhole south of Greene Lane where it combines with the Greene Lane Area flows; then it flows to lift station 75 which pumps these flows along with a portion from NUWC; and then to pump station 48 where the combined flows from station 75 and the remaining flows from Coddington Cove area are pumped to the Newport WWTF. Flows from two other major independent systems (about 40% of the total), as noted in the response to question 1, combine to become the total Navy sewerage treated at the Newport WWTF within the 2.85 MGD allocation. To determine further critical choke points downstream of pump station 988 and its force main that would impact acceptance of additional sewerage from the Melville area would require a major sewer study of the system using the current and future potential Navy flows. Exhibit (A) provides the general plans of the sewer system from Melville to Coddington Cove. From these plans one can see the extensiveness of this study effort once it reaches the major collection nodes located on Coddington Point.

Question 4: *Does the Navy's wastewater contain any industrial/chemical wastewater?*

Navy response: Yes, Navy has several permitted pre-treatment industrial/chemical waste water discharges. The majority of these discharge into the Melville to Coddington Cove system.

Question 5: *Are there any storm water/ground water connections to the Navy's sewerage system?*

Navy response: Some may still exist, but these connections are minimal. The Navy has worked to eliminate the major storm water connections to the maximum extent possible. The Navy made significant improvements to its sewerage system in the late 1990's. As part of this effort, significant infiltration was eliminated. Several smoke test contracts have been

RESPONSE TO QUESTIONS:

completed on the system and the major intrusion points eliminated.

Question 6: *Does the Navy have maximum or minimum wastewater flow rate agreements with Newport?*

Navy response: No, the Navy only has a maximum allocated contractual wastewater flow rate to the Newport WWTF of 2.85 MGD. Like Middletown, though, flows exceeding our allocation will be accepted (depending on Newport's excess treatment capacities) but at a premium rate above the contract rate. Currently, Newport uses a portion of our excess allocation to service part of the Middletown overage. No minimum flow rates are stipulated in our contract.

Question 7: *When does the Navy's present agreement for wastewater treatment with Newport expire?*

Navy response: No expiration date exist. Modifications to the Navy/Newport Sewage Disposal Contract are made as needed.

Question 8: *Please provide any information/specifications you may have regarding the 988 pumping station and force main (i.e. pump data, drawings, age of equipment, controls, etc.).*

Navy response: The design capacity for the 988 pump station is 324,000 GPD. See Exhibit (B) data sheets for more information.

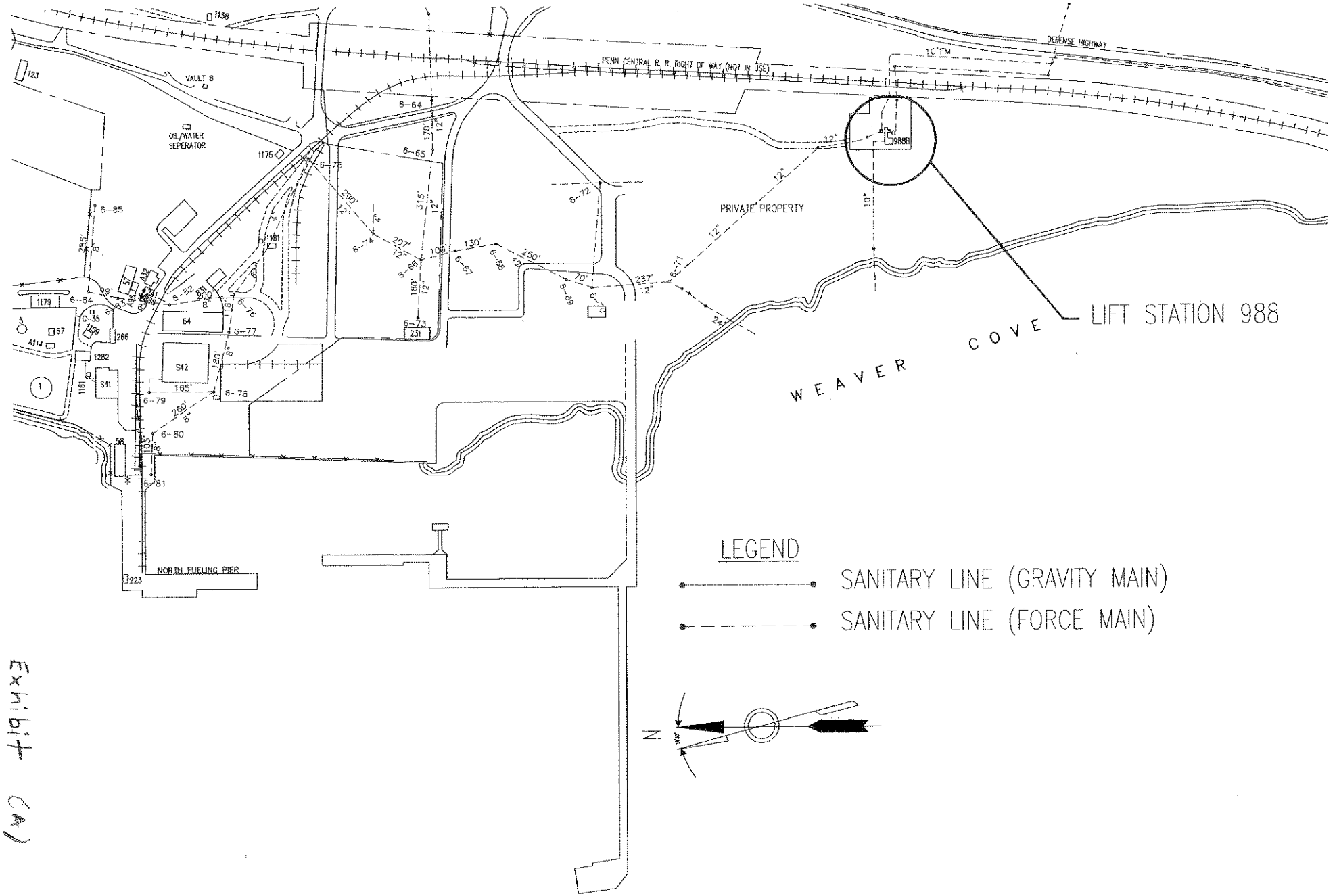
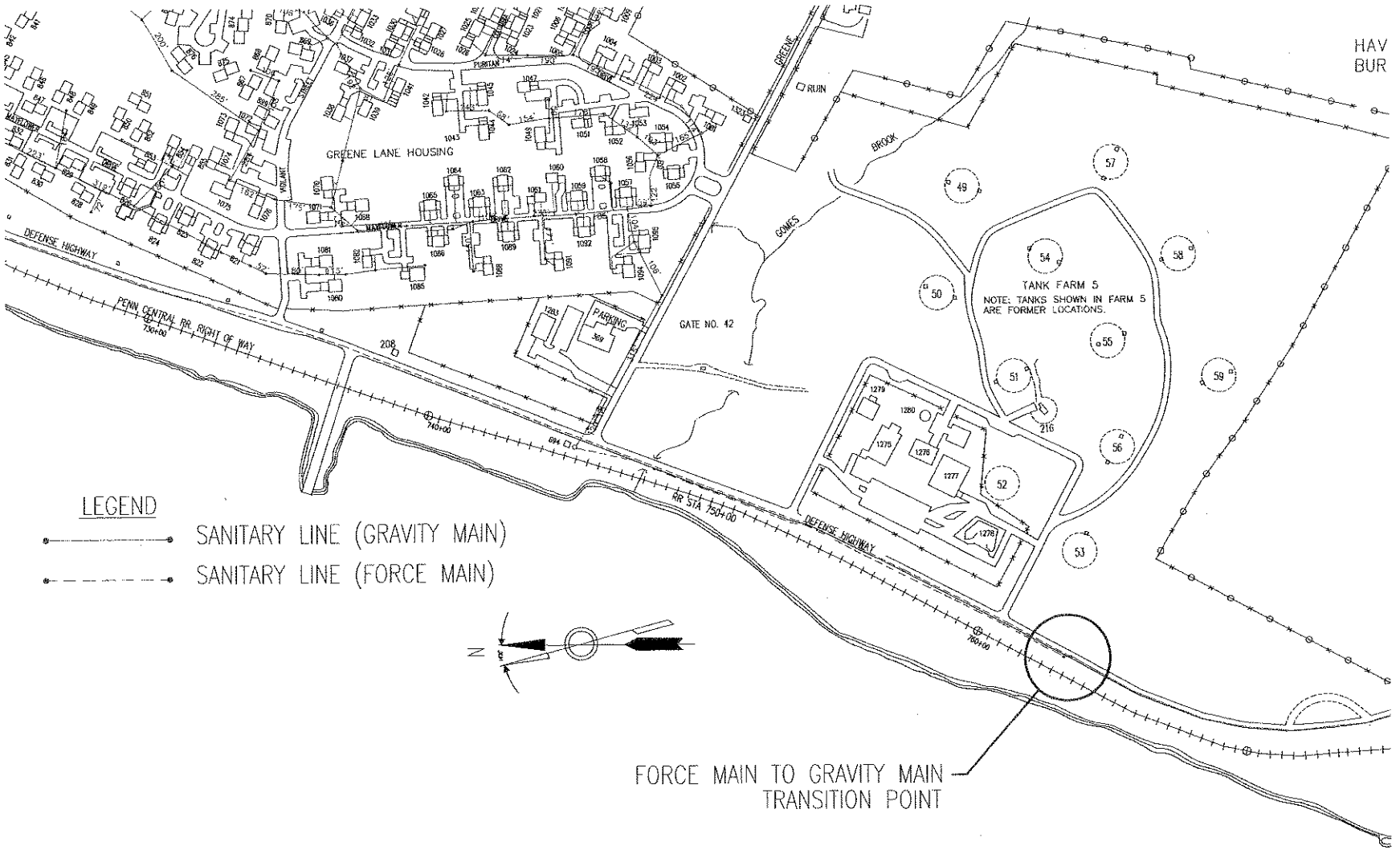

PENN CENTRAL R. R. RIGHT OF WAY (NOT IN USE)
DEFENSE HIGHWAY
10"FM
VAULT 8
OIL/WATER SEPERATOR
PRIVATE PROPERTY
WEAVER COVE
LIFT STATION 988
NORTH FUELING PIER
LEGEND
SANITARY LINE (GRAVITY MAIN)
SANITARY LINE (FORCE MAIN)
N

Exhibit CA1


GREENE LANE HOUSING
DEFENSE HIGHWAY
PENN CENTRAL RR. RIGHT OF WAY
730+00
740+00
760+00
RR STA 750+00
GATE NO. 42
PARKING
TANK FARM 5
NOTE: TANKS SHOWN IN FARM 5 ARE FORMER LOCATIONS.
BROOK
GOMES
RUIN
HAV
BUR
LEGEND
SANITARY LINE (GRAVITY MAIN)
SANITARY LINE (FORCE MAIN)
FORCE MAIN TO GRAVITY MAIN TRANSITION POINT

DEPARTMENT OF THE NAVY
UTILITIES PRIVATIZATION
TECHNICAL DATA PACKAGE

ACTIVITY:	NAVSTA Newport	**SYSTEM:**	Wastewater
SITE:	Main Base	**RFP No.:**	N62470-00-R-3600
LOCATION:	Newport, Rhode Island	**CLIN:**	0011AC

COMPONENT WORKSHEET (page 1 of 5)

DOMESTIC WASTEWATER PUMP STATION 988

Type of Pump Station: Wet Well / Dry Well

Location: Defense Highway south of Substation 214

Construction Date: 1997

Appurtenances:

- 25 gallon Steel Diesel Storage Tank
- 150 kW Diesel Generator
- Bar Screen
- Bubbler Control System
- Sonic Flow Meter
- Telephone Telemetry
- Underground Double-Walled Fiberglass Diesel Storage Tank

Pump and Motor Data:	**Pump #1**	**Pump #2**
Pump Type:	End Suction	End Suction
Rated Capacity (gpm):	1,050	1,050
Rated Head (feet):	123	123
Motor Horsepower (hp):	50	50

Overall Condition Rating: Good

Photographs:

Overall View of Pump Station 988
Photograph Taken: 08/16/00

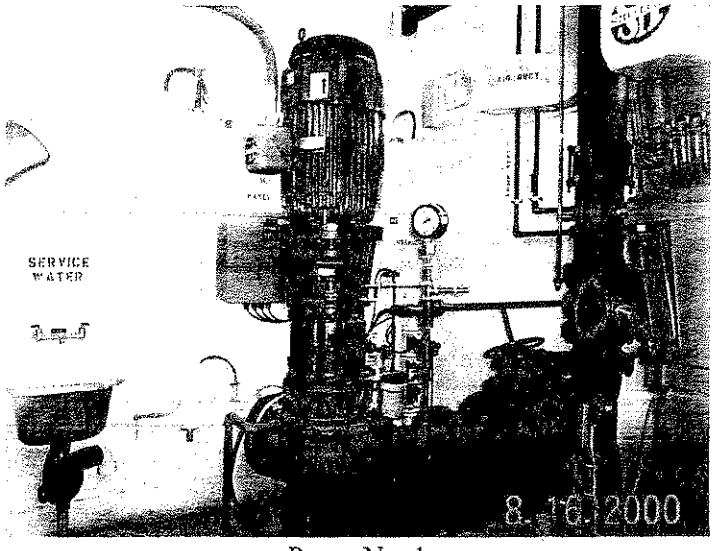
Exhibit (B)

DEPARTMENT OF THE NAVY
UTILITIES PRIVATIZATION
TECHNICAL DATA PACKAGE

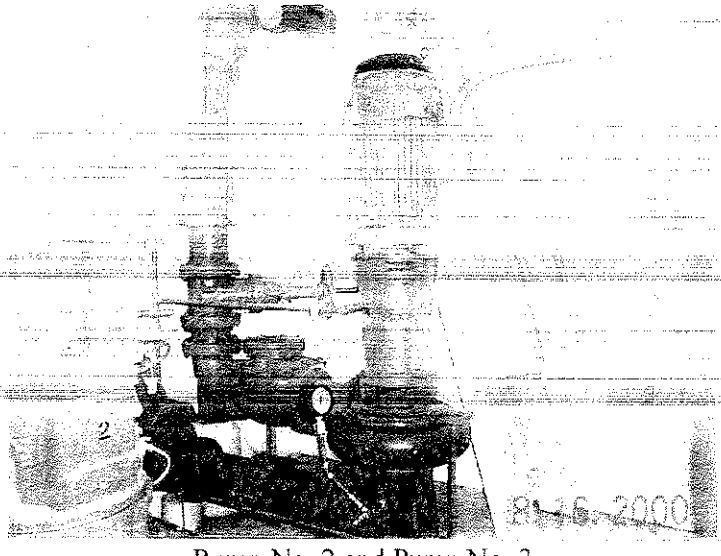
ACTIVITY:	NAVSTA Newport	**SYSTEM:**	Wastewater
SITE:	Main Base	**RFP No.:**	N62470-00-R-3600
LOCATION:	Newport, Rhode Island	**CLIN:**	0011AC

COMPONENT WORKSHEET (page 2 of 5)

DOMESTIC WASTEWATER PUMP STATION 988



Pump No. 1
Photograph Taken: 08/16/00

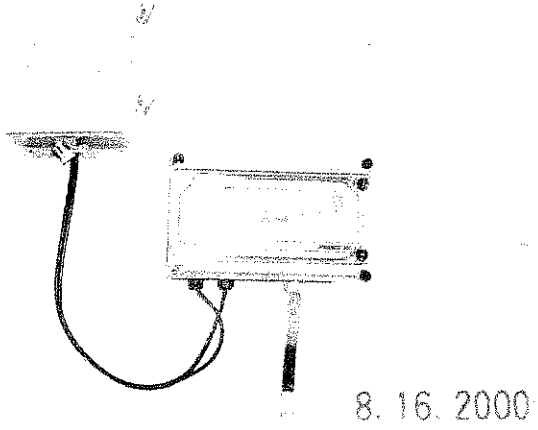


Pump No. 2 and Pump No. 3
Photograph Taken: 08/16/00

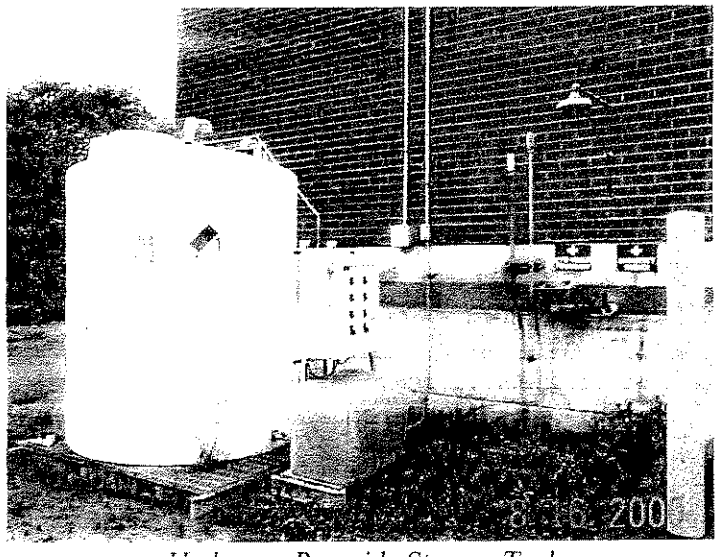
DEPARTMENT OF THE NAVY
UTILITIES PRIVATIZATION
TECHNICAL DATA PACKAGE

ACTIVITY:	NAVSTA Newport	**SYSTEM:**	Wastewater
SITE:	Main Base	**RFP No.:**	N62470-00-R-3600
LOCATION:	Newport, Rhode Island	**CLIN:**	0011AC

COMPONENT WORKSHEET (page 3 of 5)
DOMESTIC WASTEWATER PUMP STATION 988



Sonic Flow Meter Indicator
Photograph Taken: 08/16/00



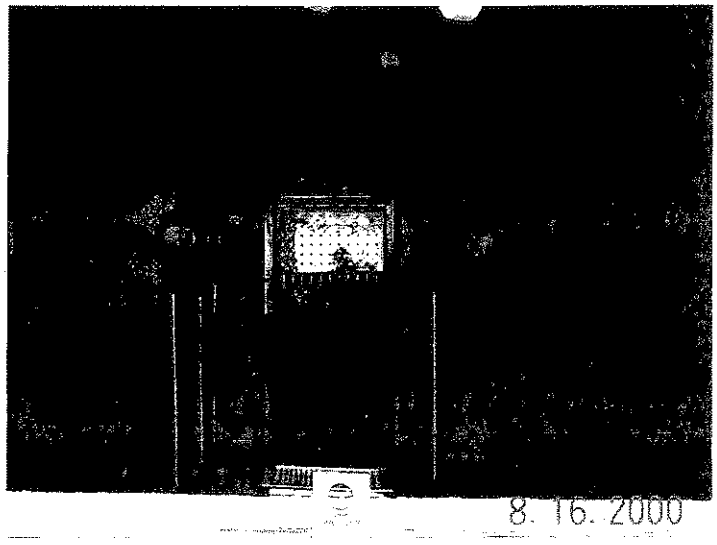
Hydrogen Peroxide Storage Tank
Photograph Taken: 08/16/00

DEPARTMENT OF THE NAVY
UTILITIES PRIVATIZATION
TECHNICAL DATA PACKAGE

ACTIVITY:	NAVSTA Newport	**SYSTEM:**	Wastewater
SITE:	Main Base	**RFP No.:**	N62470-00-R-3600
LOCATION:	Newport, Rhode Island	**CLIN:**	0011AC

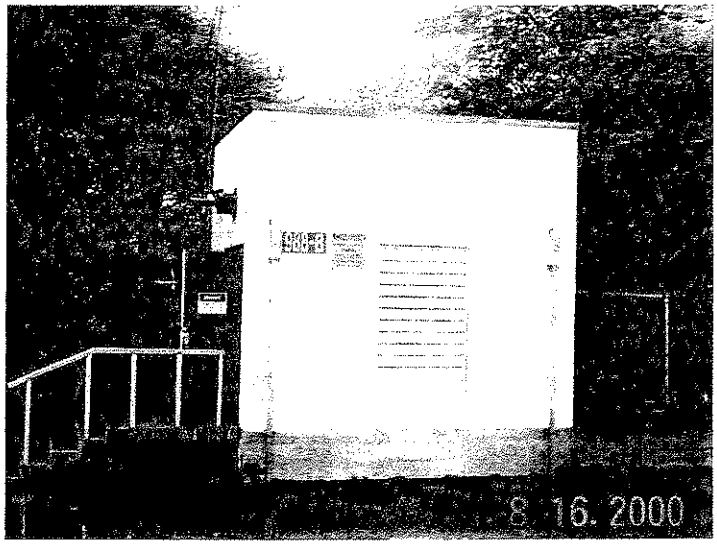
COMPONENT WORKSHEET (page 4 of 5)

DOMESTIC WASTEWATER PUMP STATION 988



Wet Well Bar Screen

Photograph Taken: 08/16/00



Emergency Generator Building

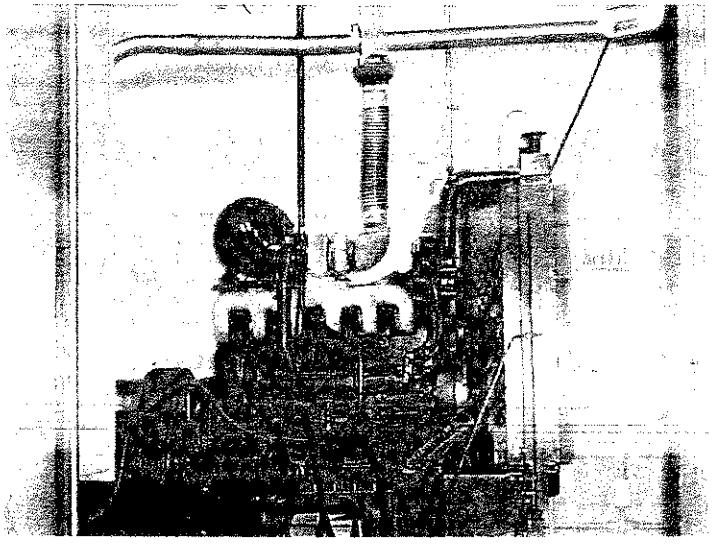
Photograph Taken: 08/16/00

DEPARTMENT OF THE NAVY
UTILITIES PRIVATIZATION
TECHNICAL DATA PACKAGE

ACTIVITY:	NAVSTA Newport	**SYSTEM:**	Wastewater
SITE:	Main Base	**RFP No.:**	N62470-00-R-3600
LOCATION:	Newport, Rhode Island	**CLIN:**	0011AC

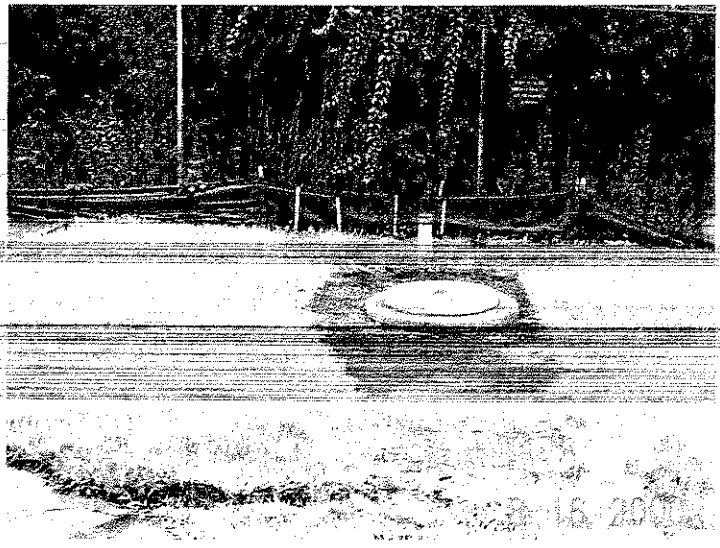
COMPONENT WORKSHEET (page 5 of 5)

DOMESTIC WASTEWATER PUMP STATION 988



Emergency Generator

Photograph Taken: 08/16/00



Underground Storage Tank Fill Ports

Photograph Taken: 08/16/00

APPENDIX G MIDDLETOWN MEETING NOTES

Northeast Engineers
& Consultants, Inc.
"A Knowledge Corporation"®

MEMO

To: Paul A. Sylvia, PE

From: Robyn M. Underwood, PE

CC: Project File 08004.0

Date: May 1, 2008

Re: Middletown Meeting

Attendants:

- Paul Sylvia – Northeast Engineers & Consultants
- Robyn Underwood – Northeast Engineers & Consultants
- Steve Landry – Maguire Group
- Warren Hall – Middletown Engineer
- Tom Landry – Middletown Director of Public Works

Key Issues:

- Town has two main pump stations (90% of flow) at Wave Ave & Coddington Highway.
- Small portion of Middletown gravity flows to Newport's WWTF but part of Newport gravity flows to Middletown so flow amount considered a wash by both parties.
- The GMH housing (prior Navy housing) currently goes to the Navy and is under a 99 year lease for all wastewater and stormwater discharge. This area is still considered Middletown.
- There are no flows from the larger Middletown area (areas excluding the GMH area) flowing to the Navy.
- Majority of flow is directed to Wave Ave pump station near 1st Beach.
- Middletown has problems with capacity during wet weather flow due to significant infiltration.
- During minor rain events, Wave pump station spills into Green End Pond and 1st Beach. Middletown has been working with RIDEM to mitigate the occurrence and has installed more monitoring devices to better assist the situation.
- Town would like 900,000 gallons from northern potion of town pumped to Raytheon if flow included wet weather flow.
- The would like a pump station at Oliphant Lane to existing pump station at Green Lane to pump to Raytheon site.
- Newport will not allow direct connection to its WWTF (possible mitigation method)
- Newport will not allow an increase in the Coddington (more direct) pump station because wet weather flows would reach WWTF sooner and would fail
- Current allowable discharge to Newport is 2.1 million gallons but Middletown often exceeds the maximum 7.5 during the wet season.

Miscellaneous:

- Received overall Middletown sewer layout with flow direction
- Received Wastewater Facilities Plan by Louis Berger - 1999
- Received Wastewater Facilities Plan by Louis Berger - 1996

APPENDIX H TOWN OF PORTSMOUTH LETTER

May 19, 2008

Paul Sylvia, P.E.
Senior Project Manager
Northeast Engineering
55 John Clarke Rd.
Middletown, RI 02842

RE: **Regional Sewer Study**

Dear Mr. Sylvia:

As requested, the following are my personal thoughts about the goals and objectives of a possible regional sewer treatment system, as the Town Council has never discussed the subject and I have not spoken with the Town Administrator about it. Therefore, they are *strictly unofficial*:

Portsmouth has identified two primary goals for a treatment system on the West Side (there may be others):

1. To facilitate economic development on the west side (expansion of marine trades, O'Neill's Weaver Cove development, development of tank farms).
2. To provide a place for sewer treatment for the north end of Portsmouth, should that pass a bond referendum.
3. Comply with EPA Clean Water Regulations.

Regional vs. Town only:

Since each municipality would have very different collection systems (age, type), it would not make sense for a regional system, regardless of who owns it, to be responsible for collection or delivery to the plant. If nothing else, it would be impossible to segregate the costs.

TOWN ONLY:
Advantages: Going it alone has the advantage of local control. We could start with a relatively small plant. If we want to build a larger plant, the other towns could be customers. There would not be the difficult problem of segregating costs.

Disadvantages: Economic development on the west side will take place over a number of years. In the meantime, the treatment plant as a business entity may have a cash flow problem for the first few years and require a subsidy.

REGIONAL TREATMENT:
Advantages: The cash flow problem above would be minimized because there would be immediate additional customers.

Disadvantages: It would be a challenge to determine governance of a joint system. Portsmouth is probably not interested in a regional organization that is also responsible for old infrastructure, so regionalization would have to be the new treatment plant only. Cost allocation could be contentious, both for original capital costs and operations. Passage of a bond referendum in two to three municipalities, if needed, would be a challenge.

GOING FORWARD:
Make no assumptions.

The level of financial contribution by each municipality is vital, be this via minimum flow or other method.

Whether Portsmouth owns the system alone or there is a regional organization, there would have to be long-term (20 yr.) agreements from the municipalities guaranteeing minimum flows, nature of flows, and financial contributions.

The Navy has made it clear that it wants to discontinue all utility service off the Base. This means any new treatment system on the west side would have to treat all the flows from the west side, including boat yards and marinas.

RIDEM must be part of and a partner in this project.

Long term water supply for the west side must be resolved.

Finally, I advise having at least preliminary answers to the concerns above before formally approaching the governing bodies.

Yours truly,

Robert Gilstein, Town Planner

c. Robert G. Driscoll, Town Administrator

APPENDIX I RIDEM FUNDING MEETING NOTES

Northeast Engineers
& Consultants, Inc.
"A Knowledge Corporation"®

MEMO

To: Paul A. Sylvia, PE

From: Robyn M. Underwood, PE

CC: John Hume, Maguire

Date: May 8, 2008

Re: Portsmouth WWTF Funding Options

Spoke with Jay Manning from Department of Environmental Management on May 8, 2008 to discuss funding options for the Portsmouth WWTF and the following are the highlights of our discussion.

- **State Revolving Fund** can pay for the WWTF and sewer main related to Portsmouth and Middletown up to 100% if funds are available. The flows from O'Neill and Raytheon are not eligible for funding through this source so whatever percentage of the flows are from these to entities will be subtracted from the total funding percentage of the project. The fund will only fund flows from the larger Portsmouth and Middletown locations excluding Raytheon and O'Neill. (i.e. if Raytheon and O'Neill are 10% of total WWTF flows, fund would provide up to 90% funding.)

- **State Bond Fund (Interceptor Bond Fund)** will fund a matching portion up to $500k for "areas which should no longer be services by ISDS systems and should be serviced by sewers." Portsmouth is the only area which qualifies for this fund. The matching provided by Portsmouth can be from the State Revolving Fund.

- **Federal Special Appropriations** may be available if initiated by a Rhode Island Senator. (A RI Senator lives in Portsmouth.)

- **Jay Manning** is the authority and expert for all funding matter regarding the development of Portsmouth.