an order of approval (OOA) will be submitted to RIDEM within 18 months following approval of the Final Facility Plan Amendment.

Environmental Assessment

Constructing the recommended alternative would have minimal impact on the environment at the FPWWTF or in the surrounding area. The project site is fully developed and contains no wetlands, endangered species, sensitive habitats, sensitive coastal areas, or public or private recreational areas. Typical impacts would be an increase in noise, dust, and heavy vehicular traffic during construction. These impacts, however, are deemed insignificant given the industrial nature of the project site. To minimize siltation in the Providence River from silt laden runoff, silt barriers, such as haybales and silt fence, would be used around catch basins that receive runoff from the project site.

As a positive environmental impact, the project will reduce the amount of nitrogen entering the Providence River. This reduction in nitrogen should improve the water quality of the River and of Narragansett Bay.

Public Participation

A public meeting was held on November 30, 2005 to present the results of the alternatives evaluations. The meeting location was the Narragansett Bay Commission's headquarters at 1 Service Road, Providence, RI. A summary of the meeting is provided in Appendix F of this Facility Plan Amendment.

The proceedings of the Public Hearing will be provided in the appendices of the Final Facility Plan Amendment report.

I INTRODUCTION

I.1 PURPOSE OF FACILITY PLAN AMENDMENT

The Narragansett Bay Commission (NBC) prepared this Facility Plan Amendment for the Field's Point Wastewater Treatment Facility (FPWWTF) in order to determine the best alternative for providing Biological Nitrogen Removal (BNR) to meet the Rhode Island Department of Environmental Management (RIDEM) total nitrogen (TN) effluent discharge permit limit of 5 mg/L monthly average on a seasonal basis.

The general content of this plan includes background information for the FPWWTF, technical evaluations of various nitrogen removal alternatives, cost evaluations of the alternatives, recommendations, and implementation strategies. Appendices provide backup data and reference documents.

The planning period for this Facility Plan Amendment is from 2004 to 2024. Previous upgrades to the FPWWTF were implemented in the 1980's and were consistent with a 20-year planning period spanning 1983 through 2003.

I.2 PLANNING AREA

The planning area is the FPWWTF, the main entrance of which is at the intersection of Ernest Street and Service Road (see Figure 1.2-1). The FPWWTF is located in an industrial area on a site that is bounded by Service Road to the west, Terminal Road to the North and East, and New York Avenue to the south. Adjacent to the Northwest corner of the facility is Providence's City Garage, and across Terminal Road to the northeast are oil storage tanks. Across Terminal Road is a ship loading/unloading operation, and across New York Avenue is a scrap metal handling company. Passing near the FPWWTF is an active freight railroad track.

The area in and around the FPWWTF is characterized by heavy truck and railroad traffic, dust, and noise that are typical of industrial areas. The FPWWTF is adjacent to the Providence River but there are no wetland areas, wooded areas, or other environmentally sensitive areas or wildlife habitats on or adjacent to the FPWWTF site. Because the shoreline is fully developed with industrial facilities, it does not support wildlife on the west bank of the Providence River. The east bank of the river does support wildlife. Activities at the FPWWTF would impact the river only, through the quality of the facility's treated effluent.

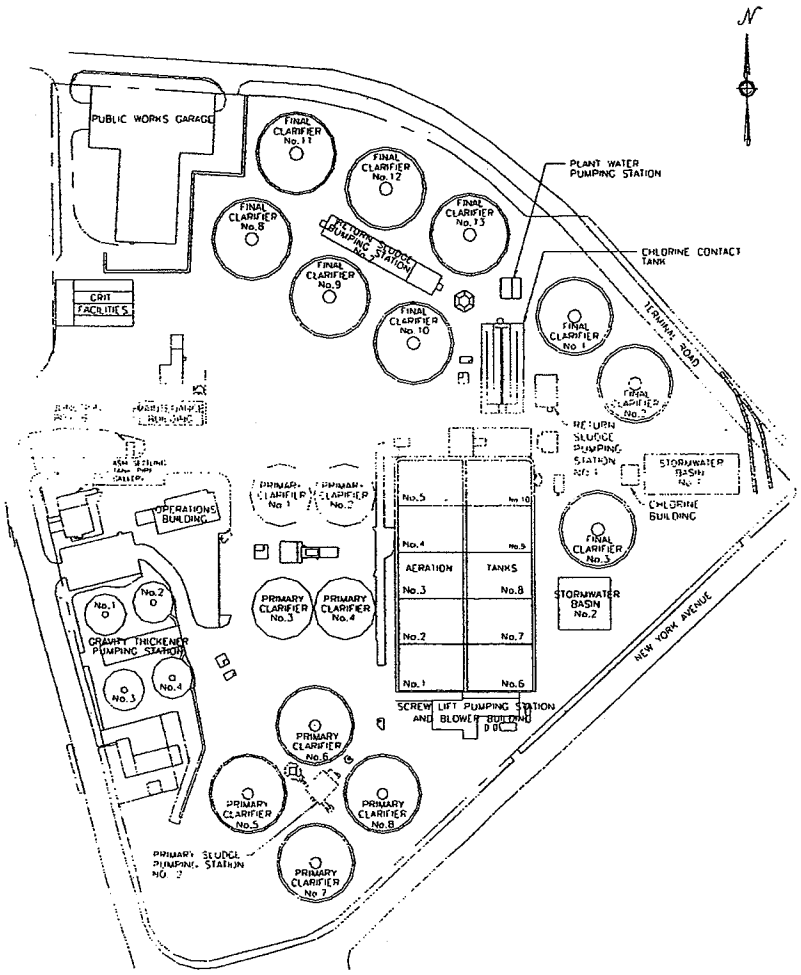

FIGURE I.2-1 PLANNING AREA - FIELD'S POINT WASTEWATER TREATMENT FACILITY (FPWWTF)

I.3 NARRAGANSETT BAY COMMISSION

The FPWWTF is owned and operated by the NBC. The NBC is a public corporation that was created in 1980 to operate and maintain the FPWWTF and its tributary interceptor sewers and pumping stations. Lateral sewers are still owned and operated by the local communities. In 1992 the NBC took over the Bucklin Point Wastewater Treatment Facility (BPWWTF) and its tributary interceptors and pumping stations, all of which had been under the jurisdiction of the Blackstone Valley Sewer Commission.

A Board of Commissioners oversees all the NBC's activities. An Executive Director manages four main divisions: Executive Division, Administration and Finance Division, Planning, Policy, and Regulation Division, and the Engineering/Operations Division. Operation of the FPWWTF and the BPWWTF is the responsibility of the Engineering/Operations Division.

The NBC operates a wastewater pretreatment program to control discharges of wastewater constituents that could adversely impact the treatment process at the FPWWTF and BPWWTF. The program is operated by the Planning, Policy, and Regulation Division.

I.4 FIELD'S POINT WASTEWATER TREATMENT FACILITY

I.4.1 Facility Description

The FPWWTF is designed to treat an average flow of 65 million gallons per day (mgd) and a peak flow of 200 mgd. The influent flow to the facility consists of a combination of wastewater and stormwater ("combined" wastewater) from the City of Providence, the Town of North Providence, the Town of Johnston, and parts of the Town of Lincoln and the City of Cranston. Domestic, commercial, and industrial wastewaters make up the wastewater portion of the influent flow. Figure I.2-1 in Section I.2 provides a plan view of the treatment facility; Figure I.4.1-1 is a process flow diagram for the FPWWTF.

The treatment facility utilizes the activated sludge treatment process, incorporating grit removal, primary clarification, secondary aeration, final clarification, chlorination, dechlorination, and final discharge to the Providence River. The majority of the flow is pumped to the treatment facility by the Ernest Street Pumping Station; a small portion of the flow is pumped by the Washington Park Pumping Station. Screens at these two pumping stations remove large debris from the flow. All flow to the treatment facility receives preliminary and primary treatment.

Hydraulically, the FPWWTF was designed to provide full primary treatment for up to 200 mgd and full secondary treatment for up to 77 mgd under the 25-year flood conditions. It was also designed to hydraulically pass up to 200 mgd through primary treatment and up to 91 mgd through secondary treatment at the 100-year flood conditions. The 123 mgd that receives only primary treatment (200 mgd -77mgd) is routed to an outfall channel to pass directly into the Providence River.

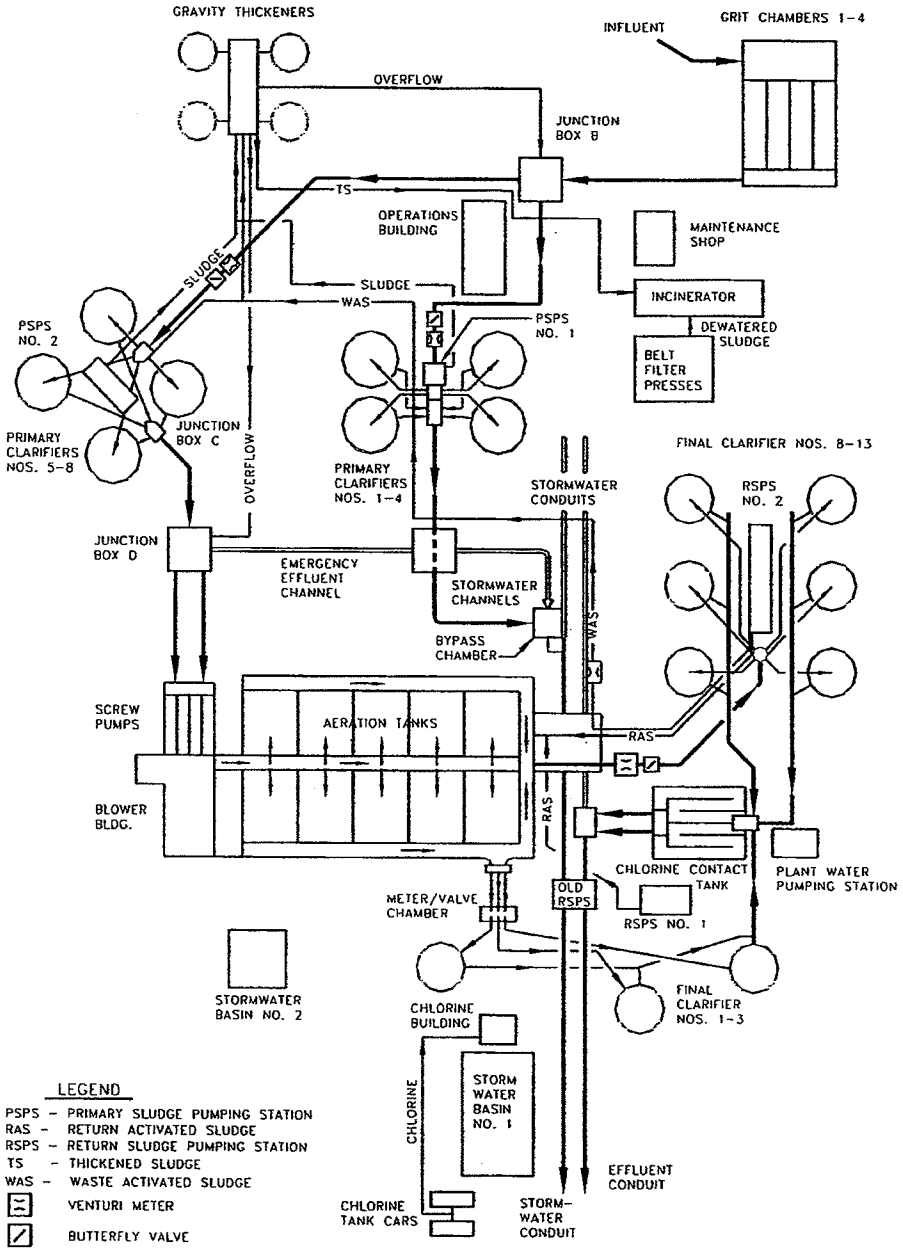

FIGURE I.4.1-1: FPWWTF PROCESS FLOW DIAGRAM

Two pumping stations limit the flow rate to the FPWWTF - the 200 mgd Ernest Street Pumping Station and the 3.88 mgd Washington Park Pumping Station (the FPWWTF can handle the extra 3.88 mgd). Flows in the sewer system in excess of 200 mgd are diverted to combined sewer overflow structures. In the near future, a significant portion of combined sewer/stormwater flow will be routed to storage tunnels then pumped to the FPWWTF at a rate consistent with the WWTF's secondary treatment capacity. Since wastewater flows are not expected

to increase beyond the design values presented in Table 1.4.2-1, the WWTF is expected to remain hydraulically adequate over the planning period.

Referring to Figure 1.4.1-1, all flow (up to 200 mgd) entering the plant passes through the grit chambers. The grit removed from these chambers is disposed of in a landfill. Up to 91 mgd for one hour, and up to 77 mgd thereafter, is directed to Primary Clarifier Nos. 5-8. From these clarifiers, the flow is lifted into the aeration tanks with screw lift pumps. Following the aeration tanks the flow passes into the final clarifiers, the chlorine contact tank, and is discharged to the Providence River. All flow in excess of 91 mgd or 77 mgd, as applicable, is routed to Primary Clarifier Nos. 1-4. This flow receives only primary treatment and disinfection, then is discharged to the Providence River.

In the aeration tanks, of which there are ten, the wastewater is vigorously mixed with air and mixed liquor. The air provides mixing and oxygen for the mixed liquor microorganisms. Five centrifugal blowers, which are located in a blower building, provide the air to the aeration tanks. Air is introduced into the aeration tanks through 7-inch diameter ceramic fine-bubble diffusers that cover the floor of each tank.

Following the aeration tanks, the mixed liquor flows to Final Clarifiers No.'s 1-3 and 8-13 where the microorganisms settle out of the liquid. The microorganisms are returned to the aeration tanks as "return activated sludge" with nine centrifugal pumps located in two return sludge pumping stations. A portion of the return sludge is diverted to the gravity thickeners as "waste activated sludge," where it is blended and thickened with primary sludge. A contract operator removes the thickened sludge by truck for final disposal at a licensed facility.

From the final clarifiers the wastewater flows into the chlorine contact chamber, where disinfection occurs. Here, sodium hypochlorite solution is mixed into the wastewater to kill pathogens. To protect aquatic life against the toxic effects of chlorine, the disinfected wastewater is dechlorinated with a sodium bisulfite solution. Following chlorination-dechlorination, the treated wastewater (effluent) flows through a conduit to the Providence River.

A portion of the effluent is reused for sodium hypochlorite dilution water, and general service water for miscellaneous uses such as floor and equipment washdown (service water is available at hose stations).

An ABB/Bailey Infi-90 computer system controls plant processes, collects, stores and displays plant operating data, and actuates plant process alarms. The system consists of five redundant process servers located in the Operations Building, the

Ernest Street Pumping Station and the Return Sludge Pumping Station No.1. There are also twelve redundant "process controllers" located at various locations throughout the treatment facility. Control of all automatic plant processes is handled by the process controllers.

I.4.2 Facility Design Data

The basic design loadings that were used for design of the FPWWTF upgrade in the early 1980's are presented in Table I.4.2-1. Because the WWTF was not required to remove nitrogen for the upgrade, nitrogen loadings were not considered in the design loadings. For this Facility Plan Amendment, however, nitrogen loadings are key to evaluation of nitrogen removal methods. Under section III, therefore, nitrogen loadings have been established as a basis of design of nitrogen removal systems.

As currently configured, the treatment facility is designed to remove a minimum of 85% of the total suspended solids and BOD_5 in the influent wastewater, except for sustained flows in excess of 77 mgd, which do not receive secondary treatment. The removal efficiencies associated with these excess flows are about 50% for total suspended solids and 35% for BOD_5.

Table I.4.2-1: Basic Design Data

Component			Design Year Initial 1983	Design 2003
Flow, mgd	Primary Treatment	Average Daily	61	65
		Peak Wet Weather	200	200
Flow, mgd	Secondary Treatment	Average Daily	61	65
		Maximum Daily	77	77
		Peak Hourly	91	91
BOD_5, lb/d		Average Daily	66,430	68,530
		Maximum Week	82,390	85,060
Total Suspended Solids, lb/d		Average Daily	68,530	83,910
		Maximum Week	85,060	104,970

I.4.3 Current RIPDES Permit Limits

The current RIPDES permit was issued on December 31, 2001, became effective on February 1, 2002 and expires on February 1, 2007. On June 27, 2005, RIDEM issued final modifications, effective on August 1, 2005, to the RIPDES permit requiring a total nitrogen average monthly discharge concentration limit of 5.0 mg/L and a loading limit of 2711 pounds per day during the months of May through October. On July 12, 2005, the NBC requested a Stay from the Final Modifications and on July 25, 2005, the NBC requested a Hearing to reconsider and/or contest the permit. On June 16, 2006, the NBC and RIDEM entered into a consent agreement in lieu of the Administrative Hearing. A copy of the permit and the modification and the consent agreement are contained in Appendix A. A summary of the permit limits is presented in Table I.4.3.1. The recommendations of this Facility Plan Amendment will, when implemented, improve the water quality of the Providence River and Narragansett Bay by reducing the nitrogen loading to both.

Table I.4.3-1 : RIPDES Permit Effluent Limitations

		Discharge Limitations			
Effluent Characteristic	**Average Month**	**Maximum Day**	**Average Month**	**Average Weekly**	**Average Daily**
A. SECONDARY TREATMENT OUTFALL (OUTFALL NO. 001A)					
Flow to Plant Headworks (1)		**Flow to be reported**			
Flow to Secondary Treatment	**65 mgd**	**77 mgd**			
BOD_5	**16,263 ld/d**	**32,109 lb/d**	**30 mg/L**	**45 mg/L**	**50 mg/L**
BOD_5 - % Removal	**85%**				
TSS	**16,263 lb/d**	**32,109 lb/d**	**30 mg/L**	**45 mg/L**	**50 mg/L**
TSS - % Removal	**85%**				
Settleable Solids	**Monitor for plant performance**				

Table I.4.3-1 - Continued
RIPDES Permit Effluent Limitations

Discharge Limitations					
Effluent Characteristic	Average Month	Maximum Day	Average Month	Average Weekly	Average Daily
Fecal Coliform			200 MPN/100 ml	400 MPN/100 ml	400 MPN/100 ml
Total Residual Chlorine			65 ug/l		65 ug/l
pH			6.0 SU Minimum		9.0 SU Maximum
FINAL MODIFICATIONS FOR NITROGEN LIMITS (AS OF JUNE 27, 2005)					
Part I.A.3: Total Nitrogen (TKN + Nitrite + Nitrate)					
May-October	2711 lb/d		5.0 mg/L		
Nov.-April	Maximize Removals				
PART 1.A.6 - TREATED WET WEATHER OVERFLOW OUTFALL (OUTFALL NO. 002A)					
Flow to Plant Headworks (1)		123 mgd			
BOD_5			to be monitored		
BOD_5 - % Removal (2)	35%				
TSS			to be monitored		
TSS - % Removal(2)	50%				
Fecal Coliform			to be monitored		
Total Residual Chlorine			to be monitored		
pH			6 SU		9 SU

(1) Flow to the WWTF's headworks shall be reported. All flows received at the headworks shall receive at least primary treatment and disinfection. Up to 77 mgd must receive secondary treatment. Flows

greater than 77 mgd but less than 91 mgd must receive secondary treatment during the first hour of such flows. Flows greater than 77 mgd received after the first hour of such flows shall be diverted to the wet weather treatment facility - outfall 002A.

(2) Compliance with these requirements shall be evaluated based on combined sewer flows generated by storms less than or equal to the one year, six hour storm and treatment received through both the wet weather facility and pump back to the secondary facility.

I.4.4 Adequacy to Handle Loadings

As discussed above, the FPWWTF was upgraded in the 1980's to handle the hydraulic and waste loadings presented in Table I.4.2.1 over a 20-year planning period that ended in 2003. The annual average and maximum daily flows and the maximum week BOD_5 and TSS loadings for 2004 were:

Table I.4.4-1: FPWWTF Influent Loadings for 2004

	Annual Average	Maximum Week
Flow, mgd		
Primary	**45**	**113 (Max. Daily)**
Secondary	**43**	**71 (Max. Daily)**
BOD_5, lb/d	**72,251**	**104,806**
TSS, lb/d	**52,467**	**88,614**

The flow and TSS loadings are below the design loadings established for 2003 and the BOD loadings are greater than the design loadings established for 2003. Despite the greater BOD loadings, the FPWWTF met its BOD_5 and TSS effluent permit limits for all months in 2004, with average monthly BOD_5 being below 24 mg/L for all months and TSS being below 21 mg/L for all months (as noted previously, the RIPDES effluent permit limit for both pollutants is 30 mg/L average monthly concentration). The annual average effluent BOD_5 concentration was 15.2 mg/L and TSS was 15.1 mg/L. Based on current and future expected loadings and current facility performance, the FPWWTF will have adequate capacity over the entire planning period to meet the RIPDES permit limits for all criteria except nitrogen.

I.4.5 Adequacy of Operating Staff

The FPWWTF is staffed by approximately 40 persons in the Operations Division and by approximately 15 persons in the Maintenance Division. An Operations Manager oversees all operation and maintenance activities at the facility. Assisting the Operations Manager are an Assistant Operations Manager and a