# MAP, PLAN AND REPORT

# FOR

# COUNTRY CLUB ESTATES SEWER DISTRICT

# CONNECTION TO ARLINGTON SEWAGE TREATMENT PLANT

## TOWN OF POUGHKEEPSIE

## DUTCHESS COUNTY, NEW YORK

**August 13, 2014**

**MA # 213405.21**

**PREPARED BY:**

# TABLE OF CONTENTS



**LIST OF APPENDICES**

# I. SUMMARY

## 1.1 Summary

This report has been prepared for the Country Club Estates Sewer District (CCESD) for the decommissioning of the existing sewage treatment facility and connection to the Arlington Sewage Treatment Plant, located in the Town of Poughkeepsie.

This Map, Plan and Report includes the boundaries and general plan for the District and the location of the proposed improvements. This report also discusses the proposed benefit assessment and budgetary estimates for capital improvement costs.

The total estimated capital costs to be bonded for this Improvement of $1,450,000 are assumed to be bonded by level debt bonding for a term of either twenty (20) or thirty (30) years with an assumed interest rate of four percent (4%).

Based upon the cost analysis presented in the Map, Plan and Report, the total existing first year cost for a typical single family home just in the CCESD, as well as the projected first year costs with the proposed improvements for a typical single family home just in the CCESD are as follows:

| Description | Capital Cost | O&M Cost | **Total Cost** |
|---|---|---|---|
| Existing CCESD | $ - | $ 368.55 | **$ 368.55** |
| Proposed CCESD - 30yr Bond | $ 257.54 | $ 276.41 | **$ 533.95** |
| Proposed CCESD - 20yr Bond | $ 327.68 | $ 276.41 | **$ 604.09** |

For the proposed improvements, the total first year cost increase for a typical single family home just in the CCESD would be approximately $ 165.40 assuming a 30 year bond and $235.54 assuming a 20 year bond.

## 1.2 Recommendations

It is recommended that the Town Board review and accept the findings in this Map, Plan and Report for improvements in the District as set forth in Town Law Section 202-b. The Town Board should determine whether a 20 year or 30 year bond is appropriate for payment of the proposed capital costs.

# II. INTRODUCTION

## 2.1 Background

The original Map, Plan and Report for the Country Club Estates Sewer District (CCESD) and subsequent extensions are on file with the office of the Town Clerk. The Country Club Estates Sewer District is a Town Sewer District that currently serves approximately 129 parcels that are mostly residential but also includes utility company parcels in the Town of Poughkeepsie. The district has two tenants to the District, which are a hotel located west of the district along New York State Route 9 and the Oak Grove Elementary School (part of the Wappinger's Central School District). The CCESD currently discharges wastewater to its own wastewater treatment facility (WWTF) located just west of the main district area. The existing WWTF is operated and maintained by the Town of Poughkeepsie.

The wastewater within the CCESD is conveyed by a series of gravity sewer mains and pump stations with force mains to the wastewater treatment facility. The existing wastewater treatment facility was constructed in the 1960s and is near the end of its useful life. An analysis of the costs to replace the treatment facility was completed as part of the "Country Club Estates Waste Water Treatment Facility Engineers Report" in September of 2013. A copy of this report is included in Appendix A of the Map, Plan and Report.

Based upon the higher costs required to replace the existing wastewater treatment facility, it has been proposed to install a new wastewater pump station, with a force main connection to the Arlington Sewage Treatment Plant wastewater collection system, and then remove the existing wastewater treatment facility.

## 2.2 Purpose and Scope

The purpose of this Map, Plan and Report is to describe the proposed improvements to the collection system to allow for a connection into the Arlington Sewage Treatment Plant wastewater collection system, as well as measures to decommission the existing plant.

In order to develop the above information, this report shall evaluate the proposed improvements, and provide an analysis of the estimated capital costs along with long-term financing and bonding requirements.

## III. DESCRIPTION OF SERVICE AREA AND RECOMMENDED IMPROVEMENTS

### 3.1 Service Area Boundary

The existing CCESD service area is shown on the District Map included in the back of this report. There are no anticipated modifications to the existing service area as a result of the proposed improvements.

### 3.2 Recommended Improvements

The decommissioning of the existing sewage treatment plant will include demolishing and removal of the existing building, removal of equipment, filling existing manholes with concrete, capping of existing piping, filling existing tanks with suitable imported material and covering the existing sand filters with topsoil. The site will be graded, seeded and mulched.

There is an existing pump station located just before the existing wastewater treatment plant and it is proposed to remove this pump station and replace it with a new pump station on the West side of Route 9, including new pumps, piping, controls and a generator for emergency power supply. Flow from CCE would be directed to the new pump station by a gravity main. There is an existing, unused casing installed as part of NYSDOT Improvements completed in the 1980s that will be used to cross under Route 9 to the proposed pump station. From the pump station, the sewage will go through a force main to an existing manhole and then flow by gravity, through existing sewers and manholes to an existing equalization tank that was installed as part of the Casperkill Ridge development in the 1990s. As part of the proposed improvements, the existing air piping and diffusers at this equalization tank will be replaced. The remaining portions of the existing sewage facilities will not need to be upgraded, as equalized sewage flow would enter the 3 Partners Pump Station and be conveyed by the existing force main to existing gravity lines and eventually to the Arlington Sewage Treatment Plant. A Conceptual Improvement Plan has been included in Appendix B of this Map, Plan and Report.

As part of the proposed improvements, extension of the force main from the existing hotel will be extended to the proposed gravity main.

The proposed improvements will require easements for the gravity main. Permits from the New York State Department of Transportation (NYSDOT) will be required for work to be performed with the State R.O.W.

The proposed improvements are subject to review and approval by the Dutchess County Department of Health and NYSDOT. Detailed design plans and specifications will need to be prepared for the proposed improvements in order to obtain Health Department and NYSDOT approval.

## IV. PROJECT COSTS AND USER COSTS

### 4.1 Capital and O&M Costs

The breakdown of capital costs for the proposed improvements are shown in Appendix C. These costs include all the legal, engineering and other such administrative costs as well as the pipeline connection and related work that would be required for construction of the improvements. The costs also include a capital buy-in required for connecting to the Arlington Sewage Treatment Plant. This buy-in cost was estimated using the average of the last 3 years of water usage and adding a factor for inflow and infiltration. The average flow to be conveyed to Arlington would be 37,000 gallons at a rate of $15 per gallon. The total estimated capital costs for all of the proposed improvements associated with decommissioning the plant, replacement of the pump station and installation, force main installation and upgrades to the equalization, as well as capital costs to buy-in to the Arlington Sewage Treatment Plant would be approximately $1,450,000,

The estimated annual payments for the proposed improvements, utilizing a bonding period of either 20 years or 30 years, are shown in Appendix D of this report. The estimated first year payment would be $106,694 for a 20 year bonding period or $83,854 for a 30 year bonding period.

According to information provided by the Town Comptroller's Office, the 2013 budget for the CCESD was approximately $120,000 and include costs for treatment and collection O&M. Quarterly usage costs were charged, based on the amount of water used by each parcel at a rate of $1.50 per 100 cf of water used, as recorded on individual water meters. As a result of the elimination of the existing sewage treatment plant, it is projected that the total budget, excluding any capital costs for the proposed improvements listed above, would decrease by about $30,000 to approximately $90,000. The quarterly usage charge on the collection system, based on water usage, would remain the same.

### 4.2 User Costs

A. Existing user costs

According to the Town Assessor's Office there are 325.6 benefit units assigned to parcels in the district. One benefit unit is assigned to each residential parcel, with additional benefit units assessed to the hotel, school and utility company parcels. Based on the 2013 estimated budget of $120,000, each benefit unit pays approximately $368.55 to pay for O&M costs associated with collection and treatment.

B. Proposed user Costs

With elimination of the treatment plant the existing district budget would reportedly decrease by $30,000 or by approximately $92.14 per benefit unit. The proposed cost for O&M would be $276.41. The capital costs associated with the District improvements would be $ 257.54 for a 30 year bonding period or $ 327.68 for a 20 year bonding period for each benefit unit assessed.

Based upon the above analysis, the total existing first year cost for a typical single family home just in the CCESD, as well as the projected first year costs with the proposed improvements for a typical single family home just in the CCESD are as follows:

| Description | Capital Cost | O&M Cost | **Total Cost** |
|---|---|---|---|
| Existing CCESD | $ - | $ 368.55 | **$ 368.55** |
| Proposed CCESD - 30yr Bond | $ 257.54 | $ 276.41 | **$ 533.95** |
| Proposed CCESD - 20yr Bond | $ 327.68 | $ 276.41 | **$ 604.09** |

For the proposed improvements, the total first year cost increase for a typical single family home just in the CCESD would be approximately $165.40 assuming a 30 year bond and $235.54 assuming a 20 bond.

# APPENDIX A

# COUNTRY CLUB ESTATES WASTEWATER TREATMENT FACILITY
# ENGINEER'S REPORT

## TOWN OF POUGHKEEPSIE
## DUTCHESS COUNTY, NY

PREPARED FOR:

TOWN OF POUGHKEEPSIE TOWN BOARD
1 OVERROCKER ROAD
POUGHKEEPSIE, NY 12603

MA# 213405.00

SEPTEMBER 2013

PREPARED BY:

TABLE OF CONTENTS

APPENDICIES



FIGURES

TABLES

## 1.0 Executive Summary

The Country Club Estates Wastewater Treatment Facility is located off of Rochambeau Lane in the Town of Poughkeepsie, Dutchess County NY. It was constructed in the mid 1960's to serve Country Club Estates, a 170 lot residential subdivision. The plant discharges into the Casperkill Creek, a NYSDEC Class C stream.

An inspection by the DEC on June 5, 2013 indicated the need for replacement of the existing equipment. Although the effluent quality from the facility currently meets or exceeds the minimum requirements of the SPDES permit, the age of the plant has created significant deterioration of the steel tankage at the facility. Their letter is included in Appendix A of this report.

The facility operates under SPDES permit # NY-0034606. A copy of this permit is included in Appendix A of this report. The general limits of the permit are as follows:

- Flow: 0.06 MGD
- UOD: 70 mg/L and 35 LBS/DAY
- TSS: 30 mg/L and 15 LBS/DAY
- Fecal Coliform: 200/100mL
- Settleable Solids: 0.1 mL/L
- pH: 6.5 to 8.5 SU
- Dissolved Oxygen: >2.0 mg/L

The facility currently consists of the following unit processes:

- Pump Station
- Comminutor
- Secondary Treatment via Extended Aeration
- Secondary Clarifiers
- Sand Filters
- Disinfection via Chlorination
- Sludge Holding Tanks

A buried equalization tank is also onsite but appears to have been removed from the treatment process. The facility consists of two identical trains of treatment after the comminutor chamber. Subsequent to the construction the facility has also accepted flows from the Oak Grove Elementary School as well as the nearby Mercury Grand Hotel.

The facility is generally operating well as observed during the study period of January 2012 through May 2013. The facility meets permit requirements consistently with the exception of flow. Significant Inflow and Infiltration (I&I) appears to be present, producing large flows during wet weather. It is felt that the open sand beds contribute significantly to these flows and is likely responsible, in part, for the flow violations. A faulty flow meter may have also been reading flows higher than actually present. The violations received do not appear to have degraded receiving stream quality; however the DEC indicated that efforts need to be taken to help eliminate these excess flows.

Various options exist to eliminate flow violations. The DEC indicated if the Town was to modify their permit to increase the permitted flow, then it is likely the new permit would have stricter standards in accordance with current policies and this would be very likely to require more advanced treatment then the current technology or a replacement in kind of existing equipment can provide. Therefore it is recommended to maintain the existing SPDES permit, upgrade the facility to replace in kind, and continue to treat to the current SPDES limits. The recommended upgrade includes the following components:

- Flow Equalization – At the current permitted flow of 60,000 gpd, approximately 20,000 gallons of equalization would be required. This would require an additional 10,000 gallons of storage be added to the existing equalization system.

- Install new comminution to process rags coming into the facility.

- The existing steel package plant would remain online as much as possible, with a new package plant being placed adjacent to the existing facility. The tanks of the new package plant would be constructed out of crystalline waterproofed concrete which should provide a longer life span than steel or regular concrete.

- Re-use the existing sand beds/dosing tank.

- Replace the chlorination system with UV disinfection.

- Install alarms on components to alert the operators of an issue that needs attention. Alarms on critical components would alert operators regardless of their location.

- Install a backup generator at the facility.

A total capital cost for this replacement in kind upgrade is estimated in Table 6-1 at $1,590,000. If it is desired to treat to a higher standard in accordance with likely permit limits and regulations, the total capital cost is estimated in Table 6-2 at $1,690,000.

## 2.0 Introduction:

### 2.1 Background:

The Country Club Estates Wastewater Treatment Facility is located off of Rochambeau Lane in the Town of Poughkeepsie, Dutchess County NY. It was constructed in the mid 1960's to serve Country Club Estates, a 170 lot residential subdivision. The plant discharges into the Casperkill Creek, a NYSDEC Class C stream.

The facility operates under SPDES permit # NY-0034606. A copy of this permit is included in Appendix A of this report. The general limits of the permit are as follows:

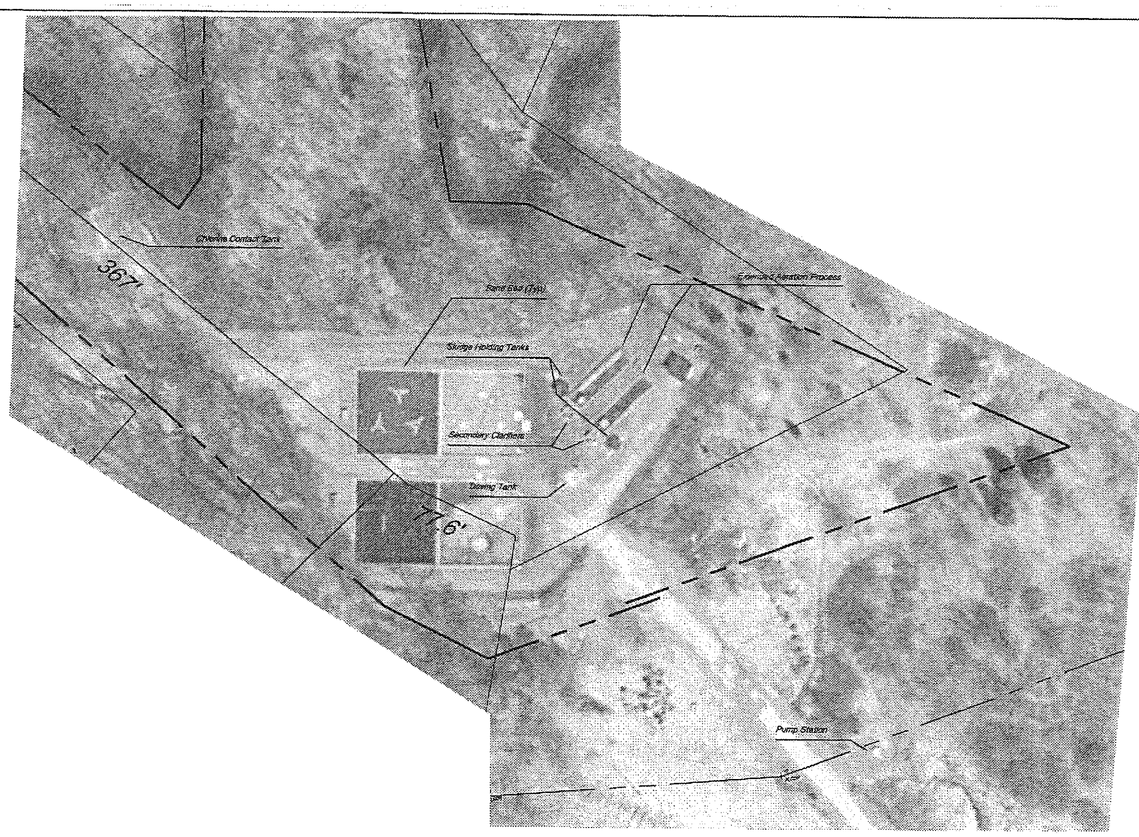
- Flow: 0.06 MGD
- UOD: 70 mg/L and 35 LBS/DAY
- TSS: 30 mg/L and 15 LBS/DAY
- Fecal Coliform: 200/100mL
- Settleable Solids: 0.1 mL/L
- pH: 6.5 to 8.5 SU
- Dissolved Oxygen: >2.0 mg/L

The facility currently consists of the following unit processes:

- Pump Station
- Comminutor
- Extended Aeration Treatment
- Secondary Settling Tanks
- Tertiary Filtration via Sand Filters
- Chlorine Contact Tanks
- Sludge Holding Tanks

A process layout is shown as Figure 2-1 and a schematic is shown in Figure 2-2. The facility consists of two identical trains of treatment after the comminutor chamber. Subsequent to the construction the facility has also accepted flows from the Oak Grove Elementary School as well as the nearby Mercury Grand Hotel.

An inspection by the DEC on June 5, 2013 indicated the need for replacement of the existing equipment. Although the effluent quality from the facility currently meets or exceeds the minimum requirements of the SPDES permit, the age of the plant has created significant deterioration of the steel tankage at the facility.

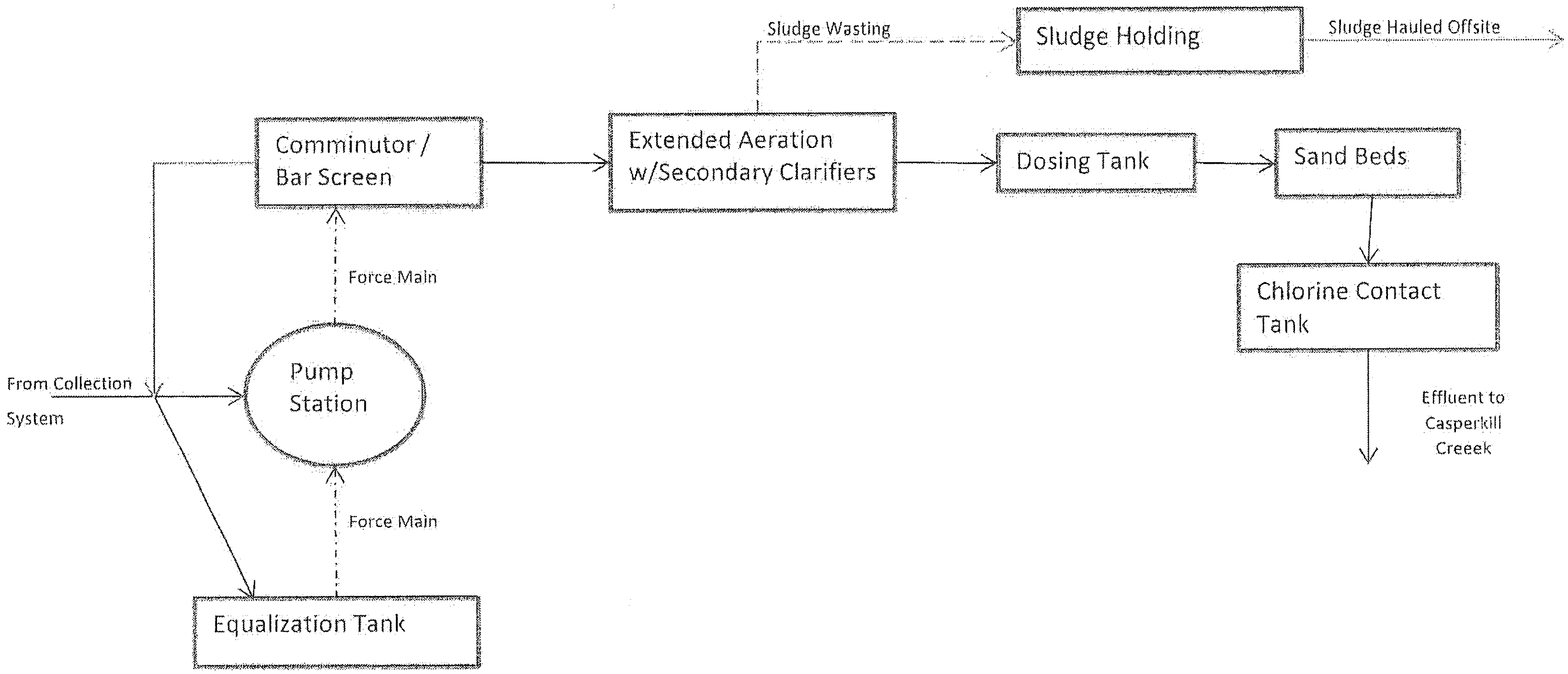



# COUNTRY CLUB WWTF
# EXISTING PROCESS LAYOUT
## PARCEL NO. 134689-6159-01-360803

TOWN OF POUGHKEEPSIE — DUTCHESS COUNTY, NY

FIGURE 2-1 — SCALE: 1" = 60 '

COUNTRY CLUB ESTATES WWTF
EXISTING PROCESS SCHEMATIC
FIGURE 2-2



### 2.2 Purpose and Scope:

The purpose of this report is to evaluate the unit processes of the facility for their effectiveness and the need for replacement or upgrade. This report provides alternatives and recommendations for upgrading the existing treatment facility.

The scope of this report will include:

1. An analysis of the treatment capacity of each component in conformance with accepted design standards and good engineering practices.

2. A cursory hydraulic analysis of the treatment facility to assess the ability to handle existing and future flows.

3. Recommendations for component improvements.

4. A cost analysis of a replacement of units in kind to the maximum extent possible; along with any proposed revisions to the process.

5. A second cost analysis of a replacement of existing equipment with upgraded components to treat to a higher level.

# 3.0 Existing Facility Review

## 3.1 Unit Process Description:

The following is a description of the major unit processes and their function. For reference, the term "10 State Standards" used in this report refers to the Recommended Standards for Wastewater Facilities, 2004 edition; as prepared by the Great Lakes-Upper Mississippi River board of State and Provincial Public Health and Environmental Managers. The 2004 edition is the most recent edition available.

### 3.1.1 Preliminary Treatment

#### 3.1.1.1 Pump Station

All wastewater from the site is conveyed to a pump station that then discharges into the facility. The pump station is a Du-O-Ject station, manufactured by Smith and Loveless Co., and is rated at 140 gpm at 30' TDH (each pump).

#### 3.1.1.2 Equalization Tank

The Town indicated that 10,000 gallons of equalization storage is currently installed via two buried concrete equalization tanks. At present it does not appear that these tanks are in use. The Town indicated that the pumps and slide rails were removed due to corrosion of the slide rails and never replaced. There is a reputed overflow line from the comminutor chamber into this tank and it is therefore assumed then that this tank would only receive flows that backed up from the comminutor during high I&I events.

#### 3.1.1.3 Comminutor/Bar Screen

Wastewater that enters the plant is first directed through a comminutor device that grinds incoming solids down so that they do not damage downstream equipment such as pumps. The operators indicate that the comminutor was removed years ago and was not replaced. Currently the facility relies only on the manually cleaned bar screen to trap incoming rags and larger solids.

### 3.1.2 Secondary Treatment

The effluent from the comminutor/bar screen chamber flows into two identical aeration tanks that constitute secondary treatment.

Secondary treatment is the main treatment phase in the facility. Typically, secondary treatment reduces organic loads to meet SPDES permit levels. The facility currently employs a process known as Extended Aeration to accomplish organic and ammonia reduction.

Extended Aeration is a variation on the traditional activated sludge process that has been in use for nearly 100 years. An activated sludge process is one where bacteria and other microorganisms needed to treat wastewater are kept suspended in the wastewater and aerated to provide enough oxygen. Extended Aeration (EA) involves keeping the wastewater under aeration longer than a traditional activated sludge (typically 24 hours versus 12 or 8 hours) with the elimination of primary clarifiers, usually resulting in a simpler operation.

The key to successful operation of any activated sludge plant is maintaining the correct amount of microorganisms in the aeration tank; which maintained within a typical operating range. The acronym MLSS is typically listed in operational reports. This stands for Mixed-Liquor Suspended Solids and is reflective of the amount of microorganisms present. As the organics are processed the microorganisms consume oxygen and will reproduce faster than they will die off. If the population isn't kept under control then the process would eventually have problems with sludge settling and oxygen. The correct amount depends on many variables such as temperature, influent organic loads, and sludge settling ability among others. Some of these variables are interconnected with one another; however it is typical for EA plants to operate in the range of 3,000 to 5,000 mg/L of MLSS.

As the MLSS requires oxygen to process the organics in the wastewater, a positive displacement blower is located above each aeration tank. These blowers convey air under pressure and into the aeration tanks through the diffusers located near the bottom of each tank. As the air bubble rises to the surface oxygen is transferred into the wastewater.

### 3.1.3 Secondary Clarifiers:

Flow is directed from the aeration tanks into secondary clarifiers. The purpose of these units is to separate solids from the wastewater. The majority of these solids are composed of MLSS as well as solids that entered the facility but didn't break down, or can't be broken down. Any solids that are light enough not to settle out in the time allotted are carried over the weir and conveyed to downstream processes. The solids that have settled to the bottom of the tank are typically pumped by airlift pumps (air is supplied by the same blowers used in aeration) back into the aeration tanks. A smaller portion of the sludge is sent to sludge holding tanks, effectively removing it from the process. This wasting is necessary to maintain optimum MLSS levels in the aeration tanks and provide optimum levels of treatment.

### 3.1.4 Tertiary Filtration:

Wastewater from the secondary clarifiers enters a dosing chamber equipped with two siphons, operating on an alternating cycle. As the wastewater fills the dosing chamber the pressure builds on the siphons. Once the pressure is high enough the siphon will draw a set amount of wastewater through it and down to the open bed sand filters. These siphons require no power and operate automatically.

The sand filters are design to remove any solids that may have carried over the secondary clarifier weir and ensure that the facility meets its permit limit with respect to solids.

### 3.1.5 Disinfection:

The final treatment process for the wastewater is disinfection. Bacteria in the wastewater are required to be inactivated prior to discharge. To accomplish this at this facility, sodium hypochlorite is dissolved into the wastewater as it flows past. The chlorinated water is then conveyed into a contact tank providing the necessary mixing and contact time with the chlorine to provide for disinfection of the wastewater. Mixing is accomplished with power using baffles located in the tank.

### 3.1.6 Sludge Handling

Sludge is essentially wastewater that has high organic solids content. Typical wastewater sludges from treatment plant processes have solids percentages from 0.5% to 3% and all biological wastewater treatment plants produce sludge. Secondary sludge is removed from the secondary clarifiers and is composed of mainly bacteria that have treated the wastewater during secondary treatment. Separate sludge treatment processes can provide thicker sludge (4-8%), however there are no such facilities at this plant.

The facility currently recycles the majority of solids back into aeration, only wasting a small portion to maintain MLSS levels. The wasted sludge is placed into sludge holding tanks and periodically hauled from the facility.

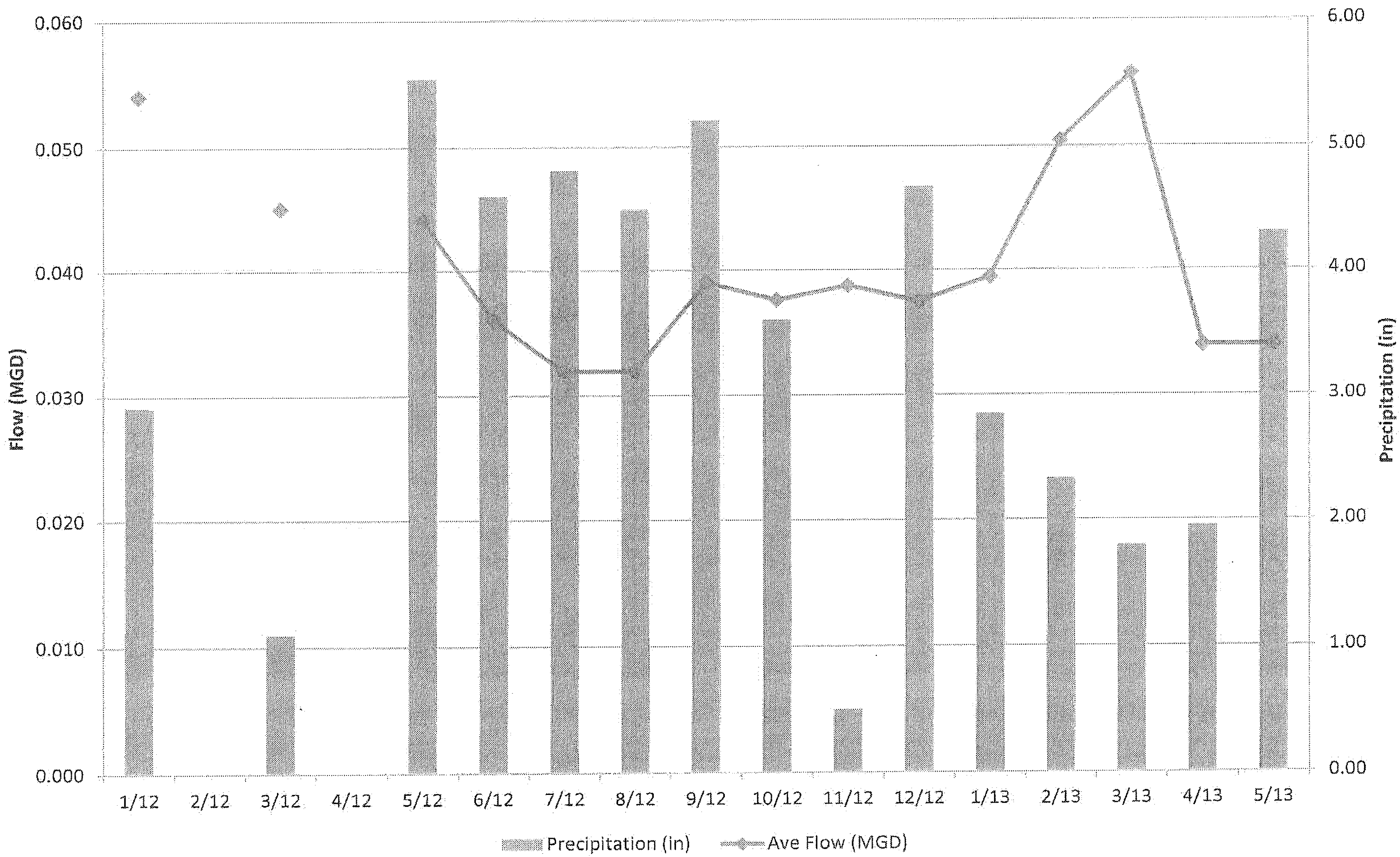
### 3.2 Wastewater Flow Rates

Wastewater that is treated is continuously monitored and recorded by the facility at the effluent of the chlorine contact tank. A statistical analysis of flow data from January 2012 to May 2013 was performed by this office and appears in Appendix B of this report. The results are summarized in Figure 3-1, which shows a wide range of flows. The system is residential in nature with the exception of the school and hotel. Raw data for this analysis is included in Appendix C. During the review of the data, it was discovered that the flow meter at the facility was out of calibration due to the sensor being moved during construction of a new roof. Flow data from mid-October 2012 through March 18, 2013 is felt to be significantly higher than what actually flowed through the facility. The data was adjusted taking this into account for this report; to more closely approximate average flows using information provided by the operators. It should be noted that the adjusted flows must still be treated as rough approximations in terms of accuracy.

Also included in the flows is the effect of rainfall into the treatment tanks directly. Typically not an issue for most small facilities, the large open sand beds at this site can increase flows significantly, and this will be termed in this report as "Direct I&I". A 1" rainfall would increase flows (Direct I&I) by an estimated 7,500 gallons from the sand beds alone. For comparison the aeration tanks would only add approximately 500 gallons in a 1" rainfall. The statistical analyses in Appendix B are not significantly affected by this Direct I&I as the precipitation impacts are averaged over a long period.

The range in flow experienced on a given day is dependent upon the diurnal flow pattern and precipitation as the data indicates significant Infiltration and Inflow (I&I) issues as seen in Figure 3-1. Daily flow data for September 2012, October 2012, and May 2013 was analyzed as these months had dry weather stretches followed by significant (>1") wet weather events. From the data and as shown in Figures 3-2 through 3-4 it

## COUNTRY CLUB ESTATES WWTF ANALYSIS: MONTHLY FLOW VS. PRECIPITATION
## FIGURE 3-1



appears on a cursory level that the collection system has more of an inflow issue rather than infiltration. It should be noted that the October 2012 results uses adjusted data due to reputed flow meter issues as described above.

Using the Average Daily flows, it appears on an average dry weather day, the plant experiences an average flow as low as 0.034 MGD. The wet weather daily max flow can be as high as approximately 0.104 MGD giving a maximum wet weather multiplier of approximately 3.1 over the study period.

This data also shows that the facility can exceed its permitted flow during heavier precipitation days. As no report is available on the existing facility, it is assumed that the SPDES permit limit for flow is equal to the design flow, and therefore any daily flows in excess of the limit could also impair treatment effectiveness. It should be noted that single day exceedences tend not to be SPDES permit violations, as the permit is based on monthly averages.

The overall average flow into the facility, averaging wet and dry weather flows and taking into account the adjusted flows, is 0.040 MGD as shown in Appendix B; or approximately 67% of the assumed design flow.

### 3.3 Existing Wastewater Composition

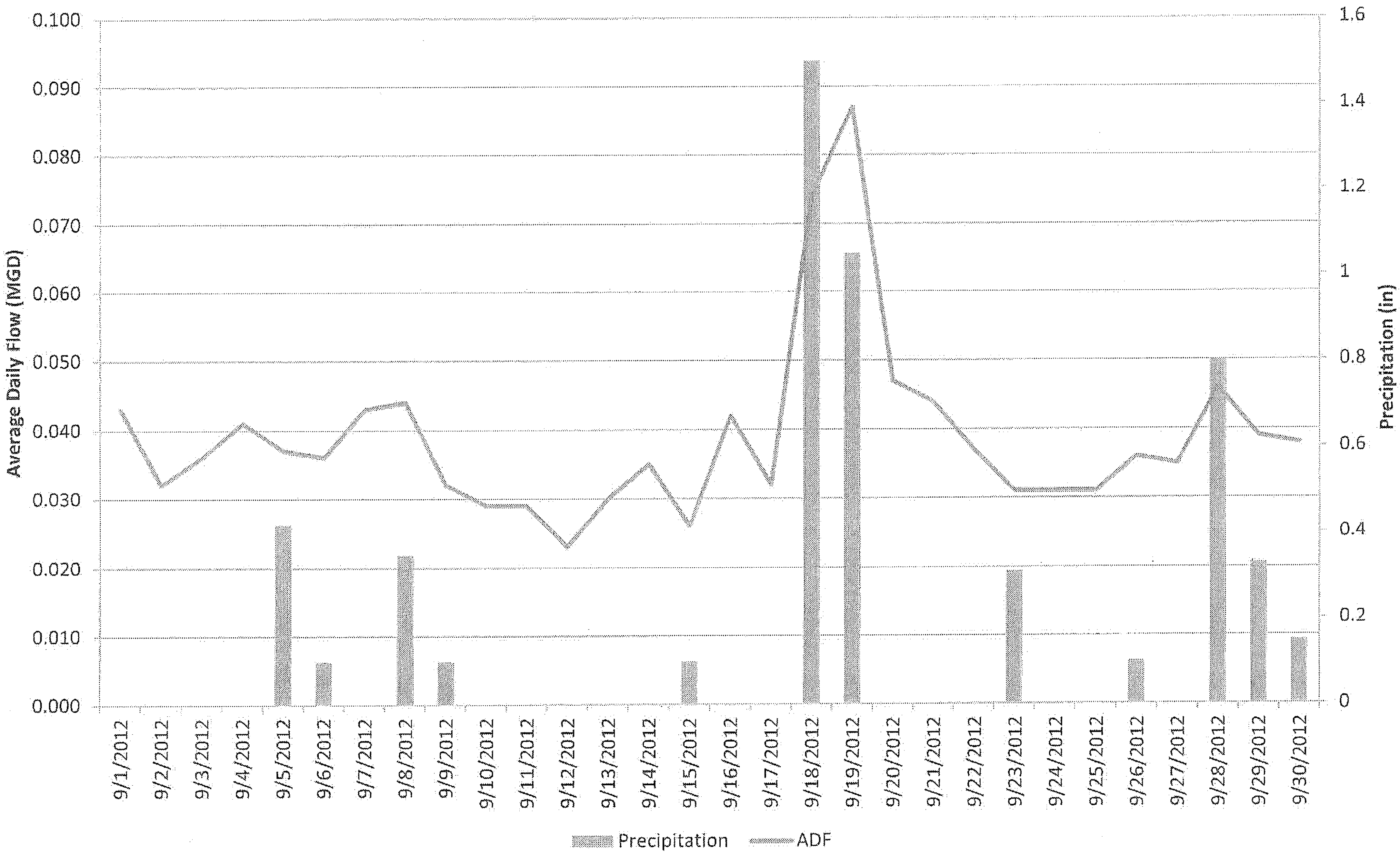
A statistical analysis of plant data was performed by this office to evaluate the facility. The analysis is included in Appendix B.

The average $BOD_5$ is approximately 152 mg/L and the average TSS concentration is approximately 154 mg/L. These levels can be generally characterized as weak to medium strength wastewater. Typical values of raw domestic wastewater, taken from Metcalf and Eddy's **Wastewater Engineering**, are shown below:

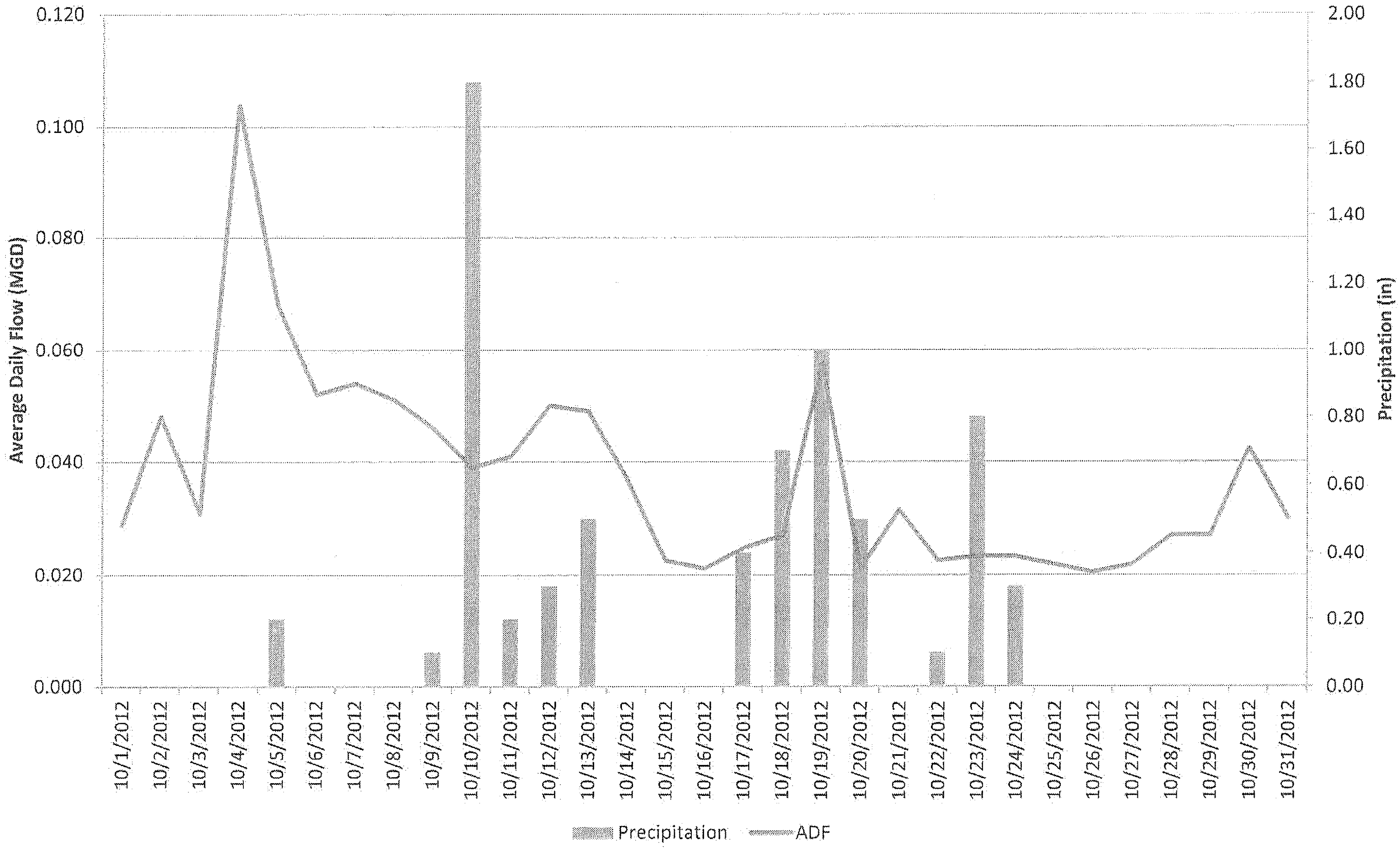
| | Units | Weak | Medium | Strong |
|---|---|---|---|---|
| • $BOD_5$ | mg/L | 110 | 220 | 400 |
| • TSS | mg/L | 100 | 220 | 350 |
| • TKN | mg/L | 20 | 40 | 85 |
| • $NH_3$ | mg/L | 12 | 25 | 50 |

There is no data showing influent ammonia or TKN levels for this facility that were made available. Given that this appears to be weak to medium strength wastewater, it will be assumed for this report that the ammonia

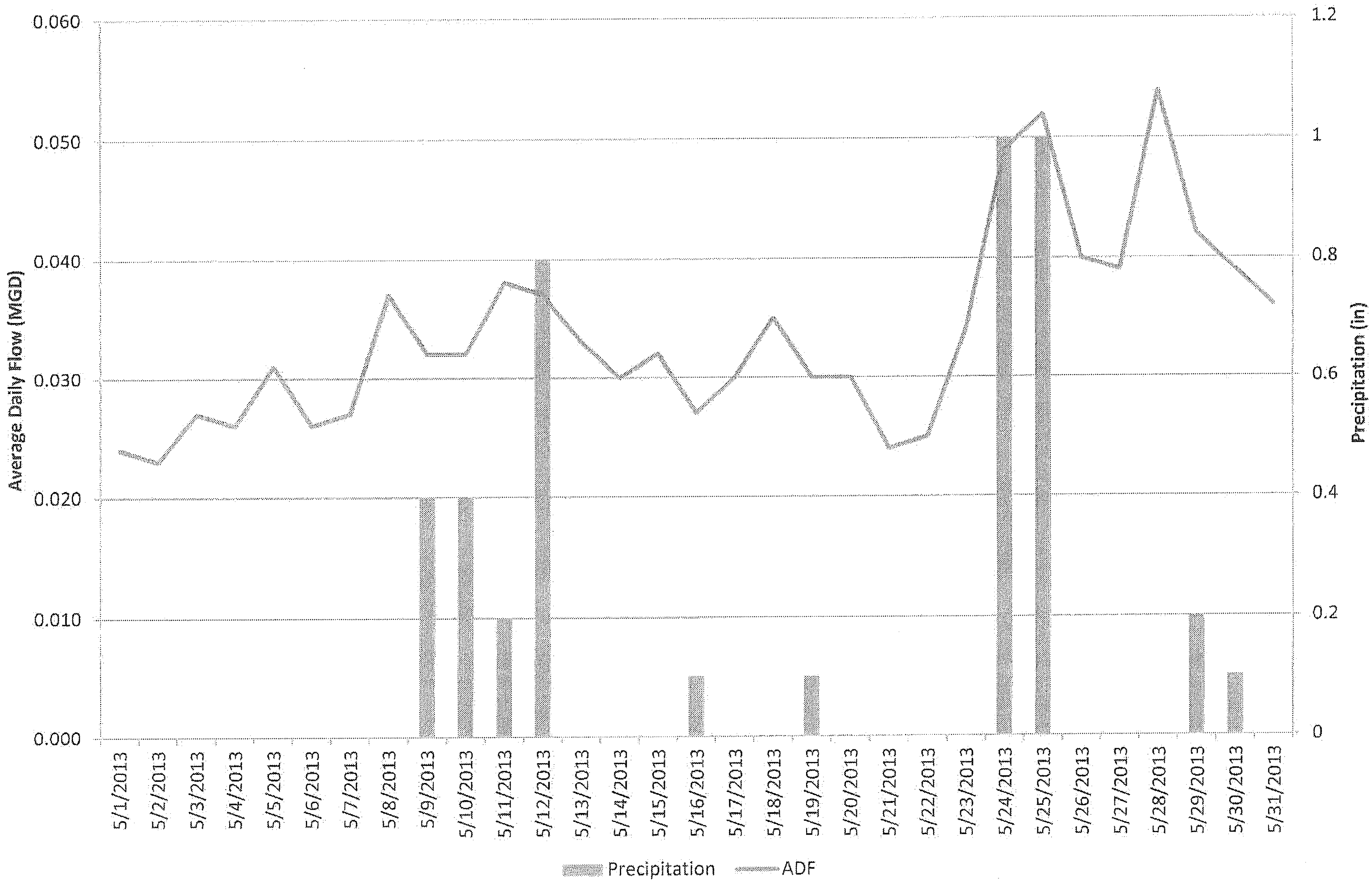
COUNTRY CLUB ESTATES WWTF ANALYSIS: I&I ESTIMATE FOR SEPTEMBER 2012
FIGURE 3-2



## COUNTRY CLUB ESTATES WWTF ANALYSIS: I&I ESTIMATE FOR OCTOBER 2012
## FIGURE 3-3

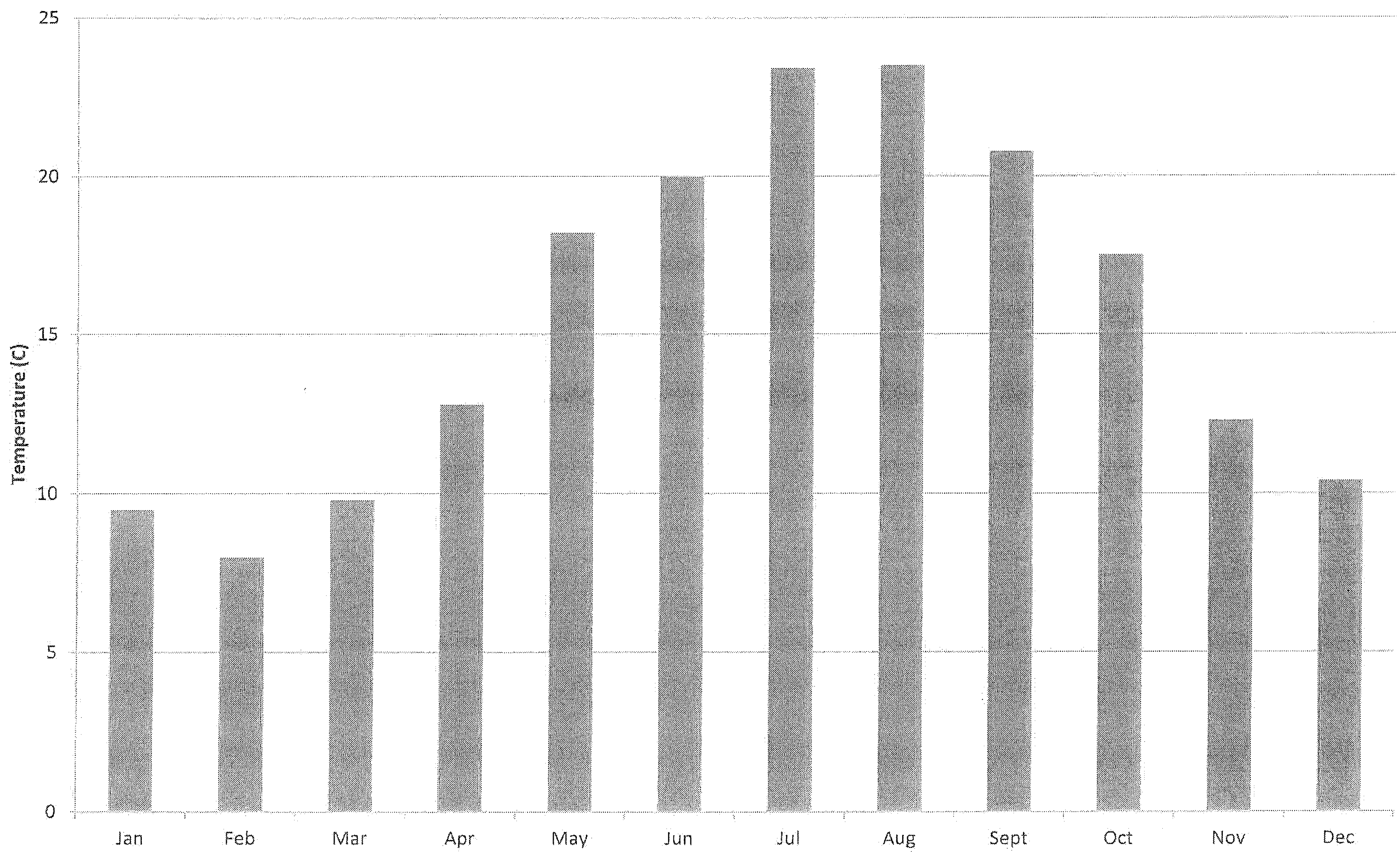


## COUNTRY CLUB ESTATES WWTF ANALYSIS: I&I ESTIMATE FOR MAY 2013
## FIGURE 3-4



## COUNTRY CLUB ESTATES WWTF ANALYSIS: AVERAGE MONTHLY TEMPERATURES JAN 2012 - MAY 2013

## FIGURE 3-5



and TKN values are 20 mg/L and 30 mg/L respectively.

Wastewater average temperatures vary between 8°C in the winter to 24°C in the summer during the study period; as shown in Figure 3-5. Daily temperatures during the study period range from 5°C to 26°C. It is felt that I&I does affect the temperatures, particularly during the winter as the lower values were observed on days with near or above permitted flows. The summertime temperatures were observed on drier weather flows indicating that the temperature was more a factor of residence time in the system.

The cold winter temperature reported (5°C) is concerning as this is the temperature where removal of ammonia becomes very difficult to achieve.

### 3.4 Performance of Existing Facility

The Country Club Estates Wastewater Treatment Facility has overall met all applicable SPDES permit limits for $BOD_5$ during the period of study. Overall, the facility has performed very well with effluent $BOD_5$ values consistently below 4.0 mg/L, giving an average removal rate of 97%.

Effluent Total Suspended Solids (TSS) values consistently below 2.0 mg/L during the study period and average 1.2 mg/L. The facility overall has an average removal rate of 99%.

It appears the facility is providing superior effluent quality despite wet weather flow exceedences.

### 3.5 Component and Process Analyses

Each piece of equipment for the treatment process was evaluated for general condition and process efficiency

The siphons and blowers are functioning well, in particular since the blowers were recently repaired. The old chlorine building appears to be in satisfactory shape structurally, but appears to be in need of a heating system replacement.

The treatment process as originally designed appears to have been easy to operate and maintain. All diffusers were accessible from grade without having to drain the tank and airlift pumps and skimmers minimize moving parts.

Each unit process at the facility was further evaluated to identify its maximum capacity based upon accepted design standards and regulatory requirements. The performance limitations of each process were identified to determine the maximum capacity of the system as a whole and to evaluate potential capacities with limited facility modification. This data was then utilized to identify reasonable expansion alternatives. A statistical analysis included in Appendix B provided the data necessary for the unit process analysis. The following is a more detailed discussion of each unit process:

### 3.5.1 Preliminary Treatment

#### 3.5.1.1 Pump Station

The pump station is located outside the treatment plant area as it is considered part of the collection system by the Town; and therefore outside the scope of this analysis except for impacts upon the treatment facility; which would be flow impacts at this facility.

As stated in Section 3.1.1 the station is rated so each pump delivers 140 gpm at the 30' design TDH. The pumps station is designed such that as one side is being emptied the other side is being filled. It appears that the pumps operate every minute to empty their respective sides providing near continuous flow into the facility at average flow conditions. Given the average daily flow of 60,000 gpd the pumps appear to be designed for a peaking factor of approximately 3.3; which is within the range of a standard peaking factor.

#### 3.5.1.2 Equalization Tank

There are two tanks, each constructed of concrete and has an approximate volume of 5,000 gallons each. With the internals of the tanks removed, the tanks currently have no ability to release any wastewater stored into the tank.

There is insufficient influent flow information to perform a cumulative mass balance diagram on an hourly basis, which is the preferred method for sizing of equalization tanks. Therefore the ability to confirm the adequacy of the tank is difficult and must be reviewed using another method.

To evaluate the EQ tank, average daily flow information will be used. The average daily flows were subtracted from the permitted flow of 0.06 MGD. If average daily flows were greater than the permitted daily flow then the excess would be stored. If average daily flows were less than the permitted daily flow then the tank would drain by the difference. Using this method a theoretical EQ tank was sized. Since the flows through the facility are measured at the effluent, Direct I&I has been estimated and subtracted out of daily flow values as Direct I&I occurs downstream of the existing equalization tank. A graph of this accumulation is shown in Figure 3-6.

Using this diagram it appears that the existing 10,000 gallons of storage is not adequate to store flows from the facility if similar weather happens in the future. This approximation is based on adjusted flow measurements due to flow meter issues that were present at that time. However it does appear reasonable that an additional 10,000 gallons at minimum be added to the equalization system to help ensure flows into the facility are better controlled.

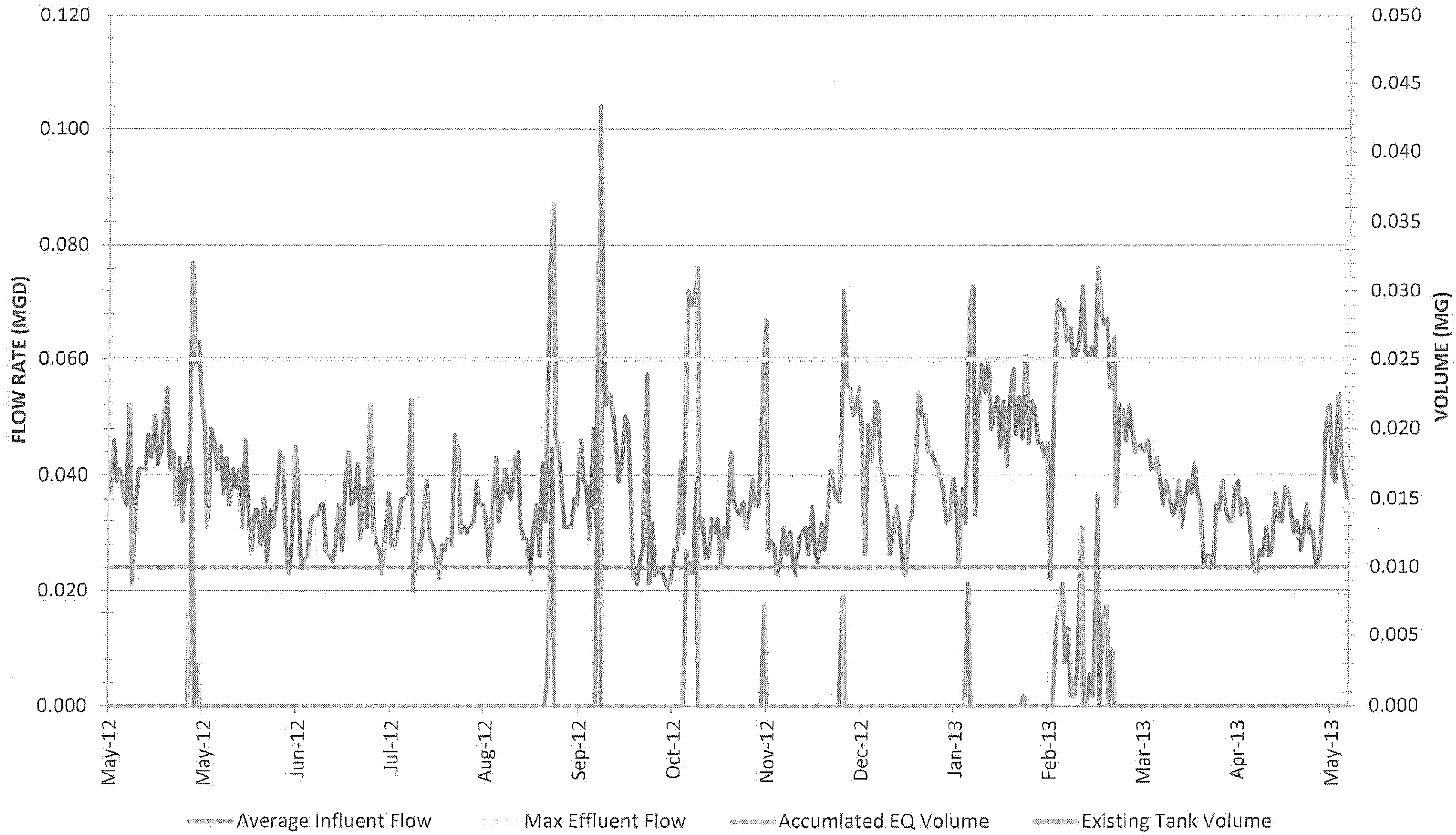
#### 3.5.1.3 Comminutor/Bar Rack

The facility has no comminutor at this time. The bar rack consists of 7 relatively thin bars approximately 1" apart. The bars do not appear to extend all the way to the bottom of the channel. Given this unique design estimating a capacity is difficult, however it does appear to be able to process the flow from the pump station, and no know overflows have been reported by the operator. However the operators have indicated that the rags that aren't trapped by the bar screen and pass through into aeration are generating nearly daily maintenance requirements to remove them from the airlift pumps so that they function. The operators note that despite their efforts the pumps continue to plug and create temporary impacts to treatment efficiency. It appears therefore that the manually cleaned bar screen is insufficient for this facility based on excessive maintenance requirements.

### 3.5.2 Secondary treatment

Each of the two aeration tanks is 30,000 gallons in volume, providing a total hydraulic retention time of 24 hours at the assumed design average flow of 60,000 gpd (0.06 MGD). This is the amount of time wastewater resides in the aeration tank. Assuming an equal flow split from the comminutor chamber the actual retention time averages 32.5 hours over the course of the

## COUNTRY CLUB ESTATES - ESTIMATED EQ TANK ACCUMULATION
## LESS DIRECT I&I
## MAY 2012 - MAY 2013
## FIGURE 3-6



study period. This is due to flows being less than the assumed design flow. The flow into the basins is intermittent; controlled by the pump station upstream. Average and peak flows therefore would be one or both pumps running respectively. The basins appear able to readily handle the flows from the pump station. When there is no flow from the pumps there is no flow through the plant. Therefore, the averages calculated above will be used in the analysis.

The influent wastewater enters into the side of the aeration tanks where it would be mixed with the recycled activated sludge. The aeration tanks appear to be approximately 10' wide by 45' in length each. This length to width ratio coupled with the inlet location all helps reduce the chance of any hydraulic short circuiting of the basin (i.e. a stream of wastewater that resides in the basin much shorter than what the average shows, impacting treatment efficiency).

The table below lists other key variables of the process and compares average values to typical design values. It should be noted that some of the values are based on flows and therefore use adjusted flows where applicable:

| Parameter | Average | Max | Min | Typical Design Value | Per 10 State Standards, 2004 edition |
|---|---|---|---|---|---|
| F:M East Train (mg/L) | 0.086 | 0.37 | 0.01 | 0.02 - 0.1 | 0.05 - 0.1 |
| F:M West Train (mg/L) | 0.076 | 0.2 | 0.02 | 0.02 - 0.1 | 0.05 - 0.1 |
| MLSS East (mg/L) | 3,359 | 4,680 | 1,442 | 3,000 - 5,000 | 3,000 - 5,000 |
| MLSS West (mg/L) | 3,192 | 4,498 | 1,210 | 3,000 - 5,000 | 3,000 - 5,000 |
| Organic Loading (lbs BOD /d/1,000 cuft) | 6 | 17.5 | 1.3 | <15 | <15 |

F:M stands for Food to Mass Ratio and is a key indicator of the process. The food is the organics as measured by BOD and the mass is the pounds of microorganisms in the reactor, specifically the active portion which is assumed at 80% in the above numbers. On average the F:M in both trains is within typical values and is one reason that the plant is performing well. The maximum and minimums reflect a single measurement and not an average and are indicative of upsets. From the table above there appears to be one such upset with the influent BOD was measured at 450 mg/L. This is approximately twice the normal design assumption for residential BOD and is not something that was expected nor was it predicable. This would be subject to further review during the detailed design phase.

MLSS is as defined earlier in the report. Related to F:M as stated above, the plant operates on average within typical ranges expected of EA facilities. There was one upset shown in the data where sludge was apparently lost from the system, overall however the plant appears to be operating well.

Organic Loading is expressed as pounds of BOD per day per 1,000 $ft^3$ of aeration tank volume. It was a main design parameter in the past and could have been used in the original design. The parameter isn't felt to be as relevant in present day designs as the understanding of the process has improved. As with the F:M, the large loading occurred during the month of high BOD.

### 3.5.3 Secondary Clarifiers

Flow is directed from each aeration tank into a secondary clarifier.

The statistical data in Appendix B indicates that the current average overflow rate for the clarifier is approximately 310 $gpd/ft^2$. This is approximately one-third of the allowable rate given in the 10 State Standards (1,000 $gpd/ft^2$). Literature sources such as the Water Environment Federation's (WEF) Manual of Practice 8 (MOP 8), base the overflow rate on the geometry of the clarifier and MLSS concentration. However these graphs assume the more traditional clarifier design and perhaps not the type of units as installed for this facility.

The majority of solids in these clarifiers are composed of microorganisms from Secondary Treatment. The rest are solids that carried over from the influent that are not biodegradable. Settled solids from this process are recycled back into the aeration tanks, with a small amount sent to the holding tanks to maintain optimum conditions in the aeration tanks. Sludge movement is performed with airlift pumps. Flow form the pumps is erratic and with no dedicated blowers and no flow meters installed on the lines, flow estimation is difficult. However the MLSS data provided appears to show that the operators have the ability to maintain proper MLSS under all the conditions observed in the study period.

The statistical analysis in Appendix B indicates approximately 2,800 gal/month of solids are wasted from the facility. As can be seen in the raw data, some months within the study period had no sludge hauled. The amount of sludge hauling required is a function of many factors such as wastewater temperature, needed MLSS concentration, and influent characteristics. At the average solids level of 2.4% (also per the data in Appendix B) this equates to approximately 565 lbs. per month.

### 3.5.4 Tertiary Filtration

The wastewater from secondary clarification is conveyed to a dosing tank equipped with two 6" bell siphons that operate in an alternating manner. Once the tank fills to a pre-determined level the siphon will activate and provide a set volume to the sand filters downstream. The siphons operate without power and have proven reliable. There are four (4) filters, each sand filter is 55' square and contains 30" of sand.

The wastewater being dosed to the filters contain small amounts of solids that don't settle out in the secondary clarifier then therefore are likely to get captured in the filters. However the filters appear to be designed around an intermittent type filter. The purpose of these types of filters is polishing of the soluble contaminants such as BOD and $NH_3$, as opposed to solids removal. Intermittent sand filters do not have backwashing capability.

Each siphon doses two different sand beds. The volume of each dose appears to be approximately 8,000 gallons based on the design drawings provided for the analysis. The average flow rate from the siphons is approximately 450 gpm which appears low when compared to current design standards of 90 gpm/1,000 sqft (544.5 gpm for these filters). The table below compares the filters at the average flow of 0.048 MGD to current (2012) NYSDEC Design Standards for intermittent sand filters. The Standards split the parameters into two groups: either filters are designed to only polish BOD or they are designed to polish BOD and provide nitrification, as shown in the following table:

| | | | | |
|---|---|---|---|---|
| BOD Polishing | Media Effective Size (mm) | 0.3 - 0.5 | 0.25 - 1.0 | Pass |
| | Media Uniformity Coefficient | < 3.5 | <4 | Pass |
| | Hydraulic Loading* (gpd/sqft) | 5.3 | < 5 | Fail |
| | Organic Loading* (lb BOD/d/sqft) | 0.0002 | < 0.005 | Pass |
| Nitrification | Media Effective Size (mm) | 0.3 - 0.5 | 0.14 - 0.65 | Pass |
| | Media Uniformity Coefficient | < 3.5 | 1.5 - 4.0 | Pass |
| | Hydraulic Loading* (gpd/sqft) | 5.3 | 0.33 - 3.0 | Fail |
| | Organic Loading* (lb BOD/d/sqft) | 0.0002 | < 0.003 | Pass |

* - Loadings based on three filters online, one filter is offline for resting.

It would not be necessarily expected that filters designed and installed in the 1960's would meet current design standards, but it appears the filters do meet the most critical of the current requirements. The failing of hydraulic loadings only indicate that the filters do not meet current standards. It should further be noted that with all filters online, only the hydraulic loading for nitrification would be higher than allowed. Lastly, the large hydraulic residence time in the aeration suggests enough time exists to fully oxidize BOD and $NH_3$ and therefore the average amounts discharged into the filters may likely meet effluent limits; meaning that the filters would provide an effective safeguard to ensure continued compliance.

The facility produced effluent in compliance with its SPDES permit during the study period, even during months where I&I caused a violation of flow limits. The values above do include the effects of Direct I&I.

Each dose of the filters is sufficient to flood the two sand beds with 2" of depth. This is also in agreement with current standards.

The sand filters can be a maintenance item if large amounts of solids are overflowed onto them. This occurred recently due to an upset in the plant, forcing sludge through an overflow and into the sand beds. This appears to have been designed into the facility as a failsafe against sludge being discharged to the ground. Soil pressure has also bowed the block walls of two of the sand beds. The operators have also pulled vegetation from the beds as routine maintenance.

The sand media of all four of the beds is in need of replacement.

### 3.5.5 Disinfection

The facility currently utilizes hypochlorite to provide disinfection. The chemical is dispenses utilizing a makeshift tablet feeder. The tablets are loaded into PVC tubes and as wastewater flows past the feeder unit the tablets slowly dissolve, releasing hypochlorite into the wastewater. After dosing, the wastewater enters a 10' wide by 24' long baffled chamber. This chamber, referred to as the chlorine contact tank (CCT), provides mixing to help ensure even distribution of hypochlorite throughout the wastewater. Mixing is accomplished by forcing the wastewater to flow over and under baffles which creates turbulence and therefore mixing.

The CCT is approximately 9,000 gallons in volume. Current Design Standards (10 States) requires 15 minutes of residence time at peak hourly flow. The flow through disinfection is controlled by the sand filter dosing siphons. The flow rate of a siphon is estimated at 450 gpm. This would provide a residence time of 20 minutes. The existing chamber appears sufficient on dry weather days.

The Direct I&I discussed earlier has a significant impact on peak flows. Intensity-Duration-Frequency (IDF) Curves were obtained for the Poughkeepsie Region of NY through the Northeast Regional Climate Center via Cornell University and are included in Appendix D. The Table below shows the impact of various precipitation amounts on the flow rate into disinfection, and their recurrence interval:

| Recurrance Interval (yr) | Precipitation (in/hr) | Estimated Flow Rate (gpm) |
|---|---|---|
| 1 | 1.5 | 200.5 |
| 2 | 1.6 | 213.8 |
| 5 | 1.8 | 240.6 |
| 10 | 2.0 | 267.3 |
| 25 | 2.4 | 320.8 |
| 50 | 2.6 | 347.5 |
| 100 | 2.8 | 374.2 |

Taking the values above and combining with the siphon flow rate the impact to disinfection is estimated as follows:

| Recurrance Interval (yr) | Precipitation (in/hr) | Estimated Combined Flow Rate (gpm) | CCT Residence Time (min) |
|---|---|---|---|
| 1 | 1.5 | 650.5 | 13.8 |
| 2 | 1.6 | 663.8 | 13.6 |
| 5 | 1.8 | 690.6 | 13.0 |
| 10 | 2 | 717.3 | 12.5 |
| 25 | 2.4 | 770.8 | 11.7 |
| 50 | 2.6 | 797.5 | 11.3 |
| 100 | 2.8 | 824.2 | 10.9 |

From the above table it is clear that a 1.5 inch/hr storm event, which is statistically likely to occur each year, will create a residence time in the CCT that does not meet the 15 minute requirement during that hour, possibly impacting disinfection efficiency.

Tablet feeders work best within a relatively small range of flows. Flows that are too low will create a risk of large doses that could result in high residuals reaching the Casper Creek. High flows can dissolve the tablets quickly providing lower than design dosages, impacting disinfection efficiency and risk dissolving all the tablets before operators arrive the next day to refill the feeder.

A review of the operational reports over the study period shows a wide range of residuals, including zero residual. This is likely due to the low flows leading to high residuals and the I&I flows as described earlier dissolving all the tablets and leading to a zero residual.

### 3.5.6 Effluent Re-Use

The facility is equipped with a bladder tank and jet pump that takes effluent water and pumps it back into the plant for equipment wash down. The current system replaced a hydro pneumatic tank system that is shown on the design plans. The water is not, nor intended to be, potable.

## 3.6 Hydraulic Analysis

A basic hydraulic analysis of the existing facility was performed to evaluate the flow characteristics and identify "bottlenecks" within the system.

Based on field observations and the hydraulic profile shown in the design plans it does not appear to be any issues at this facility in regards to hydraulics at the permitted flow of 60,000 gpd.

### 3.7 Structural Inspection:

A cursory structural inspection was performed to assess buildings and tankage at the facility.

The design plans from 1965 indicate that cathodic protection for the steel tanks was to be installed. It is unknown if this had been done, however the steel has been observed to have severe corrosion, and some tanks have holes forming in multiple tanks above the water line.

The operators indicated that in the recent past they attempted to drain one of the aeration tanks for inspection but could not drain the tanks more than a few feet before the tank wall began collapsing in. The water was returned to the tank however this bow in the tank wall is still present. This would indicate that the tank wall thickness below grade is perhaps too thin and/or the vertical ribs and cross beam supports are also too deteriorated to allow the tank to maintain its shape when empty; which is an unacceptable condition. Further, additional deterioration that would occur in the near future may result in leaks, allowing partially treated wastewater to enter the ground.

Concrete and block tankage at the facility does appear to be in adequate condition. There is slight bowing of the block walls of the sand beds, likely due to the soil pressure.

The building near the effluent discharge appears to be in satisfactory condition with a roof that was recently replaced. The heating system in the building appears to be in need of replacement however. The electric line powering this building is at one point surrounded by trees, possible going through a tree, which is needs to be addressed by clearing all trees near the electrical lines. There is no current backup power supply for the facility

## 4.0 Facility Upgrade Alternatives:

The unit component and process analyses for the existing facilities discussed above outlined the shortfalls of the facility. Replacement of the plant in kind is felt possible with the exception of any code related items or manufacturer issues. The DEC has given preliminary indication that significant impacts to the SPDES permit may result from an upgrade where the permitted flow or discharge location would change. However, it will be assumed that the SPDES limits will not be affected by this upgrade. An alternative analysis is included to provide a comparison of costs should a higher level of treatment be pursued. This may prevent the need for a further upgrade in the future, should the DEC alter SPDES limits. Additional information on all the equipment options contained in this report is included in Appendix E.

It is unknown what impacts may result from only replacing the treatment system. In regards to the steel tankage, relining methods and products were reviewed for potential inclusion as options; however the condition of the tanks appears to eliminate relining as a viable option and will not be further pursued. The operators have indicated that they would prefer to have as much of the existing plant remain online as possible during the upgrade.

Discussed below are options for this facility to be considered. It should be noted that replacement in kind would also include treatment for the I&I flows known to be present.

### 4.1 Preliminary Treatment

#### 4.1.1 Pump Station

The existing pump station appears adequate to handle dry and wet weather flows and therefore the station will not require any upgrades.

#### 4.1.2 Comminutor/Bar Rack

A new dual comminutor system is one option for this facility. Each unit would reside in its own channel and sized to handle the incoming flow from the pump station (550 gpm). These units would protect the facility from large rags that may impair downstream processes. A comminutor/bar screen is another option however given the reported issues with rags affecting downstream equipment a manually cleaned bar screen would not be recommended.

Mechanically cleaned bar screens could be utilized however these units are more expensive than comminution and would require a building to contain the odors from removed screenings.

### 4.1.3 Flow Equalization

As stated in Section 3 of this report, the existing tanks are not adequate to handle the observed I&I flows over the past year of the study period (May 2012 through May 2013). It is reasonable that this weather could occur in the future so the following are options that should eliminate flow violations at the facility as currently permitted:

1. Install an additional 10,000 gallon equalization tank, complete with mixing and aeration (required by design codes to prevent odors). This option would require an area equivalent to the existing tanks, as well as power to operate the aeration and mixing equipment. This tank would allow the facility to keep the current permitted flow, however at the cost of increased utility costs and maintenance time. Modification of the tanks could be reviewed to minimize pumping requirements.

2. Modify the SPDES permit, raising the permitted flow to 70,000 gpd. This would allow the existing equalization tank to be re-utilized to handle the observed I&I flows (less one anomalous day), based on the adjusted values. This will very likely have impacts on the other SPDES limits, meaning the treatment plant would likely be required to meet more stringent limits called Intermittent Stream Effluent Limits (ISEL) significantly increasing costs for the new treatment facility. The tanks would also need to be equipped with new components to provide equalized flow, and aeration/mixing to prevent odors.

3. Re-use the existing equalization tank and alter the SPDES limit to base flow violations on a rolling average basis. This may also have impacts to current SPDES limits.

4. Mitigate I&I to allow for the re-utilization of the existing equalization tank. Based on experience, this option is typically less expensive than other options and is the preferred initial course of action by regulatory agencies. Mitigation of I&I is crucial to the long term stability of any biological treatment system. In the case of this facility it would help keep temperatures warmer in the winter,

improving performance. This option also has the lowest risk of impacting other SPDES permit limits.

## 4.2 Secondary Treatment

The existing aeration basins and clarifiers are beyond their service life and have experienced significant deterioration and must be replaced. Given a replacement in kind of existing technology (Extended Aeration or EA for short), the DEC indicated verbally that no impacts to the SPDES limit would be anticipated. This should provide the most cost effective option for the facility.

If stricter standards are imposed in the future, such as Intermittent Stream Effluent Limits (ISEL), neither the existing facility nor a replacement in kind upgraded facility, is likely to meet such limits. Various other treatment options exist and are necessary to treat wastewater to ISEL; however four processes were reviewed for this site which would provide the bulk of the required treatment:

1. Biologically Engineered Single Sludge Treatment (BESST) system.
2. Rotating Biological Contactor (RBC) system.
3. Sequencing Batch Reactor (SBR) system.
4. Moving Bed Bioreactor (MBBR)

Each of the options would require downstream treatment to meet remaining ISEL. Options #1 and #3 above can provide the highest levels of treatment within the same general advanced treatment classification as the others; namely the ability to also remove some nitrogen and phosphorus from the wastewater. The RBC system is considered advanced as enough disc area would be present to remove ammonia from the wastewater.

New blowers that would be utilized for any of the processes above, as well as an EA plant, could be placed outside. The noise levels of the blowers are very low (rated for 71 dBA at 1 meter) and are housed in weatherproof, sound attenuating enclosures.

## 4.3 Secondary Clarification

The various options described in Section 4.2 have differing methods to accomplish solids removal. Respectively they are as follows:

1. An EA plant would require traditional rectangular or circular clarifiers.
2. The BESST has an integral upflow clarifier built into the aeration tank.

3. RBC's would require traditional rectangular or circular clarifiers.
4. Clarification is achieved in the same tankage as the aeration in an SBR.
5. MBBR's typically have inverted hopper clarifiers after the aeration tanks.

Any of the five methods have been shown to be effective. Options #1 and #3 have clarification integral to the aeration basins to minimize plant area.

## 4.4 Tertiary Filters

As stated in Section 4.2 of this report, any treatment option would require treatment downstream. Filtration following clarification will help ensure the facility meets TSS requirements at minimum. Two options were reviewed for this treatment:

1. Re-use the existing sand beds.
2. Install rotary drum filters.

The drum filters take up considerably less space than the existing beds and have the ability to backwash solids to sludge holding; however the drum fitlers would require a heated building (approximately 20'W x 15' L x 8' H). Sand filters would require a replacement of the sand so there is a cost associated with their continued use in the new facility. Use of rotary drum filters is assumed to allow the beds to simply have the walls removed and the media would be buried in place. The underdrains would be re-routed to drain to daylight.

In order to address the Direct I&I issues associated with the sand beds, the beds would need to be covered in some manner. Given the size of the beds, a pole barn or other structure and would be required to cover the beds and facilitate entry for inspection and periodic media replacement.

## 4.5 Disinfection

Having equalized flow would not improve the effectiveness of a tablet based disinfection system with the sand beds remaining in use due to the Direct I&I impacts. If the sand beds are replaced with drum filters or some other equivalent technology then the Direct I&I is removed and tablet feeders become more reliable as the system would see equalized flow. The other option for chlorination is to use sodium hypochlorite, a liquid provided in drums. The logistics of delivering the chemical to the building is difficult as larger vehicles aren't able to make it to that area of the site without damaging the sand beds. If sand beds are in use, then flow pacing of the chemical would also be recommended, due to the Direct I&I issues.

It should be noted that if stricter limits are imposed (not anticipated on a replacement in kind upgrade) it would require that the facility to remove the chlorine residual prior to discharge. This would require an additional small mixing tank and another chemical to be utilized at the facility.

In lieu of chlorination and possible de-chlorination, an ultraviolet (UV) light disinfection system is felt viable. UV disinfection is preferred by regulatory agencies as it does not use chemicals and is considered a green technology. The process requires only power for the UV lamps and the UV light provides the disinfection, but is dependent on transmissivity of the wastewater (i.e. how clear the water is to allow the light to penetrate). The particular system proposed for this facility utilizes lower wattage lamps than other systems, which should help keep utility costs minimal.

The UV units are sized based on the maximum flow rate expected through the units. If sand beds are utilized, this would likely be the expected flow rate through the sand beds as shown in Section 3.5.6 of this report. Utilizing rotary drum filters in lieu of the sand beds would appear to reduce the flow rate to the equalized flow rate.

## 4.6 Post Aeration

The SPDES limits require dissolved oxygen to be present in the wastewater prior to discharge. Currently this limit is greater than 2.0 mg/L. The existing facility appears to meet this limit consistently. As such a replacement in kind should not require any additional equipment.

However if the SPDES limit is altered in the future and UV disinfection is utilized, the existing CCT would serve adequately for post aeration purposes. If chlorination is used, then another tank downstream of the dechlorination tank would be required and the site appears constrained in this location. Small blowers could be housed in the existing building by the CCT, or outside if space in the building is limited. These blowers could be housed in the same sound attenuating weatherproof enclosures as described in Section 4.2.

## 4.7 Sludge Handling

The four options discussed in Section 4.2 of this report would all require, at minimum, a solids holding tank to store wasted solids from the facility under aeration until it can be hauled offsite in a cost effective manner. The other option is to upgrade to a digester, which would be large in size and designed to destroy a certain percentage of solids depending on ultimate disposal. Given the relatively small daily flows and solids entering the facility it is recommended to only construct a solids holding tank. The tank would be aerated to prevent odors and have the ability to decant water back into the main treatment plant allowing for a thicker sludge to be hauled from the facility, increasing the cost effectiveness of hauling offsite.

## 4.8 Effluent Reuse

Due to the lack of potable water at the site, the facility should continue to re-use effluent water for non-potable uses such as equipment wash down. No other cost effective option appears to exist. The system would meet current design guidelines established for the type of use proposed, but it is assumed that the existing pump and bladder tank would continue to be utilized.

## 4.9 Miscellaneous Issues

### 4.9.1 Building Issues and Site Security

The fence line and gates surrounding the facility is in generally good condition and spot repairs are proposed to ensure continued protection from unauthorized access.

### 4.9.2 Power

The new power requirements of the proposed facility should allow for re-use of the current service. Detailed design would need to be performed to confirm this. The facility currently has no emergency generator, which is not in accordance with current codes. A new generator is proposed for this facility, sized to operate the critical components of the treatment process.

It has been noted that the power line feeding the building by the effluent discharge point is surrounded by trees. It is proposed to clear all nearby trees as part of the upgrade to prevent any power issues.

### 4.9.3 Instrumentation and Control

The instrumentation and controls would be improved to allow for alarm conditions to be sent out to operators regardless of time or location so that critical alarms can be addressed as quickly as possible. Other minor alarms would appear on local control panels and operators would address them when they return to the site. Major alarms would include the following:

1. Power Failure
2. Disinfection Failure

3. Generator Start Fail

The operators of the facility had a radio survey performed and a signal was found and could send alarm signals wirelessly, as this method appears on a cursory level to be more cost effective than using phone lines.

More advanced control schemes are available for the various alternatives, including but not limited to: dissolved oxygen control using sensors and blowers driven by variable frequency drives (VFD's); flow pacing of UV disinfection; ORP control; process monitoring; and Supervisory Control and Data Acquisition (SCADA). These control schemes are generally used on larger facilities. Equipping the blowers with VFD's is recommended, however the VFD's would be manually controlled.

Flow pacing of the UV is not felt to be required as the flow through the process should be essentially equalized by the siphons feeding the sand beds or through the equalization system should rotary drum filters be used. Care would be taken to ensure wastewater is always present in the UV units.

## 5.0 Facility Costs and Recommendations:

This section discusses estimated construction costs associated with the various treatment equipment options for each section of the facility as discussed in Section 4 of this report.

### 5.1 Preliminary Treatment

#### 5.1.1 Pump Station

There are no anticipated cost impacts to the pump station as part of this upgrade.

#### 5.1.2 Comminutor

The estimated construction costs for the various comminutor options are as follows:

1. A new dual comminutor system: $90,000
2. A comminutor / bar screen: $50,000
3. Mechanically cleaned / manually cleaned bar screen: $200,000.

Although option #2 is the least expensive, due to reasons provided in Section 4.1.2 of this report (ineffectiveness of the bar screen), Option #1 is recommended. The new units would be placed to receive flow from the pump station and discharge into flow equalization.

#### 5.1.3 Flow Equalization

The estimated construction costs for the various flow equalization options are as follows:

1. New 10,000 gallon equalization tank to add to existing storage including new pumps, mixing and aeration: $75,000

2. Modify the SPDES permit, raising the permitted flow to 70,000 gpd and re-use existing tanks: $50,000

3. Re-use the existing equalization tank and alter the SPDES limit to base flow violations on a rolling average basis. This may also have impacts to current SPDES limits: $50,000 (Tank re-use cost only. Impacts to treatment costs shown in 5.2)

4. Mitigate I&I to allow for the re-utilization of the existing equalization tank: $50,000 for the tank. I&I abatement costs should be budgeted at $30,000 each year. The first year, would allow for video inspection of the collection system to identify the trouble areas. The following years would pay for relining where needed. The I&I abatement costs could factor into operational budgets and not capital investments.

It is recommended that the plant install an additional 10,000 gallons of equalization capacity at this time, remain at the 60,000 gpd permitted flow, and invest in future I&I abatement. It is felt this approach is most cost effective, particularly in the long term.

## 5.2 Treatment

Construction cost estimates were obtained for a 60,000 gpd facility and were lump sum estimates that included costs for the main treatment process, secondary clarification, and a sludge holding tank.

Costs for the options are (treatment equipment and installation of equipment only):

1. EA: $300,000
2. BESST: $375,000
3. RBC: $514,000
4. SBR: $535,000
5. MBBR: $500,000

It would appear that the EA plant appears to be the lowest cost option, and therefore recommended; assuming that SPDES limits are not altered or more advanced treatment is pursued. The BESST process appears to be the lowest cost alternative if a more advanced treatment process is pursued.

A generator, controls, and alarm telemetry are recommended with any treatment system.

## 5.3 Tertiary Filtration

Filtration costs are variable dependent on the type of technology. Re-use of the sand beds would require replacement of sand, at a minimum. Based on the options discussed in Section 4.4 of this report the following construction cost estimates are provided:

| Technology | Estimated Cost |
|---|---|
| Sand Bed | $ 70,000.00 |
| Sand Bed w/Covers | $ 1,328,000.00 |
| Rotary Drum Filter w/Building | $ 225,000.00 |

The re-use of the sand beds appears to be the lowest cost option, however the size of the units has a direct impact on disinfection system sizing, and therefore costs for disinfection should be taken into account prior to making a recommendation on filtration. Such a recommendation will be provided in Section 5.4 below.

### 5.4 Disinfection

Disinfection costs are linked to the type of filtration chosen as discussed earlier in this report. Various cost estimates for UV disinfection were obtained to cover the range of possible flows given the choice of filtration. The estimates assume one unit is to handle the flow while the second unit is a standby unit. The estimated costs are as follows:

| Flow (gpm) | Equipment Cost |
|---|---|
| 42 | $ 30,000.00 |
| 450 | $ 70,000.00 |
| 825 | $ 90,000.00 |

The facility has, according to the IDF curves, a 1.0% chance of seeing an 825 gpm flow rate through disinfection in any given year. To minimize costs, it would be assumed that if this rare event were to occur, both UV units sized at 450 gpm would handle this flow. The use of uncovered sand beds appears to more than double the cost of UV treatment. There is also an additional cost that is added below to account for the re-piping necessary to accommodate UV. This cost is estimated at $15,000.

A tablet feeder has an estimated installed cost of $2,500 for a direct bury unit. The CCT would follow the tablet feeder to provide the contact time as is currently done at the facility. Although inexpensive, it appears that the system is only feasible under the following scenario:

1. Current SPDES limits remain in effect after the upgrade.
2. Use of flow equalization as recommended combined with filtration without Direct I&I (i.e. covered sand bed or rotary drum filters).

With a UV system, if enhanced levels of dissolved oxygen become required in the future, the existing CCT can be re-purposed for post aeration, as stated earlier in this report.

Taking into account the costs for filtration above a combined cost for filtration and disinfection is as follows:

| Technology | Estimated Cost |
|---|---|
| Sand Bed Uncovered w/UV | $ 155,000.00 |
| Sand Bed Covered w/UV | $ 1,354,000.00 |
| Sand Bed Covered w/Tablet | $ 1,330,500.00 |
| Rotary Drum w/UV | $ 255,000.00 |
| Rotary Drum with Tablet | $ 227,500.00 |

From the combined costs above it appears that use of sand filters and upsized UV disinfection would have the least capital investment. As a result of the UV, power use would be expected to be higher. Electrical costs would be somewhat dependent on the amount of Direct I&I as the UV would need to be flow paced to ensure effective disinfection at all flow ranges.

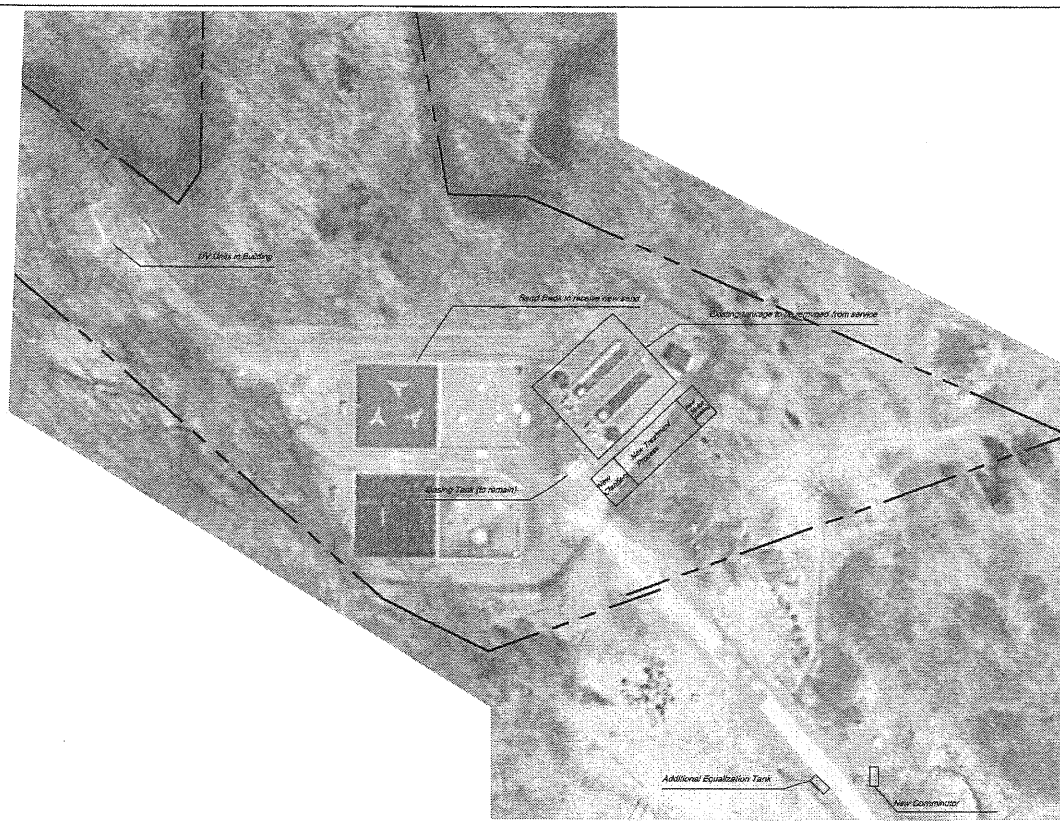
## 5.5 Equipment Layout and Flow Description

To summarize, the following components are recommended for a replacement in kind:

- Additional 10,000 gallon equalization tank
- New comminutors
- A new Extended Aeration plant in concrete tanks with secondary clarifiers and a sludge holding tank.
- Re-use of the existing dosing tank and sand filters
- New Ultraviolet (UV) Light disinfection

A proposed layout alternative is shown in Figure 5-1 and a proposed process schematic is shown in Figure 5-2. It is expected that the equalization tank system would continue to operate as designed, less the overflow line. The existing pump station would discharge into the comminutor chambers and from there into the new process at an equalized flow. Once treated, the flow would enter the filters to remove any remaining suspended solids. The new UV units would be housed in the new building along with the filters. From UV the flow would discharge to the stream using existing piping. The effluent reuse system would remain in place. All new units would be designed to meet 10 State Standards as well as all other applicable codes.

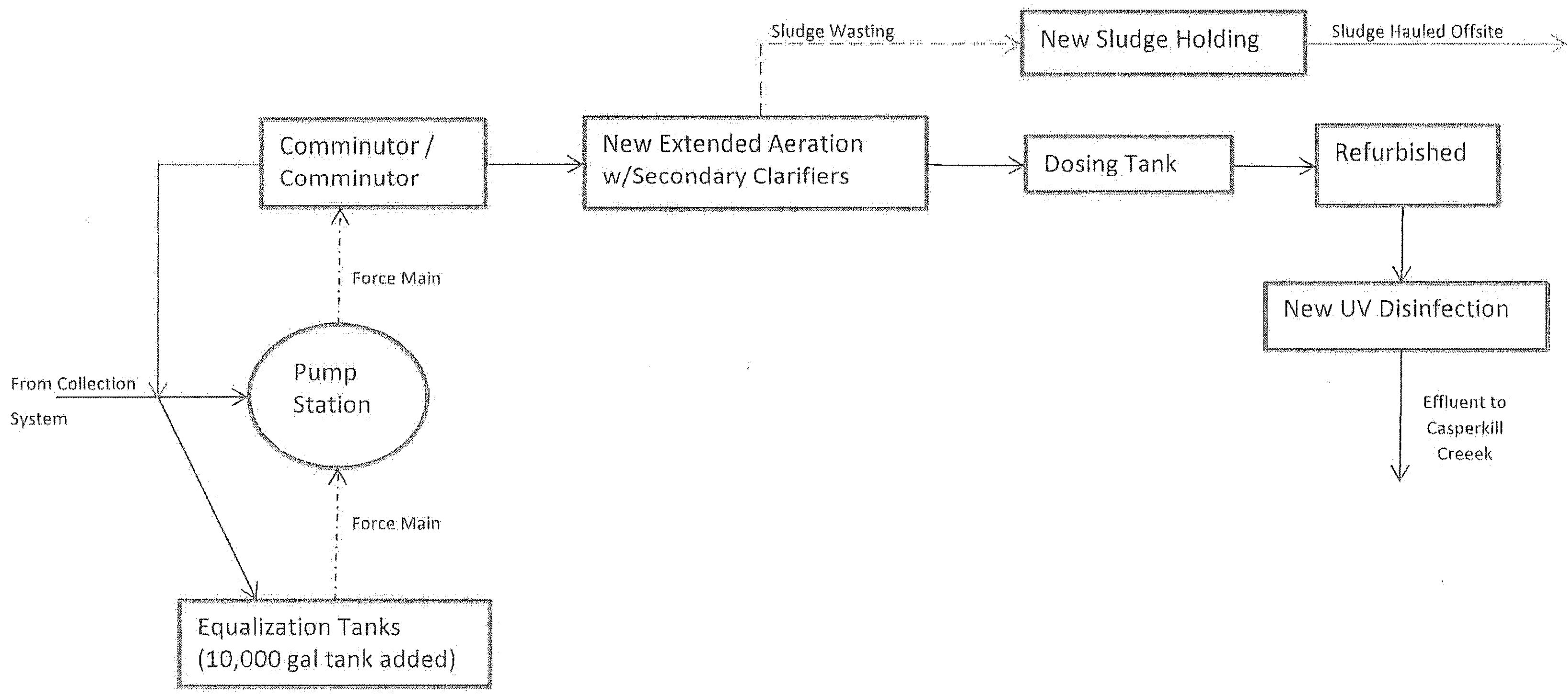
The location as shown would allow for the existing facility to remain fully online and operational. The impacts to overall treatment efficiency should be minimal under normal flow conditions during construction.




# COUNTRY CLUB WWTF
## PROPOSED PROCESS LAYOUT
PARCEL NO. 134689-6159-01-360803

TOWN OF POUGHKEEPSIE — DUTCHESS COUNTY, NY
FIGURE 5-1 — SCALE: 1" = 60 '

COUNTRY CLUB ESTATES WWTF
PROPOSED PROCESS SCHEMATIC
FIGURE 5-2



## 6.0 Economic Impacts:

Preliminary capital cost estimates have been developed for the following two (2) scenarios: Replacement in kind of the existing treatment facilities assuming that the SPDES permit conditions do not change; and, advanced treatment to meet the anticipated requirements for revised SPDES permit conditions.

In addition to the treatment process improvements included in Section 5 of this report, estimated construction costs have been included for site and electrical improvements, concrete tankage, equipment pads, and a new generator.

The capital costs associated with the replace in kind of existing facilities is shown in Table 6-1. This is a preliminary estimate based on 60,000 gpd EA treatment technology and reusing the existing equalization tank, as recommended in Section 5.0 of this report. The total estimated capital cost for this scenario is estimated at $1.59 million.

The capital costs associated with the replace of existing facilities with advanced treatment is shown in Table 6-2. This is a preliminary estimate based on a 60,000 gpd BESST technology to provide more advanced treatment, as discussed in Section 5.0 of this report. The total estimated capital cost for this scenario is estimated at $1.69 million.

The total estimated capital costs for the treatment improvements are estimated to be in the range of $1.59M - $1.69M. Based upon these values, the estimated increase in typical user costs can be determined, assuming that the improvement would be bonded at an interest rate of 3% over a term of either 20 or 30 years. There are 327 benefit units assessed to the district, with the typical user being assessed one (1) benefit unit. The following summary table shows the estimated annual payment increases under the various options:

| Bond | Annual Payment | Cost Increase per Benefit Unit |
|---|---|---|
| 20 year, $1.59M | $ 106,873.00 | $ 370.44 |
| 30 year, $1.59M | $ 81,121.00 | $ 281.18 |
| 20 year, $1.69M | $ 113,595.00 | $ 393.74 |
| 30 year, $1.69M | $ 86,223.00 | $ 298.87 |

Detailed bond payment information can be found for the replace in kind treatment scenario in Tables 6-3 and 6-4 for 20 and 30 year bonds, respectively. For the advanced treatment scenario, detailed bond payment information can be found for Tables 6-5 and 6-6 for 20 and 30 year bonds, respectively.

The cost per benefit unit values above reflect a potential increase in the debt of the District. The above values do not take into account existing debt or operation and maintenance costs. Preparation of a separate Map, Plan and Report would be required to evaluate the total user costs for Country Club Estates.

COUNTRY CLUB ESTATES WWTF FEASIBILITY REPORT
ESTIMATED PROJECT COSTS - 60,000 GPD REPLACE IN KIND FACILITY
Table 6-1

| Construction Item | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| **Earthwork** | | | | |
| Excavation | C.Y. | $25 | 1000 | $25,000 |
| Backfill/Regrading/Seeding/Mulching | C.Y. | $30 | 1000 | $30,000 |
| Tree Clearing and Grubbing | L.S. | $10,000 | 1 | $10,000 |
| Buried Piping/Conduit | L.F. | $100 | 100 | $10,000 |
| | | | Earthwork Subtotal: | $75,000.00 |
| **Concrete** | | | | |
| Equalization Tank | L.S. | $35,000 | 1 | $35,000 |
| Package Plant | L.S. | $130,000 | 1 | $130,000 |
| Blower/Generator Pad | L.S. | $1,000 | 1 | $1,000 |
| | | | Concrete Subtotal: | *$166,000* |
| **Equipment** | | | | |
| Comminutors | EA. | $45,000 | 2 | $90,000 |
| EQ Tank Pumps | L.S. | $30,000 | 1 | $30,000 |
| EQ Tank Mixing/Aeration | L.S. | $30,000 | 1 | $30,000 |
| Purestream EA Plant - 60,000 gpd | EA. | $300,000 | 1 | $300,000 |
| -w/airlift pumps, blowers, diffusers, etc | | | | |
| -Sludge Holding Tank w/blowers | | | | |
| UV System with Re-Piping | EA. | $85,000 | 1 | $85,000 |
| Stainless Steel Air Piping | L.F. | $100 | 100 | $10,000 |
| Filter Replacement | L.S. | $70,000 | 1 | $70,000 |
| Generator | EA. | $35,000 | 1 | $35,000 |
| *Miscellaneous Equipment Items* | | | | |
| Equipment Demolition | L.S. | $25,000 | 1 | $25,000 |
| Equipment Installation | L.S. | $40,000 | 1 | $40,000 |
| | | | Equipment Subtotal: | $715,000 |
| **Miscellaneous** | | | | |
| Mobilization/Demobilization General Conditions | L.S. | $40,000 | 1 | $40,000 |
| Additional Testing Services | L.S. | $5,000 | 1 | $5,000 |
| Miscellaneous Additional Work | L.S. | $50,000 | 1 | $50,000 |
| Electrical Costs | L.S. | $50,000 | 1 | $50,000 |
| Soil & Aggregate Material Allowances | L.S. | $10,000 | 1 | $10,000 |
| | | | Miscellaneous Subtotal: | $155,000 |

| | | |
|---|---|---|
| Base Construction Costs: | | $1,111,000 |
| 10% Construction Contingency: | | $111,100 |
| Total Estimated Construction Costs: | | $1,222,100 |
| | SAY: | $1,220,000 |
| 30% Engineering/Legal/Administration Contingency: | | $366,000 |
| TOTAL PROJECT COST: | | $1,586,000 |
| | SAY: | $1,590,000 |

COUNTRY CLUB ESTATES WWTF FEASIBILITY REPORT
ESTIMATED PROJECT COSTS - 60,000 GPD ISEL FACILITY
Table 6-2

| Construction Item | Units | Unit Cost | Quantity | Total Cost |
|---|---|---|---|---|
| **Earthwork** | | | | |
| Excavation | C.Y. | $25 | 1000 | $25,000 |
| Backfill/Regrading/Seeding/Mulching | C.Y. | $30 | 1000 | $30,000 |
| Tree Clearing and Grubbing | L.S. | $10,000 | 1 | $10,000 |
| Buried Piping/Conduit | L.F. | $100 | 100 | $10,000 |
| | | | Earthwork Subtotal: | $75,000.00 |
| **Concrete** | | | | |
| Equalization Tank | L.S. | $35,000 | 1 | $35,000 |
| Package Plant | L.S. | $130,000 | 1 | $130,000 |
| Blower/Generator Pad | L.S. | $1,000 | 1 | $1,000 |
| | | | Concrete Subtotal: | *$166,000* |
| **Equipment** | | | | |
| Comminutors | EA. | $45,000 | 2 | $90,000 |
| EQ Tank Pumps | L.S. | $30,000 | 1 | $30,000 |
| EQ Tank Mixing/Aeration | L.S. | $30,000 | 1 | $30,000 |
| Purestream BESST Plant - 60,000 gpd | EA. | $375,000 | 1 | $375,000 |
| -w/airlift pumps, blowers, diffusers, etc | | | | |
| -Sludge Holding Tank w/blowers | | | | |
| -Post Aeration Blowers and diffusers | | | | |
| UV System with Re-Piping | EA. | $85,000 | 1 | $85,000 |
| Stainless Steel Air Piping | L.F. | $100 | 100 | $10,000 |
| Filter Replacement | L.S. | $70,000 | 1 | $70,000 |
| Generator | EA. | $35,000 | 1 | $35,000 |
| *Miscellaneous Equipment Items* | | | | |
| Equipment Demolition | L.S. | $25,000 | 1 | $25,000 |
| Equipment Installation | L.S. | $40,000 | 1 | $40,000 |
| | | | Equipment Subtotal: | $790,000 |
| **Miscellaneous** | | | | |
| Mobilization/Demobilization General Conditions | L.S. | $40,000 | 1 | $40,000 |
| Additional Testing Services | L.S. | $5,000 | 1 | $5,000 |
| Miscellaneous Additional Work | L.S. | $50,000 | 1 | $50,000 |
| Electrical Costs | L.S. | $50,000 | 1 | $50,000 |
| Soil & Aggregate Material Allowances | L.S. | $10,000 | 1 | $10,000 |
| | | | Miscellaneous Subtotal: | $155,000 |

| | | |
|---|---|---|
| Base Construction Costs: | | $1,186,000 |
| 10% Construction Contingency: | | $118,600 |
| Total Estimated Construction Costs: | | $1,304,600 |
| | SAY: | $1,300,000 |
| 30% Engineering/Legal/Administration Contingency: | | $390,000 |
| TOTAL PROJECT COST: | | $1,690,000 |
| | SAY: | $1,690,000 |

TABLE 6-3

## Country Club Estates WWTP

Bond Costs-0.06 MGD Upgrade

Interest Rate 3.00%

20 Year Repayment

Financed Amount $1,590,000

| Year | Payment | Interest | Principal Paid | Principal Remaining |
|---|---|---|---|---|
| 1 | $106,873 | $47,700 | $59,173 | $1,530,827 |
| 2 | $106,873 | $45,925 | $60,948 | $1,469,879 |
| 3 | $106,873 | $44,096 | $62,777 | $1,407,102 |
| 4 | $106,873 | $42,213 | $64,660 | $1,342,442 |
| 5 | $106,873 | $40,273 | $66,600 | $1,275,843 |
| 6 | $106,873 | $38,275 | $68,598 | $1,207,245 |
| 7 | $106,873 | $36,217 | $70,656 | $1,136,589 |
| 8 | $106,873 | $34,098 | $72,775 | $1,063,814 |
| 9 | $106,873 | $31,914 | $74,959 | $988,855 |
| 10 | $106,873 | $29,666 | $77,207 | $911,648 |
| 11 | $106,873 | $27,349 | $79,524 | $832,125 |
| 12 | $106,873 | $24,964 | $81,909 | $750,215 |
| 13 | $106,873 | $22,506 | $84,367 | $665,849 |
| 14 | $106,873 | $19,975 | $86,898 | $578,951 |
| 15 | $106,873 | $17,369 | $89,504 | $489,447 |
| 16 | $106,873 | $14,683 | $92,190 | $397,257 |
| 17 | $106,873 | $11,918 | $94,955 | $302,302 |
| 18 | $106,873 | $9,069 | $97,804 | $204,498 |
| 19 | $106,873 | $6,135 | $100,738 | $103,760 |
| 20 | $106,873 | $3,113 | $103,760 | $0 |

TABLE 6-4

## Country Club Estates WWTP

Bond Costs-0.06 MGD Upgrade

Interest Rate 3.00%

30 Year Repayment

Financed Amount $1,590,000

| Year | Payment | Interest | Principal Paid | Principal Remaining |
|---|---|---|---|---|
| 1 | $81,121 | $47,700 | $33,421 | $1,556,579 |
| 2 | $81,121 | $46,697 | $34,423 | $1,522,156 |
| 3 | $81,121 | $45,665 | $35,456 | $1,486,700 |
| 4 | $81,121 | $44,601 | $36,520 | $1,450,181 |
| 5 | $81,121 | $43,505 | $37,615 | $1,412,565 |
| 6 | $81,121 | $42,377 | $38,744 | $1,373,822 |
| 7 | $81,121 | $41,215 | $39,906 | $1,333,916 |
| 8 | $81,121 | $40,017 | $41,103 | $1,292,813 |
| 9 | $81,121 | $38,784 | $42,336 | $1,250,476 |
| 10 | $81,121 | $37,514 | $43,606 | $1,206,870 |
| 11 | $81,121 | $36,206 | $44,915 | $1,161,955 |
| 12 | $81,121 | $34,859 | $46,262 | $1,115,694 |
| 13 | $81,121 | $33,471 | $47,650 | $1,068,044 |
| 14 | $81,121 | $32,041 | $49,079 | $1,018,964 |
| 15 | $81,121 | $30,569 | $50,552 | $968,413 |
| 16 | $81,121 | $29,052 | $52,068 | $916,344 |
| 17 | $81,121 | $27,490 | $53,630 | $862,714 |
| 18 | $81,121 | $25,881 | $55,239 | $807,475 |
| 19 | $81,121 | $24,224 | $56,896 | $750,579 |
| 20 | $81,121 | $22,517 | $58,603 | $691,975 |
| 21 | $81,121 | $20,759 | $60,361 | $631,614 |
| 22 | $81,121 | $18,948 | $62,172 | $569,442 |
| 23 | $81,121 | $17,083 | $64,037 | $505,404 |
| 24 | $81,121 | $15,162 | $65,958 | $439,446 |
| 25 | $81,121 | $13,183 | $67,937 | $371,509 |
| 26 | $81,121 | $11,145 | $69,975 | $301,533 |
| 27 | $81,121 | $9,046 | $72,075 | $229,459 |
| 28 | $81,121 | $6,884 | $74,237 | $155,222 |
| 29 | $81,121 | $4,657 | $76,464 | $78,758 |
| 30 | $81,121 | $2,363 | $78,758 | $0 |

TABLE 6-5

## Country Club Estates WWTP

Bond Costs-0.06 MGD Upgrade

Interest Rate 3.00%

20 Year Repayment

Financed Amount $1,690,000

| Year | Payment | Interest | Principal Paid | Principal Remaining |
|---|---|---|---|---|
| 1 | $113,595 | $50,700 | $62,895 | $1,627,105 |
| 2 | $113,595 | $48,813 | $64,781 | $1,562,324 |
| 3 | $113,595 | $46,870 | $66,725 | $1,495,599 |
| 4 | $113,595 | $44,868 | $68,727 | $1,426,873 |
| 5 | $113,595 | $42,806 | $70,788 | $1,356,084 |
| 6 | $113,595 | $40,683 | $72,912 | $1,283,172 |
| 7 | $113,595 | $38,495 | $75,099 | $1,208,073 |
| 8 | $113,595 | $36,242 | $77,352 | $1,130,721 |
| 9 | $113,595 | $33,922 | $79,673 | $1,051,048 |
| 10 | $113,595 | $31,531 | $82,063 | $968,985 |
| 11 | $113,595 | $29,070 | $84,525 | $884,460 |
| 12 | $113,595 | $26,534 | $87,061 | $797,399 |
| 13 | $113,595 | $23,922 | $89,673 | $707,726 |
| 14 | $113,595 | $21,232 | $92,363 | $615,363 |
| 15 | $113,595 | $18,461 | $95,134 | $520,230 |
| 16 | $113,595 | $15,607 | $97,988 | $422,242 |
| 17 | $113,595 | $12,667 | $100,927 | $321,315 |
| 18 | $113,595 | $9,639 | $103,955 | $217,360 |
| 19 | $113,595 | $6,521 | $107,074 | $110,286 |
| 20 | $113,595 | $3,309 | $110,286 | $0 |

TABLE 6-6

Country Club Estates WWTP
Bond Costs-0.06 MGD Upgrade
Interest Rate 3.00%
30 Year Repayment
Financed Amount $1,690,000

| Year | Payment | Interest | Principal Paid | Principal Remaining |
|---|---|---|---|---|
| 1 | $86,223 | $50,700 | $35,523 | $1,654,477 |
| 2 | $86,223 | $49,634 | $36,588 | $1,617,889 |
| 3 | $86,223 | $48,537 | $37,686 | $1,580,203 |
| 4 | $86,223 | $47,406 | $38,816 | $1,541,387 |
| 5 | $86,223 | $46,242 | $39,981 | $1,501,406 |
| 6 | $86,223 | $45,042 | $41,180 | $1,460,226 |
| 7 | $86,223 | $43,807 | $42,416 | $1,417,810 |
| 8 | $86,223 | $42,534 | $43,688 | $1,374,122 |
| 9 | $86,223 | $41,224 | $44,999 | $1,329,123 |
| 10 | $86,223 | $39,874 | $46,349 | $1,282,774 |
| 11 | $86,223 | $38,483 | $47,739 | $1,235,034 |
| 12 | $86,223 | $37,051 | $49,172 | $1,185,863 |
| 13 | $86,223 | $35,576 | $50,647 | $1,135,216 |
| 14 | $86,223 | $34,056 | $52,166 | $1,083,050 |
| 15 | $86,223 | $32,492 | $53,731 | $1,029,319 |
| 16 | $86,223 | $30,880 | $55,343 | $973,976 |
| 17 | $86,223 | $29,219 | $57,003 | $916,973 |
| 18 | $86,223 | $27,509 | $58,713 | $858,260 |
| 19 | $86,223 | $25,748 | $60,475 | $797,785 |
| 20 | $86,223 | $23,934 | $62,289 | $735,496 |
| 21 | $86,223 | $22,065 | $64,158 | $671,338 |
| 22 | $86,223 | $20,140 | $66,082 | $605,256 |
| 23 | $86,223 | $18,158 | $68,065 | $537,191 |
| 24 | $86,223 | $16,116 | $70,107 | $467,084 |
| 25 | $86,223 | $14,013 | $72,210 | $394,874 |
| 26 | $86,223 | $11,846 | $74,376 | $320,498 |
| 27 | $86,223 | $9,615 | $76,608 | $243,890 |
| 28 | $86,223 | $7,317 | $78,906 | $164,984 |
| 29 | $86,223 | $4,950 | $81,273 | $83,711 |
| 30 | $86,223 | $2,511 | $83,711 | $0 |

# APPENDIX A DEC INSPECTION LETTER AND SPDES PERMIT

91-20-5 (5/97)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
State Pollutant Discharge Elimination System (SPDES)
# NOTICE / RENEWAL APPLICATION / PERMIT

ENTERED

Please read ALL instructions on the back before completing this application form. Please TYPE or PRINT clearly in ink.

## PART 1 - NOTICE 09/15/2011

Permittee Contact Name, Title, Address

POUGHKEEPSIE (T) ARLINGTON WWTP
~~JAMES TOBESSERLIK~~ Stephen Segna X
78 SAND DOCK RD
POUGHKEEPSIE NY 12601

Facility and SPDES Permit Information

Name: POUGHKEEPSIE (T) COUNTRY CLUB EST
Ind. Code: 4952 County: DUTCHESS
DEC No.: 3-1346-00054/00002
SPDES No.: NY 003 4606
Expiration Date: 07/31/2012
Application Due By: 02/02/2012

**Are these name(s) & address(es) correct?** If not, please write corrections above.

The State Pollutant Discharge Elimination System Permit for the facility referenced above expires on the date indicated. You are required by law to file a complete renewal application **at least 180 days prior to expiration of your current permit. Note the "Application Due By" date above.**

**CAUTION:** This short application form and attached questionnaire are the only forms acceptable for permit renewal. Sign Part 2 below and mail only this form and the completed questionnaire using the enclosed envelope. *Effective April 1, 1994 the Department no longer assesses SPDES application fees.*

**If there are changes to your discharge, or to operations affecting the discharge,** then in addition to this renewal application, you must also submit a separate permit modification application to the Regional Permit Administrator for the DEC region in which the facility is located, as required by your current permit. See the reverse side of this page for instructions on filing a modification request.

## PART 2 - RENEWAL APPLICATION

**CERTIFICATION:** I hereby affirm that under penalty of perjury that the information provided on this form and all attachments submitted herewith is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to section 210.45 of the Penal Law.

Patricia Myers — Name of person signing application (see instructions on back)
Supervisor — Title

Patricia Myers — Signature
Oct. 3, 2011 — Date

## PART 3 - PERMIT (Below this line -- Official Use Only)

Effective Date: 8/1/12 Expiration Date: 7/31/17

Stuart Fox — Permit Administrator

Address: NYSDEC - Division of Environmental Permits
Bureau of Environmental Analysis
625 Broadway, Albany, NY 12233-1750

Stuart M Fox — Signature
DEC 19 2011 — Date

This permit together with the previous valid permit for this facility issued 8/1/07 and subsequent modifications constitute authorization to discharge wastewater in accordance with all terms, conditions and limitations specified in the previously issued valid permit, modifications thereof or issued as part of this permit, including any special or general conditions attached hereto. Nothing in this permit shall be deemed to waive the Department's authority to initiate a modification of this permit on the grounds specified in 6NYCRR §621.14, 6NYCRR §754.4 or 6NYCRR §757.1 existing at the time this permit is issued or which arise thereafter.

~~Attachments: General Conditions dated __/__~~

rec'd 10/6/11

91-20-5 (5/97)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
State Pollutant Discharge Elimination System (SPDES)
NOTICE / RENEWAL APPLICATION / PERMIT

Please read ALL instructions on the back before completing this application form. Please TYPE or PRINT clearly in ink.

PART 1 - NOTICE 10/14/2011

Permittee Contact Name, Title, Address

POUGHKEEPSIE (T) - ARLINTON WWTP
~~JAMES PODESZEDLIK~~ Stephen Segna
78 SAND DOCK ROAD
POUGHKEEPSIE NY 12601

Facility and SPDES Permit Information

Name: POUGHKEEPSIE (T) ARLINGTON WWTP
Ind. Code: 4952 County: DUTCHESS
DEC No.: 3-1346-00052/00003
SPDES No.: NY 002 6271
Expiration Date: 08/31/2012
Application Due By: 03/04/2012

**Are these name(s) & address(es) correct?** if not, please write corrections above.

The State Pollutant Discharge Elimination System Permit for the facility referenced above expires on the date indicated. You are required by law to file a complete renewal application at least 180 days prior to expiration of your current permit. **Note the "Application Due By" date above.**

CAUTION: This short application form and attached questionnaire are the only forms acceptable for permit renewal. Sign Part 2 below and mail only this form and the completed questionnaire using the enclosed envelope. *Effective April 1, 1994 the Department no longer assesses SPDES application fees.*

**If there are changes to your discharge, or to operations affecting the discharge,** then in addition to this renewal application, you must also submit a separate permit modification application to the Regional Permit Administrator for the DEC region in which the facility is located, as required by your current permit. See the reverse side of this page for instructions on filing a modification request.

PART 2 - RENEWAL APPLICATION

**CERTIFICATION:** I hereby affirm that under penalty of perjury that the information provided on this form and all attachments submitted herewith is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to section 210.45 of the Penal Law.

Patricia Myers — Supervisor

Name of person signing application (see instructions on back) — Title

Patricia Myers — 10/24/11

Signature — Date

PART 3 - PERMIT (Below this line - Official Use Only)

Effective Date: 9/1/12 Expiration Date: 8/31/17

Stuart Fox

Permit Administrator

Address: NYSDEC - Division of Environmental Permits
Bureau of Environmental Analysis
625 Broadway, Albany, NY 12233-1750

Stuart M. Fox — DEC 29 2011

Signature — Date

This permit together with the previous valid permit for this facility issued 9/1/07 and subsequent modifications constitute authorization to discharge wastewater in accordance with all terms, conditions and limitations specified in the previously issued valid permit, modifications thereof or issued as part of this permit, including any special or general conditions attached hereto. Nothing in this permit shall be deemed to waive the Department's authority to initiate a modification of this permit on the grounds specified in 6NYCRR §621.14, 6NYCRR §754.4 or 6NYCRR §757.1 existing at the time this permit is issued or which arise thereafter.

~~Attachments: General Conditions dated~~ __/__

RECEIVED NYSDEC OCT 27 2011

**New York State Department of Environmental Conservation**
**Division of Environmental Permits, 4th Floor**
625 Broadway, Albany, New York 12233-1750
**Phone:** (518) 402-9167 • **FAX:** (518) 402-9168
**Website:** www.dec.state.ny.us

MAR - 1 2007

FACILITY INFORMATION

NAME: POUGHKEEPSIE (T) COUNTRY CLUB
LOCATION: POUGHKEEPSIE ( T )
COUNTY: DUTCHESS
SPDES NO: NY 003 4606
DEC ID NO. 3-1346-00054-00002

POUGHKEEPSIE (T) ARLINGTON WWTP
JAMES PODESZEDLIK
78 SAND DOCK RD
POUGHKEEPSIE NY 12601

Dear SPDES Permittee:

Enclosed please find a validated NOTICE/RENEWAL APPLICATION/PERMIT form renewing your State Pollutant Discharge Elimination System (SPDES) permit for the referenced facility. This validated form, together with the previously issued permit (see issuance date of this permit in Part 3 of the NOTICE/RENEWAL APPLICATION/PERMIT form), and any subsequent permit modifications constitute authorization to discharge wastewater in accordance with all terms, conditions and limitations specified therein.

The instructions and other information that you received with the NOTICE/RENEWAL APPLICATION/PERMIT package fully described procedures for renewal and modification of your SPDES permit under the Environmental Benefit Permit Strategy (EBPS). As a reminder, SPDES permits are renewed at a central location in Albany in order to make the process more efficient. All other concerns with your permit such as applications for permit modifications, permit transfers to a new owner, name changes, and other questions should be directed to the Regional Permit Administrator at the following address:

Margaret Duke
NYSDEC REGION 3
21 South Putt Corners Road
New Paltz, NY 12561-1696
(845) 256-3054

If you have already filed an application for modification of your permit, it will be processed separately through our regional office. If you have questions concerning this permit renewal, please contact Lynn Kaplan at (518) 402-9165.

Sincerely,

William R. Adriance

Chief Permit Administrator

Enclosure
cc: RPA
RWE
BWP

lew York State Department of Environmental Conservation
ivision of Environmental Permits, 4th Floor
25 Broadway, Albany, New York 12233-1750
hone: (518) 402-9167 • FAX: (518) 402-9168
lebsite: www.dec.state.ny.us


MAR - 1 2007

FACILITY INFORMATION

NAME: POUGHKEEPSIE (T) COUNTRY CLUB
LOCATION: POUGHKEEPSIE ( T )
COUNTY: DUTCHESS
SPDES NO: NY 003 4606
DEC ID NO. 3-1346-00054-00002

POUGHKEEPSIE (T) ARLINGTON WWTP
JAMES PODESZEDLIK
78 SAND DOCK RD
POUGHKEEPSIE NY 12601

Dear SPDES Permittee:

Enclosed please find a validated NOTICE/RENEWAL APPLICATION/PERMIT form renewing your State Pollutant Discharge Elimination System (SPDES) permit for the referenced facility. This validated form, together with the previously issued permit (see issuance date of this permit in Part 3 of the NOTICE/RENEWAL APPLICATION/PERMIT form), and any subsequent permit modifications constitute authorization to discharge wastewater in accordance with all terms, conditions and limitations specified therein.

The instructions and other information that you received with the NOTICE/RENEWAL APPLICATION/PERMIT package fully described procedures for renewal and modification of your SPDES permit under the Environmental Benefit Permit Strategy (EBPS). As a reminder, SPDES permits are renewed at a central location in Albany in order to make the process more efficient. All other concerns with your permit such as applications for permit modifications, permit transfers to a new owner, name changes, and other questions should be directed to the Regional Permit Administrator at the following address:

Margaret Duke
NYSDEC REGION 3
21 South Putt Corners Road
New Paltz, NY 12561-1696
(845) 256-3054

If you have already filed an application for modification of your permit, it will be processed separately through our regional office. If you have questions concerning this permit renewal, please contact Lynn Kaplan at (518) 402-9165.

Sincerely,

Chief Permit Administrator

Enclosure
cc: RPA
RWE
BWP

-5 (5/97)

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

State Pollutant Discharge Elimination System (SPDES)

# NOTICE / RENEWAL APPLICATION / PERMIT

Please read ALL instructions on the back before completing this application form. Please TYPE or PRINT clearly in ink.

## PART 1 - NOTICE 10/16/2006

Permittee Contact Name, Title, Address

POUGHKEEPSIE (T) ARLINGTON WWTP
JAMES PODESZEDLIK
78 SAND DOCK RD
POUGHKEEPSIE NY 12601

Facility and SPDES Permit Information

Name: POUGHKEEPSIE (T) COUNTRY CLUB EST
Ind. Code: 4952 County: DUTCHESS
DEC No.: 3-1346-00054/00002
SPDES No.: NY 003 4606
Expiration Date: 08/01/2007
Application Due By: 02/02/2007

**Are these name(s) & address(es) correct?** If not, please write corrections above.

The State Pollutant Discharge Elimination System Permit for the facility referenced above expires on the date indicated. You are required by law to file a complete renewal application **at least 180 days prior to expiration of your current permit. Note the "Application Due By" date above.**

**CAUTION:** This short application form and attached questionnaire are the only forms acceptable for permit renewal. Sign Part 2 below and mail only this form and the completed questionnaire using the enclosed envelope. *Effective April 1, 1994 the Department no longer assesses SPDES application fees.*

**If there are changes to your discharge, or to operations affecting the discharge,** then in addition to this renewal application, you must also submit a separate permit modification application to the Regional Permit Administrator for the DEC region in which the facility is located, as required by your current permit. See the reverse side of this page for instructions on filing a modification request.

## PART 2 - RENEWAL APPLICATION

**CERTIFICATION:** I hereby affirm that under penalty of perjury that the information provided on this form and all attachments submitted herewith is true to the best of my knowledge and belief. False statements made herein are punishable as a Class A misdemeanor pursuant to section 210.45 of the Penal Law.

GEORGE B. CACCHIO — MANAGING OPERATOR
Name of person signing application (see instructions on back) — Title

Signature: [signature] — Date: JANUARY 10TH, 2007 1/10/07

RECEIVED JAN 15 P 12:11 NYSDEC

## PART 3 - PERMIT (Below this line - Official Use Only)

Effective Date: 8/1/07 Expiration Date: 7/31/12

William R. Adriance
Permit Administrator

Address: NYSDEC - Division of Environmental Permits
Bureau of Environmental Analysis
625 Broadway, Albany, NY 12233-1750

Signature: [signature] Date: MAR - 1 2007

This permit together with the previous valid permit for this facility issued 8/1/02 and subsequent modifications constitute authorization to discharge wastewater in accordance with all terms, conditions and limitations specified in the previously issued valid permit, modifications thereof or issued as part of this permit, including any special or general conditions attached hereto. Nothing in this permit shall be deemed to waive the Department's authority to initiate a modification of this permit on the grounds specified in 6NYCRR §621.14, 6NYCRR §754.4 or 6NYCRR §757.1 existing at the time this permit is issued or which arise thereafter.

~~Attachments: General Conditions dated __/__~~

CCE

Facility ID # 0034606

Part 1, Page 2 of 3

(7/84)

1 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

ng the Period Beginning August 1, 1987

asting until August 1, 1992

lischarges from the permitted facility shall be limited and monitored by the

nittee as specified below:

TABLE 1

| utfall umber | Effluent Limitations (Maximum Limits except where otherwise indicated) | | | |
|---|---|---|---|---|
| | (X) Flow | 30 day arithmetic mean | 0.06 | (X) MGD ( ) GPD |
| | ( ) BOD5 | 30 day arithmetic mean | ___ mg/l and | ___ lbs/day(*1) |
| | ( ) BOD5 | 7 day arithmetic mean | ___ mg/l and | ___ lbs/day |
| | ( ) BOD5 | Daily | ___ mg/l and | ___ lbs/day |
| | (X) UOD (*2) | Daily | 70 mg/l and | 35 lbs/day |
| | (X) Suspended Solids | 30 day arithmetic mean | 30 mg/l and | 15 lbs/day(*1) |
| | (X) Suspended Solids | 7 day arithmetic mean | 45 mg/l and | 23 lbs/day |
| | ( ) Suspended Solids | Daily | ___ mg/l and | ___ lbs/day |

(X) Effluent disinfection required: (X) all year

( ) Seasonal from ______ to ______

(X) Fecal Coliform 30 day geometric mean shall not exceed 200/100 ml

(X) Fecal Coliform 7 day geometric mean shall not exceed 400/100 ml

( ) Fecal Coliform 6 hour geometric mean shall not exceed 800/100 ml (*3)

( ) Fecal Coliform No individual sample may exceed 2400/100 ml (*3)

If chlorine is used for disinfection, a chlorine residual of ______ mg/l shall be maintained in the chlorine contact chamber whenever disinfection is required. If specified here, the chlorine residual in the final discharge shall not exceed ______ mg/l.

| | | |
|---|---|---|
| ( ) Total Coliform | Daily | ______/100 ml |
| ( ) Total Kjeldahl Nitrogen | Daily | ______/mg/l as N |
| ( ) Ammonia | Daily | ______/mg/l as $NH_3$ |
| (X) Dissolved Oxygen | Minimum | greater than 2.0 mg/l |
| (X) pH | Range | 6.5 to 8.5 |
| (X) Settleable Solids | Daily | 0.1 ml/l |
| ( ) Phosphorus | Daily | ______ mg/l as P |
| ( ) Total Nitrogen | Daily | ______ mg/l as N |
| ( ) ______ | | |

TABLE 2

## Monitoring Requirements

| Parameter | Frequency | Sample Type | Sample Location: Influent | Sample Location: Effluent |
|---|---|---|---|---|
| [X] Total Flow, MGD | Cont | N/A | X | |
| [X] $BOD_5$, mg/l | 1/Month | GRAB | X | X |
| [X] Suspended Solids, mg/l | 1/Month | GRAB | X | X |
| [X] Fecal Coliform, No./100 ml | 1/Month | GRAB | | X |
| [ ] Total Coliform, No./100 ml | | | | |
| [X] Total Kjeldahl Nitrogen, mg/l as N | 1/Month | GRAB | | X |
| [ ] Ammonia, mg/l as $NH_3$ | | | | |
| [X] Dissolved Oxygen, mg/l | 1/Month | GRAB | | |
| [X] pH | DAILY | GRAB | X | X |
| [X] Settleable Solids, ml/l | DAILY | GRAB | X | X |
| [X] Residual Chlorine, mg/l | DAILY | GRAB | | X |
| [ ] Phosphorus, mg/l as P | | | | |
| [X] Temperature, °C | DAILY | GRAB | X | X |
| [ ] Total Nitrogen, mg/l as N | | | | |
| [ ] Visual Observation | | | | |
| [ ] ______________ | | | | |

NOTE: (*1) and effluent values shall not exceed 15 % of influent values.
(*2) (Ultimate Oxygen Demand) shall be computed and reported as follows:
$UOD = 1\ 1/2 \times CBOD_5 + 4\ 1/2 \times TKN$ (Total Kjeldahl Nitrogen).
(*3) applicable only in the Interstate Sanitation District.
(*4) sample contact chamber effluent and final effluent if limits are specified for both.

New York State Department of Environmental Conservation
Division of Water, Region 3
21 South Putt Corners Road, New Paltz, NY 12561-1620
Phone: (845) 256-3000 • FAX: (845) 255-3414
Website: www.dec.ny.gov

RECEIVED 6/18/13

Joe Martens
Commissioner

June 14, 2013

RECEIVED
JUN 18 2013
By copy Super Town Board Sewer Legal

Town of Poughkeepsie
1 Overocker Road
Poughkeepsie, NY 12603
Attn: Supervisor Tancredi and Town Board

Re: **Notice of Violation and**
**Annual Compliance Inspection Report**
Country Club Estates Sewer District
Town of Poughkeepsie, Dutchess County
SPDES # NY0034606

Dear Supervisor Tancredi:

On June 5, 2013, an annual inspection of the above referenced facility was performed for the purpose of evaluating compliance with the State Pollutant Discharge Elimination System (SPDES) Permit and Article 17 of the Environmental Conservation Law. A copy of the inspection report is enclosed for your information.

At the time of this inspection, substantial operation and maintenance deficiencies were observed as noted below:

1. All the tanks, i.e., aeration tanks, secondary clarifiers, and sludge holding tanks are corroded, have passed their useful life span, and need rehabilitation and/ or replacement.

2. A significant quantity of sludge was floating on the surface of the secondary clarifier, overflowing the weirs.

3. One of the sand beds was ponded, with a significant quantity of floating sludge. The remaining three sand beds need to be cleaned for the future use.

4. Lack of "Incident Reporting" notice to the Department in accordance with 6NYCRR Part 750-2.7 of the maintenance work.

5. The final effluent at the outfall appeared to be greyish in color, and was in contrast with the receiving waters at the point of discharge.

The above represent non-compliance with the terms of your SPDES permit and water quality standards. This needs to be corrected promptly. You must notify the Department in writing when the necessary corrections have been made.

We shall expect an engineering report, prepared by a professional engineer licensed in New York State, by August 1, 2013, detailing specific corrective measures to be taken, and a schedule for their implementation. In addition, a compliance conference has been scheduled for July 1, 2013 at 11:00 A.M. in the DEC, New Paltz Office to discuss the corrective actions necessary to address the observed violations and the overall condition of the treatment plant. Please call this office by June 24 to confirm appropriate attendance.

Very truly yours,

V. J. Gandhi

Vijay Gandhi
Environmental Engineer

cc: Shohreh Karimipour, RWE, NYSDEC
John Sansalone, P.E. – NYSDEC
Steve Segna, Plant Operator
File

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER

# MUNICIPAL WASTEWATER FACILITY INSPECTION REPORT - COMPREHENSIVE (Part I)

| | | |
|---|---|---|
| Purpose of Inspection: Comprehensive | DEC Region: 3 | Date of Inspection: 06/05/2013 |
| SPDES No. NY-0034605 | Facility Name: Country Club Estates STP | Location (C,T,V): T/ Poughkeepsie |
| County: Dutchess | Name of Inspector: Vijay Gandhi | Part II Attached? ☑ Yes ☐ No |

Summary Rating: Unsatisfactory

Weather Conditions: 55 degrees, sunny

Rating Codes: S = Satisfactory U = Unsatisfactory M = Marginal NI = Not Inspected NA = Not Applicable

| Items | Rating | Comments (Note units out of operation/outstanding operation/etc.) |
|---|---|---|
| A. General<br>1. Buildings/Grounds/Housekeeping | U | |
| 2. Flow Metering | S | Calibrated: 03/18/2013 |
| 3. Stand-by Power | N/A | |
| 4. Alarm Systems | N/A | |
| 5. Odors/Odor Control | S | |
| 6. Influent Impact on Operations | U | |
| 7. Preventive Maintenance | U | Aeration tanks & Clarifiers are corroded and needs rehabilitation or |
| 8. | | replacement. |
| B. Preliminary/Primary<br>1. Influent Pumps | S | |
| 2. Bar Screen/Comminutor | S | |
| 3. Disposal of Grit/Screenings | S | |
| 4. Grit Removal | S | |
| 5. Settling Tanks | N/A | |
| 6. Scum/Sludge Removal | N/A | |
| 7. Effluent | U | Sludge solids floating on the Primary/ Aeration tank. |
| 8. | | |
| C. Secondary/Tertiary<br>1. Aeration Tank -2 | U | Tanks have passed their useful life and needs rehab/replacement. |
| 2. Secondary Clarifier -2 | U | Floating sludge crossing the weirs into the effluent |
| 3. Open Sand Beds -4 | U | Sand bed was ponded with sludge on one of the sand beds, which was |
| 4. | | in use at the time of the inspection. -Significant presence of sludge |
| 5. | | solids in the bed. |
| 6. | | |
| 7. | | |
| 8. | | |
| D. Effluent<br>1. Disinfection | S | Dis. by Sodium Hypochlorite tablet feeder |
| 2. Effluent Condition | U | greyish in color. |
| 3. Receiving Water Condition | S | contrast at the point of discharge. |
| 4. | | |
| E. Sludge Handling/Disposal<br>1. Digesters | U | sludge holding tank is corroded. |
| 2. Sludge Pumps | S | |
| 3. Sludge Dewatering | S | |
| 4. Sludge Disposal | S | Approx. 4,000 gallons/ month to EarthCare Inc. |
| 5. | | |

| | | |
|---|---|---|
| Signature of Inspector: Vijay Gandhi | Title: Environmental Engineer | Date: 06/05/2013 |
| Name of Facility Representative: Ed Balicki | Title: Plant Operator | Date: |

# MUNICIPAL WASTEWATER FACILITY INSPECTION REPORT - COMPREHENSIVE (Part II)

| Facility Name | SPDES Number | Comments |
|---|---|---|
| Country Club Estates STP | NY-0034606 | |

## A. Collection System

(1) 100 % Separate ____% Combined

(2) Did sewer overflows occur upstream of the plant in the past year? __Yes ✓No __N/A

(3) Reason for overflow(s).

(4) Was overflow sewage chlorinated? __Yes __No ✓N/A

(5) Were there any unpermitted overflows/bypasses? __Yes ✓No __N/A

(6) Were appropriate agencies notified promptly, when required, of each overflow? __Yes __No ✓N/A

(7) Is the capability for bypass designed into the plant? __Yes ✓No __N/A

If so, list units which can be bypassed.

(8) Does sewage by-pass the plant? __Yes ✓No __N/A

Define conditions under which bypass occurs (e.g. what flow):

Bypass frequency (times per year): -

Average duration of bypass (hours): -

(9) Infiltration/Inflow problems, e.g., is sewage ordinance enforced with respect to illegal stormwater connections? Explain as needed (include reference to corrective action or lack thereof).

(10) Is there a BMP/Wet Weather Operations Plan? ✓Yes __No __N/A

(11) Number of pump stations in system: 4

Number inspected this inspection: 0

Comments (consider access, ventilation, lighting, emergency power, safety, etc):

## B. Industrial Waste

(1) Are industrial waste loadings causing problems at this facility? __Yes ✓No __N/A

Explain as needed (describe nature of problem an extent and adequacy of measures to address the problem):

(2) Is there a sewer use ordinance? ✓Yes __No __N/A

Date: Pre 1970

Based on Model: ____

Is it being enforced to control Industrial Waste? ✓Yes __No __N/A

(3) Does this facility accept septage? __Yes ✓No __N/A

How much?

How is it introduced?

## C. Laboratory Information

(1) Is the permittee using an ELAP certified laboratory? ✓Yes __No __N/A
Details: ELAP # 10,124

(2) Is a commercial laboratory used? ✓Yes __No __N/A
Lab Name: EnviroTest Lab.

Lab Address: Newburgh, NY

(3) Pertaining to SPDES Self-Monitoring:

(a) Does the permittee have a written sampling plan? ✓Yes __No __N/A
If yes, are they following their plan? ✓Yes __No __N/A
(b) Is testing done for all parameters at required frequency and punctually reported? ✓Yes __No __N/A
(c) Do sampling techniques meet requirements and intent of permit? ✓Yes __No __N/A
(d) Are EPA-approved procedures used? ✓Yes __No __N/A
(e) Is calibration and maintenance of instrumentation and equipment satisfactory? ✓Yes __No __N/A
(f) Is quality control used? (Spiked/duplicate samples) __Yes ✓No __N/A
(g) Should sampling frequencies/types be modified? __Yes ✓No __N/A
If yes, please explain:

(h) Are lab records satisfactory? ✓Yes __No __N/A
(i) Is a minimum of 3 years data kept? ✓Yes __No __N/A

(4) Pertaining to Process Control:

(a) Is testing performed for all necessary parameters? ✓Yes __No __N/A
(b) Is testing performed at necessary frequencies? ✓Yes __No __N/A
(c) Are procedures technically sound? ✓Yes __No __N/A
(d) Is sampling adequate? ✓Yes __No __N/A

Activated Sludge Facility:

(e) Does the facility operator test for the following:
MLSS? ✓Yes __No __N/A
Dissolved Oxygen? ✓Yes __No __N/A
Settleability? ✓Yes __No __N/A
Microscopic Analysis of Sludge? ✓Yes __No __N/A
Final Clarifier Sludge Blanket Depth? ✓Yes __No __N/A
Process Control "Target Values"? ✓Yes __No __N/A

(f) Does the facility operator calculate the following process control parameters:
MCRT? ✓Yes __No __N/A
Sludge Age? ✓Yes __No __N/A

(g) Is the testing applied towards process control adjustments? ✓Yes __No __N/A

(h) What approach (if any) is used to determine changes in:
Sludge Age?

Waste Sludge Flow?

(i) Was laboratory information used to prepare the DMR and Monthly Operating Report properly? ✓Yes __No __N/A

(5) Explanation as needed for any of the above:

## D. Personnel Information

(1) Is staffing and training adequate? (Consider all aspects, including management/supervision, operations, laboratory, maintenance, safety, availability of training, development of staff, etc). ✓ Yes __No __N/A

(2) Certified Operators:

Chief Operator - Name, Certificate Number, Grade, Renewal Date:

Steve Segna, 3A, # 9,390, Exp. Date: 10/01/2014

Assistant Operator - Name, Certificate Number, Grade, Renewal Date:

Ed Balicki, 3A, # 12,649, Exp. Date: 10/2017

(3) Is operational staff certified at the appropriate level(s)? ✓ Yes __No __N/A

Explain if needed:

(4) Do facility operators have renewal certification and/or training records? ✓ Yes __No __N/A

(5) Plant Classification: 2A

(6) Plant Score: ______

(7) Explain as needed for any of the above:

## E. Additional Information

(1) Is treatment facility properly operated and maintained? ✓ Yes __No __N/A

Details:

(2) Check Adequate/Inadequate as appropriate:

| | | |
|---|---|---|
| (a) Preventive maintenance schedules exist and are followed? | __Adequate | ✓ Inadequate |
| (b) Records are kept for maintenance, repairs and replacement? | __Adequate | ✓ Inadequate |
| (c) Spare parts inventory is maintained? | __Adequate | ✓ Inadequate |
| (d) O&M Manual exists and is available? | __Adequate | ✓ Inadequate |
| (e) O&M Manual kept up-to-date? | __Adequate | ✓ Inadequate |
| (f) As-built plans and specifications exist and are available? | __Adequate | ✓ Inadequate |
| (g) Manufacturers' O&M specifications exist and are available? | __Adequate | __Inadequate |
| (h) Other records kept as needed (e.g. flow recorder charts)? | __Adequate | __Inadequate |
| (i) Alarm system for power or equipment failures is properly maintained and tested? | __Adequate | __Inadequate |
| (j) Standby power system exists and is routinely tested? | __Adequate | __Inadequate |

(3) Current copy of Part I and Part II of SPDES permit on premises? ✓ Yes __No __N/A

(4) Has facility been subject of complaints (odors, others)? __Yes ✓ No __N/A

If yes, describe:

(5) Is sludge disposal satisfactory and are required permits in force? ✓ Yes __No __N/A

(a) Name and location of sludge disposal site (and/or name and permit number of scavenger):

(b) Is there an alternate sludge disposal site or contingency plan? ✓ Yes __No __N/A

If yes, please describe:

to haul the sludge to the Arlington treatment plant.

(6) Does facility have effective administrative structure and adequate financial systems (e.g. Repair Reserve Fund, Uniform Accounting System)? ✓ Yes __No __N/A

(7) Is progress on compliance schedule(s) (e.g. Upgrading, CSO, Pretreatment) satisfactory? __Yes __No ✓ N/A

(8) Explanation as needed for any of the above:

**F. Inspector Comments**

-Replaced blower motor for aeration tank # 1.
-Peplaced blowers on aeration tank #2.

| | | |
|---|---|---|
| Signature of Inspector: Vijay Gandhi | Title: Environmental Engineer | Date: 06/05/2013 |
| Name of Facility Representative: Ed Balicki | Title: Plant Operator | Date: |

# APPENDIX B STATISTICAL ANALYSIS OF PLANT DATA

COUNTRY CLUB ESTATES WWTF
STATISTICAL SUMMARY

| Average Daily Flow (MGD) | |
|---|---|
| Mean | 0.048 |
| Standard Error | 0.004 |
| Median | 0.045 |
| Mode | 0.032 |
| Standard Deviation | 0.014 |
| Sample Variance | 0.000 |
| Kurtosis | -0.832 |
| Skewness | 0.560 |
| Range | 0.042 |
| Minimum | 0.032 |
| Maximum | 0.074 |
| Sum | 0.718 |
| Count | 15 |
| Confidence Level(95.0%) | 0.0077 |

| Maximum Daily Flow (MGD) | |
|---|---|
| Mean | 0.078 |
| Standard Error | 0.0061 |
| Median | 0.078 |
| Mode | 0.101 |
| Standard Deviation | 0.0237 |
| Sample Variance | 0.0006 |
| Kurtosis | -1.715 |
| Skewness | -0.216 |
| Range | 0.064 |
| Minimum | 0.042 |
| Maximum | 0.106 |
| Sum | 1.17 |
| Count | 15 |
| Confidence Level(95.0%) | 0.013 |

| Influent pH | |
|---|---|
| Mean | 7.48 |
| Standard Error | 0.11 |
| Median | 7.3 |
| Mode | 6.9 |
| Standard Deviation | 0.598 |
| Sample Variance | 0.358 |
| Kurtosis | -0.73399998 |
| Skewness | -0.103 |
| Range | 2.4 |
| Minimum | 6.1 |
| Maximum | 8.5 |
| Sum | 209.4 |
| Count | 28 |
| Confidence Level(95.0%) | 0.232 |

| Average BOD IN(mg/L) | |
|---|---|
| Mean | 151.87 |
| Standard Error | 34.72 |
| Median | 90 |
| Mode | 130 |
| Standard Deviation | 134.46 |
| Sample Variance | 18079.40952 |
| Kurtosis | 0.87 |
| Skewness | 1.52 |
| Range | 410 |
| Minimum | 40 |
| Maximum | 450 |
| Sum | 2278 |
| Count | 15 |
| Confidence Level(95.0%) | 74.46 |

| AVE TSS IN (mg/L) | |
|---|---|
| Mean | 153.93 |
| Standard Error | 37.57 |
| Median | 96 |
| Mode | 58 |
| Standard Deviation | 145.49 |
| Sample Variance | 21167.78 |
| Kurtosis | 4.83 |
| Skewness | 2.13 |
| Range | 542 |
| Minimum | 38 |
| Maximum | 580 |
| Sum | 2309 |
| Count | 15 |
| Confidence Level(95.0%) | 80.57 |

| pH Effluent Min | |
|---|---|
| Mean | 7.014 |
| Standard Error | 0.091 |
| Median | 6.9 |
| Mode | 6.9 |
| Standard Deviation | 0.48 |
| Sample Variance | 0.23 |
| Kurtosis | 0.26 |
| Skewness | 0.43 |
| Range | 2.1 |
| Minimum | 6.1 |
| Maximum | 8.2 |
| Sum | 196.4 |
| Count | 28 |
| Confidence Level(95.0%) | 0.187 |

| Inf. Settleable Solids (mL/L) | |
|---|---|
| Mean | 24.07 |
| Standard Error | 1.91 |
| Median | 25 |
| Mode | 25 |
| Standard Deviation | 7.39 |
| Sample Variance | 54.64 |
| Kurtosis | 0.04 |
| Skewness | 0.35 |
| Range | 27 |
| Minimum | 13 |
| Maximum | 40 |
| Sum | 361 |
| Count | 15 |
| Confidence Level(95.0%) | 4.09 |

| AVE. MLSS East Train(mg/L) | |
|---|---|
| Mean | 3358.6 |
| Standard Error | 218.85 |
| Median | 3472.5 |
| Mode | #N/A |
| Standard Deviation | 847.61 |
| Sample Variance | 718449.686 |
| Kurtosis | 0.41 |
| Skewness | -0.58 |
| Range | 3238 |
| Minimum | 1442 |
| Maximum | 4680 |
| Sum | 50379 |
| Count | 15 |
| Confidence Level(95.0%) | 469.39 |

| AVE. MLSS West Train(mg/L) | |
|---|---|
| Mean | 3191.7 |
| Standard Error | 193.66 |
| Median | 3186 |
| Mode | #N/A |
| Standard Deviation | 750.05 |
| Sample Variance | 562576.1 |
| Kurtosis | 3.305 |
| Skewness | -0.784 |
| Range | 3288 |
| Minimum | 1210 |
| Maximum | 4498 |
| Sum | 47875.5 |
| Count | 15 |
| Confidence Level(95.0%) | 415.36 |

COUNTRY CLUB ESTATES WWTF
STATISTICAL SUMMARY

| SVI East Train | |
|---|---|
| Mean | 120.04 |
| Standard Error | 4.19 |
| Median | 114.73 |
| Mode | #N/A |
| Standard Deviation | 16.23 |
| Sample Variance | 263.29 |
| Kurtosis | -1.65 |
| Skewness | 0.29 |
| Range | 43.70 |
| Minimum | 100.50 |
| Maximum | 144.20 |
| Sum | 1800.59 |
| Count | 15 |
| Confidence Level(95.0%) | 8.99 |

| SVI West Train | |
|---|---|
| Mean | 115.18 |
| Standard Error | 15.10 |
| Median | 106.75 |
| Mode | #N/A |
| Standard Deviation | 58.47 |
| Sample Variance | 3418.23705 |
| Kurtosis | 11.05 |
| Skewness | 3.17 |
| Range | 244.11 |
| Minimum | 69.94 |
| Maximum | 314.05 |
| Sum | 1727.71 |
| Count | 15 |
| Confidence Level(95.0%) | 32.38 |

| Solids Percent | |
|---|---|
| Mean | 0.024 |
| Standard Error | 0.00 |
| Median | 0.0226 |
| Mode | 0.023 |
| Standard Deviation | 0.0073 |
| Sample Variance | 5.29021E-05 |
| Kurtosis | 1.091 |
| Skewness | 1.158 |
| Range | 0.027 |
| Minimum | 0.014 |
| Maximum | 0.041 |
| Sum | 0.3539 |
| Count | 15 |
| Confidence Level(95.0%) | 0.004 |

| AVE TSS OUT (mg/L) | |
|---|---|
| Mean | 1.193 |
| Standard Error | 0.073 |
| Median | 1 |
| Mode | 1 |
| Standard Deviation | 0.284 |
| Sample Variance | 0.081 |
| Kurtosis | 1.272 |
| Skewness | 1.394 |
| Range | 0.9 |
| Minimum | 1 |
| Maximum | 1.9 |
| Sum | 17.9 |
| Count | 15 |
| Confidence Level(95.0%) | 0.157 |

| Aeration Basin HRT (hrs) | |
|---|---|
| Mean | 32.47 |
| Standard Error | 2.32 |
| Median | 32 |
| Mode | 45 |
| Standard Deviation | 8.98 |
| Sample Variance | 80.69 |
| Kurtosis | -1.48 |
| Skewness | 0.07 |
| Range | 25.54 |
| Minimum | 19.46 |
| Maximum | 45 |
| Sum | 487.07 |
| Count | 15 |
| Confidence Level(95.0%) | 4.97 |

| Secondary Overflow (gpd/sqft) | |
|---|---|
| Mean | 309.82 |
| Standard Error | 23.39 |
| Median | 291.26 |
| Mode | 207.12 |
| Standard Deviation | 90.58 |
| Sample Variance | 8204.27 |
| Kurtosis | -0.83 |
| Skewness | 0.56 |
| Range | 271.84 |
| Minimum | 207.12 |
| Maximum | 478.96 |
| Sum | 4647.25 |
| Count | 15 |
| Confidence Level(95.0%) | 50.160 |

| F:M Ratio East (lb BOD/lb MLVSS) | |
|---|---|
| Mean | 0.100 |
| Standard Error | 0.028 |
| Median | 0.051 |
| Mode | #N/A |
| Standard Deviation | 0.11 |
| Sample Variance | 0.01 |
| Kurtosis | 2.88 |
| Skewness | 1.95 |
| Range | 0.36 |
| Minimum | 0.01 |
| Maximum | 0.37 |
| Sum | 1.51 |
| Count | 15 |
| Confidence Level(95.0%) | 0.060 |

| F:M Ratio West (lb BOD/lb MLVSS) | |
|---|---|
| Mean | 0.091 |
| Standard Error | 0.019 |
| Median | 0.056 |
| Mode | #N/A |
| Standard Deviation | 0.07 |
| Sample Variance | 0.01 |
| Kurtosis | 4.50 |
| Skewness | 1.96 |
| Range | 0.29 |
| Minimum | 0.02 |
| Maximum | 0.31 |
| Sum | 1.37 |
| Count | 15 |
| Confidence Level(95.0%) | 0.04 |

| Organic Loading (lbs/1,000 cuft) | |
|---|---|
| Mean | 7.15 |
| Standard Error | 1.67 |
| Median | 4.41 |
| Mode | 13.47 |
| Standard Deviation | 6.47 |
| Sample Variance | 41.81 |
| Kurtosis | 5.83 |
| Skewness | 2.30 |
| Range | 25.41 |
| Minimum | 1.33 |
| Maximum | 26.74 |
| Sum | 107.26 |
| Count | 15 |
| Confidence Level(95.0%) | 3.58 |

COUNTRY CLUB ESTATES WWTF
STATISTICAL SUMMARY

| *Adjusted Ave Flow (MGD)* | |
|---|---|
| Mean | 0.041 |
| Standard Error | 0.002 |
| Median | 0.039 |
| Mode | 0.032 |
| Standard Deviation | 0.008 |
| Sample Variance | 0.000 |
| Kurtosis | -0.250 |
| Skewness | 0.899 |
| Range | 0.024 |
| Minimum | 0.032 |
| Maximum | 0.056 |
| Sum | 0.609 |
| Count | 15 |
| Confidence Level(95.0%) | 0.004 |

| *Adjusted Secondary Overflow (gpd/sqft)* | |
|---|---|
| Mean | 262.97 |
| Standard Error | 12.79 |
| Median | 250.71 |
| Mode | 207.12 |
| Standard Deviation | 49.54 |
| Sample Variance | 2453.73 |
| Kurtosis | -0.25 |
| Skewness | 0.90 |
| Range | 153.82 |
| Minimum | 207.12 |
| Maximum | 360.94 |
| Sum | 3944.52 |
| Count | 15 |
| Confidence Level(95.0%) | 27.43 |

| *Adjusted Organic Loading (lbs/1,000 cuft)* | |
|---|---|
| Mean | 6.05 |
| Standard Error | 1.24 |
| Median | 4.33 |
| Mode | 13.47 |
| Standard Deviation | 4.81 |
| Sample Variance | 23.14 |
| Kurtosis | 1.30 |
| Skewness | 1.53 |
| Range | 16.23 |
| Minimum | 1.33 |
| Maximum | 17.57 |
| Sum | 90.76 |
| Count | 15 |
| Confidence Level(95.0%) | 2.664 |

| *Adjusted F:M Ratio East (lb BOD/lb MLVSS)* | |
|---|---|
| Mean | 0.086 |
| Standard Error | 0.025 |
| Median | 0.042 |
| Mode | #N/A |
| Standard Deviation | 0.096 |
| Sample Variance | 0.009 |
| Kurtosis | 5.493 |
| Skewness | 2.332 |
| Range | 0.358 |
| Minimum | 0.015 |
| Maximum | 0.373 |
| Sum | 1.287 |
| Count | 15 |
| Confidence Level(95.0%) | 0.053 |

| *Adjusted F:M Ratio West (lb BOD/lb MLVSS)* | |
|---|---|
| Mean | 0.076 |
| Standard Error | 0.014 |
| Median | 0.056 |
| Mode | #N/A |
| Standard Deviation | 0.055 |
| Sample Variance | 0.003 |
| Kurtosis | 1.364 |
| Skewness | 1.431 |
| Range | 0.187 |
| Minimum | 0.015 |
| Maximum | 0.202 |
| Sum | 1.143 |
| Count | 15 |
| Confidence Level(95.0%) | 0.030 |

# APPENDIX C RAW DATA

| Month | Ave Flow (MGD) | Max Daily Flow (MGD) | Peaking Factor | Precipitation (in) | AVE BOD IN(mg/L) | AVE BOD IN(LBS/DAY) | AVE TSS IN (mg/L) | AVE TSS IN (LBS/DAY) | AVE BOD OUT(mg/L) |
|---|---|---|---|---|---|---|---|---|---|
| 1/12 | 0.054 | 0.078 | 1.444 | 2.91 | 77.0 | 34.7 | 120.0 | 54.0 | 4.0 |
| 2/12 | | | | | | | | | |
| 3/12 | 0.045 | 0.066 | 1.467 | 1.10 | 140.0 | 52.5 | 230.0 | 86.3 | 4.0 |
| 4/12 | | | | | | | | | |
| 5/12 | 0.044 | 0.077 | 1.750 | 5.54 | 73.0 | 26.8 | 83.0 | 30.5 | 4.0 |
| 6/12 | 0.036 | 0.048 | 1.333 | 4.60 | 130.0 | 39.0 | 160.0 | 48.0 | 4.0 |
| 7/12 | 0.032 | 0.052 | 1.625 | 4.81 | 40.0 | 10.7 | 58.0 | 15.5 | 4.0 |
| 8/12 | 0.032 | 0.053 | 1.656 | 4.49 | 120.0 | 32.0 | 72.0 | 19.2 | 4.0 |
| 9/12 | 0.039 | 0.087 | 2.231 | 5.21 | 80.0 | 26.0 | 96.0 | 31.2 | 4.0 |
| 10/12 | 0.038 | 0.075 | 1.982 | 3.60 | 90.0 | 28.2 | 120.0 | 37.6 | 4.0 |
| 11/12 | 0.039 | 0.072 | 1.860 | 0.50 | 130.0 | 42.0 | 350.0 | 113.1 | 4.0 |
| 12/12 | 0.037 | 0.072 | 1.925 | 4.67 | 450.0 | 140.5 | 580.0 | 181.1 | 4.0 |
| 1/13 | 0.039 | 0.073 | 1.848 | 2.85 | 53.0 | 17.4 | 38.0 | 12.5 | 4.0 |
| 2/13 | 0.050 | 0.070 | 1.396 | 2.33 | 49.0 | 20.6 | 66.0 | 27.8 | 4.0 |
| 3/13 | 0.056 | 0.076 | 1.366 | 1.80 | 86.0 | 40.0 | 220.0 | 102.3 | 4.0 |
| 4/13 | 0.034 | 0.042 | 1.235 | 1.95 | 380.0 | 107.8 | 58.0 | 16.4 | 4.0 |
| 5/13 | 0.034 | 0.054 | 1.588 | 4.30 | 380.0 | 107.8 | 58.0 | 16.4 | 4.0 |

| Month | Temperature 2012 | Temperature 2013 | Average Temperature | Minimum Temperature | Flow @ Min (MGD) | Maximum Temperature | Flow @ Max (MGD) |
|---|---|---|---|---|---|---|---|
| Jan | 10 | 9 | 10 | 5 | 0.049 | 12 | 0.074 |
| Feb | | 8 | 8 | 5 | 0.064 | 12 | 0.077 |
| Mar | 11 | 9 | 10 | 6 | 0.059 | 16 | 0.041 |
| Apr | | 13 | 13 | 9 | 0.039 | 16 | 0.039 |
| May | 20 | 16 | 18 | 14 | 0.037 | 22 | 0.056 |
| Jun | 20 | | 20 | 13 | 0.041 | 25 | 0.031 |
| Jul | 23 | | 23 | 22 | 0.026 | 26 | 0.036 |
| Aug | 24 | | 24 | 22 | 0.033 | 25 | 0.035 |
| Sept | 21 | | 21 | 18 | 0.046 | 24 | 0.037 |
| Oct | 18 | | 18 | 14 | 0.041 | 20 | 0.058 |
| Nov | 12 | | 12 | 10 | 0.050 | 16 | 0.098 |
| Dec | 10 | | 10 | 7 | 0.043 | 14 | 0.101 |

| | |
|---|---|
| Winter Average (Nov. - Mar.) | 10.0 |
| Summer Average (Apr.-Oct.) | 19.5 |

| Date | ADF | Precipitation | Date | ADF | Precipitation | Date | Max Daily Flow | Precipitation |
|---|---|---|---|---|---|---|---|---|
| 9/1/2012 | 0.043 | 0 | 10/1/2012 | 0.029 | 0.00 | 5/1/2013 | 0.024 | 0 |
| 9/2/2012 | 0.032 | 0 | 10/2/2012 | 0.048 | 0.00 | 5/2/2013 | 0.023 | 0 |
| 9/3/2012 | 0.036 | 0 | 10/3/2012 | 0.031 | 0.00 | 5/3/2013 | 0.027 | 0 |
| 9/4/2012 | 0.041 | 0 | 10/4/2012 | 0.104 | 0.00 | 5/4/2013 | 0.026 | 0 |
| 9/5/2012 | 0.037 | 0.42 | 10/5/2012 | 0.068 | 0.20 | 5/5/2013 | 0.031 | 0 |
| 9/6/2012 | 0.036 | 0.1 | 10/6/2012 | 0.052 | 0.00 | 5/6/2013 | 0.026 | 0 |
| 9/7/2012 | 0.043 | 0 | 10/7/2012 | 0.054 | 0.00 | 5/7/2013 | 0.027 | 0 |
| 9/8/2012 | 0.044 | 0.35 | 10/8/2012 | 0.051 | 0.00 | 5/8/2013 | 0.037 | 0 |
| 9/9/2012 | 0.032 | 0.1 | 10/9/2012 | 0.046 | 0.10 | 5/9/2013 | 0.032 | 0.4 |
| 9/10/2012 | 0.029 | 0 | 10/10/2012 | 0.039 | 1.80 | 5/10/2013 | 0.032 | 0.4 |
| 9/11/2012 | 0.029 | 0 | 10/11/2012 | 0.041 | 0.20 | 5/11/2013 | 0.038 | 0.2 |
| 9/12/2012 | 0.023 | 0 | 10/12/2012 | 0.050 | 0.30 | 5/12/2013 | 0.037 | 0.8 |
| 9/13/2012 | 0.030 | 0 | 10/13/2012 | 0.049 | 0.50 | 5/13/2013 | 0.033 | 0 |
| 9/14/2012 | 0.035 | 0 | 10/14/2012 | 0.037 | 0.00 | 5/14/2013 | 0.030 | 0 |
| 9/15/2012 | 0.026 | 0.1 | 10/15/2012 | 0.023 | 0.00 | 5/15/2013 | 0.032 | 0 |
| 9/16/2012 | 0.042 | 0 | 10/16/2012 | 0.021 | 0.00 | 5/16/2013 | 0.027 | 0.1 |
| 9/17/2012 | 0.032 | 0 | 10/17/2012 | 0.025 | 0.40 | 5/17/2013 | 0.030 | 0 |
| 9/18/2012 | 0.074 | 1.5 | 10/18/2012 | 0.027 | 0.70 | 5/18/2013 | 0.035 | 0 |
| 9/19/2012 | 0.087 | 1.05 | 10/19/2012 | 0.057 | 1.00 | 5/19/2013 | 0.030 | 0.1 |
| 9/20/2012 | 0.047 | 0 | 10/20/2012 | 0.021 | 0.50 | 5/20/2013 | 0.030 | 0 |
| 9/21/2012 | 0.044 | 0 | 10/21/2012 | 0.032 | 0.00 | 5/21/2013 | 0.024 | 0 |
| 9/22/2012 | 0.037 | 0 | 10/22/2012 | 0.023 | 0.10 | 5/22/2013 | 0.025 | 0 |
| 9/23/2012 | 0.031 | 0.31 | 10/23/2012 | 0.023 | 0.80 | 5/23/2013 | 0.034 | 0 |
| 9/24/2012 | 0.031 | 0 | 10/24/2012 | 0.023 | 0.30 | 5/24/2013 | 0.049 | 1 |
| 9/25/2012 | 0.031 | 0 | 10/25/2012 | 0.022 | 0.00 | 5/25/2013 | 0.052 | 1 |
| 9/26/2012 | 0.036 | 0.1 | 10/26/2012 | 0.020 | 0.00 | 5/26/2013 | 0.040 | 0 |
| 9/27/2012 | 0.035 | 0 | 10/27/2012 | 0.022 | 0.00 | 5/27/2013 | 0.039 | 0 |
| 9/28/2012 | 0.046 | 0.8 | 10/28/2012 | 0.027 | 0.00 | 5/28/2013 | 0.054 | 0 |
| 9/29/2012 | 0.039 | 0.33 | 10/29/2012 | 0.027 | 0.00 | 5/29/2013 | 0.042 | 0.2 |
| 9/30/2012 | 0.038 | 0.15 | 10/30/2012 | 0.042 | 0.00 | 5/30/2013 | 0.039 | 0.1 |
| | | | 10/31/2012 | 0.030 | 0.00 | 5/31/2013 | 0.036 | 0 |

| | | | |
|---|---|---|---|
| Average Dry Flow | 0.034 | 0.040 | 0.028 |
| Average Flow over 1" precip: | 0.081 | 0.048 | 0.051 |
| Peaking Factor | 2.4 | 1.2 | 1.8 |

| Year | Average Flow | Average Precipitation |
|---|---|---|
| 2012 | 0.040 | 3.743 |
| 2013 | 0.043 | 2.646 |

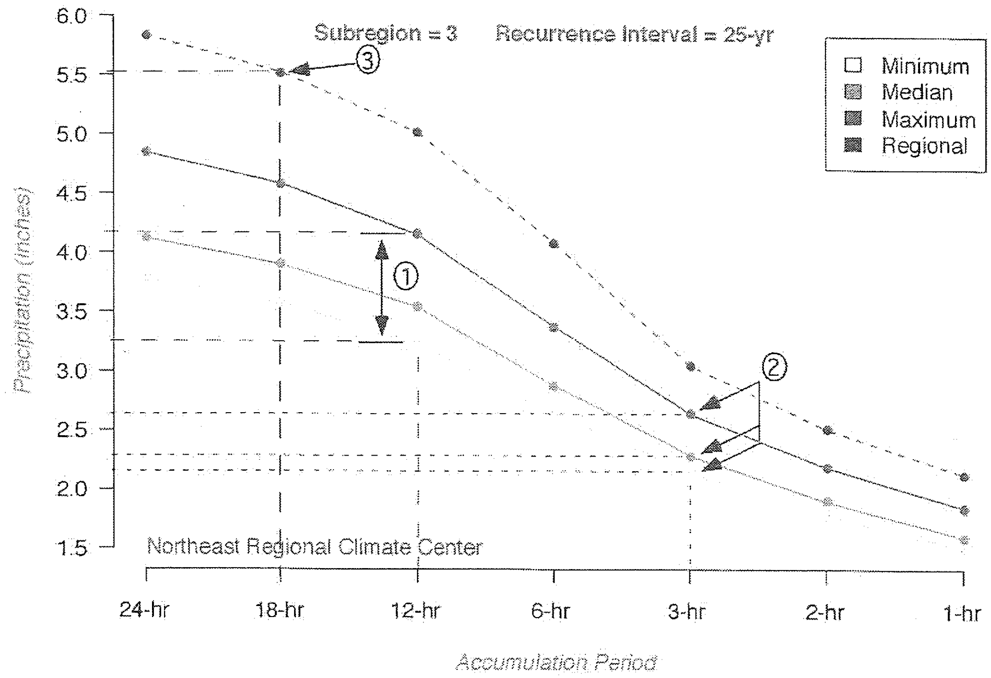
| AVE TSS OUT (mg/L) | % BOD removal | % TSS Removal | pH Influent Min | pH Influent Max | pH Effluent Min | pH Effluent Max | Inf. Settleable Solids (mL/L) | Min Cl Residual (mg/L) | Max Cl Residual (mg/L) | Effluent TKN (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.3 | 94.8% | 98.9% | 7.0 | 7.9 | 6.9 | 7.8 | 14 | 0.1 | 1.9 | 1.0 |
| 1.0 | 97.1% | 99.6% | 6.9 | 8.0 | 6.9 | 7.8 | 16 | 0.1 | 3.0 | 1.0 |
| 1.0 | 94.5% | 98.8% | 6.9 | 8.1 | 6.5 | 7.1 | 25 | 0.0 | 2.5 | 1.0 |
| 1.0 | 96.9% | 99.4% | 6.9 | 8.5 | 6.6 | 7.2 | 30 | 0.0 | 0.8 | 1.0 |
| 1.3 | 90.0% | 97.8% | 6.9 | 7.8 | 6.7 | 7.4 | 17 | 0.0 | 0.6 | 1.0 |
| 1.0 | 96.7% | 98.6% | 7.1 | 8.2 | 6.7 | 7.1 | 25 | 0.0 | 0.9 | 1.0 |
| 1.0 | 95.0% | 99.0% | 7.2 | 8.0 | 6.6 | 7.2 | 28 | 0.0 | 1.2 | 1.0 |
| 1.0 | 95.6% | 99.2% | 6.9 | 7.7 | 6.8 | 7.2 | 25 | 0.0 | 0.2 | 1.0 |
| 1.0 | 96.9% | 99.7% | 7.2 | 8.1 | 6.8 | 7.3 | 32 | 0.0 | 0.3 | 1.0 |
| 1.9 | 99.1% | 99.7% | 7.0 | 7.8 | 6.8 | 7.5 | 20 | 0.1 | 0.8 | 1.0 |
| 1.5 | 92.5% | 96.1% | 7.2 | 8.4 | 6.9 | 7.9 | 22 | 0.0 | 0.3 | 1.0 |
| 1.3 | 91.8% | 98.0% | 6.9 | 7.8 | 6.5 | 8.2 | 30 | 0.0 | 0.4 | 1.0 |
| 1.6 | 95.3% | 99.3% | 6.1 | 8.1 | 6.1 | 7.6 | 13 | 0.1 | 0.6 | 1.0 |
| 1.0 | 98.9% | 98.3% | 7.3 | 8.1 | 6.6 | 7.6 | 24 | 0.0 | 1.0 | 1.0 |
| 1.0 | 98.9% | 98.3% | 7.3 | 8.0 | 6.7 | 7.3 | 40 | 0.2 | 1.3 | 1.0 |

| Effluent D.O. (mg/L) | Saturation D.O. @ Temp | Effluent UOD (mg/L) | AVE. SSV East Train(mg/L) | AVE. SSV West Train(mg/L) | AVE. MLSS East Train(mg/L) | MLVSS East (lbs) | F:M Ratio East (lb BOD/lb MLVSS) | AVE. MLSS West Train(mg/L) |
|---|---|---|---|---|---|---|---|---|
| 12.4 | 11.83 | 10.5 | 482 | 270 | 3,974 | 796 | 0.044 | 3,114 |
| 11.5 | 11.55 | 10.5 | 485 | 293 | 4,273 | 856 | 0.061 | 2,740 |
| 7.3 | 10.07 | 10.5 | 390 | 313 | 3,870 | 775 | 0.035 | 3,186 |
| 8.7 | 10.53 | 10.5 | 510 | 490 | 4,680 | 937 | 0.042 | 4,373 |
| 7.3 | 8.40 | 10.5 | 520 | 535 | 3,606 | 722 | 0.015 | 3,486 |
| 7.9 | 8.56 | 10.5 | 593 | 373 | 4,332 | 868 | 0.037 | 3,410 |
| 6.8 | 8.40 | 10.5 | 493 | 375 | 3,543 | 710 | 0.037 | 3,478 |
| 7.9 | 9.26 | 10.5 | 438 | 355 | 3,473 | 695 | 0.041 | 3,300 |
| 9.2 | 10.29 | 10.5 | 400 | 285 | 2,893 | 579 | 0.072 | 2,903 |
| 10.5 | 11.02 | 10.5 | 370 | 243 | 3,225 | 646 | 0.218 | 3,468 |
| 11.9 | 12.13 | 10.5 | 292 | 210 | 2,716 | 544 | 0.032 | 2,886 |
| 10.7 | 12.13 | 10.5 | 263 | 380 | 2,522 | 505 | 0.041 | 1,210 |
| 11.1 | 11.55 | 10.5 | 250 | 275 | 2,488 | 498 | 0.080 | 2,923 |
| 6.6 | 10.53 | 10.5 | 346 | 504 | 3,344 | 670 | 0.161 | 4,498 |
| 7.6 | 9.86 | 10.5 | 204 | 246 | 1,442 | 289 | 0.373 | 2,902 |

| MLVSS West (lbs) | F:M Ratio West (lb BOD/lb MLVSS) | SVI East Train | SVI West Train | Chlorine Consumption (LBS) | Solids Hauled (GAL) | Solids Percent | Average Aeration Basin HRT (hrs) | Average CCT HRT (hrs) | Average Secondary HRT (hrs) | Average Secondary Overflow (gpd/sqft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 624 | 0.056 | 121 | 87 | 29.3 | 4,000 | 1.80% | 27 | 4 | 4 | 350 |
| | | | | | | 2.16% | | | | |
| 549 | 0.096 | 114 | 107 | 45.9 | | | 32 | 5 | 4 | 291 |
| 638 | 0.042 | 101 | 98 | 20.5 | 4,000 | 2.60% | 33 | 5 | 4 | 285 |
| 876 | 0.045 | 109 | 112 | 28.2 | 2,000 | 1.40% | 40 | 6 | 5 | 233 |
| 698 | 0.015 | 144 | 153 | 25.8 | 2,000 | 2.30% | 45 | 7 | 6 | 207 |
| 683 | 0.047 | 137 | 109 | 25.8 | 8,000 | 1.60% | 45 | 7 | 6 | 207 |
| 696 | 0.037 | 139 | 108 | 31.7 | | 1.95% | 37 | 6 | 5 | 252 |
| 661 | 0.043 | 126 | 108 | 10.3 | 8,000 | 2.3% | 38 | 6 | 5 | 243 |
| 581 | 0.072 | 138 | 98 | 19.0 | | 3.4% | 37 | 6 | 5 | 251 |
| 694 | 0.202 | 115 | 70 | 23..6 | 4,000 | 3.3% | 38 | 6 | 5 | 242 |
| 578 | 0.030 | 108 | 73 | 29.5 | 4,000 | 2.0% | 37 | 5 | 5 | 255 |
| 242 | 0.085 | 104 | 314 | 19.0 | | 4.1% | 29 | 4 | 4 | 327 |
| 585 | 0.068 | 101 | 94 | 25.8 | | 2.3% | 26 | 4 | 3 | 361 |
| 901 | 0.120 | 103 | 112 | 20.6 | 12,000 | 2.4% | 42 | 6 | 6 | 220 |
| 581 | 0.185 | 141 | 85 | 30.6 | | 1.9% | 42 | 6 | 6 | 220 |
| | | | | | 48,000 | | | | | |

| Minimum | | | | | |
|---|---|---|---|---|---|
| Aeration Basin HRT (hrs) | CCT HRT (hrs) | Secondary HRT (hrs) | Maximum Secondary Overflow (gpd/sqft) | Organic Loading (lbs/1,000 cuft) | Solids Wasted (LB/Month) |
| 18 | 3 | 2 | 505 | 4.3 | 600 |
| 22 | 3 | 3 | 427 | 6.6 | 0 |
| 19 | 3 | 2 | 498 | 3.3 | 867 |
| 30 | 5 | 4 | 311 | 4.9 | 234 |
| 28 | 4 | 4 | 337 | 1.3 | 384 |
| 27 | 4 | 4 | 343 | 4.0 | 1,068 |
| 17 | 2 | 2 | 563 | 3.3 | 0 |
| 19 | 3 | 3 | 482 | 3.5 | 1,508 |
| 20 | 3 | 3 | 466 | 5.2 | 0 |
| 20 | 3 | 3 | 466 | 17.6 | 1,108 |
| 20 | 3 | 3 | 472 | 2.2 | 651 |
| 20 | 3 | 3 | 456 | 2.6 | 0 |
| 19 | 3 | 3 | 493 | 5.0 | 0 |
| 34 | 5 | 5 | 272 | 13.5 | 2,402 |
| 27 | 4 | 4 | 350 | 13.5 | 0 |

# APPENDIX D IDF CURVES




## Example: Intensity–Duration Curves

### *'Point' Intensity-Duration Curves*

The green curves in this example represent 25-yr precipitation return period amounts at specific stations (points) within subregion 3. These curves represent the minimum, median and maximum return period amounts calculated at available stations within the subregion.

For example:

*At Point 1 on graph:* The 25-yr return period amounts at stations within subregion 3 range from approximately 3.25 inches to 4.20 inches for 12-hr precipitation events.

*At Point 2 on graph:* The minimum, median and maximum 25-yr return period amounts are approximately 2.20 inches, 2.30 inches and 2.60 inches, respectively, for 3-hr precipitation events. It is estimated that 3-hr precipitation events of these magnitudes are separated, on average, by 25 years.

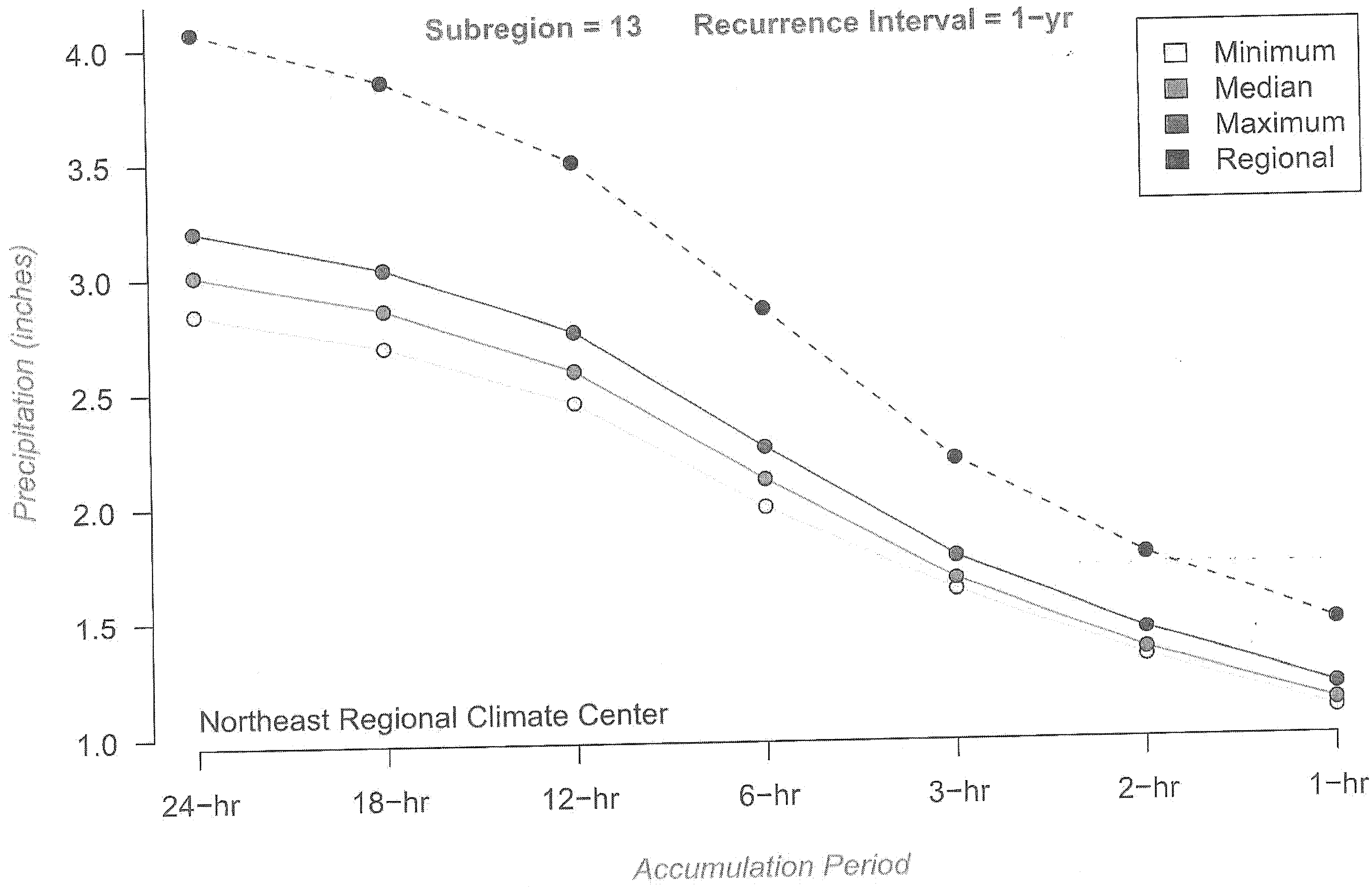
*Note: The spatial variability of return period amounts can be viewed in isohyetal maps, while exact return period values for all stations within a subregion can be viewed in text tables. Although there is variability between stations, return period amounts within a single subregion are not significantly different.*

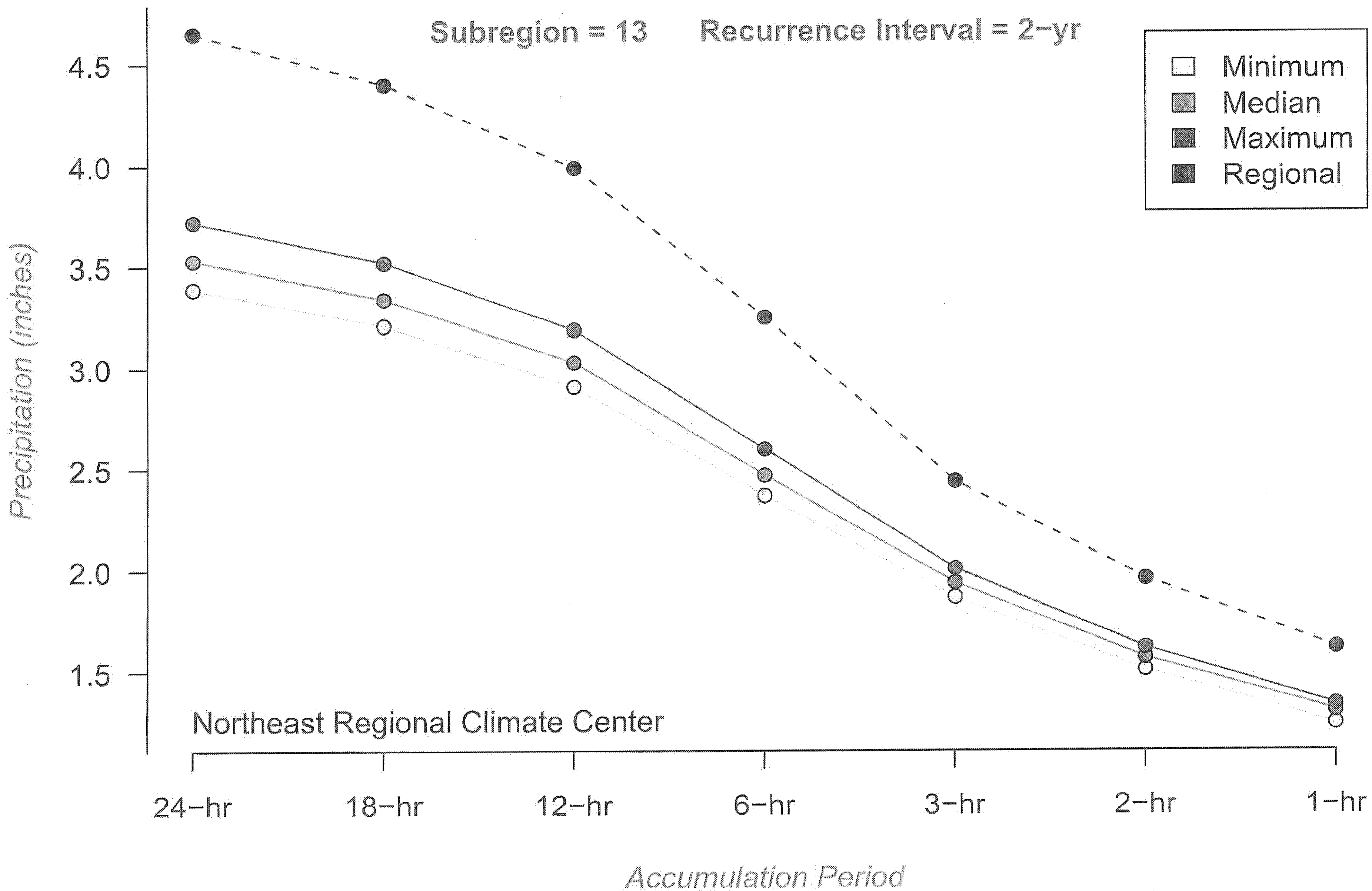
### *'Regional' Intensity-Duration Curves*

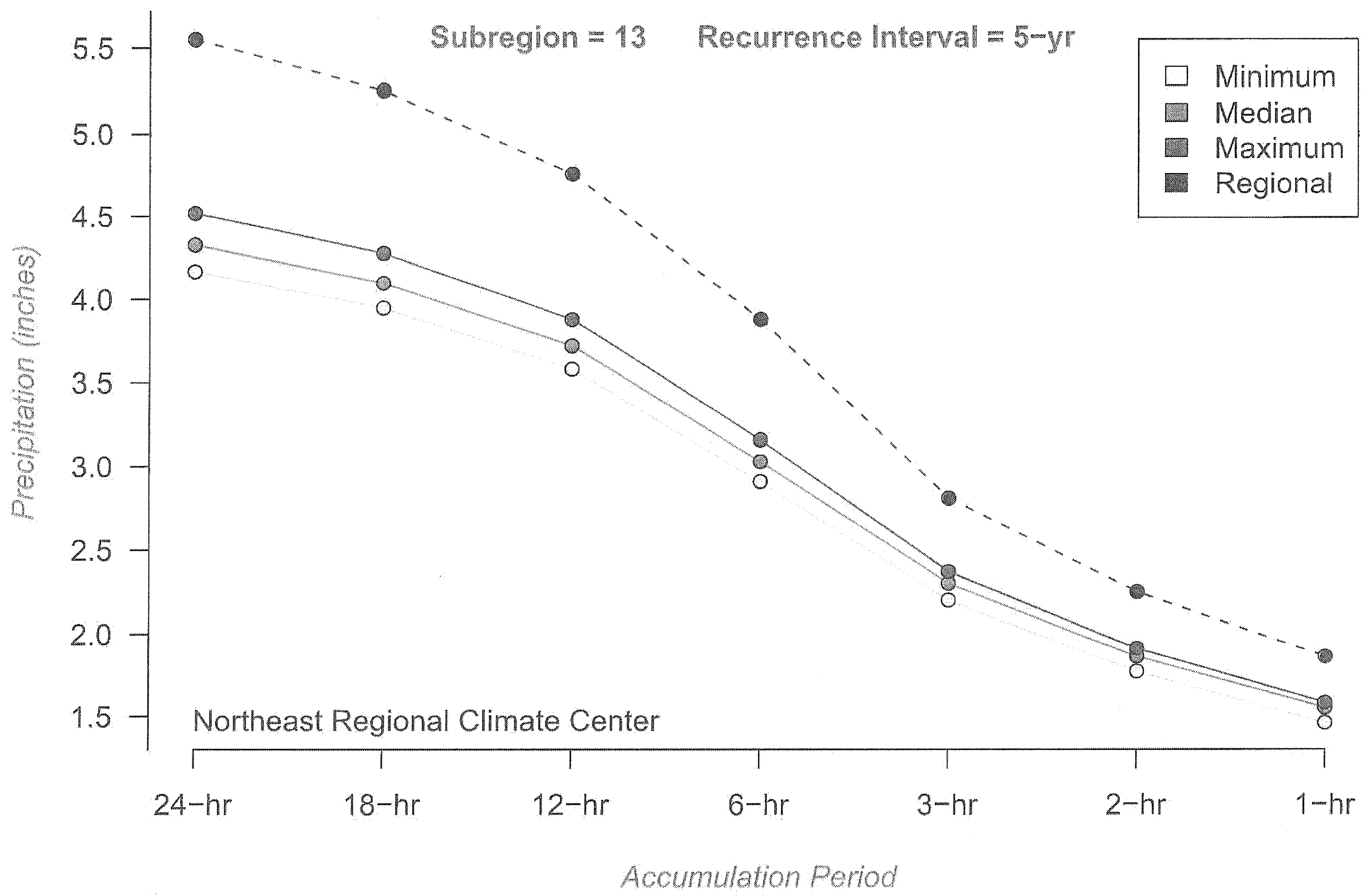
The blue curve is associated with 'regional' 25-yr return period amounts.

For example:

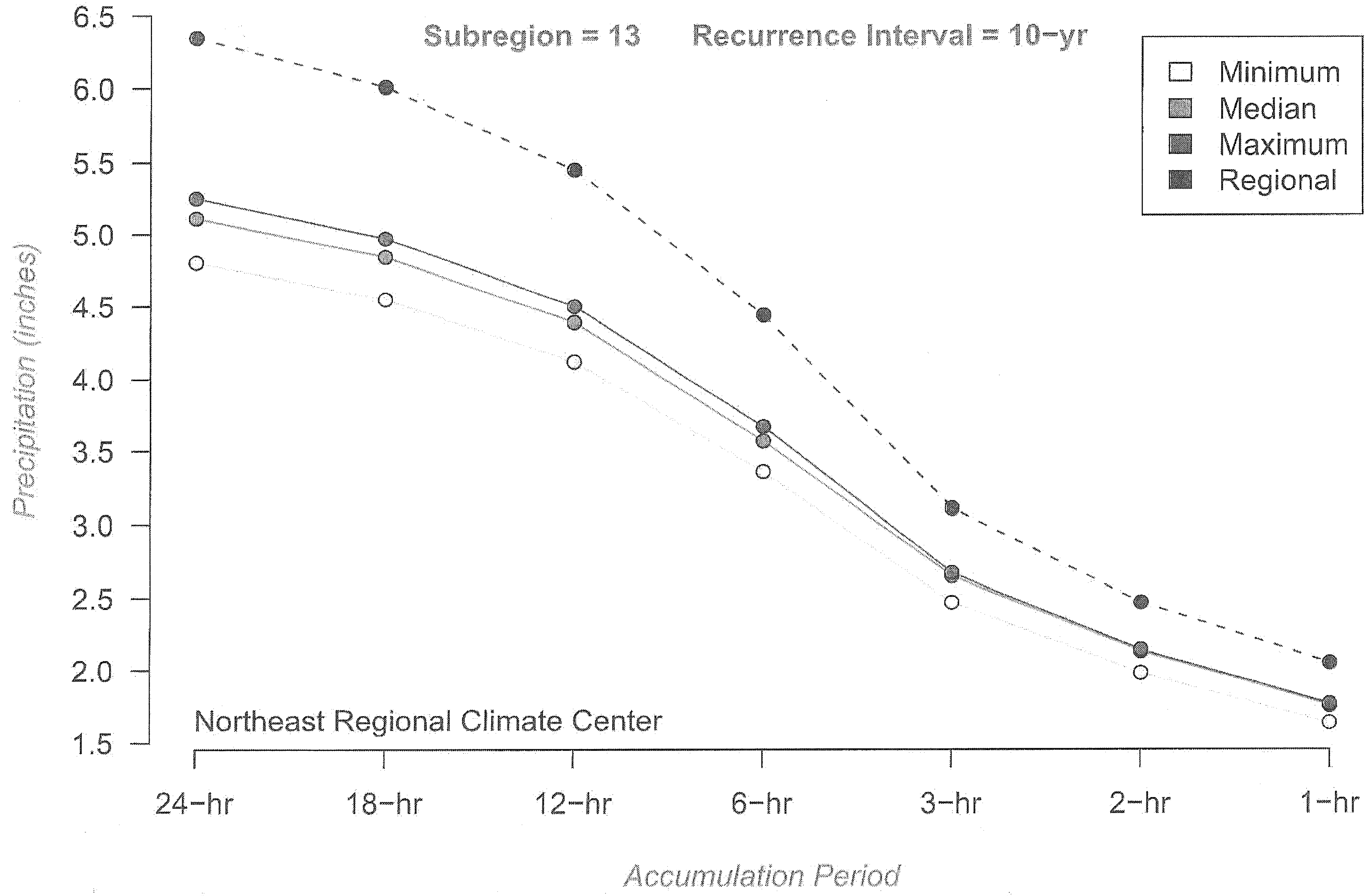
*At Point 3 on graph:* The regional 25-yr return period amount is approximately 5.50 inches for 18-hr precipitation events. It is estimated that 18-hr precipitation events of this magnitude occurring *anywhere* within the subregion (not restricted to a fixed location) are separated, on average, by 25 years.

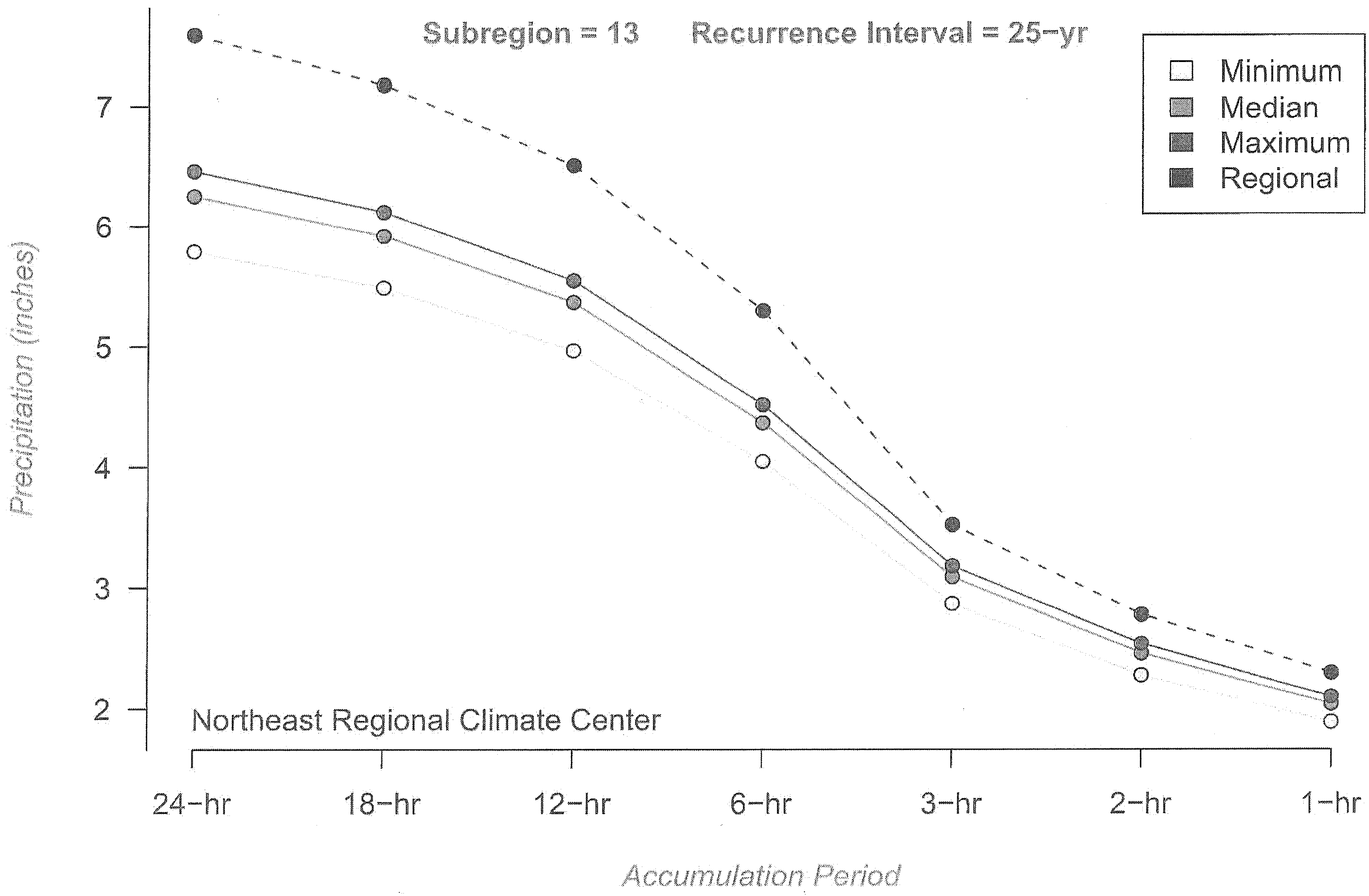

Subregion = 13
Recurrence Interval = 1-yr
Minimum
Median
Maximum
Regional
4.0
3.5
3.0
2.5
2.0
1.5
1.0
Precipitation (inches)
Northeast Regional Climate Center
24-hr
18-hr
12-hr
6-hr
3-hr
2-hr
1-hr
Accumulation Period


Subregion = 13 Recurrence Interval = 2−yr
Minimum
Median
Maximum
Regional
Precipitation (inches)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
Northeast Regional Climate Center
24−hr
18−hr
12−hr
6−hr
3−hr
2−hr
1−hr
Accumulation Period

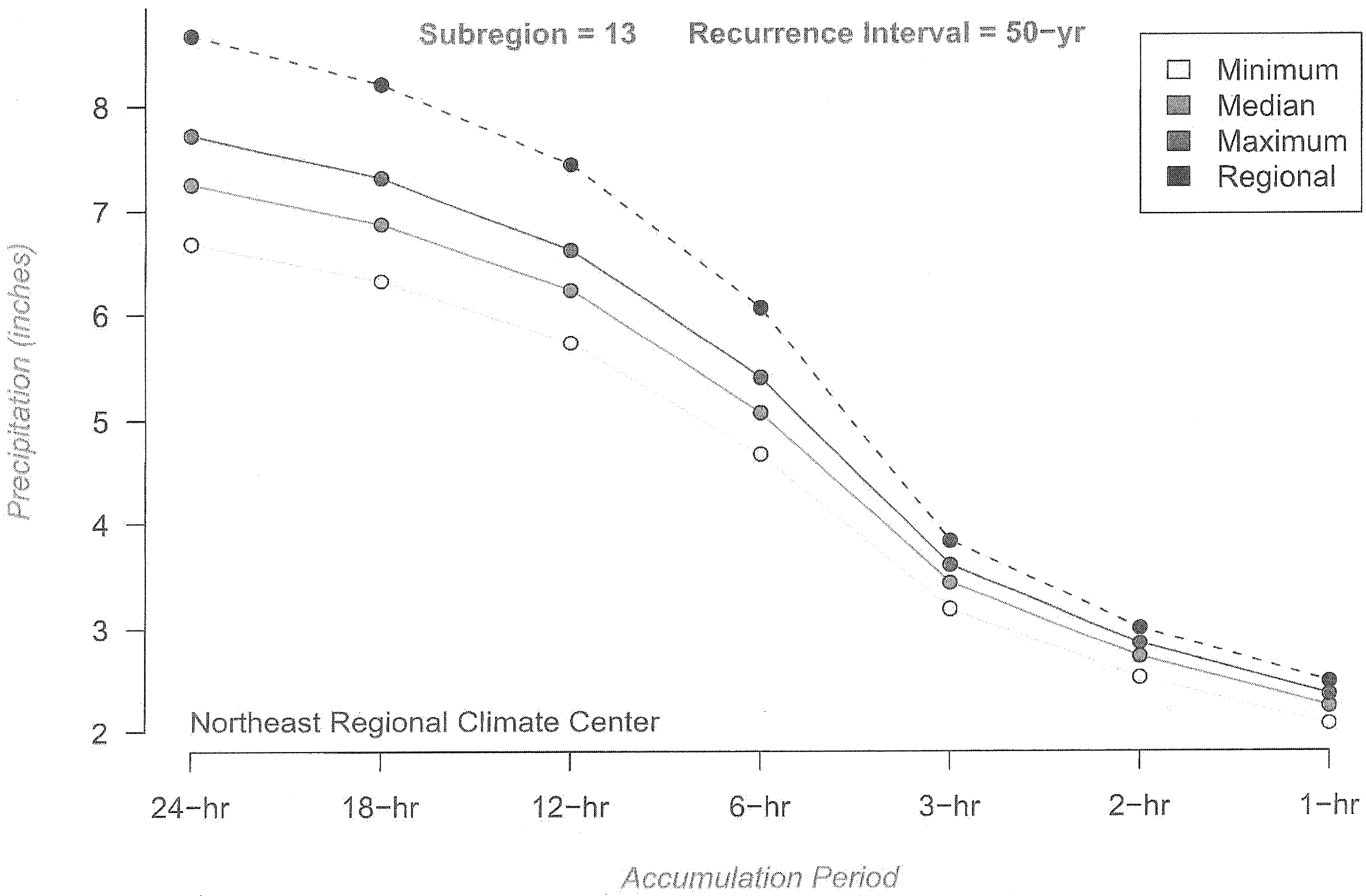


Subregion = 13
Recurrence Interval = 5-yr
Minimum
Median
Maximum
Regional
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
Precipitation (inches)
Northeast Regional Climate Center
24-hr
18-hr
12-hr
6-hr
3-hr
2-hr
1-hr
Accumulation Period

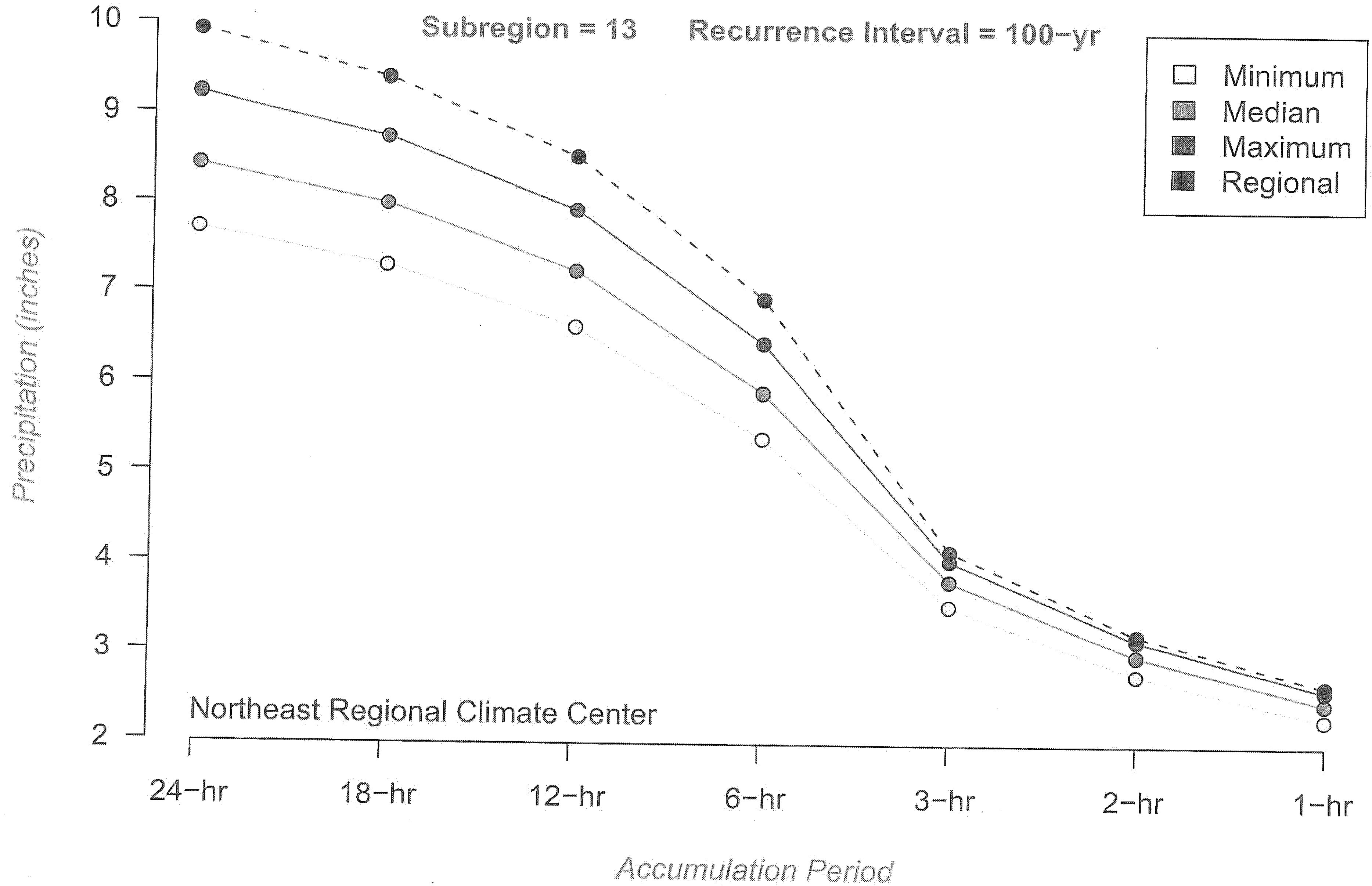

Subregion = 13
Recurrence Interval = 10-yr
Minimum
Median
Maximum
Regional
Precipitation (inches)
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
Northeast Regional Climate Center
24-hr
18-hr
12-hr
6-hr
3-hr
2-hr
1-hr
Accumulation Period

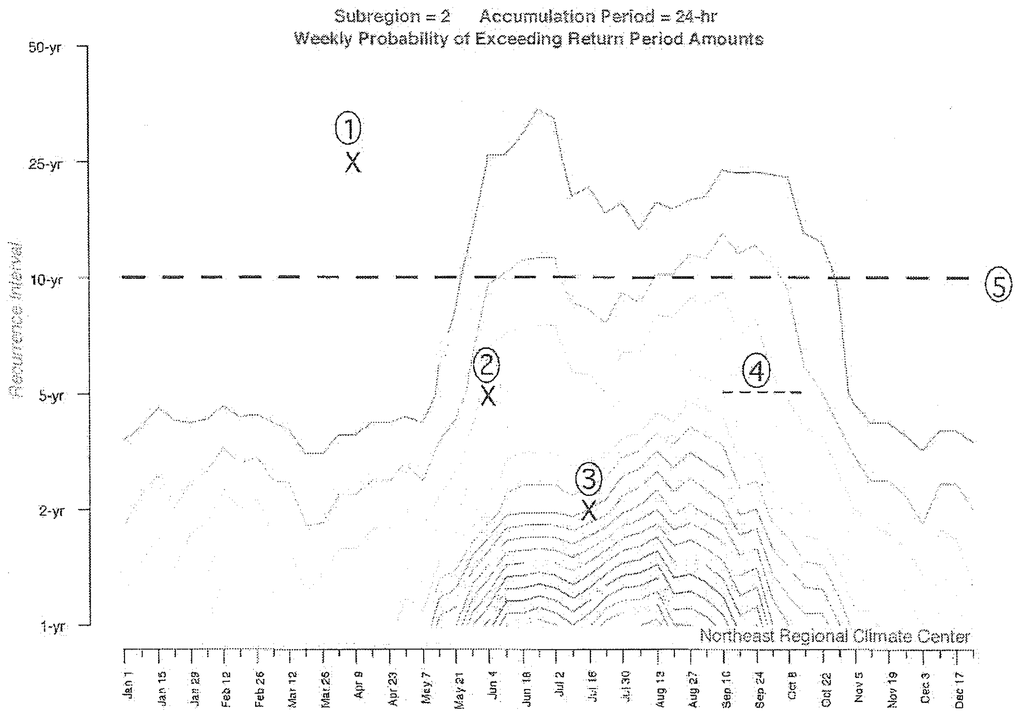


Subregion = 13
Recurrence Interval = 25-yr
Minimum
Median
Maximum
Regional
Precipitation (inches)
7
6
5
4
3
2
Northeast Regional Climate Center
24-hr
18-hr
12-hr
6-hr
3-hr
2-hr
1-hr
Accumulation Period



Subregion = 13
Recurrence Interval = 50-yr
Minimum
Median
Maximum
Regional
Precipitation (inches)
8
7
6
5
4
3
2
Northeast Regional Climate Center
24-hr
18-hr
12-hr
6-hr
3-hr
2-hr
1-hr
Accumulation Period


Subregion = 13
Recurrence Interval = 100-yr
Minimum
Median
Maximum
Regional
Precipitation (inches)
10
9
8
7
6
5
4
3
2
Northeast Regional Climate Center
24-hr
18-hr
12-hr
6-hr
3-hr
2-hr
1-hr
Accumulation Period




**Example:** **Weekly Probability of Exceeding Return Period Amounts**

*Probabilities for one-week intervals:*

*At Point 1 on graph*: The 'X' indicates the probability of receiving a 24-hr precipitation event that exceeds the 25-yr return period amount during the week starting April 9th. This probability is approximately 0.04%.

*At Point 2 on graph:* The 'X' indicates the probability of receiving a 24-hr precipitation event that exceeds the 5-yr return period amount during the week starting June 4th. This probability is approximately 0.7%.

*At Point 3 on graph:* The 'X' indicates the probability of receiving a 24-hr precipitation event that exceeds the 2-yr return period amount during the week starting July 16th. This probability is approximately 1.6%.

*Probabilities for intervals longer than one week:*

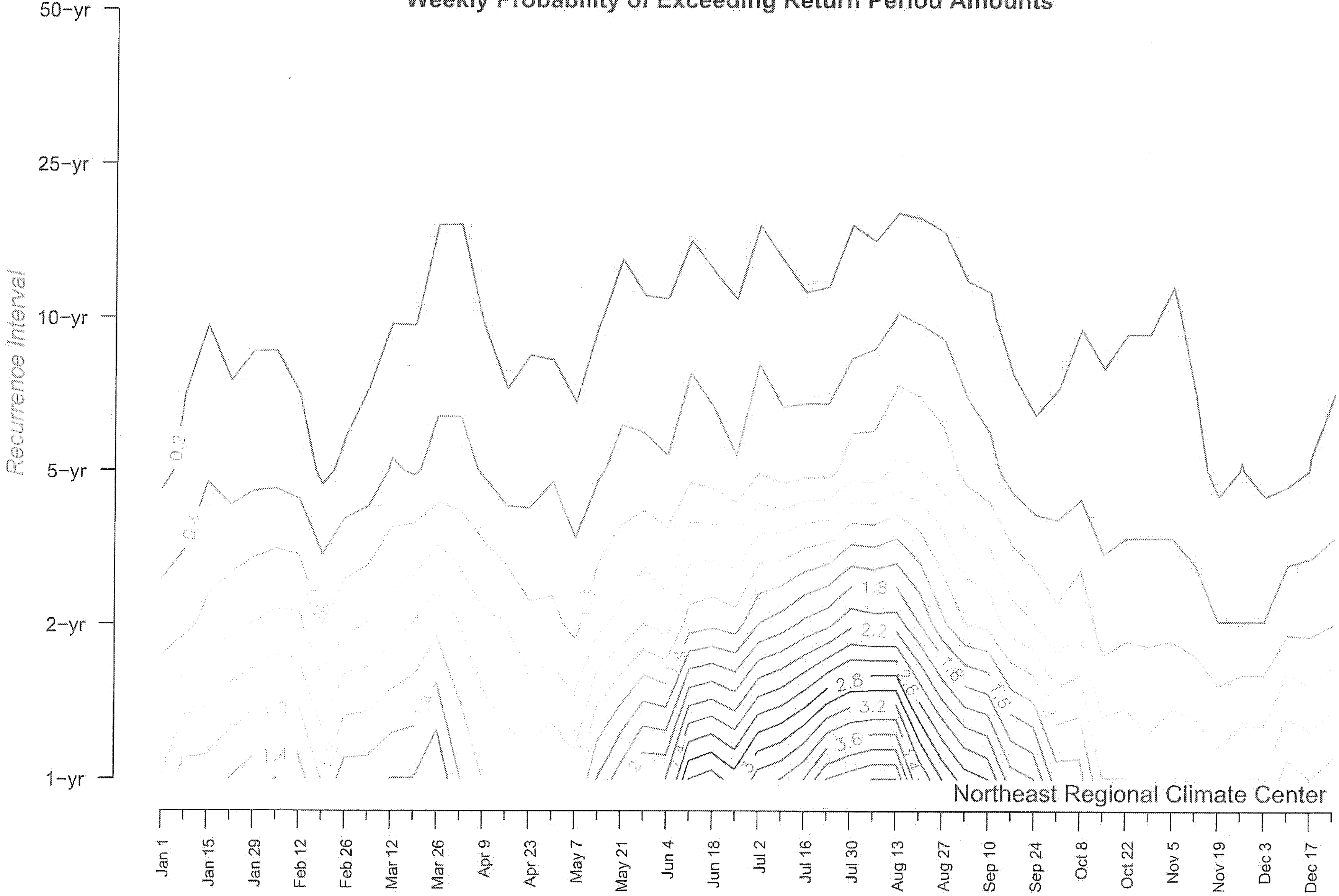
*At Point 4 on graph:* The dashed line indicates the probability of receiving a 24-hr precipitation event that exceeds the 5-yr return period amount sometime during the 6-week interval beginning September 10th. The six individual weekly probabilities are summed throughout this period to obtain the total probability of occurrence of approximately 4.4%.

*At Point 5 on graph:* The sum of probabilities over an entire year is equal to: (1.0/recurrence_interval)*100. In this example, the probability of receiving a 24-hr precipitation event that exceeds the 10-yr return period amount sometime during the year is 10%. For other recurrence intervals, these annual probabilities are:

**1-yr :** 100% **2-yr :** 50% **5-yr :** 20% **10-yr :** 10% **25-yr :** 4% **50-yr :** 2%

Subregion = 7 Accumulation Period = 1-hr

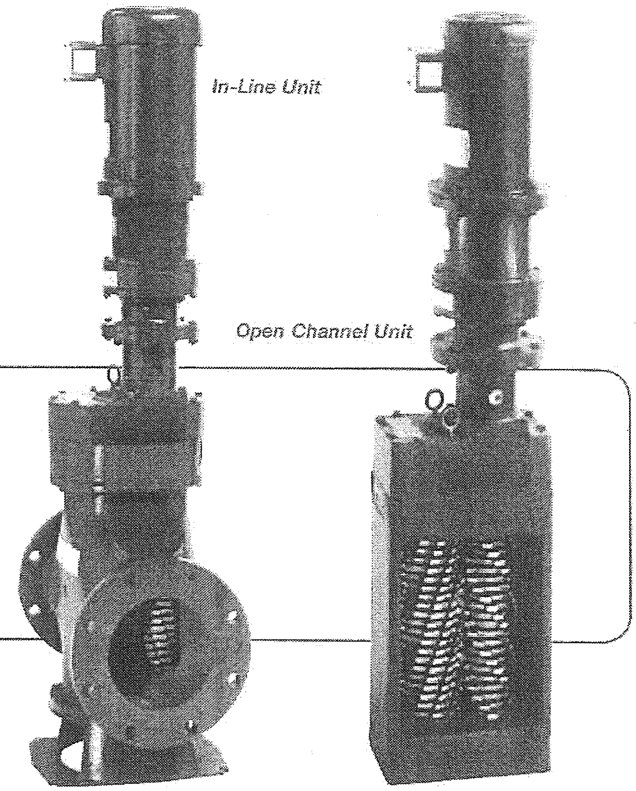
Weekly Probability of Exceeding Return Period Amounts



# APPENDIX E EQUIPMENT DATA

# Muffin Monster®

## Family of Grinders




### Mini Monster®

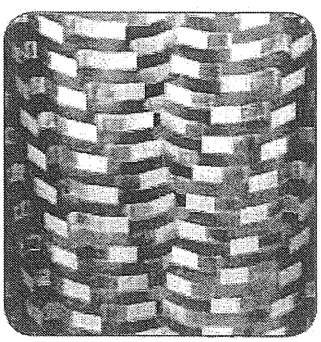
For lower flows, buildings, condos and resorts the Mini Monster is a powerful grinder in a compact package. It shreds rags and trash into tiny pieces in wastewater or sludge to protect pumps and eliminate costly breakdowns and back-ups.

### Muffin Monster

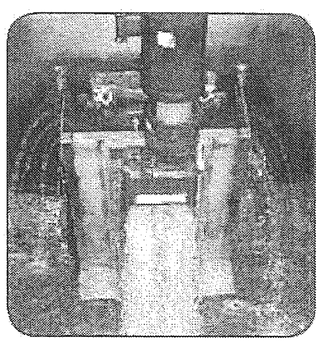
The workhorse of wastewater since 1973 the Muffin Monster easily reduces troublesome solids. The dual-shaft design uses low speed, high-torque power to shred tough solids in sewage and sludge. With over 30,000 installations the Muffin Monster is the proven solution for protecting pumps and systems.

### Macho Monster

For bigger solids reduction projects the Macho Monster has the power to keep up with the flow. The 40000 model uses 7-1/2" (190mm) cutters and the 70000 model uses massive 10" (254mm) cutters to slice through difficult solids. Ideal for sludge lines, prisons, waste-to-energy and food processing.



*Dual shafted grinder*



*Easy pump station installation with custom frames.*

## Features & Benefits

**Dual Shafted Grinder**
- Low-speed, high torque grinders handle rags, rocks, wood, clothing, plastics and other debris
- Capable of grinding a wider variety of solids than single shafted machines and macerators

**Compact and Efficient Design**
- Adapts to pipelines or channels with little or no modification
- Custom stainless steel frames allow easy installation in channels, wet wells and pump stations
- In-line Mini and Muffin Monster incorporate easy to remove cutter cartridge

**Cartridge Seal Assembly**
- High pressure capability up to 90 PSI (6 bar)
- Runs submerged or dry with no seal flush required

**Patented High-Flow Side Rails**
- Increases flow capacity and decreases head loss
- Deflects solids into the cutting chamber

**Automated Monitoring and Controls**
- Auto load sensing and reversals reduce interrupts and optimize the grinder's performance

Muffin Monster®

Santa Ana Mfg. Facility JWC Environmental Registered Firm UL ISO9001:2008 #10001513 QM08

Costa Mesa Facility JWC Environmental Registered Firm UL ISO9001:2008 #10001513 QM08

JWC Environmental®
Trust Monster Quality™

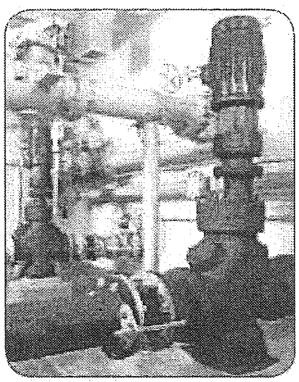
www.jwce.com

# Applications

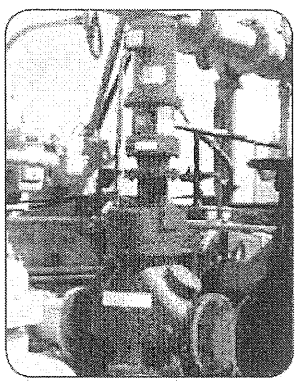
| | Mini Monster | Muffin Monster | Macho Monster | Characteristics |
|---|---|---|---|---|
| Buildings, Resorts and Condos | ⚙ | ⚙ | | Grinds up rags, cotton products and other trash frequently flushed down the toilet. Grinders are more powerful than grinder pumps and eliminate sewage pumping problems. |
| Pump Stations | ⚙ | ⚙ | ⚙ | Channel grinders can be installed on the wall of a wet well. In-line units are installed in dry pumping stations. Grinds solids to keep pumps running reliably and efficiently. |
| Septage / Grease | | ⚙ | ⚙ | Grinds up rags, silverware, solids and trash as septage/grease are unloaded. |
| Sludge / Scum | | ⚙ | ⚙ | Grinds up rag balls, rocks and plastics to protect sludge pumps. |
| Belt Press / Centrifuge | | ⚙ | ⚙ | Grinds a variety of solids to protect dewatering systems from damage and makes them more efficient by homogenizing sludge prior to dewatering. |
| Jails / Prisons | | ⚙ | ⚙ | Prevents clogs and spills. Installed in over 2,000 prisons, jails and institutional facilities. |
| Hospitals / Nursing Homes | | ⚙ | ⚙ | Grinds up rags, pads, clothing, needles and dangerous waste to protect pumps & systems. |
| Food / Fish Processing | | ⚙ | ⚙ | Grinds up material such as fish guts, slaughterhouse scraps, rendering material, food scraps and more. Frequently used in biogas applications to turn waste into energy. |
| Pulp / Paper | | ⚙ | ⚙ | Installed in sludge lines, pulp systems and wastewater plants to protect pumps & pipelines. |
| Industrial | | | ⚙ | Used in refineries, hazardous waste processing, obsolete inventory destruction & recycling. |

** Consult factory for additional application assistance and approval.*

# Photo Gallery

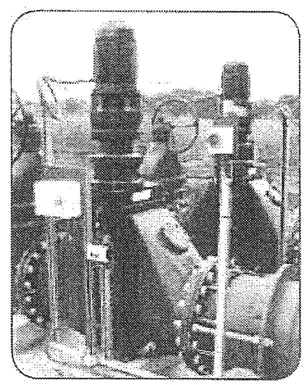


*Muffin Monster in-line grinders handling septage.*

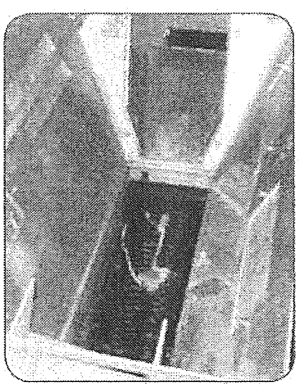


*Muffin Monster in-line sludge grinder.*

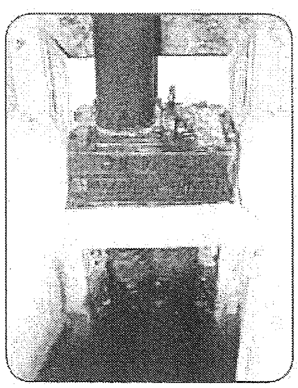
*Macho Monster in-line sewage grinder in a jail.*



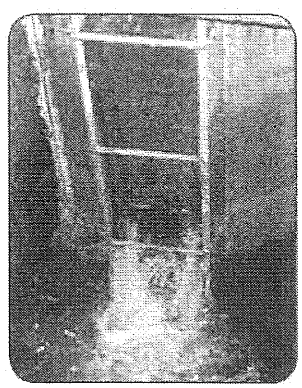
*Macho Monster in-line sludge grinders.*



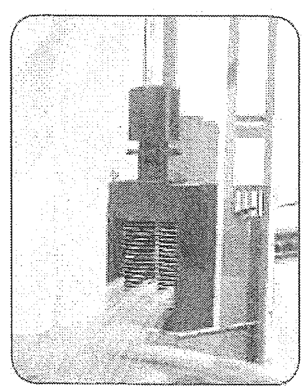
*Muffin Monster grinder in a fish processing plant.*



*Muffin Monster channel grinder in a prison.*



*Muffin Monster pump station grinder and installation frame.*



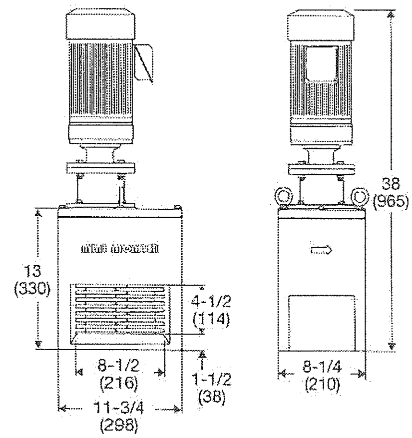
*Muffin Monster pump station grinder and installation frame.*

# Mini Monster

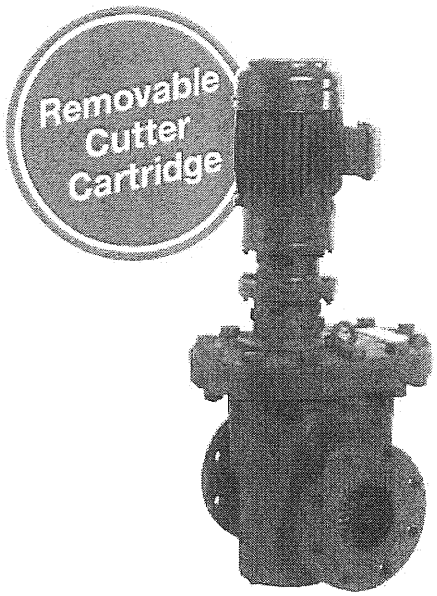
Model 20000

Standard Specifications

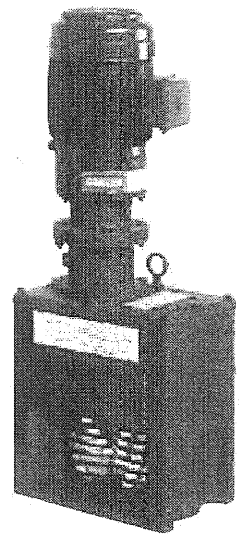
| Model | Motor HP (kW) | Hex Size in. (mm) | Reducer | Cutter Size in. (mm) | Max Force at Cutter Tip lbs. (kN) |
|---|---|---|---|---|---|
| 20000 | 3 (2.2) | 2 (50) | 29:1 | 4-3/4 (120) | 6,150 (27.4) |

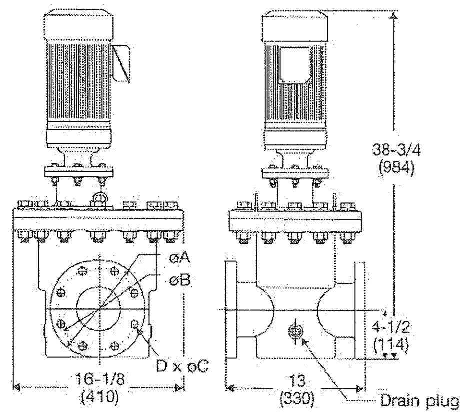


*Open Channel Configuration*



*In-Line Unit*


*Open Channel Unit*



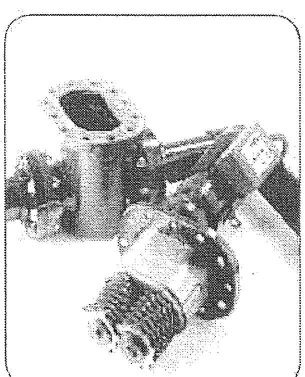
*In-Line Configuration*

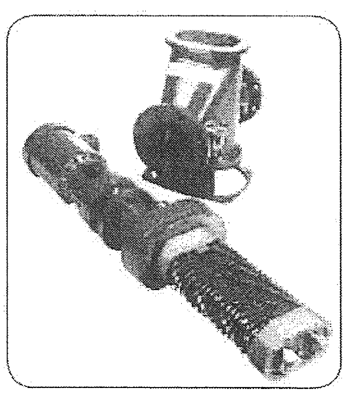
Performance Capability

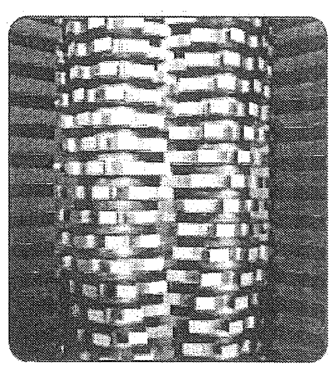
| Model | Configuration | Head Drop inches (mm) | Pressure Drop PSI (bar) | Max Pressure PSI (bar) | Flow Rate GPM (m³/h) | Approximate Net Weight lbs (kg) |
|---|---|---|---|---|---|---|
| 20002 | Open channel | 3.8 (97) | n/a | 90 (6) | 80 (18) | 225 (102) |
| 20000 | In-line | n/a | 1 (0.07) | 90 (6) | 265 (60) | 275 (125) |

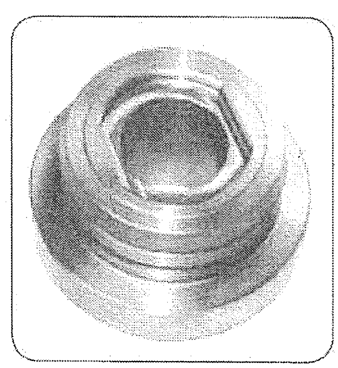
* Notes: In-Line unit typically installed prior to suction side of pump. Flow based on optimum channel conditions. Consult factory for final analysis of application.

## Exclusive Features


*Removable Mini Monster cartridge*


*Removable Muffin Monster cartridge*


*Patented high-flow side rails (open channel configurations)*

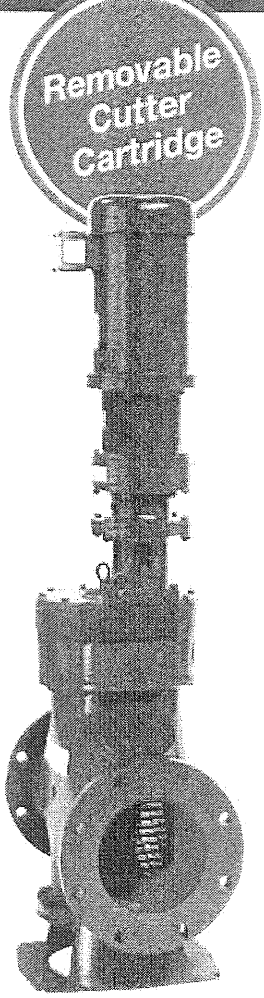

*Exclusive hex driven, tungsten face seal cartridges*

# Muffin Monster

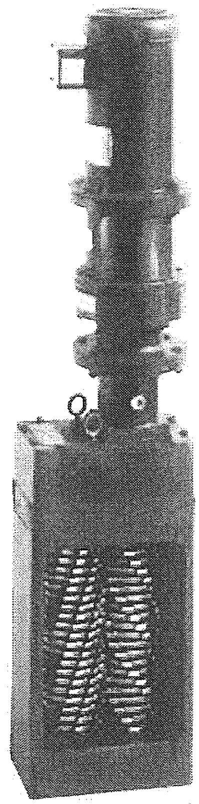
Model 30000

### Standard Specifications

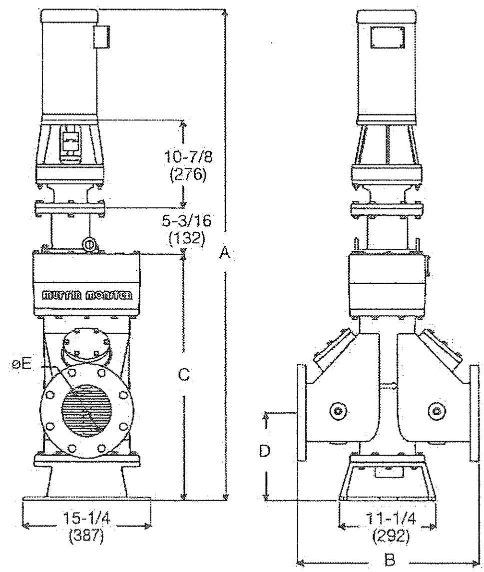
| Models | Motor HP (kW) | Hex Size in. (mm) | Reducer | Cutter Size in. (mm) | Max Force at Cutter Tip lbs. (kN) |
|---|---|---|---|---|---|
| 30004T / 30005 | 3 (2.2) | 2 (50) | 29:1 | 4-3/4 (120) | 6,150 (27.4) |
| 30004T / 30005 | 5 (3.7) | 2 (50) | 29:1 | 4-3/4 (120) | 9,150 (40.7) |



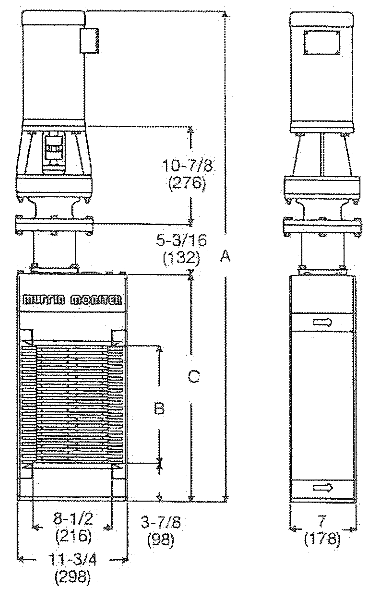

In-Line Unit



Open Channel Unit




In-Line Configuration




Open Channel Configuration

### Performance Capability – Open Channel Configuration

| Model | Flow Rate GPM (m³/h) | Head Drop inches (mm) | Approximate Net Weight lbs (kg) | Dimensions - inches (mm) A | B | C |
|---|---|---|---|---|---|---|
| 30005-0008 | 335 (76) | 9-1/2 (241) | 370 (168) | 48 (1219) | 8 (203) | 19-1/2 (482) |
| 30005-0012 | 490 (111) | 13-1/2 (343) | 410 (186) | 52-1/8 (1320) | 12 (305) | 23-5/8 (584) |
| 30005-0018 | 740 (168) | 17-1/2 (444) | 465 (211) | 58 (1473) | 18 (457) | 29-1/2 (736) |
| 30005-0024 | 1000 (227) | 19-1/2 (495) | 520 (236) | 63-3/4 (1600) | 24 (609) | 35-1/4 (889) |
| 30005-0032 | 1470 (334) | 21-1/2 (546) | 580 (263) | 71-1/2 (1803) | 32 (813) | 43 (1092) |
| 30005-0040 | 2000 (454) | 23-1/2 (597) | 650 (295) | 79-1/2 (2006) | 40 (1016) | 51 (1295) |

** Notes: Flow based on optimum channel conditions • Consult factory for final analysis of application • Dimensions based on 3 HP (2.2kW) electrical motor.*

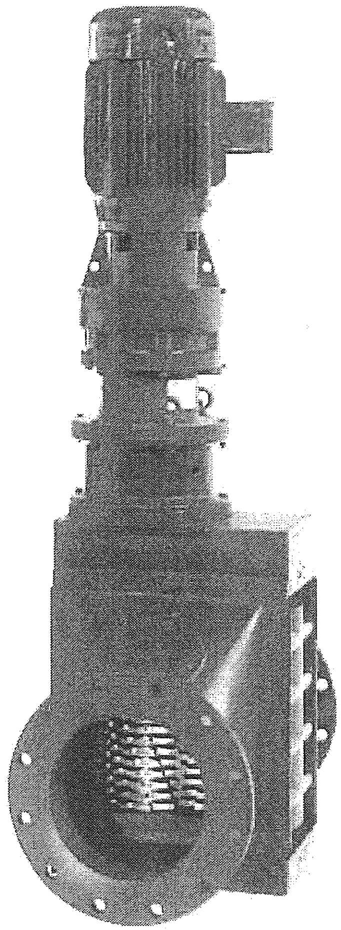
### Performance Capability – In-Line Configuration

| Model | Flow Rate GPM (m³/h) | Pipeline Size inches (mm) | Pressure Drop PSI (bars) | Max Pressure PSI (bars) | Approx. Net Weight lbs (kg) | Dimensions - inches (mm) A | B | C | D | E |
|---|---|---|---|---|---|---|---|---|---|---|
| 30004T-1204 | 400 (91) | 4 (102) | 0.42 (0.03) | 90 (6) | 550 (250) | 56-1/4 (1423) | 19-1/4 (483) | 28-1/4 (711) | 8-1/8 (206) | 4 (102) |
| 30004T-1206 | 600 (136) | 6 (152) | 0.86 (0.06) | 90 (6) | 560 (254) | 56-1/4 (1423) | 21-1/4 (534) | 28-1/4 (711) | 9-1/8 (232) | 6 (152) |
| 30004T-1208 | 800 (182) | 8 (203) | 1.60 (0.11) | 90 (6) | 570 (258) | 56-1/4 (1423) | 23-1/4 (584) | 28-1/4 (711) | 10 (254) | 8 (203) |
| 30004T-2410 | 1000 (227) | 10 (254) | 1.22 (0.08) | 90 (6) | 785 (356) | 67-3/4 (1727) | 27-1/4 (686) | 39-3/4 (1010) | 11-1/2(283) | 10 (254) |
| 30004T-2412 | 1200 (273) | 12 (305) | 1.59 (0.11) | 90 (6) | 810 (367) | 67-3/4 (1727) | 31-1/4 (787) | 39-3/4 (1010) | 12 (305) | 12 (305) |

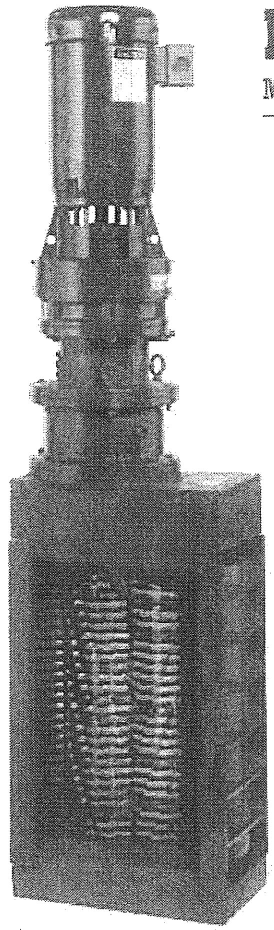
** Notes: In-Line unit typically installed prior to suction side of pump.*

# Macho Monster

## Model 40000 and 70000

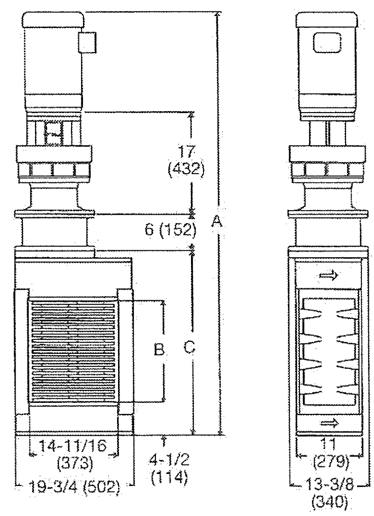


*In-Line Unit*

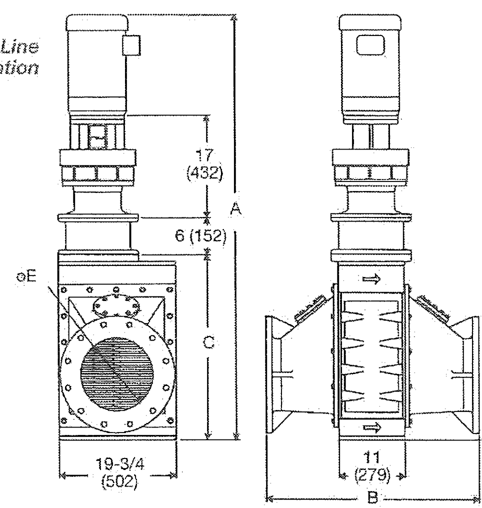


*Open Channel Unit*

*Open Channel Configuration*




*In-Line Configuration*




**Standard Specifications**

| Model | Motor HP (kW) | Hex Size in. (mm) | Reducer | Cutter Size in. (mm) | Max Force at Cutter Tip lbs. (kN) |
|---|---|---|---|---|---|
| 40002 | 10 (7.5) | 2-1/2 (64) | 43:1 | 7-1/2 (191) | 16,237 (72) |
| 70000 | 50 (37.5) | 4 (102) | 43:1 | 10 (254) | 41,177 (183) |

**Performance Capability - Open Channel Configuration**

| Model | Flow Rate GPM (m³/h) | Head Drop inches (mm) | Approximate Net Weight lbs. (kg) | Dimensions inches (mm) A | B | C |
|---|---|---|---|---|---|---|
| 40002-0018 | 915 (208) | 8 (203) | 1175 (533) | 69-1/4 (1754) | 18 (457) | 30-1/4 (768) |
| 40002-0024 | 1440 (327) | 16 (404) | 1365 (619) | 75 (1905) | 24 (609) | 37-1/4 (946) |
| 40002-0032 | 2100 (477) | 18 (457) | 1560 (708) | 76-1/4 (1937) | 32 (812) | 76-7/8 (1444) |
| 70000-0040† | throughput 770 ft³/h (22 m³/h) | | 4200 (1900) | 123 (3124) | 41 (1041) | 59 (1499) |

*† Typically used in material shredding applications.*

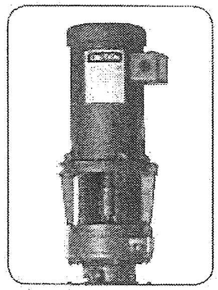
**Performance Capability - In-Line Configuration**

| Model | Flow Rate GPM (m³/h) | Pressure Drop PSI (bar) | Max Pressure PSI (bar) | Approx. Net Weight lbs (kg) | Dimension inches (mm) A | B | C | D | E |
|---|---|---|---|---|---|---|---|---|---|
| 40002-1812 | 2500 (500) | 3.00 (.207) | 90 (6) | 1520 (690) | 69-1/4 (1759) | 35-1/4 (895) | 30-1/4 (768) | 10-3/4 (273) | 12 (305) |
| 40002-2412 | 3000 (681) | 1.12 (.077) | 90 (6) | 1775 (805) | 76-1/4 (1937) | 35-1/4 (895) | 37-1/4 (946) | 10-3/4 (273) | 12 (305) |
| 40002-2416 | 3500 (795) | 1.50 (.103) | 90 (6) | 1895 (860) | 76-1/4 (1937) | 43-1/4 (1099) | 37-1/4 (946) | 12-5/8 (321) | 16 (406) |
| 40002-2418 | 4000 (908) | 2.20 (.152) | 90 (6) | 2095 (950) | 76-1/4 (1937) | 47-1/4 (1200) | 37-1/4 (946) | 13-5/8 (346) | 18 (457) |
| 40002-3220 | 5000 (1136) | 3.00 (.207) | 90 (6) | 2610 (1184) | 82-3/4 (2102) | 51-1/4 (1301) | 43-7/8 (1114) | 15 (381) | 20 (508) |

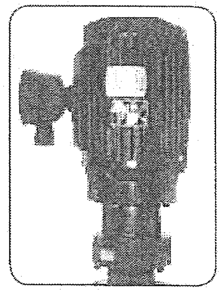
** Notes: In-Line unit typically installed prior to suction side of pump. Flow based on optimum channel conditions. Consult factory for final analysis of application.*

# Muffin Monster Options

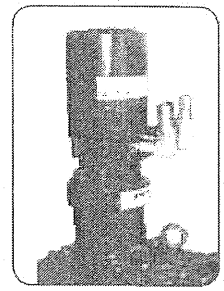
*Hardened steel cutters available in many sizes*



*Electric motor*



*Exclusive: JWC designed immersible motor (NEMA-6P)*



*Hydraulic drive*

### Cutters

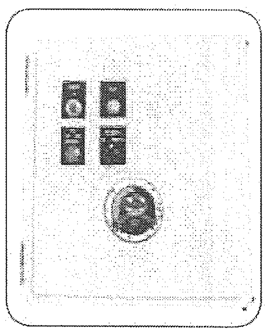
- 7, 11 and 13 tooth variations
- Special: 3-tooth fish grinding cutters
- Optional: extra-hard carburized cutters; stainless steel

### Custom Frames

- Stainless steel guide frames attach to pump station or channel walls to make installation easier
- Frame is customized to fit each site and includes: guide rails; grinder support base; subchannel; overflow bar racks and more

### High-tech Controllers

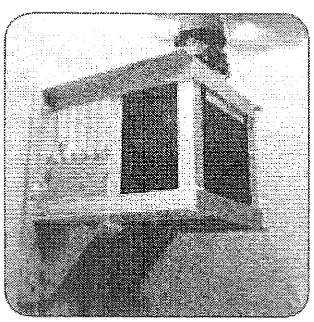
- Model PC2200 standard
- Standard enclosure: NEMA-4x fiberglass, 3 position switch and indicators
- Optional enclosures: NEMA-4x 304 stainless steel; NEMA-4x 316 stainless; NEMA-7 explosion proof



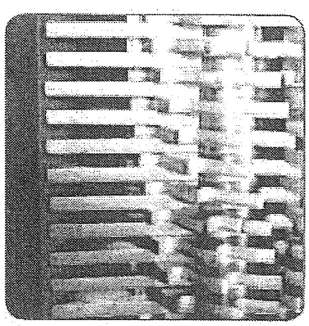
*High-tech Controllers*

### Scrapers

- Integrated steel scrapers increase throughput and help cutters clean-out faster. Improves performance of hopper fed applications.



*Custom stainless steel frames*



*Scrapers (optional)*

### Motors

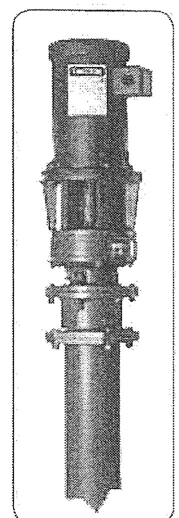
- TEFC - Totally enclosed fan cooled electric
- XPFC - Explosion proof fan cooled electric
- XPNV - Exclusive electric immersible
- Available in: 3, 5, 10 HP (2.2, 3.7, 7.5 kW)

### Hydraulic Power Packs

- Available in 5, 10, 15 HP (3.7, 7.5, 11 kW)

### Extended Motor Shaft

- Places motor above highest water level. Available in 6" (150mm) increments. Maximum: 12' (3600mm)

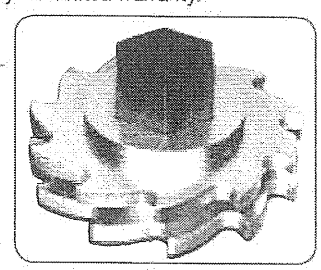


*Extended motor shaft*

# Service Options

**JWC offers several programs to choose from**

1. **MonsterCare:** Affordable service contract provides peace-of-mind and covers most grinder repairs.
2. **Monster Exchange**: First we send a newly re-conditioned grinder; next, swap the new and old grinders and finally ship the old one back. Free labor with 1 year limited warranty.
3. **Factory Repair**: We rebuild your grinder good as new. Free labor, 1 year limited warranty.
4. **Parts**: Genuine Monster cutters, shafts and seals make a big difference.
5. **Upgrade**: move up to the next generation of Monster grinding technology.



*Genuine Monster parts*

**Headquarters**
290 Paularino Ave.
Costa Mesa, CA 92626 USA
Toll Free: (800) 331-2277
Phone: (949) 833-3888
Fax: (949) 833-8858
jwce@jwce.com

**Western Product Support**
2600 S. Garnsey St.
Santa Ana, CA 92707, USA
Toll Free: (800) 331-2277
Phone: (949) 833-3888
Fax: (714) 751-1913
jwce@jwce.com

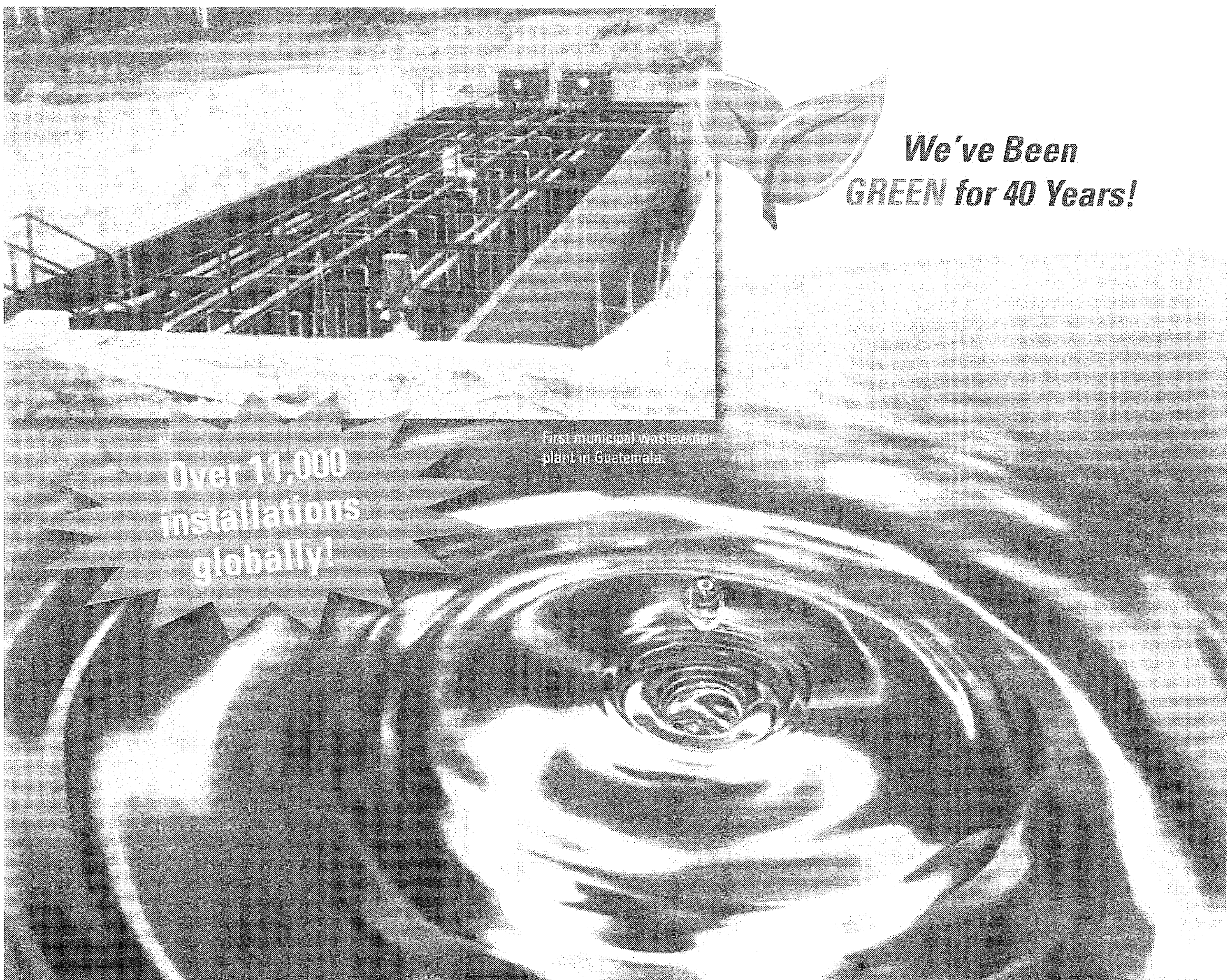
**Eastern Product Support**
4485 Commerce Dr, Ste 109
Buford, GA 30518, USA
Toll Free: (800) 331-8783
Phone: (770) 271-2106
Fax: (770) 925-9406
jwce@jwce.com

# purestream

## Package Sewage Treatment Systems

**Superior Treatment for:**

- New Developments
- Municipalities
- Subdivisions
- Mobile Home Parks
- Long-Term Construction Sites




First municipal wastewater plant in Guatemala.

# Package Sewage Treatment Systems

## Proven Design with YOU in Mind

### *How Does It Work?*

The Purestream Sewage Treatment Plant is an extended aeration system in a package design for ease of use and installation. The combination of oxygen and retention time provides ideal living conditions for aerobic bacteria which reduce $BOD_5$, Total Suspended Solids and (if so designed) Ammonia .

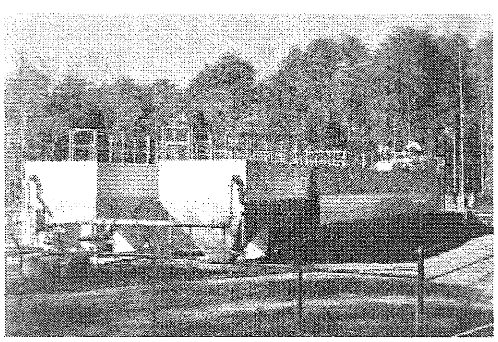
Our treatment plant takes advantage of the mixing power of coarse bubble diffusers and the hexagonal cross-section design to ensure that there are no "dead spots" in the treatment process. The aerated waste stream then enters a hopper bottom clarifier for solids settling before discharge to downstream processes such as filtration and/or disinfection.

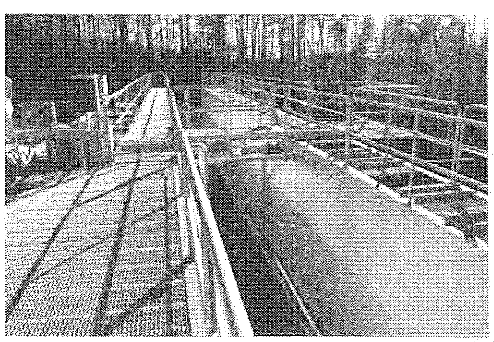
### *Where It's Used*

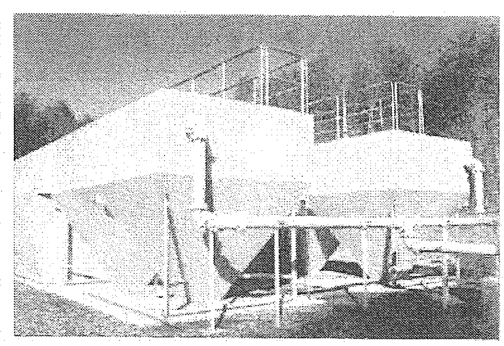
The Purestream Sewage Treatment System is a great alternative to septic systems and provides a higher degree of treatment. If the project is located where it is not economical to pump to a municipal treatment plant, then the Purestream Sewage Treatment Plant is the perfect solution for decentralized wastewater treatment on projects such as:

- Subdivisions / Private Development
- Municipalities
- Schools
- Recreational Parks
- Nursing Homes
- Mobile Home Developments
- Factories and other Commercial Businesses

**Largest Supplier in the USA | 40+ Years in Business**

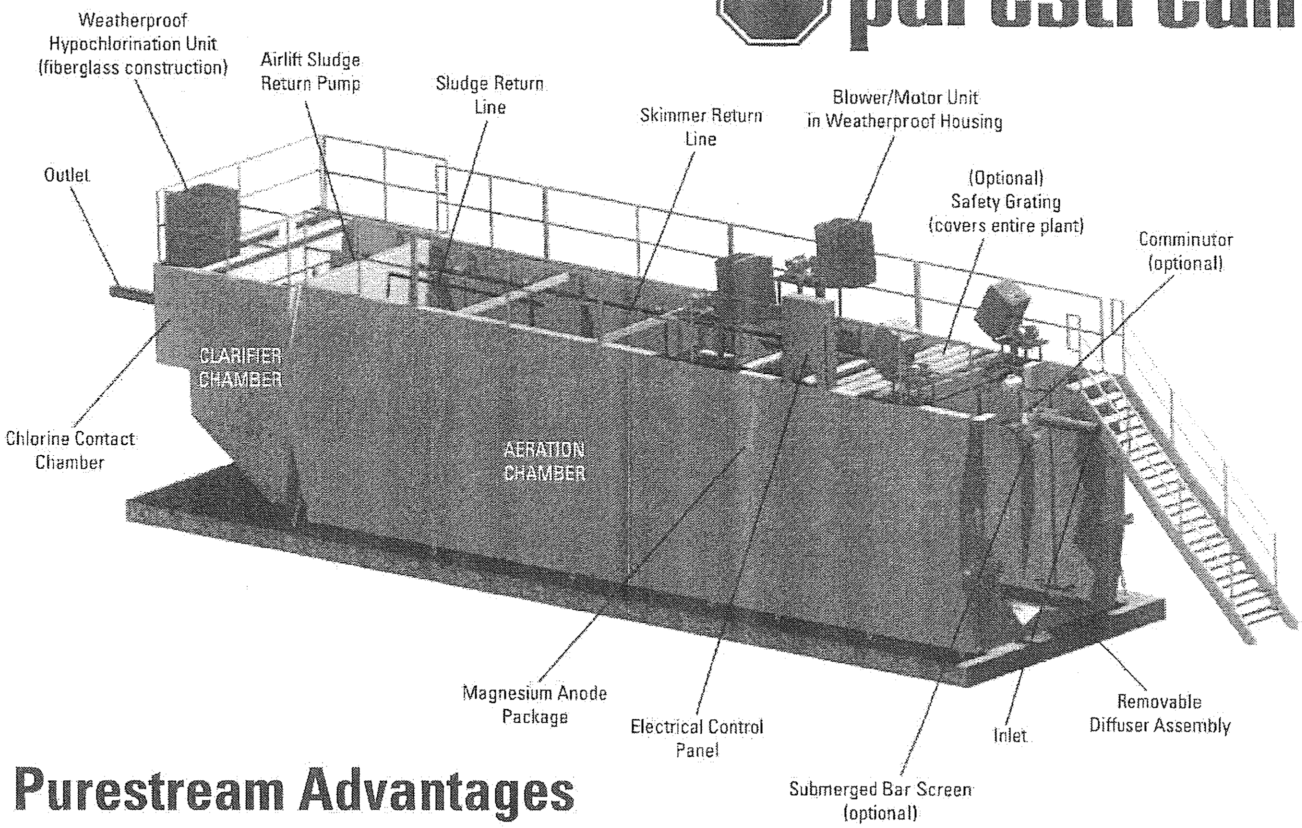






**Over 11,000 Installations Globally | We are Green**

purestream




# Purestream Advantages

## *Can Be Installed in Less Than a Day*

The Purestream Extended Aeration Treatment Plant is a complete, pre-fabricated unit in a compact package, and may be installed above or below grade. Auxiliary equipment that requires field mounting can be installed in just a few hours. Designed for quick and simple installation, to save you time and money.

## *Economical to Operate, Easy to Maintain*

We've spent over 40 years implementing suggestions from engineers, operators, and contractors. Providing a quality product that is easy to operate and maintain is our primary goal. And Purestream is with you through the whole process. Support is available through your local representative or direct from the factory: from installation to operation.

## *Simple to Expand*

A duplicate Purestream unit can be installed anytime in the future to handle the growing sewage load as your development expands.

## *Resale Value*

The Purestream package design makes selling your used unit a simple and straightforward process. Perhaps you'd like to transfer it to another location? No problem. If your subdivision or municipality expands, moving the unit is accomplished with ease.

# Purestream

## Easy to Customize

The Purestream system is customized for the specific project requirements of your water pollution control authority. Purestream will assist you, the engineer, with preliminary plans and cost structures to eliminate any guesswork. Our goal is to have your system installed as quickly, efficiently and easily as possible.

The Purestream system arrives as a completely integrated unit. Auxiliary components are delivered pre-assembled and ready for mounting and electrical connection. At your request, a Purestream representative will be on hand to inspect your installation.

The Purestream Sewage Treatment System is designed to provide long life and easy, low-maintenance service. If you like long and trouble-free operation, you'll like the Purestream System. Low VOC high solids epoxy coatings, or similar chemically resistent coatings, together with cathodic protection and easy to maintain accessory equipment combine to provide for long life and smooth operation. The Purestream package design also gives you the option to remove and resell the system, should you no longer need it. It's a great way to recoup part of your investment!


Plus, a Purestream representative will be on hand to start up the system and provide all the information you'll need for a smooth and trouble-free installation. We'll also provide you with an operations manual for reference. And please note that Purestream is available to you for free advice, if any issues arise, today or 20 years from now.

***We've Been GREEN for 40 Years!***

**purestream**


P.O. Box 68 • Florence, Kentucky 41022-0068
Phone: (859) 371-9898 • Fax: (859) 371-3577
*www.purestreaminc.com* • Email: *purestream@purestreaminc.com*
For Parts: *www.purestreamparts.com*

**purestream ES** LLC

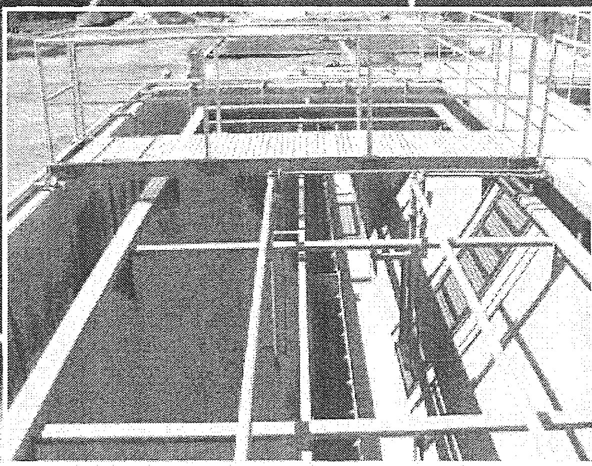
*Advanced Environmental Treatment Systems*

# BESST

BIOLOGICALLY ENGINEERED SINGLE SLUDGE TREATMENT

## *The* latest *tech*nology in *adva*nced biological wastewater treatment

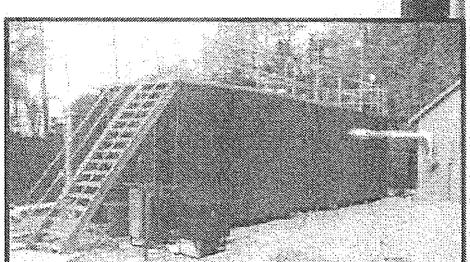
# BESST- brings cutting edge technology



## The Technology

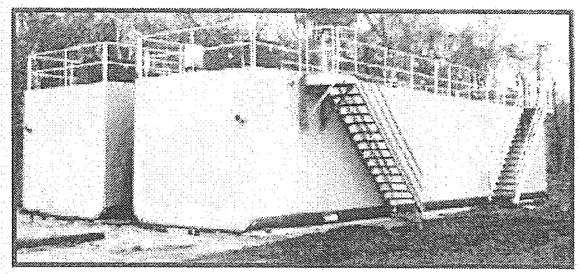
BESST™ (Biologically Engineered Single Sludge Treatment) is a Patent Pending process that is a culmination of activated sludge processes dating back to the 1920's. The BESST process is the most advanced wastewater treatment process available, and is the result of almost 60 years of research, development, practical experience and testing. Combining the principals of single sludge treatment for $BOD_5$, TSS and nutrient removal, and sludge blanket clarification for efficient solids separation, this process places all the components into one vessel. The end result is a compact system that can be provided in either a steel package plant for smaller systems or built in place concrete systems for larger municipalities and high strength industrial waste streams. Either configuration provides an efficient, cost effective wastewater treatment plant with extremely low maintenance and operating costs. With its efficient use of mixed liquor, the BESST process requires less sludge wasting resulting in lower hauling costs for waste sludge.

The BESST process has no capacity limits, and is used in a wide range of applications. Plants serving development and municipal sectors, industrial, and food processing wastewaters, have been designed and are in highly successful operation throughout the US, Mexico, Central America and the Caribbean.



## The Process

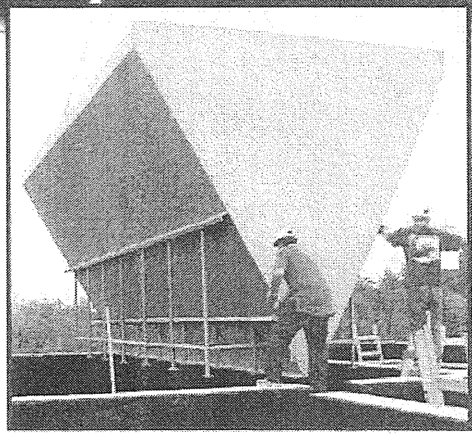
The BESST process is based on Lawrence and McCarty biological kinetics and hydraulic models dating back to the early 1900's. Utilizing the benefits of Pre-Anoxic Single Sludge activated sludge process; the BESST system uses the endogenous carbon source found in all sanitary waste to denitrify in the anoxic zone without the use of methanol or other exogenous carbon sources. The raw wastewater enters the anoxic zone first where it is mixed with nitrified Return Activated Sludge from the sludge blanket clarifier. Submersible mechanical mixers are installed in the anoxic compartment to facilitate homogeneous mixing, and increase the denitrification efficiency. From here, the mixed liquor flows in a plug flow manner to the aeration zone where fine bubble diffusers provide the oxygen required for nitrification and $BOD_5$ reduction.



After aeration, the mixed liquor enters the bottom of the separation compartment where solids and treated effluent are separated by a patented velocity gradient sludge blanket clarifier. The operation of the velocity gradient sludge blanket clarifier is self-regulating. As the flow enters the bottom of the clarifier, a velocity gradient is created in such a way that the bottom 2 to 3 feet of solids are kept in a completely mixed state which eliminates the need for the operator to scrape the clarifier (solids will not bulk). While the solids rise, their velocity decreases creating a sludge based, fluidized bed filter, which removes fine and colloid particles from the treated effluent. Trapping these particles increases the weight of the solids, causing them to drop to the bottom of the clarifier, where they are returned to the anoxic zone by an airlift or mechanical pump. The internal circulation loop created by this plug flow is typically set at a minimum of four (4) times the average daily flow, increasing nitirification and denitrification dramatically.

The effluent weir is equipped with a scum baffle and scum skimmer which aids in the reduction of TSS in the effluent. The efficiency of the process, and velocity gradient sludge blanket clarifier, produces effluent quality well below 10 mg/l $BOD_5$, <10 mg/l TSS, less than 1 mg/l ammonia, less than 10 mg/l total nitrogen (<5 mg/l TKN) and effluent phosphorous levels between 2 and 3 mg/l by "Luxury Uptake" and less than 0.5 mg/l with the use of metal salts.

# to advanced biological wastewater treatment



## The Features & Benefits

BESST technology incorporates many innovative and advanced features that increase its efficiency and reduces both capital and operational costs.

### 1. Mechanical Reliability

The BESST process is designed with 100% backup of all electromechanical equipment and failsafe controls. This ensures reliability of operation even when there is a mechanical failure.

### 2. Single Sludge Treatment

Of the three methods of single sludge treatment, the Pre-Anoxic method is the most efficient and effective method for nutrient removal and mixed liquor stabilization. By designing the BESST process with the anoxic zone as the first compartment to receive wastewater, the sludge becomes more stable and has better settling qualities than typical activated sludge processes, resulting in a lower SVI which equates to better settling sludge. This increase in sludge settleability increases the efficiency of the sludge blanket clarifier and aids in achieving between 4% and 6% solids in the sludge storage tank, reducing sludge hauling costs dramatically. In addition, the raw wastewater entering the anoxic zone provides the endogenous carbon source required for denitrification. No addition of exogenous carbon is needed to achieve Total Nitrogen levels below 10 mg/l and Total Kjeldahl Nitrogen less than 5 mg/l. The aeration chamber is designed for efficient $BOD_5$ and TSS removal to levels less than 10 mg/l, and with dissolved oxygen levels between 2.0 mg/l and 3.5 mg/l, the nitrification rate is extremely high, resulting in ammonia levels below 1 mg/l.

### 3. Mixed Liquor Suspended Solids (MLSS) Concentrations

The BESST process is designed to operate at MLSS concentrations well above the typical levels for other activated sludge processes. With a design range between 3000 mg/l and 6000 mg/l, more microbial cells are available to "feed" on a wider range of organic material in the waste stream, including some previously considered non-biodegradable.

### 4. Reduced Capital Costs

The efficiency of the BESST process is not only in the biology and hydraulics, but in the construction as well. By integrating all of the components into one tank, the installation costs and capital costs are reduced dramatically. In many cases by more than 40% when compared to other activated sludge processes. In addition to the upfront savings, the BESST process also reduces operating costs by as much as 50%. By maximizing the biological engineering and utilizing the mixed liquor to its fullest potential, less sludge is wasted from the system reducing hauling costs by up to 75%, and lower horsepower electrical components are required for operation resulting in lower electric costs.

### 5. No Odor

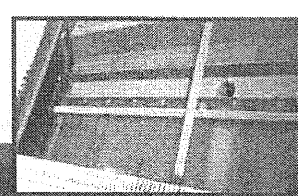
The stability and age of the sludge, combined with the aerobic conditions, result in a process with NO UNPLEASANT ODORS. This enables the process to be installed in locations in close proximity to populated areas without the need for costly buildings or tank coverings.

### 6. Hydraulic Flexibility

The velocity gradient sludge blanket clarifier's half triangle design is the most efficient design for solids separation. By taking peak flows into account at the design stage, the clarifier can hydraulically withstand a continuous peak of up to 3 times the design flow. This allows for instantaneous peaks of up to 1200% of the design flow for up to 2 hours. The sludge based fluidized bed is also self regulating in these peak conditions, as the flow increases, the sludge rises in the clarifier and expands increasing both the filtration volume and surface area.

### 7. Modular and Flexible Design

The small footprint and single tank design allows for easy expansion for future needs of the community or development. By placing the package plant design in parallel allows for additional tankage to be easily added as flow demands increase. The efficiency of the BESST design also lends itself well to retrofits, often times increasing the treated flow capacities by as much as 20% without the need for additional tankage.



# BESST

BIOLOGICALLY ENGINEERED SINGLE SLUDGE TREATMENT

## Special Applications

Although the BESST process can be applied successfully to all biologically degradable wastewaters, with minimal operator attention, it is especially suited for the following applications:

1. Environmentally sensitive areas requiring advanced treatment, such as:
   - Golf Course Communities
   - Resort Areas
   - Commercial Fishing Areas

2. Highly Variable daily hydraulic flow patterns found in:
   - Subdivisions
   - Schools
   - Small Communities
   - Shopping Centers
   - Campgrounds

3. Unusually strong and/or variable organic loads created by industrial wastes, such as:
   - Food Processing (Meat, Poultry, Vegetable....)
   - Dairies
   - Tanneries and Textile Mills

purestream ES LLC

*Advanced Environmental Treatment Systems*

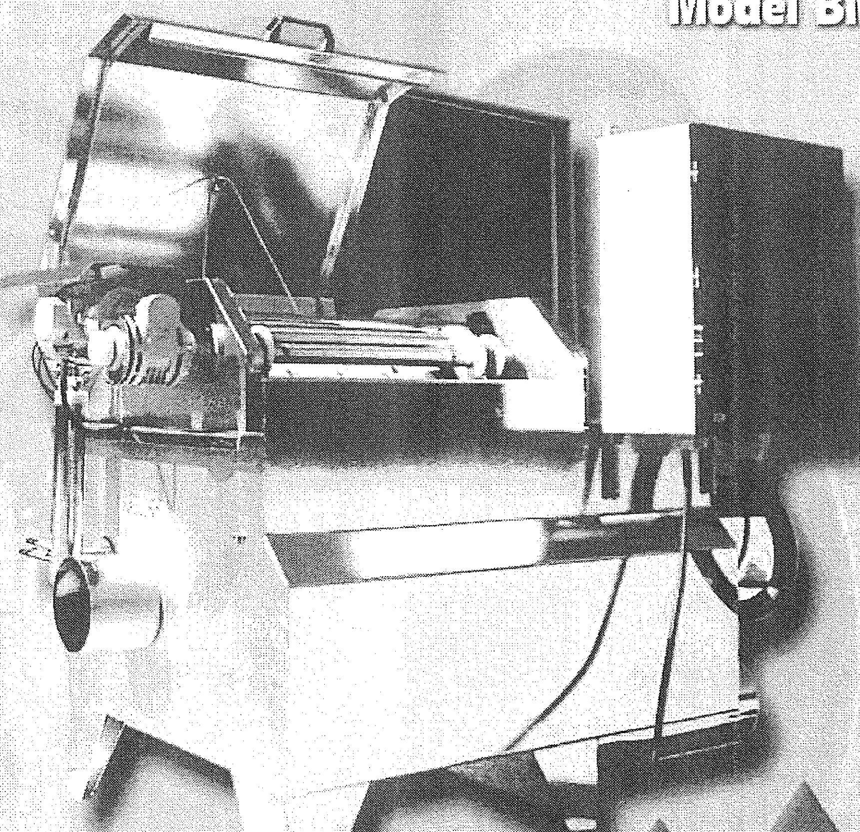
10584 Dixie Highway
Walton, KY 41094
Telephone: (859) 371-9898
FAX: (859) 371-3577
e-mail: purestream@purestreaminc.com
Website: www.purestreaminc.com

**purestream ES** LLC

*Advanced Environmental Treatment Systems*

# MICROSCREEN DRUM FILTER

## Model BMF



*Ideal, inexpensive way to upgrade tertiary wastewater treatment to meet increased stringent effluent requirements*

# THE TECHNOLOGY

BMF Microscreen Drum Filters are designed for the tertiary stage filtration process and especially for the removal of non-soluble particles in community and industrial wastewater treatment plants.

The BMF Filters are open, gravitational filter sets based on the drum filter principle. The filters are constructed so that they can be built into an underground concrete channel or attached to a stainless steel tank for aboveground installation.

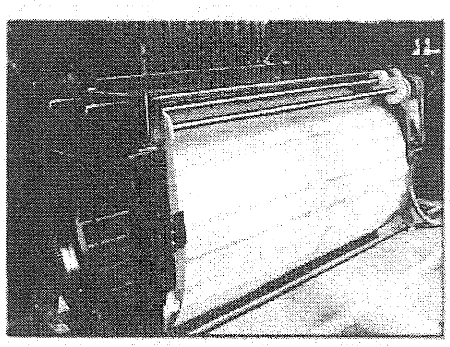
Microscreen Drum Filters are manufactured using stainless steel for the larger parts and shafts, and the highest quality plastic for the smaller parts. The simple, rugged construction eliminates deposits left below the water surface and guarantees safe, low-maintenance service. The automatic two-way rinse filter also ensures simple, trouble-free operation.

No part of the Microscreen Filter needs lubrication, and maintenance is limited to periodic replacement of the used filter cloth. The life span of the filter cloth depends on the condition of the water being filtered and the content of the solid materials it contains.

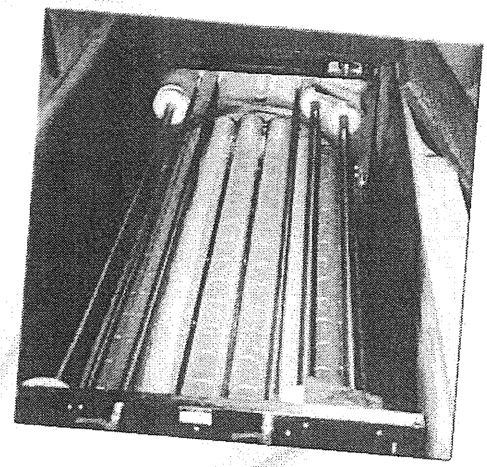
A plastic switchboard cabinet (NEMA 4 X rated) is included in every filter. The switchboard is completely equipped for the automatic operation of the filter.

## THE PROCESS

Water containing solid particles flow through the inlet pipe into the interior part of the filter drum. Impurities are caught on the inner side of the filter cloth and the filtered water flows out through the cloth. The entire filter remains off during this initial process. As the filter cloth slowly becomes clogged by the increasing amount of filtered waste, its resistance to the flow increases. The water level inside the filter drum increases accordingly. When the preset level is reached, the level probe located at the forefront of the filter automatically activates the rotating drum and simultaneously the rinsing pump which pumps the filtered water into the jet rinse system. The residue accumulated on the inner side of the filter cloth is removed by the directed stream of water from the jets and then washed into the waste trough located in the inner drum. The residue is then washed into the silt sump where it is washed out by the silt pump which is automatically controlled by the level probe located on the wall of the silt sump. This pump may not be needed when the gravitational flow alone is sufficient to rinse out the silt.



The rinsed cloth is relocated at the bottom of the filter by the revolving of the drum rotation. The surface level difference is diminished and the probe automatically switches off the drum rotation, as well as the pump. The rotating drum and the pump remain off until reactivated, at which point the entire cycle is repeated. The average activated operation and rest cycles of the filter are dependent on the amount of impurities flowing into the filter, the properties they contain and the condition of the filter cloth.



Since the flow of the untreated water remains uninterrupted throughout the entire filtration process, and the flow of the rinse water is taken directly from the filter set, no additional rinse water trays or tankage is needed. This significantly reduces initial investment costs.

The automatic activation and deactivation of the filter reduces the amount of electricity needed for filter operation. It also increases the average quality of the water filtered, increases the density of the outflowing sludge and prolongs the life span of the entire system.

## TECHNICAL PARAMETERS

The filter capacity is determined by the basic parameter of the effective working surface of the filter cloth. The second and third parameters are the size of the openings in the filter cloth and the area of their freely functioning surface. These parameters are chosen to produce the required quality of the filtered water. The composition of the solid particles also has a significant effect on the capacity of the filter. This depends on 1.) their shape; (flat particles block the openings more easily than round), 2.) their density; (solid particles are filtered better than non-solid mucus), and 3.) the average amount of large and small particles in the entire volume of inflowing wastewater.

When a certain amount of dense particles larger than the filter cloth openings is reached, a thin silt layer is formed on the filter cloth. This silt layer acts as a secondary filter and is able to catch particles which are much smaller than the actual openings in the filter cloth. Therefore, it is advantageous to select a filter with a larger filter surface so the "rest" period between cycles is as long as possible. This secondary filter layer is then washed into the waste trough when the filter cloth is rinsed.

When using the Microscreen Drum Filter as the tertiary treatment process in domestic and industrial plants, a filter cloth with an opening diameter of 0.04mm is usually suitable. For more contaminated water or to meet specific requirements, optimal opening diameters and other parameters can be determined by prior experience in similar conditions or by administering filter tests.

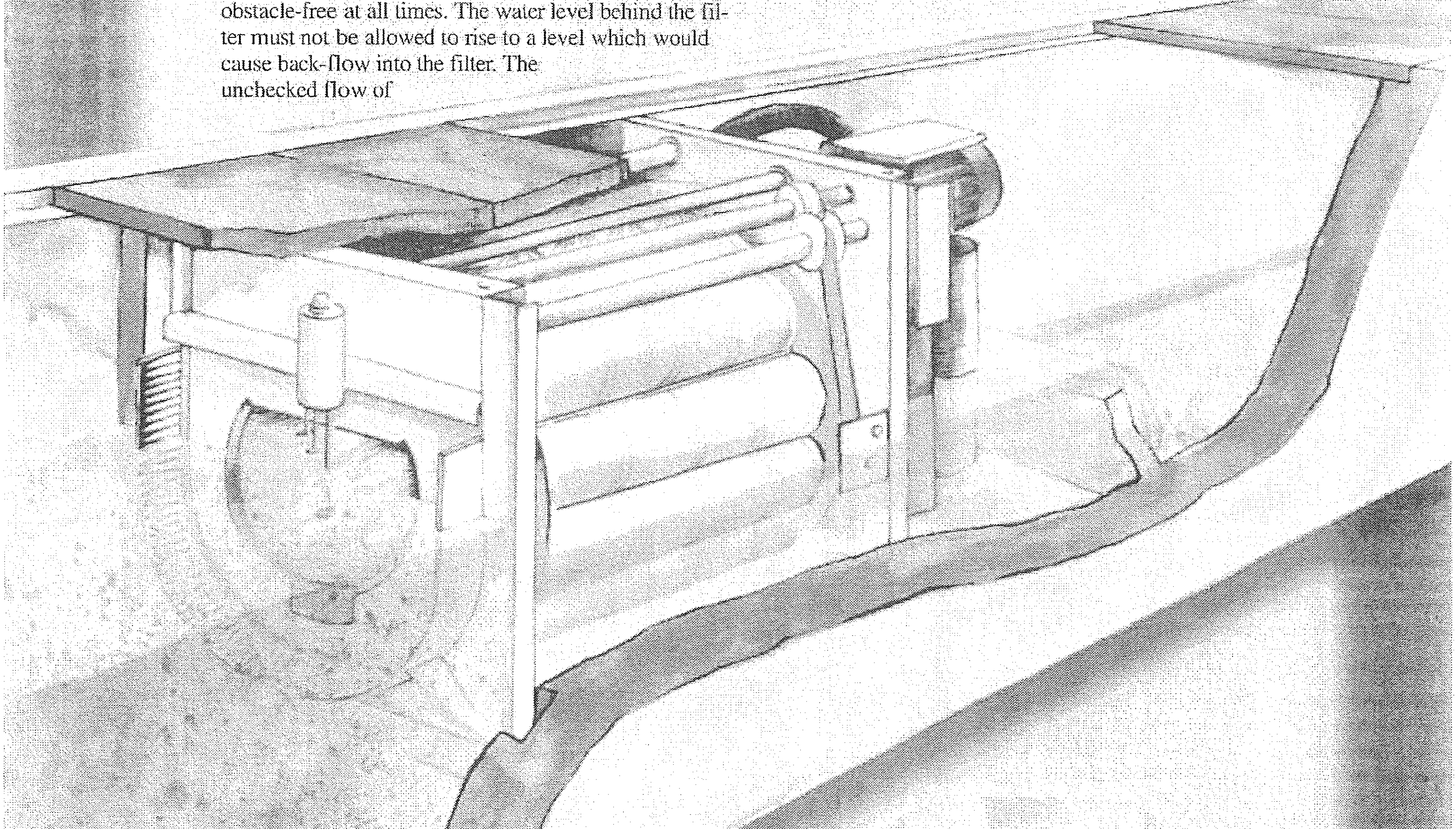
## OPERATION

In locating the Miscroscreen Drum Filter it is necessary to consider that the flow of water into the filter should whirl as little as possible so that solid particles are not broken up. For this reason a gravity flow is recommended rather than a filter feed pump. A flow control box should be used to create a gravity flow into the filter in lieu of direct pumping.

The Microscreen Filter should be set in a horizontal position with a maximum divergence of 3mm.

The filtered water outlet from the filter must be kept obstacle-free at all times. The water level behind the filter must not be allowed to rise to a level which would cause back-flow into the filter. The unchecked flow of water back into the filter will cause the water level inside the filter to rise and the filter will cease to function.

If either the filter capacity is exceeded or the filter stops functioning, water will pass through unfiltered. Building a bypass line is not necessary although it may be advantageous to be able to cut off the water flow in order to change the filter cloth. Filter models installed in concrete shafts may be lifted out and then returned to the sewer without interrupting the sewer water flow.



## OUTSTANDING FEATURES OF THE BMF MICROSCREEN DRUM FILTER

Inexpensive WWTP upgrade to meet more stringent effluent requirements

Completely self contained - no need for additional controls, tankage, pumps, or outside water supply

Lower capital and operational costs than any other filter

300 series stainless steel construction means less maintenance and no corrosion

# TECHNICAL DATA

## STAINLESS STEEL TANK INSTALLATION

| MODEL | WIDTH (INCHES) | LENGTH (INCHES) | HEIGHT (INCHES) | WEIGHT (LBS) | MAX.POWER INPUT (HP) | FLOW RANGE (GPD) | MAXIMUM FLOW (GPM/GPD) |
|---|---|---|---|---|---|---|---|
| 5 BMF 5-0 | 29 | 46 | 35.5 | 243 | 2.4 | 0-120K | 132/190K |
| 5 BMF 10-0 | 29 | 66 | 35.5 | 353 | 2.4 | 120K-300K | 264/380K |
| 10 BMF 10-0 | 55.5 | 67 | 61.50 | 926 | 3.4 | 300K-700K | 625/900K |
| 10 BMF 20-0 | 55.5 | 106 | 61.50 | 1323 | 3.4 | 700K-1.3MGD | 1250/1.8 MGD |

## CONCRETE CHANNEL INSTALLATION

(Concrete provided by others)

| MODEL | CHANNEL WIDTH (INCHES) | FILTER LENGTH (INCHES) | CHANNEL DEPT (INCHES) | WEIGHT (LBS) | MAX.POWER INPUT (HP) | FLOW RANGE (GPD) | MAXIMUM FLOW (GPM/GPD) |
|---|---|---|---|---|---|---|---|
| 5 BMF 5 | 25.6 | 49.2 | 30.7 | 148 | 2.4 | 0-200K | 173/250K |
| 5 BMF 10 | 25.6 | 73.6 | 30.7 | 210 | 2.4 | 200K-500K | 396/570K |
| 10 BMF 10 | 51.2 | 71.7 | 55.1 | 926 | 3.4 | 500K-1MGD | 792/1.14MGD |
| 10 BMF 20 | 51.2 | 116.1 | 55.1 | 1081 | 3.4 | 1MGD/2MGD | 1597/2.3MGD |

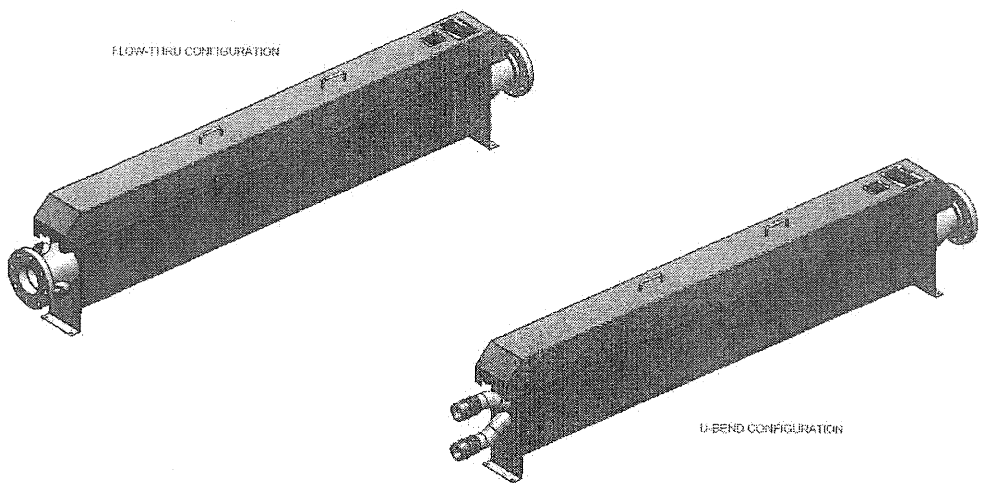
purestream ES LLC

*Advanced Environmental Treatment Systems*

Purestream ES, LLC
10584 Dixie Highway
Walton, KY 41094
Ph. (859) 371-9898
Fax (859) 371-3577
e-mail purestream@purestreaminc.com
Website: purestreaminc.com

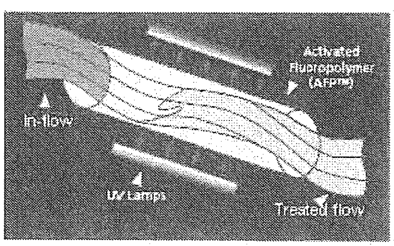
# Series M- 4 UV Dosing System for Wastewater Treatment






The Series M-4 Water Treatment system from Enaqua are the most practical and efficient system for low and moderate flow Wastewater treatment plants.

Each Series M-4 utilizes Enaqua's Non-Contact™ UV process which promotes superior, efficient disinfection. Using AFP™840 tubes and a unique plug flow design, you receive the maximum disinfection capability from the lamps, while the turbulent action of the water scours the inside of the tubes, keeping them free from scale build up.




With its compact size, the Series M-4 fits most plants designs and budgets. The Series M-4 is designed for flows up to 110 GPM and multiple units can be configured in Parallel or Series for higher flows.

## Features

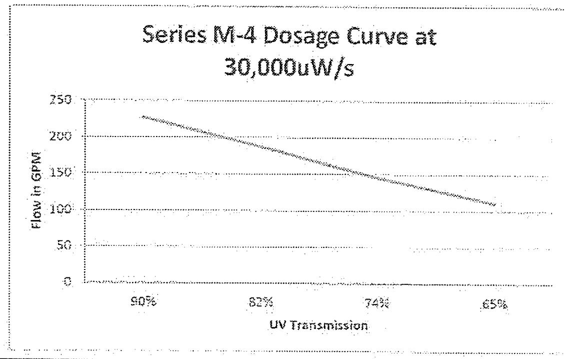
- Flow up to 110 GPM per Unit at 65% UVT
- Corrosion Resistant Alloy construction
- No Quartz Sleeves to foul
- Turbulent flow for self cleaning
- Air cooled lamps
- More consistent UV output
- Reduced maintenance
- Dry lamp changes
- No special cleaning requirements or fixtures
- Lamp racks weigh less than 15 lbs
- Quick Disconnect lamp racks

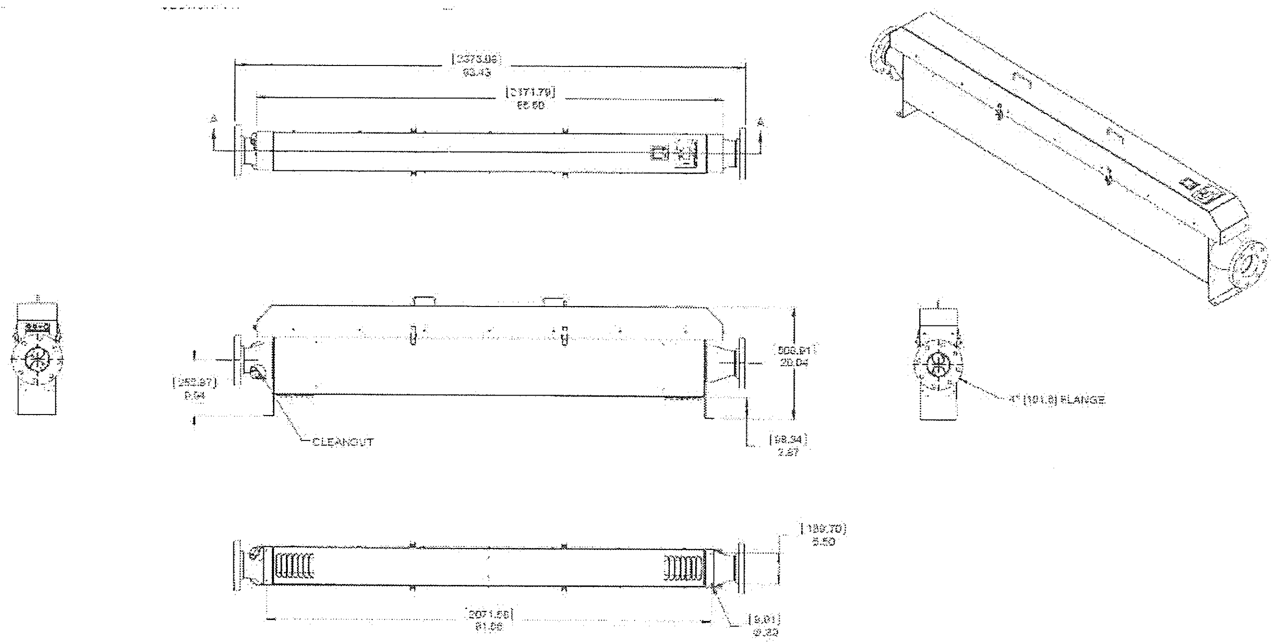
## SPECIFICATIONS:

| | |
|---|---|
| Treatment capacity | Up to 110 GPM |
| Connection | 4" ANSI Std. flange |
| Housing | Corrosion Resistant Alloy |
| Dimensions | 94" x 8" x 21" |
| Lamp Type | Non Amalgam HO |
| Number of lamps | Up to 8 |
| Ballast design | Electronic |
| Removable lamp rack | Yes |
| UV Sensor | Optional |
| Lamp life detection | Yes |
| | |
| Operating Voltage | 120/240 Volts |
| Operating Current | 10 Amps (max) |

For a typical Waste Water Treatment process seeking:

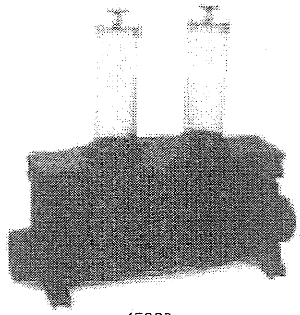
| | |
|---|---|
| UVT | 65% |
| TSS | <10mg/l |
| BOD | <30mg/l |



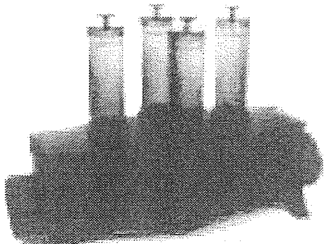




For more information visit our website at www.enaqua.com
All values are nominal; specification subject to change without notice.

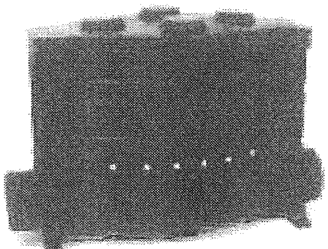

Worldwide Headquarters
Enaqua
2410 Birch Street
Vista, CA 92081 (USA)
Phone: (760) 599-2644
Fax: (760) 599-2642
Info@enaqua.com



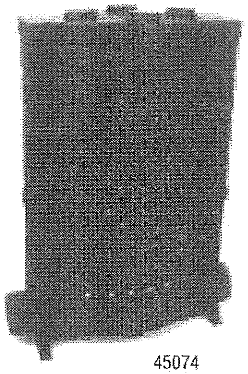
45060



45070



45073



45074

## Norweco® Tablet Feeders

- NSF-approved!

Norweco Bio-Dynamic series 2000 and 4000 tablet feeders are complete dry chemical dosing systems for water and wastewater treatment. These feeders handle maximum flows of up to 200,000 gpd. The standard units are installed at grade, in-line or in the contact tank of a water or wastewater treatment system.

Each unit has four mounting feet that accept 3/8" diameter bolts. All flow entering the tablet feeder is channeled under an adjustable inlet baffle. The inlet baffle can be adjusted from 1 to 3-1/2"H. Raising the inlet baffle will increase chemical dosage.

Units are available with an adjustable outlet sluice gate for maximum operational control. These adjustable gates allow you to slow the flow of water down through the feeder, thus increasing contact time with the tablets. The tablet feeder is supplied with interchangeable 1", 2" and 3" weir outlet plates. Each unit has a 4" or 6" diameter openings that will accept PVC Sch 40 piping.

Units listed are suitable for direct burial of up to 48" below grade. Models for deeper burial depth are available by special order; contact USABlueBook for more information. These units have completely encased tubes; bury the feeders so that only the tops of the tubes show. The remote tube removal system (included) allows you to remove the tubes easily.

**Note:** Check with your state's regulatory agency to make sure your state will allow the use of tablet feeders.

Certified to NSF/ANSI 60

| | Inlet/Outlet | Minimum Flow | Design Flow | Maximum Flow | # of Tubes |
|---|---|---|---|---|---|
| **Model 2000:** | 4" | 200 | 20,000 | 100,000 | 2 |
| **Model 4000:** | 6" | 20,000 | 50,000 | 200,000 | 4 |

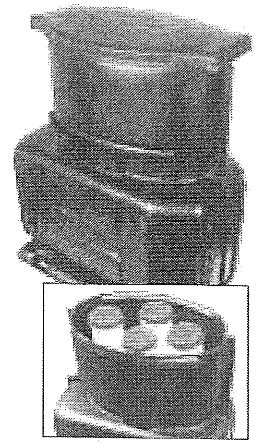
| DESCRIPTION | MODEL 2000 STOCK # | EACH | MODEL 4000 STOCK # | EACH |
|---|---|---|---|---|
| With Fixed Weir | 45060 | $ 289.95 | 45070 | $ 464.95 |
| With Adjustable Outlet | 45061 | 379.95 | 45071 | 599.95 |
| With Fixed Weir, 24"H for Direct Burial | 45062 | 349.95 | 45072 | 559.95 |
| With Adjustable Outlet, 24"H for Direct Burial | 45063 | 444.95 | 45073 | 724.95 |
| With Adjustable Outlet, 48"H for Direct Burial | 45064 | 589.95 | 45074 | 964.95 |
| REPLACEMENT ITEMS | | | | |
| Rplmt Remote Feed Tube Removal System | 45065 | $ 97.95 | 45075 | $ 182.95 |
| Rplmt Feed Tube with Standard Cap | 45963 | 38.95 | 45963 | 38.95 |
| Rplmt Remote Removal Cap | 45964 | 26.95 | 45964 | 26.95 |

## JET® Tablet Feeders

- Low initial cost, low operating cost and easy installation
- Ten year limited warranty and years of repair-free life

This is a complete, self-contained non-mechanical chlorinating and dechlorinating system. It consists of a JET tablet feeder that dispenses either chlorine tablets or sodium sulfite tablets. Available in sizes to handle flows up to 100,000 gallons of wastewater per day using two Model 110s. Constructed of tough corrosion-proof plastic.

**Note:** Check with your state's regulatory agency to make sure the state allows use of tablet feeders.

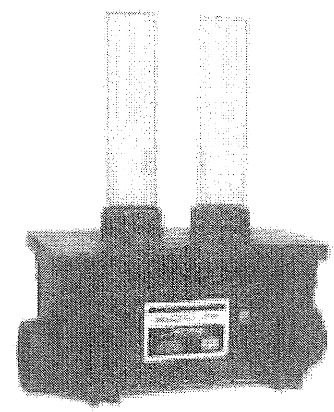


Four tubes

| MFR # | INLET SIZE, ID | FLOW TREATED | STOCK # | EACH |
|---|---|---|---|---|
| 120 | Blank Inlet for Discharge Lines Up to 10"Dia | Up to 50,000 gpd | 45020 | $ 429.95 |
| 110 | 6 5/8" | Up to 50,000 gpd | 45022 | 449.95 |
| 108 | 4 1/2" | Up to 10,000 gpd | 45024 | 314.95 |

## Severn Trent Feeders

- For Sanuril®, Aquaward®, D-Chlor and other 2-5/8" tablets



These tablet feeders are used at thousands of installations worldwide. Dosage is regulated simply and efficiently through the controlled erosion of tablets, which varies based upon the level of water that fluctuates due to flow. Minimal maintenance, low cost, and no power requirements are major benefits.

The A200 has a short 5" inlet lip for a flexible coupling (ex. 5 x 6 or 5 x 4) and a long 5" outlet. All other models require a drop box or a caulked butt fit to the weir. A drop box is available for field installations where you wish to have a ready-made adapter to fit over the weir and provide an outfall pipe adapter.

**Note:** Check with your state's regulatory agency to make sure the state allows use of tablet feeders.

Certified to NSF/ANSI 61

| MFR # | MAX TUBES | GPD | FEATURES | STOCK # | EACH |
|---|---|---|---|---|---|
| 200 | 2 | 1,500 | 4" In/Out Pipes, No Weir | 28534 | $ 195.95 |
| 100 | 2 | 10,000 | 4" In Pipe/Weir | 28536 | 241.95 |
| A200 | 2 | 10,000 | 4" In/Weir Pipe and 4" Out Pipe | 28538 | 243.95 |
| — | — | 5" x 4" | Rubber Coupling | 21323 | 8.39 |
| — | — | 5" x 6" | Rubber Coupling | 22012 | 13.99 |
| 1000 | 4 | 50,000 | 6" Pipe Inlet/Weir(s) Out | 28540 | 434.95 |
| 1001 | 4 | 50,000 | Max 10" Butt Inlet/Weir(s) Out | 28542 | 434.95 |
| Drop Box | — | — | — | 28548 | 304.95 |

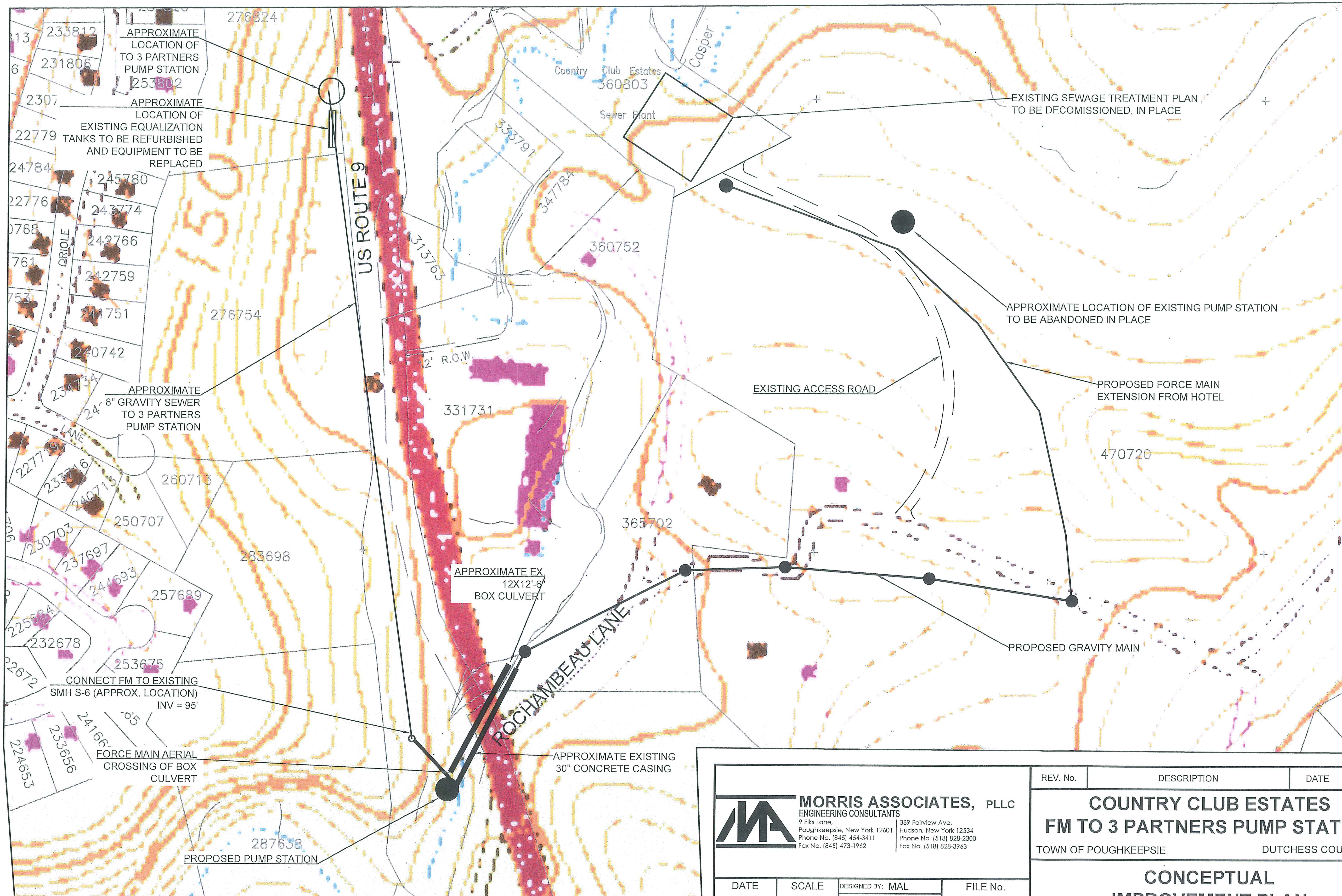
## Feeder Tubes and Caps

- For Eltech, Sanuril, JET and other 2-5/8" feeders

Replace those old, cracked tubes and missing caps today.

| FEATURES | STOCK # | EACH |
|---|---|---|
| 28" White Tubes (Jet) | 29060 | $ 44.95 |
| 24" Clear Tubes | 28550 | 47.95 |
| Cap | 28552 | 15.99 |

# APPENDIX B




**MORRIS ASSOCIATES, PLLC**
ENGINEERING CONSULTANTS

9 Elks Lane, Poughkeepsie, New York 12601
Phone No. (845) 454-3411
Fax No. (845) 473-1962

389 Fairview Ave. Hudson, New York 12534
Phone No. (518) 828-2300
Fax No. (518) 828-3963

| REV. No. | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | | | |

# COUNTRY CLUB ESTATES
# FM TO 3 PARTNERS PUMP STATION

TOWN OF POUGHKEEPSIE — DUTCHESS COUNTY, NY

| DATE | SCALE | | FILE No. |
|---|---|---|---|
| 06 / 26 / 14 | 1"=200' | DESIGNED BY: MAL<br>DRAWN BY: MAL<br>CHECKED BY: PDS | 213405.21 |

## CONCEPTUAL IMPROVEMENT PLAN

DWG 1-1

# APPENDIX C

## COUNTRY CLUB ESTATES
## MA # 213405.21
## FORCE MAIN TO 3 PARTNERS PUMP STATION
## COST ESTIMATE GRAVITY TO EX CASING, EXTEND RAMADA FORCE MAIN

DECOMISSION EX SEWAGE TREATMENT PLANT

| ITEM | UNIT | UNIT $ | QTY | EXT $ | | |
|---|---|---|---|---|---|---|
| DEMO EX BLDG | CY | $ 233.00 | 50 | $ 11,650.00 | | |
| FILL FILTER TANKS | CY | $ 20.00 | 1793 | $ 35,860.00 | | |
| FILL CL2 CHAMBER | CY | $ 20.00 | 1 | $ 20.00 | | |
| FILL AER. TANK | CY | $ 20.00 | 340 | $ 6,800.00 | | |
| FILL SETTLING TANKS | CY | $ 20.00 | 56 | $ 1,120.00 | | |
| FILL SLUDGE TANKS | CY | $ 20.00 | 58 | $ 1,160.00 | | |
| FILL DOSING TANK | CY | $ 20.00 | 44 | $ 880.00 | | |
| FILL EQ TANKS | CY | $ 20.00 | 50 | $ 1,000.00 | | |
| CONC FILL 7 MH | CY | $ 380.00 | 12 | $ 4,560.00 | | |
| PLUG EXISTING PIPES | L.S. | $ 5,300.00 | 1 | $ 5,300.00 | | |
| TOPSOIL SEED&MULCH | SY | $ 4.00 | 700 | $ 2,800.00 | | |
| REM EX EQUIPMENT | L.S. | $ 11,000.00 | 1 | $ 11,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **82,150.00** |

EXTEND RAMADA INN FORCE MAIN

| ITEM | UNIT | UNIT $ | QTY | EXT $ | | |
|---|---|---|---|---|---|---|
| INSTALL FM | LF | $ 76.00 | 1000 | $ 76,000.00 | | |
| UPGRADE PUMPS | LS | $ 5,000.00 | 1 | $ 5,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **81,000.00** |

NEW PUMP STATION

| ITEM | UNIT | UNIT $ | QTY | EXT $ | | |
|---|---|---|---|---|---|---|
| REM EX PUMP STA | LS | $ 4,500.00 | 1 | $ 4,500.00 | | |
| INST PUMPS, PIPE | LS | $ 26,000.00 | 1 | $ 26,000.00 | | |
| EL. GENERATOR & MOD | LS | $ 60,000.00 | 1 | $ 60,000.00 | | |
| EXC FOR WETWELL | CY | $ 23.24 | 50 | $ 1,162.00 | | |
| SHEET WETWELL | SF | $ 19.25 | 640 | $ 12,320.00 | | |
| INST WETWELL | VF | $ 400.00 | 20 | $ 8,000.00 | | |
| BOUYANCY PAD | CY | $ 380.00 | 6 | $ 2,280.00 | | |
| BACKFILL | CY | $ 57.00 | 26 | $ 1,482.00 | | |
| CONTROL EQUIPMENT | LS | $ 14,000.00 | 1 | $ 14,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **129,744.00** |

**COUNTRY CLUB ESTATES**

**MA # 213405.21**

**FORCE MAIN TO 3 PARTNERS PUMP STATION**

**COST ESTIMATE OPTION 3 GRAVITY TO EX CASING, EXTEND RAMADA FORCE MAIN**

INSTALL GRAVITY MAIN

| ITEM | UNIT | UNIT $ | QTY | EXT $ | | |
|---|---|---|---|---|---|---|
| 8" GRAVITY & MH | LF | $ 153.24 | 1390 | $ 213,003.60 | | |
| | | | | **TOTAL EST COST** | **$** | **213,003.60** |

CROSSING THROUGH EXISTING CASING

| ITEM | UNIT | UNIT $ | QTY | EXT $ | | |
|---|---|---|---|---|---|---|
| MATERIALS | LS | $ 10,000.00 | 1 | $ 10,000.00 | | |
| LABOR | LS | $ 11,000.00 | 1 | $ 11,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **21,000.00** |

INSTALL AERIAL CROSSING

| ITEM | UNIT | UNIT $ | QTY | EXT $ | | |
|---|---|---|---|---|---|---|
| FORCE MAIN TO EX MH | LF | $ 76.00 | 200 | $ 15,200.00 | | |
| INSTALL CROSSING | LS | $ 20,000.00 | 1 | $ 20,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **35,200.00** |

CONNECT TO EXISTING MANHOLE

| | | | | | | |
|---|---|---|---|---|---|---|
| CORE EXISTING MH | LS | $ 5,000.00 | 1 | $ 5,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **5,000.00** |

MODIFY EXISTING EQUALIZATION TANK

| | | | | | | |
|---|---|---|---|---|---|---|
| REV EX PIPE & EQ | LS | $ 9,000.00 | 1 | $ 9,000.00 | | |
| F&I PIPE AND DIFFUSERS | LS | $ 31,000.00 | 1 | $ 31,000.00 | | |
| | | | | **TOTAL EST COST** | **$** | **40,000.00** |
| | | | | ***TOTAL CONST COST*** | **$** | **607,097.60** |
| | | | | **5% CONTINGENCY** | **$** | **30,354.88** |

| | | |
|---|---|---|
| ***TOTAL CONST COST*** | **$** | **637,452.48** |
| ***DMINISTRATIVE, LEGAL, ENGINEERING & FINANCING*** | **$** | **212,000.00** |
| ***EASEMENT ACQUISITION*** | **$** | **20,000.00** |
| ***MP&R, EASEMENT APPRAISAL, SEQR*** | **$** | **22,000.00** |
| ***ARLINGTON CAPITAL BUY IN*** | **$** | **555,000.00** |
| ***TOTAL PROJECT COST*** | **$** | **1,446,452.48** |
| ***SAY*** | **$** | **1,450,000** |

# APPENDIX D

TABLE 6-3

# Country Club Estates Sewer District : Connection to Arlington WWTF

Bond Costs

Interest Rate 4.00%

20 Year Repayment

Financed Amount $1,450,000

| Year | Payment | Interest | Principal Paid | Principal Remaining |
|---|---|---|---|---|
| 1 | $106,694 | $58,000 | $48,694 | $1,401,306 |
| 2 | $106,694 | $56,052 | $50,641 | $1,350,665 |
| 3 | $106,694 | $54,027 | $52,667 | $1,297,998 |
| 4 | $106,694 | $51,920 | $54,774 | $1,243,225 |
| 5 | $106,694 | $49,729 | $56,965 | $1,186,260 |
| 6 | $106,694 | $47,450 | $59,243 | $1,127,017 |
| 7 | $106,694 | $45,081 | $61,613 | $1,065,404 |
| 8 | $106,694 | $42,616 | $64,077 | $1,001,327 |
| 9 | $106,694 | $40,053 | $66,640 | $934,686 |
| 10 | $106,694 | $37,387 | $69,306 | $865,380 |
| 11 | $106,694 | $34,615 | $72,078 | $793,302 |
| 12 | $106,694 | $31,732 | $74,961 | $718,340 |
| 13 | $106,694 | $28,734 | $77,960 | $640,380 |
| 14 | $106,694 | $25,615 | $81,078 | $559,302 |
| 15 | $106,694 | $22,372 | $84,321 | $474,981 |
| 16 | $106,694 | $18,999 | $87,694 | $387,286 |
| 17 | $106,694 | $15,491 | $91,202 | $296,084 |
| 18 | $106,694 | $11,843 | $94,850 | $201,234 |
| 19 | $106,694 | $8,049 | $98,644 | $102,590 |
| 20 | $106,694 | $4,104 | $102,590 | ($0) |

TABLE 6-4

# Country Club Estates Sewer District : Connection to Arlington WWTF

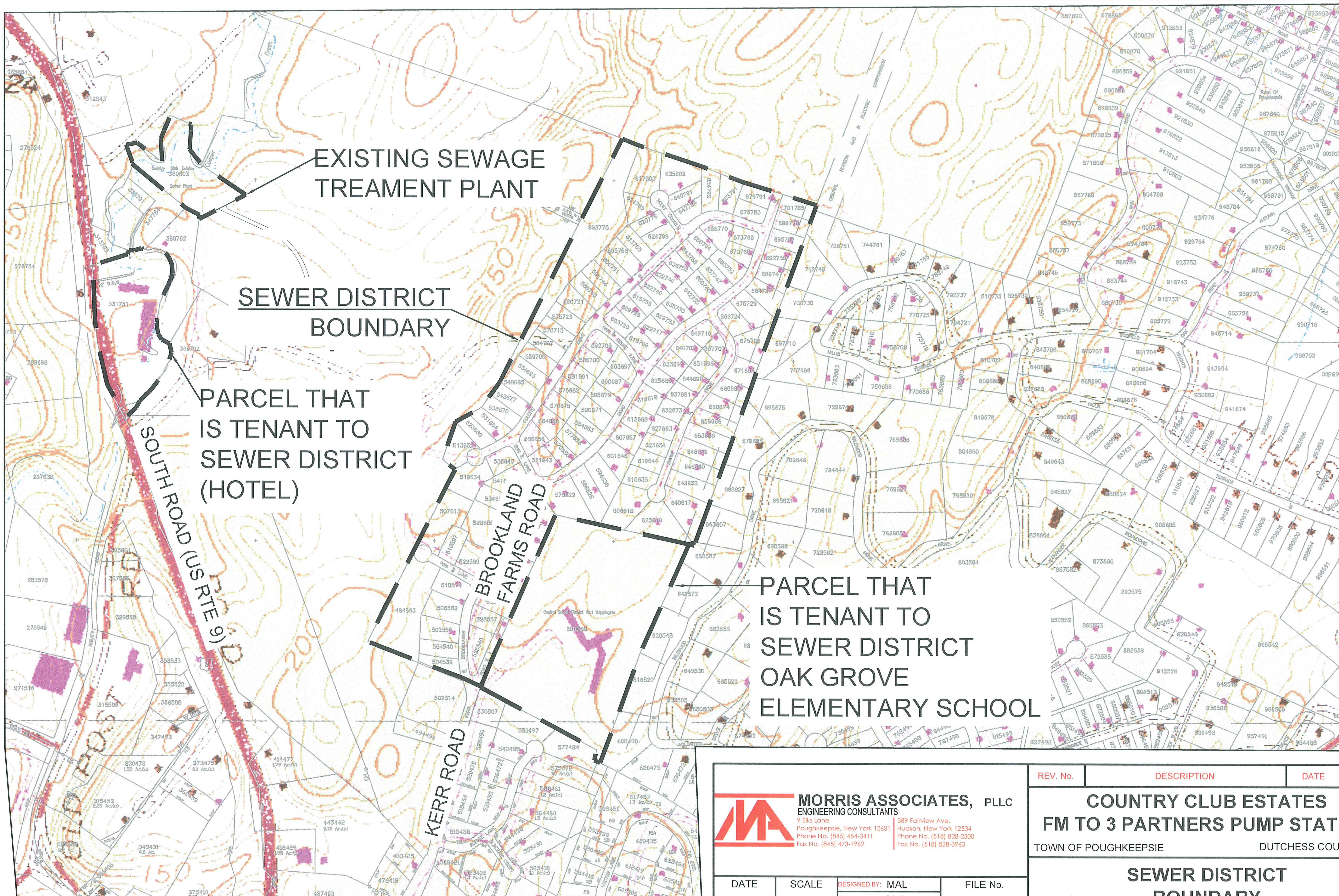
Bond Costs

Interest Rate 4.00%

30 Year Repayment

Financed Amount $1,450,000

| Year | Payment | Interest | Principal Paid | Principal Remaining |
|---|---|---|---|---|
| 1 | $83,854 | $58,000 | $25,854 | $1,424,146 |
| 2 | $83,854 | $56,966 | $26,888 | $1,397,259 |
| 3 | $83,854 | $55,890 | $27,963 | $1,369,295 |
| 4 | $83,854 | $54,772 | $29,082 | $1,340,213 |
| 5 | $83,854 | $53,609 | $30,245 | $1,309,968 |
| 6 | $83,854 | $52,399 | $31,455 | $1,278,513 |
| 7 | $83,854 | $51,141 | $32,713 | $1,245,800 |
| 8 | $83,854 | $49,832 | $34,022 | $1,211,779 |
| 9 | $83,854 | $48,471 | $35,382 | $1,176,396 |
| 10 | $83,854 | $47,056 | $36,798 | $1,139,598 |
| 11 | $83,854 | $45,584 | $38,270 | $1,101,329 |
| 12 | $83,854 | $44,053 | $39,800 | $1,061,528 |
| 13 | $83,854 | $42,461 | $41,393 | $1,020,136 |
| 14 | $83,854 | $40,805 | $43,048 | $977,087 |
| 15 | $83,854 | $39,083 | $44,770 | $932,317 |
| 16 | $83,854 | $37,293 | $46,561 | $885,756 |
| 17 | $83,854 | $35,430 | $48,423 | $837,333 |
| 18 | $83,854 | $33,493 | $50,360 | $786,973 |
| 19 | $83,854 | $31,479 | $52,375 | $734,598 |
| 20 | $83,854 | $29,384 | $54,470 | $680,128 |
| 21 | $83,854 | $27,205 | $56,649 | $623,480 |
| 22 | $83,854 | $24,939 | $58,914 | $564,565 |
| 23 | $83,854 | $22,583 | $61,271 | $503,294 |
| 24 | $83,854 | $20,132 | $63,722 | $439,572 |
| 25 | $83,854 | $17,583 | $66,271 | $373,302 |
| 26 | $83,854 | $14,932 | $68,922 | $304,380 |
| 27 | $83,854 | $12,175 | $71,678 | $232,701 |
| 28 | $83,854 | $9,308 | $74,546 | $158,156 |
| 29 | $83,854 | $6,326 | $77,527 | $80,629 |
| 30 | $83,854 | $3,225 | $80,629 | $0 |




MORRIS ASSOCIATES, PLLC
ENGINEERING CONSULTANTS
9 Elks Lane, Poughkeepsie, New York 12601, Phone No. (845) 454-3411, Fax No. (845) 473-1962
389 Fairview Ave., Hudson, New York 12534, Phone No. (518) 828-2300, Fax No. (518) 828-3963

| REV. No. | DESCRIPTION | DATE | BY |
|---|---|---|---|

# COUNTRY CLUB ESTATES FM TO 3 PARTNERS PUMP STATION

TOWN OF POUGHKEEPSIE — DUTCHESS COUNTY, NY

## SEWER DISTRICT BOUNDARY

| DATE | SCALE | | | FILE No. |
|---|---|---|---|---|
| 01 / 16 / 14 | 1"=500' | DESIGNED BY: | MAL | 213405.21 |
| | | DRAWN BY: | MAL | |
| | | CHECKED BY: | PDS | |

DWG 1-1