2. Introduction

2.1 Background

The City of Rehoboth Beach Wastewater Treatment Plant (RBWWTP) receives wastewater from the City and surrounding areas of Henlopen Acres and Dewey Beach and discharges the treated effluent to the Lewes-Rehoboth Canal. The original RBWWTP was completed in 1989 and was designed to provide a secondary level of treatment, equating to a minimum reduction of 85% of influent concentrations of biological oxygen demand (BOD) and total suspended solids (TSS) (USEPA 2010). Nutrient removal was not a requirement of this discharge permit.

In 1993, Delaware Department of Natural Resources and Environmental Control (DNREC) issued a consent order to implement Biological Nutrient Removal (BNR) at the RBWWTP that was driven by and consistent with the "Comprehensive Conservation and Management Plan (CCMP) for Delaware's Inland Bays" (DNREC 1995). This plan established goals for nutrient reductions throughout the Rehoboth Bays watershed. A final cap on nutrients was established based on the 1989 baseline load. The final cap was established as a 30% reduction in nitrogen and a 70% reduction in phosphorus to be monitored on a rolling annual average. Interim goals of a 15% and 30% reduction in nitrogen and phosphorus discharge, respectively, were also established. Therefore, the plant was upgraded in two phases, in 1994 and 1997, to reduce the nitrogen and phosphorus discharge as required. In 1994, an automated Dissolved Oxygen (DO) control system, consisting of DO probes, blower VFD controls, and a programmable logic controller, was installed in order to achieve simultaneous nitrification/denitrification in the existing oxidation ditches. The system has been operating successfully to remove effluent nitrogen. The 1997 project added a chemical phosphorus removal system and replaced the Ultraviolet (UV) disinfection system that was not reliable with a chlorination/dechlorination system. Minor upgrades were also implemented at the plant in 2002 to improve grit removal.

2.2 Project Need

Section 303(d) of the Federal Clean Water Act requires states to identify water bodies that do not meet water quality standards and to impose a Total Maximum Daily Load (TMDL) on both the point and non-point sources that discharge to the water bodies that do not meet the water quality standards for its intended use (USEPA 2002). Water quality monitoring performed by the federal government, the State of Delaware, citizen monitoring groups, and various university and private researchers have shown the Inland Bay (Rehoboth Bay and Indian River Bay), which the Lewes-Rehoboth Canal empties into, to be highly enriched with nitrogen and phosphorus (DNREC 1998). High levels of nutrients lead to eutrophication or the excess growth of algae, which is severely detrimental to water quality. The mats of algae that form deplete the dissolved oxygen as they decay and reduce the water clarity that native animals and plants need to survive. Additionally, algae blooms can hinder human navigation, cause noxious odors, and otherwise affect the aesthetics of the water body (USEPA 2002a). Thus, in 1996, Rehoboth Bay was listed as water quality limited by DNREC and required the development of a TMDL.

The TMDL was issued in December 1998 and required that “all point source discharges which are currently discharging into the Indian River, Indian River Bay, and Rehoboth Bay and their tributaries shall be eliminated systematically” (DNREC 1998). Thus, the City of Rehoboth Beach had to find an alternate method to discharge their treated wastewater effluent.

In December 2002, the terms of the consent order, which addressed the TMDL were finalized between the City of Rehoboth Beach and DNREC, and a revised discharge permit for the RBWWTP was issued in August of 2005. As stated in the plant’s discharge permit, the consent order establishes a firm date of December 31, 2014 for the discharge to be eliminated and the new discharge method to be fully operational (USEPA 2005a). A copy of the consent order is included in (Appendix A). To meet the consent order and revised discharge permit, the need for an alternative method of discharge at the RBWWTP was identified.

2.3 Project Purpose and Scope of Environmental Impact Statement

The purpose of the document is to complete an Environmental Impact Statement (EIS) for the proposed project in accordance with the Environmental Review Procedures of the Delaware Water Pollution Control Revolving Loan Fund (WPCRLF) as directed by DNREC. The goal is to determine if the preferred alternative can be supported by the regulatory agencies and public, and if found to be environmentally and socially acceptable, to obtain a Record of Decision in support of the ocean outfall alternative.

Several studies evaluating alternative methods of discharging the treated effluent from the RBWWTP in accordance with the requirements of the consent order have been completed by both the City of Rehoboth Beach and Sussex County (Stearns & Wheler 2005) (Stearns & Wheler 2009) (Whitman, Requardt & Associates, LLP 2009). The alternatives that have been evaluated include:

- No Action
- Nutrient Trading
- Land Application
- Rapid Infiltration Bed
- Ground Water Injection
- Ocean Outfall

These studies have led to consensus by the City that the preferred alternative is to build an ocean outfall for the discharge of treated effluent. This conclusion is based on not only the cost impact to the residents of Rehoboth Beach and the surrounding service areas but also the environmental impact associated with each alternative. Several of the alternatives were determined to be technically not feasible or to have excessive risk.

This EIS document compares the six alternative methods of treated effluent disposal at RBWWTP detailed above through an Alternative Analysis, and focuses on an ocean outfall as the preferred alternative. For the three alternatives determined to be technically feasible, this document presents the effected environment, environmental impacts (both positive and negative), and proposed mitigation methods. A cost benefit analysis for these three alternatives was also performed and is included in (Appendix B).

2.4 Current Treatment

The RBWWTP is an advanced secondary treatment plant that produces an effluent of higher quality than that of a typical secondary treatment plant. The additional level of treatment includes processes to remove nitrogen and phosphorus and filtration to remove additional very fine solids. The service area is primarily residential with some light commercial consisting of shops and restaurants. Thus, the influent wastewater is typical of domestic wastewater treatment facilities. There are no industries and no contributors requiring an industrial pretreatment program.

The plant is designed for an average flow rate of 2.5 million gallons per day (MGD) with a max month design capacity of 3.4 MGD. Because of the seasonal nature of the area, flows vary greatly between the summer and winter months with peak flows occurring on summer holiday weekends. Current average summer and winter flows are shown in Table 2-1 and Figure 2-1.

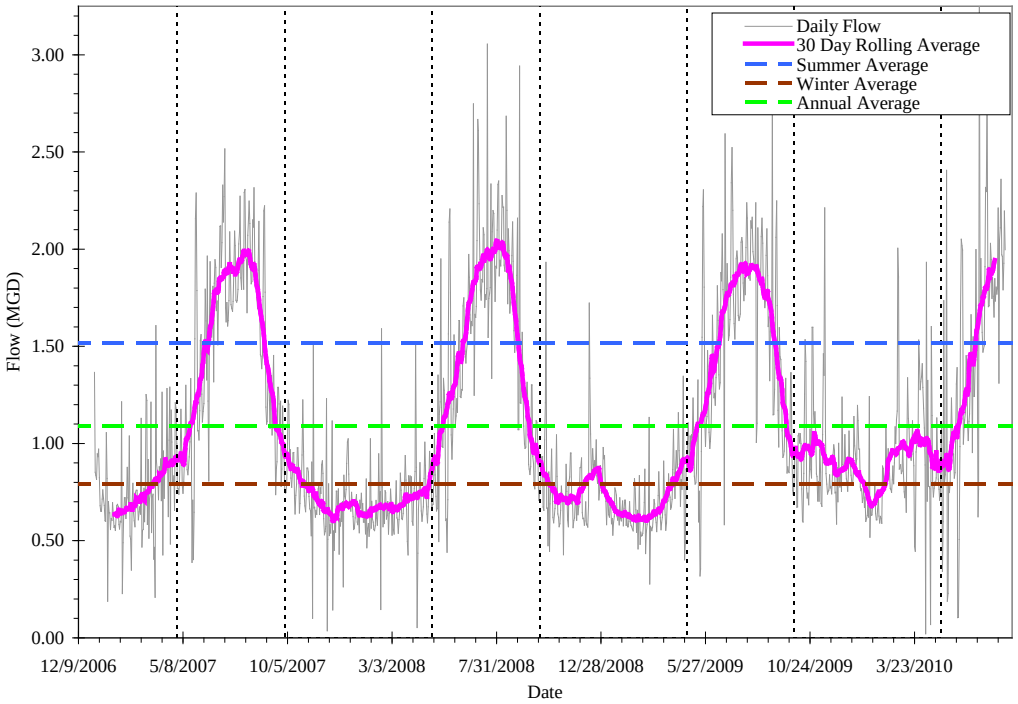
Table 2-1 RBWWTP Measured Average Flows

Description	Flow Rate (MGD)
Summer Average	1.5
Winter Average	0.8
Annual Average	1.1

Note:

1. Average flow data calculated based on flows from January 2007 – July 2010.

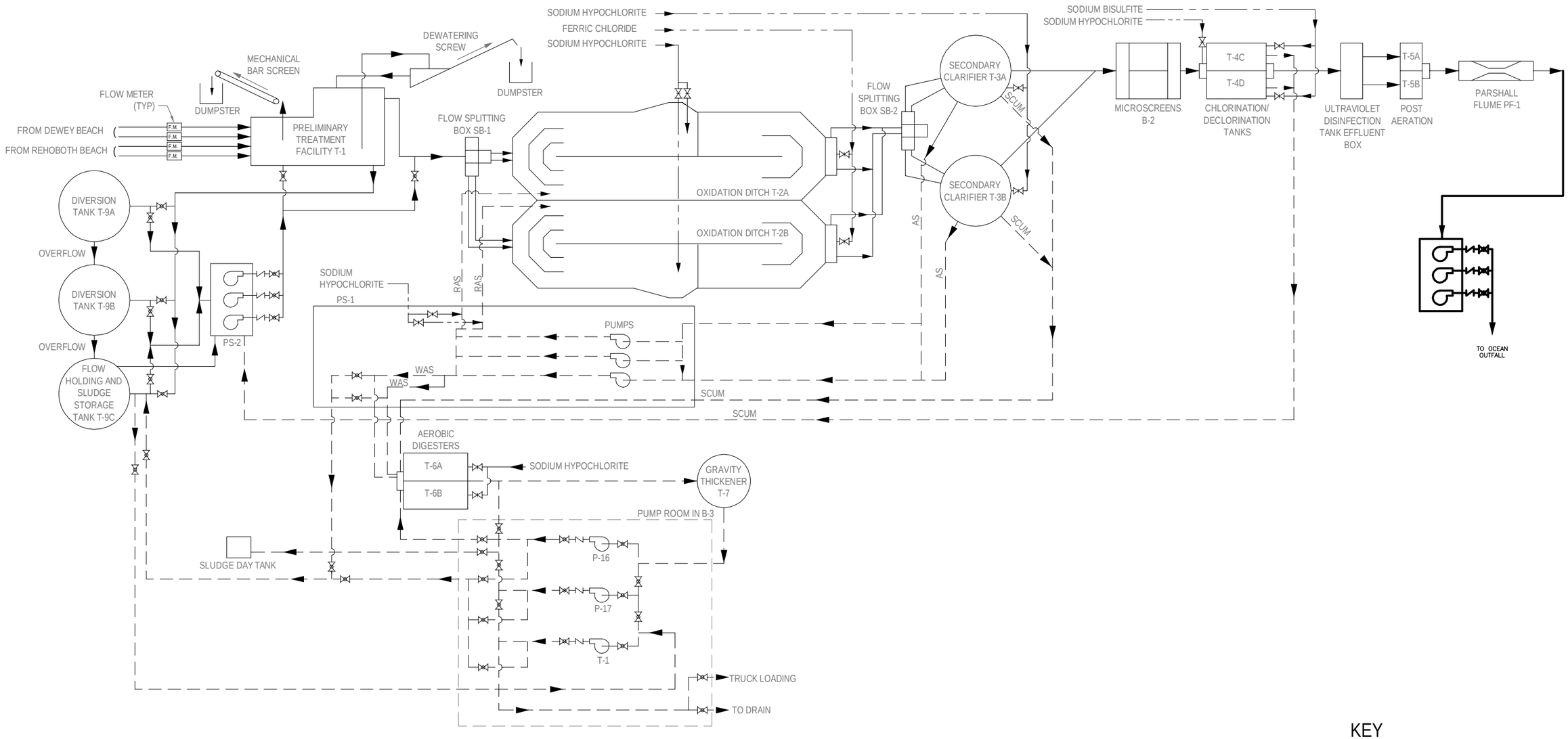
Figure 2-1 RBWWTP Recorded Flows



The plant currently consists of the following treatment processes:

- Screening
- Grit removal
- Activated sludge process
  - Barrier oxidation ditches (2) with cyclical aeration and variable speed DO controlled blowers for carbonaceous Biological Oxygen Demand (BOD) removal, nitrification and denitrification
  - Final clarifiers (2) – 98-ft diameter, 12-ft side water depth
- Chemical phosphorus removal
- Microscreen effluent filtration
- Chlorination
- Dechlorination
- Reaeration

Sludge is aerobically digested and land applied in liquid form. Figure 2-2 shows a process schematic for the RBWWTP. Figure 2-3 shows the existing site plan for the RBWWTP.



PROCESS FLOW DIAGRAM

NOT TO SCALE

KEY

- PLANT FLOW
- OTHER FLOW
- CHEMICAL

NOT TO SCALE

CLIENTS | PEOPLE | PERFORMANCE

CITY OF REHOBOTH BEACH, DELEWARE
ENVIROMENTAL IMPACT STATEMENT

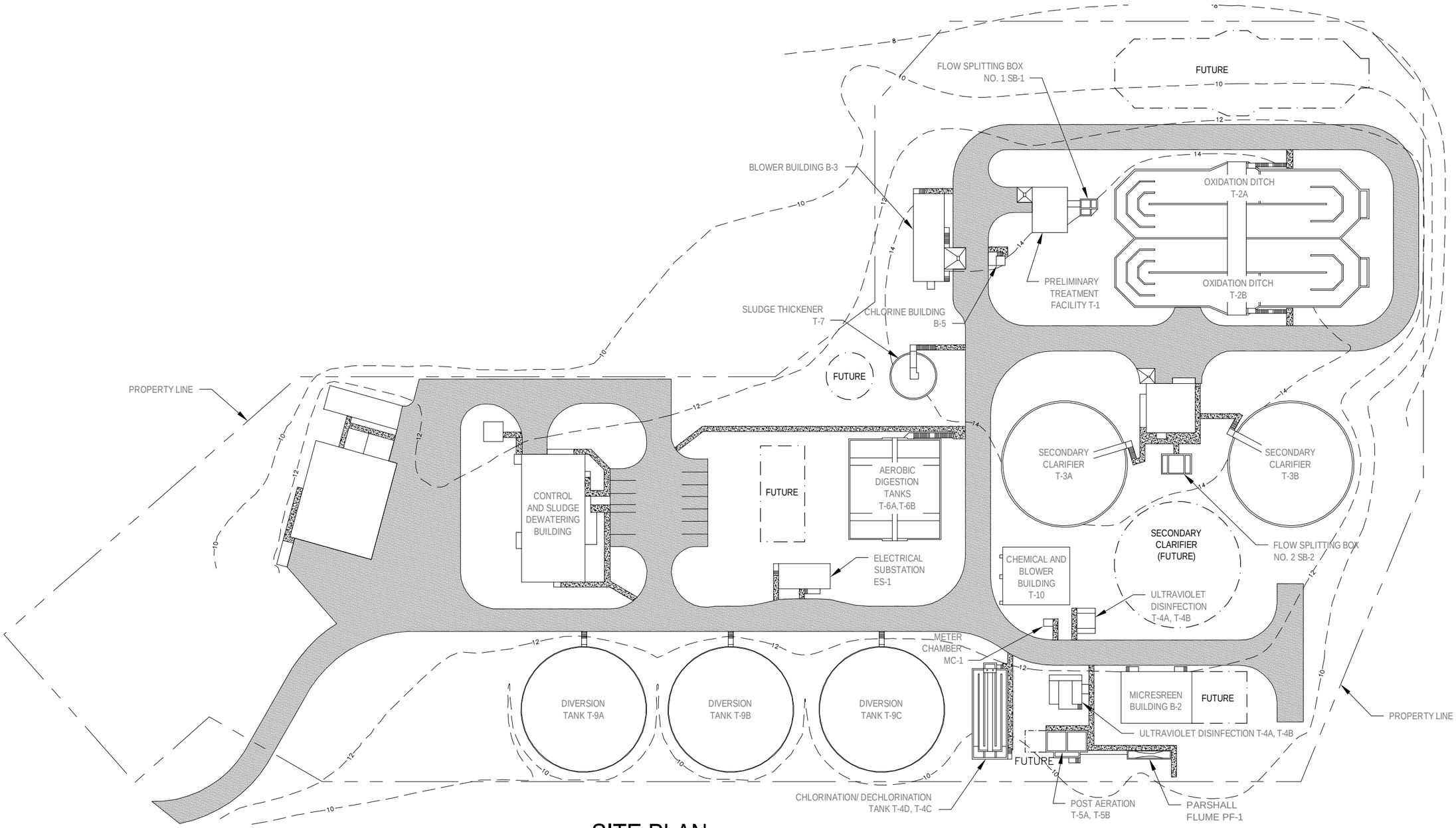
RBWWTP
PROCESS FLOW DIAGRAM

Job Number	86-1432700
Revision	A
Date	9/11

Figure 2-2

16701 Melford Boulevard, Suite 330, Bowie MD 20715 USA T 1 301 805 5629 F 1 301 805 4665 E bowmail@ghd.com W www.ghd.com

THIS PAGE INTENTIONALLY LEFT BLANK



SITE PLAN

SCALE: 1"=80'-0"

0 40 80 120

SCALE 1"=80' AT ORIGINAL SIZE

GHD

CLIENTS | PEOPLE | PERFORMANCE

CITY OF REHOBOTH BEACH, DELAWARE
ENVIROMENTAL IMPACT STATEMENT

RBWWTP EXISTING SITE PLAN

Job Number	86-1432700
Revision	A
Date	9/11

Figure 2-3

16701 Melford Boulevard, Suite 330, Bowie MD 20715 USA T 1 301 805 5629 F 1 301 805 4665 E bowmail@ghd.com W www.ghd.com

Plot Date: 14 September 2011 - 4:50 PM Cad File No: G:\86\14327\Task 5 - WWTP Facility Plan\CAD\EIS Figures\14327-FIG-2.2-2-SITE_PLAN.dwg

THIS PAGE INTENTIONALLY LEFT BLANK

2.4.1 Effluent Requirements

The RBWWTP operates under State Permit No. WPCC 3084D/74. The effluent limits of that permit, issued by DNREC are summarized in Table 2-2.

It is anticipated that under the renewed permit, the daily average and daily maximum BOD_5 limits will be revised to 15 and 23 mg/L, respectively. The other parameters will likely stay at their current limits although the Annual Waste Load Allocation (WLA) for nitrogen and phosphorus would not be required if the proposed discharge location is in the ocean. The WLA was based on the TMDL that was developed for the Inland Bays. If the permit requirement pertaining to the WLA for nitrogen and phosphorus was eliminated, the City would still intend to operate the plant as they have for nutrient removal.

Table 2-2 Rehoboth Beach NPDES Permit Limits (USEPA 2005a)

Parameter	Permit Requirement	Unit	Basis
Flow	3.4	MGD	Max Month
BOD_5	19[(1)]	mg/L	Daily Average
	29[(2)]	mg/L	Daily Maximum
TSS	15	mg/L	Daily Average
	23	mg/L	Daily Maximum
TN	24,300	lbs/yr	Annual rolling average [(1)]
TP	5,308	lbs/yr	Annual rolling average [(1)]
DO	>5.0	mg/L	Continuous
pH	6.0 – 9.0	Std. units	Continuous
Enterococcus	10	Colonies/100 mL	Geometric mean
Total Residual Chlorine	None Detectable		

Notes:

1. Future permit anticipated to limit average BOD_5 to 15 mg/L.
2. Future permit anticipated to limit maximum BOD_5 to 23 mg/L. Maximum BOD_5 might be limited to 15 mg/L under the ocean outfall alternative, based on the limits currently imposed on the nearby South Coastal RWF, which discharges through an ocean outfall.

2.4.2 Performance

The RBWWTP is currently meeting and exceeding the current existing permit limits with effluent concentrations and loading well below the permitted amounts. Table 2-3 summarizes recorded effluent data.

Table 2-3 Rehoboth Beach WWTP Current Effluent Performance Data

Parameter	Measured Concentration (mg/L)	Current Annual Average Load (lbs/yr)[1]	Anticipated Annual Average Load (lbs/yr)[2]
BOD	2.8	9,190	21,220
TSS	5.4	15,090	40,990
TN	6.2	17,120	47,470
TP	0.3	1,180	2,650
DO	8.6	---	---
pH	6.6	---	---
Enterococcus	2.7 Colonies / 100 mL	---	---

Notes:

1. Performance data based on January 2007 – July 2010. Annual average flow for reported period was 1.1 MGD.
2. Anticipated Annual average flow is 2.5 MGD.

The design capacity of the RBWWTP is considered adequate, and there are no plans to expand the capacity either now or in the future. It is anticipated that upgrades will be implemented throughout the RBWWTP before the new effluent discharge solution is executed. This will include at a minimum an upgrade to the filter system and the solids handling equipment. The purpose of the upgrades is to extend the useful life of the RBWWTP and to improve plant reliability.