City of Venice
Eastside Water Reclamation Facility

Final Lake Filtration System Alternatives Evaluation Report

March 2013

McKIM&CREED

Lake Filtration System Alternatives Evaluation Report

prepared for

City of Venice

March 2013

Prepared By:

McKIM&CREED

378 Interstate Court
Sarasota, FL 34240
(941) 379-3404

Blake Peters, PE Date
Florida Licensed Professional Engineer
No. 64429

City of Venice Eastside Water Reclamation Facility

Lake Filtration System Alternatives Evaluation Report

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF FIGURES

APPENDICES

EXECUTIVE SUMMARY

The City of Venice owns and operates the 6 million gallons per day (mgd), 3-Month Average Daily Flow (MADF), Eastside Water Reclamation Facility (WRF) to treat wastewater from the City's collection system and to provide reclaimed water to reclaimed customers. During periods of low reclaimed water demand from customers and high reclaimed water production from the reclamation facility, the excess water is stored in the 3 million gallon (MG) ground storage tank and the 35 MG lined storage lake. Additional storage will be provided in the future 7.5 MG ground storage tank. The water in the ground storage tanks are readily available to meet demands from reclaimed water customers when demands exceed reclaimed water production.

When the water in the tanks is exhausted, the City must return water from the storage lake to meet those demands. The water returned from the storage lake may contain algae, sand, sticks, duckweed and other debris that necessitates retreating the water to improve suitability for reclaimed water use. The existing roughing filters serve as a lake filtration system for the storage lake, but are inadequate for this application given the size and quantity of algae that may be returned from the storage lake during certain periods of the year. Corrective recommendations are as follows:

1. Remove the existing roughing filter system and replace with a gravity disk filter system, Nova Water Technologies Ultrascreen® Microfilter or an approved equal, with a peak capacity of 2 mgd and a 25 micron mesh stainless steel media. The filter manufacturer shall have reasonably demonstrated the ability to successfully remove algae, sand and other contaminates at design size and flow. A preliminary opinion of project cost for the Nova filter installation is provided in Table ES-1.

2. The existing pumps will need to be replaced with larger pumps to meet the design flow of 2 mgd. The existing electric service to the station appears to be adequate to support the larger pumps but a new control panel is recommended.

3. Remove and replace approximately 700 linear feet of existing 8-inch lake water return pipe and upsize to 12-inch diameter to feed the gravity filter system.

4. Install a transfer pump station downstream of the gravity disk filter to pump the filtered lake water into the common header of the ground storage tanks or directly into the future 7.5 MG ground storage tank (GST). A pressure sustaining valve downstream of the pump station will maintain constant head conditions for adequate filter backwashing.

5. Install a new backwash pump station with a 4-inch force main to pump backwash waste water to the plant drain pump station or the WAS line to the sludge storage.

6. Install a chlorine trimming system with a dedicated pump skid (1 duty, 1 standby), chlorine analyzer, injection vault and piping system to provide chlorine disinfection, trim and residual required to maintain the integrity of the reclaimed water system.

7. Install piping, valves, structures, electrical service, panels and all other appurtenances required to provide a fully functional and complete system with appropriate provisions to allow the expansion of the system should the City so choose.

Table ES-1: Lake Filtration Project Costs

Item	Description	Amount
1	Civil	$ 34,000
2	Mechanical	$ 389,000
3	Structural	$ 7,000
4	Supporting Infrastructure	$ 354,000
5	Electrical	$ 83,000
6	Instrumentation	$ 82,000
	Construction Subtotal	**$ 949,000**
7	30% Contingency	$ 285,000
	Construction Total	**$ 1,234,000**
8	Engineering & CEI	$ 309,000[1]
	Project Total	**$ 1,543,000**

1. Engineering & CEI services based on 25% of construction cost with limited site observation.

1.0 INTRODUCTION

1.1 Facility Background

The Eastside WRF is owned and operated by the City of Venice. The facility is located at 3510 East Laurel Road in Venice, Florida. The existing site plan is shown in **Figure 1-1**. All wastewater flow from the City's wastewater collection service area is received and treated at the Eastside WRF under Florida Department of Environmental Protection (FDEP) permit No. FL0041441. The current permit provides for a capacity to treat 6.0 mgd based on a 3-MADF. Sarasota County owns 3.0 mgd of the Eastside WRF's treatment capacity and sends flow to the plant on an as needed basis.

The Eastside WRF was put in to service July of 1992 and expanded in 2001. The expanded facility consists of preliminary treatment followed by dual train five-stage Bardenpho biological process, four secondary clarifiers, three dual media automatic backwash (ABW) traveling bridge filters, and three chlorine contact chambers fitted with a sodium hypochlorite disinfection system and the option to provide aeration in the event surface water discharge is necessary. Sludge is processed by four aerated holding tanks and dewatered using two belt filter presses prior to being transported by contract haulers for stabilization and final disposal. A process flow schematic is provided in **Figure 1-2**.

Reclaimed water is stored in either a 3 million gallon (MG) ground storage tank or a 35 MG membrane lined storage lake prior to discharge into the reclaimed water distribution system, surface water, or deep injection well. Effluent that does not meet permit limits is diverted to a 6 MG clay-lined reject pond where it can be returned to the plant lift station via gravity. A 7.5 MG ground storage tank is currently in design and is proposed to be constructed adjacent to the existing ground storage tank.

NORTH

300' 0 300' 600'

SCALE: 1"=300' (Horiz.)

RECLAIMED WATER STORAGE LAKE
(35 MG)

LAKE RETURN
PUMP STATION

STORMWATER RETENTION POND

REJECT POND
(6.0 MG)

ADMIN. BUILDING

5 STAGE BARDENPHO
BIOLOGICAL PROCESS

SECONDARY CLARIFICATION

SLUDGE THICKENING
AND DEWATERING
BUILDING

DRYING BEDS

PRELIMINARY TREATMENT

NORTH

80' 0 80' 160'

SCALE: 1"=80' (Horiz.)

SODIUM
HYPOCHLORITE
BUILDING

ABW FILTERS

CHLORINE CONTACT
BASIN

OPERATIONS BUILDING

PLANT WATER

TRANSFER PUMPING

EXISTING LAKE
FILTERS

HIGH SERVICE PUMP
STATION

REUSE GROUND STORAGE TANK
(3.0 MG)

FUTURE REUSE GROUND STORAGE TANK
(7.5 MG)

McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice
City on the Gulf

CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES
EVALUATION REPORT

EASTSIDE WRF EXISTING SITE PLAN

MARCH 2013

1-1

S:\5883\0001\80-Drawings\Current Figure Drawings\Figure 1-1.dwg, 3/7/2013 8:32:41 AM, Quint Shelton

WASTEWATER INFLUENT

INFLUENT MAGNETIC FLOW METER

FE FLW-01

MECHANICAL BAR SCREEN (2)

BYPASS MANUAL BAR SCREEN (1)

GRIT REMOVAL

GRIT REMOVAL

FE RAS

REJECT WATER FROM STORAGE PONDS

PLANT LIFT STATION

RECLAIMED WATER STORAGE LAKE

FILTER BACKWASH

FILTRATE/DECANT FROM PLANT RESIDUALS PROCESSING AND DISPOSAL FACILITIES

FERMENTATION TANKS (2) 60,000 GAL EACH

FIRST ANOXIC TANKS (2) 6,000 GAL EACH

RECIRCULATE

FE WAS

FIRST ANOXIC TANKS (2) 215,000 GAL EACH

AERATION TANKS (2) 1,310,000 GAL EACH

IR PUMPS

RAS/WAS PUMP STATION

SODIUM HYPOCHLORITE

RAS/WAS

SODIUM HYPOCHLORITE

SODIUM HYPOCHLORITE

RAS/WAS

SCUM TO PLANT LIFT STATION

SECONDARY CLARIFIERS 595,000 GAL EACH

SCUM TO PLANT LIFT STATION

SECOND ANOXIC TANKS (2) 250,000 GAL EACH

REAERATION TANKS (2) 50,000 GAL EACH

ALUM

FROM RECLAIMED WATER STORAGE LAKE

EFFLUENT MANAGEMENT AND RECYCLE SYSTEM

STORAGE LAKE EFFLUENT RECYCLE PUMPS

TO PLANT LIFT STATION

RECIRCULATE

RECLAIMED WATER STORAGE LAKE

TO REAERATION TANK

FE

PLANT WATER

TO PLANT LIFT STATION

EFFLUENT TRANSFER PUMP STATION

REJECT STORAGE POND 6 MG

CCC BASIN 3 83,000 GAL

CCC BASINS 1 & 2 42,000 GAL EACH

SODIUM HYPOCHLORITE

RECLAIMED WATER HIGH SERVICE PUMPS

INTRACOASTAL

DECHLOR

FE

EXISTING LAKE FILTERS

REUSE GROUND STORAGE TANK (3 MG)

FE

CITY OF VENICE RECLAIMED WATER DISTRIBUTION SYSTEM

AUTOMATIC BACKWASH FILTERS 1,056 SF EACH

FILTER BACKWASH TO PLANT DRAIN

FUTURE REUSE GROUND STORAGE TANK (7.5 MG)

FE

FE

DECHLOR

SURFACE WATER DISCHARGE

SARASOTA COUNTY RECLAIMED WATER DISTRIBUTION SYSTEM AND DEEP INJECTION WELL

RESIDUAL PROCESS SCHEMATIC

DECANT TO PLANT LIFT STATION

BELT FILTER PRESSES (2)

TO OFFSITE BIOSOLIDS TREATMENT FACILITY

WASTE SLUDGE FROM RAS/WAS PUMP STATION

FE

AERATED SLUDGE HOLDING TANKS (4) 120,000 GAL EACH

FILTRATE TO PLANT LIFT STATION

McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice City on the Gulf

CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES EVALUATION REPORT

EASTSIDE WRF EXISTING FLOW SCHEMATIC

MARCH 2013

1-2

The Eastside WRF has four main methods of disposal for treated effluent, which includes surface water discharge to Curry Creek (3 mgd), reuse system land application (3 mgd City of Venice System, 2.5 mgd Sarasota County South Master Reuse System), internal outfall (1 mgd) – Venice reverse osmosis concentrate disposal system, and Sarasota County deep injection well at Venice Gardens WRF.

1.2 Project Description

Reclaimed water returned from the 35 MG storage lake is sent either to the plant drain pump station, lake roughing filters or reaeration tank for further processing in order to reduce the potential of clogging sprinkler heads within the reclaimed water distribution system due to algae. Previous attempts to bypass the biological process and return the lake water to the roughing filters and subsequently the ABW filter and chlorine contact basin has resulted in elevated turbidity levels which increases the risk of triggering a reject event. The City has noted that retreated lake water causes a green hue in the chlorine contact basins, even when processed through the entire plant. This report evaluates three lake filtration systems to support the return of stored reclaimed water from the storage lake to meet customer demands.

2.0 EXISTING CONDITIONS

2.1 Permit Requirements

The Eastside WRF Operating Permit #FL0041441 (provided in **Appendix C**), specifies reclaimed water effluent limitations and monitoring requirements as defined by FDEP rules in FAC 62-610 Part III. These limitations are based on compliance monitoring points prior to the water entering the reclaimed water system or storage lake.

Once the reclaimed water has met the effluent limits set by the operating permit and is in the storage lake, there are no regulatory requirements to retreat or to monitor the quality of the water discharged from the lakes and returned into the reclaimed water system. An exception to this is the permit monitoring requirements for effluent discharged to Curry Creek. The blended lake and plant effluent water quality at the surface water discharge is subject to the monitored parameters at the point of discharge outlined in the operating permit.

The addition of screening to remove solids and chlorine to prevent algal growth in the distribution system are a matter of best management practices and are recommended to prevent clogging of irrigation sprinkler heads within the distribution system, reduce system maintenance and operating costs, improve system reliability and minimize customer complaints. Effluent leaving the plant that does not meet Part III requirements must be sent to the reject lake for storage and future retreatment through the plant.

The reclaimed water samples for compliance monitoring are collected after filtration, prior to disinfection and prior to dechlorination for surface water discharge. The parameters monitored for public access reclaimed water and surface water discharge per the permit are shown in **Table 2-1** and **Table 2-2,** respectively.

Table 2-1: Public Access Reclaimed Water Limits
(Venice RWS and Sarasota South RWS)

Parameter	Units	Max/Min	Limit
BOD, Carbonaceous, 5	mg/l, annual	Max	20
Total Suspended	mg/l, single sample	Max	5
Nitrogen	mg/l, single sample	Max	Report
Phosphorus, Total P	mg/l, single sample	Max	Report
pH	mg/l, single sample	Min-Max	6.0 – 8.5
Coliform, Fecal	mg/l, single sample	Max	25
Total Chlorine	mg/l, single sample	Min	1.0
Turbidity	NTU, single sample	Max	Report

Table 2-2: Surface Water Discharge Water Limits
(Internal Outfall and Surface Water Discharge)

Parameter	Units	Max/Min	Limit
BOD, Carbonaceous, 5	mg/l, annual	Max	5
Total Suspended Solids	mg/l, annual	Max	5
Nitrogen	mg/l, annual	Max	3
Phosphorus, Total P	mg/l, annual	Max	1
pH	mg/l, single sample	Min-Max	6.0 – 8.5
Nitrogen, Total as N*	lbs/yr, annual total	Max	6,370
Coliform, Fecal	mg/l, single sample	Max	25
Total Chlorine Residual*	mg/l, single sample	Min	1.0
Oxygen, Dissolved (DO)*	mg/l, single sample	Min	7
Dichlorobromomethane*	µg/l, annual average	Max	22
Dibromochloromethane*	µg/l, annual average	Max	34
Acute Whole Effluent Toxicity*	Percent, single sample	Min	100

*Monitored at EFD-01 (prior to discharge to surface waters).

2.2 Reclaimed Water Storage Lake

The Eastside WRF has an onsite 35 MG lined storage lake as shown in **Figure 1-1**. The storage lake area, depth, and operating volume are 11 acres, 9.2 feet, and 35 MG, respectively. The storage lake is utilized to store reclaimed water during extended periods of wet weather or any other circumstance when influent flows are in excess of reuse demands. The water level of the lake varies during the year

and is highest during the wet weather season when rainfall is high and reclaimed water demand is low. During the dry season, the opposite condition generally exists with low lake water levels, low rainfall and high reclaimed water demand.

A low head transfer pump station routes flow from the chlorine contact basins to the reclaimed water ground storage tank, reject lake, or reclaimed water storage lake. The flow destination is controlled by automated isolation valves along a 20-inch pipeline from the transfer pump station to the storage locations.

2.3 Lake Return Pump Station

The storage lake has a lake return pump station consisting of a 20-inch ductile iron pipe intake with the invert set 2 feet above the bottom of the lake. The elevation of the intake pipe is the basis for the available 35 MG of operating storage volume of the lake based on review of the 2001 expansion record drawings. The intake pipe hydraulically connects the storage lake to the 6-ft diameter wet well. One 15 hp Hydromatic pump (model S4M) and one 3 hp Hydromatic pump (model S4N) transfers flow to the plant and is adequate for current operations. A summary of the WRF effluent pumps including the lake return pump station is shown in **Table 2-3**. Flow from the 15 hp pump is currently throttled to reduce the flow rate to approximately 500 gpm. Without throttling the 15 hp pump would likely operate on the far right side of its curve in excess of 900 gpm. The flow from the lake return pump station is metered. The existing lake return pump station is shown in **Figure 2-1**.

The pump station is equipped with a 10-inch discharge pipe. The 10-inch pipe continues west towards the plant and becomes downsized to an 8-inch pipe as it turns north and approaches the west end of the plant. The pipe then manifolds and continues to either the lake roughing filters, reaeration basins, or the plant lift station.

Figure 2-1: Lake Return Pump Station

Table 2-3: Effluent Pumping Major Equipment Summary

Unit	Qty	Mfg	Model	Flow (gpm/each)[2]	Head (ft)	Year	Life Exp (years)
RCW HSPS Pumps	4	Ingersoll-Dresser	8LR14A	2,780	150	2002	20
Plant Water Pumps[1]	2	Layne & Bowler	N/A	1,200	54	1990	20
Effluent Transfer Pumps	3	Ingersoll-Dresser	18 ENH-1	4,200	54	2002	20
Lake Return PS Pumps	1	Hydromatic	S4M	500[3]	49	2002	20
	1	Hydromatic	S4N	335	24	2002	20

1. Since installation, one pump has been rebuilt and one pump has been replaced approximately 6 to 7 years ago as reported by plant staff.
2. Capacity is for each pump.
3. Pump rate is a throttled flow.

2.4 Lake Roughing Filters

During storage of reclaimed water in the 35 MG lake, there is the potential to develop algal growth and plant life, as well as, the addition of debris like sticks, leaves, and sediment, due to wild life and weather. The roughing filters were installed between the lake return pump station and the ABW filters to remove these undesirable materials inadvertently returned from the lake.

The existing roughing filtration system consists of one Everfilt STAKfilter unit containing six self-contained 42.3-inch wedge-wire screens rated for a maximum flow capacity of 800 gpm or 1.2 mgd. The unit is preassembled and skid mounted. The filter unit is Model STK 63-30-6A with 200 mesh (75 micron) stainless steel screens. The filter stack is shown in **Figure 2-2**. 75 micron is smallest removal size available for the Everfilt STAKfilter.

The filter has an operating range of 25-125 psi. The backwash cycle for the filter may be activated by differential pressure between the filter stack inlet and the outlet as well as a timer. The filter requires a backwash for 15 to 30 seconds at a minimum pressure of 25 psi created by the lake return pump. Each screen is backwashed sequentially once the backwash cycle is triggered. A three-way valve closes the inlet, opens a drain pipe and allows water within the filter discharge manifold to reverse flow and backwash the filter.

Currently, the filter is not used because of high turbidity in the plant effluent when lake water was sent through the roughing filter and into the ABW filters. The reported problems associated with backwashing appear to be due to inadequate system pressure at the roughing filter based on review of the installed pumps at the lake return pump station and lack of a pressure sustaining valve prior to discharge into the ABW filter. Given these operational and performance issues it is current practice to run lake water to the plant lift station

and back through the plant. The turbidity levels are still elevated from normal operating conditions, but do not exceed the compliance limit.

Figure 2-2: Everfilt Filter Stack

The Everfilt STAKfilter system is a technology more appropriate in an agricultural application. The 75 micron mesh size will not remove the bulk of the blue-green algae that grows in RCW storage lake and creates issues for WRF operations and micro-irrigations systems.

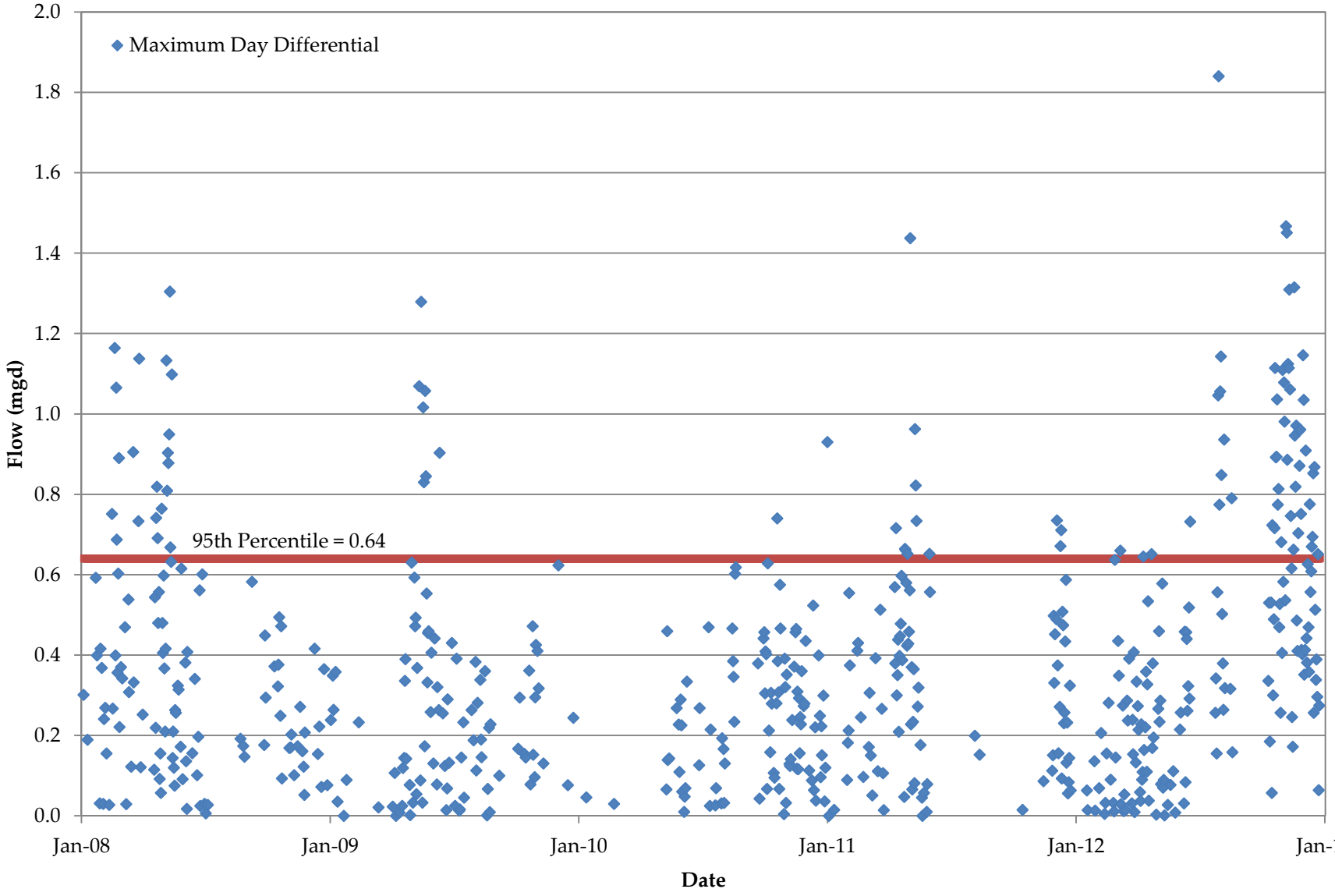
3.0 EQUIPMENT REQUIREMENTS

3.1 Existing Peak Flow

The Eastside WRF historical influent and effluent flows were reviewed in order to determine the maximum design flow rate of reclaimed water withdrawal from the 35 MG storage lake. The design flow rate was used to size the lake filter equipment and supporting infrastructure discussed in **Section 5**. First, peak hour flows were evaluated by calculating the differential in the Eastside WRF influent and effluent flow using hourly SCADA data from March 2010 through March 2011. This was the most recent SCADA data collected during the wastewater master planning effort. To eliminate data outliers, the 95th percentile of the peak hour flow was used to establish a maximum hour differential of 6.71 mgd. The volume of reclaimed water associated with the 95th percentile peak hour flow rate was calculated as approximately 1.5 MG. This volume is associated with daily diurnal flows which were assumed to be accounted for by available storage within the 3 MG reclaimed water ground storage tank and the future 7.5 MG ground storage tank, currently under design. Reclaimed water from the 35 MG storage lake was therefore determined to not be necessary to meet peak hour flows during a single day event.

Second, the maximum day flows were examined by calculating the differential between average daily flows during the period of January 2008 through December 2012 using a similar methodology as the peak hour flow evaluation. This was the most recent data available from the facility's DMRs. This evaluation produced a 95th percentile maximum day differential of 0.64 mgd. Maximum day flows were assumed to have the potential to last several days and require reclaimed water from the storage lake. **Figure 3-1** shows a scatter graph of the maximum day differentials.

Figure 3-1
95th Percentile Maximum Day Differential



3.2 Future Peak Flow

In order to determine the required filter capacity in 2030, the maximum day differential was projected into the future in five year increments by comparing the differential between the projected reclaimed water demands and wastewater generation established in the Reclaimed Water Master Plan prepared by McKim & Creed dated October 2012. The demand projections for reclaimed water were understood to be from Scenario 2 of the Reclaimed Water Master Plan, which assumed the City will continue to treat wastewater flow from Sarasota County. Scenario 2 projects that reclaimed water demand will generally increase at a rate faster than wastewater generation as shown in **Table 3-1**. In the year 2015 the projected reclaimed water demand increases by 63% from year 2010 and the wastewater generation increases by 51%.

Table 3-1: Projection Percentages

Year	% Increase in RCW Demand	% Increase in WW Generation
2015	63%	51%
2020	11%	14%
2025	13%	11%
2030	9%	7%

In order to determine the reclaimed water demand and wastewater generation flows to base the projections on, specific days with flow differentials of 0.64 mgd (maximum day 95th percentile) were examined. March 1, 2012 was selected since it had a maximum day differential of 0.64 mgd and was based on the largest corresponding wastewater generation and reclaimed water demands of 3.04 mgd and 3.68 mgd respectively. The percentages from **Table 3-1** were applied to the March 1, 2012 flows along with a 15% safety factor to calculate the flow differential for each planning period and arrive at the projected demands from the lake. The lake demand is projected to be 1.50 mgd by 2015 and 2.08 mgd by

2030, as shown in **Table 3-2**. Based on the flow projections, the maximum flow of 2.0 mgd was selected as the filter maximum flow rate.

Table 3-2: 95th Percentile Projected Maximum Day Differential

Year	WW Generation (mgd)	RCW Demand (mgd)	Differential (mgd)	Increase in Differential (mgd)	Demand From Lake (mgd)[1]
2012	3.04	3.68	0.64	0.00	0.74
2015	4.59	6.00	1.40	0.76	1.50
2020	5.24	6.66	1.42	0.02	1.52
2025	5.81	7.52	1.71	0.29	1.81
2030	6.22	8.20	1.98	0.27	2.08

1. Includes a 15% contingency or safety factor.

3.3 Removal Requirements

Typically, solids larger than 200 microns must be removed in order to prevent clogging of residential irrigation systems. However, the City would like to accommodate micro-irrigation systems which have greater removal requirements. Manufacturers of micro-irrigation system components such as Toro and Netafim recommend a filtration removal of 74 microns to prevent bridging and subsequent clogging of micro-irrigation systems. This filtration criterion is also recommended for micro-irrigation systems in the University of Florida's IFAS Publications *AE57- Media Filters for Trickle Irrigation in Florida, AE61- Screen Filters in Trickle Irrigation Systems, AE65- Settling Basins for Trickle Irrigation in Florida, AE70- Principles of Micro Irrigation* and Oregon State University's Publication *EM 8782- Drip Irrigation: An Introduction*.

Florida sands typically range in size from 50 to 350 microns with a size distribution of 80% < 275 microns, 60% < 200 microns and 25% < 150 microns and 10% < 75 microns. Abundant quantities of sand are commonly found in unlined storage pond water which are typical for reclaimed water storage at treatment

facilities in Florida, however, the Eastside WRF storage lake is lined and anticipated to contain a lower quantity of sands. As such, the removal requirements for the majority of sand being 50 microns would also be sufficient to remove the algae which may clog micro-irrigation systems in the City's reclaimed water system.

3.4 Algae Characteristics

Lake filter equipment performance was based the pilot testing conducted between July and August 2010 at he Manatee County SWWRF as discussed further in **Section 4.0**. In order to determine if the pilot test results are applicable to the algae within the City's storage lake, the algae characteristics were evaluated. The algae characteristics evaluated were algae ID, enumeration and particle size distribution.

3.4.1 Algae ID and Enumeration

To determine the algal conditions in the 35 MG storage lake, samples were collected on December 10, 2012 from the northwest corner of the lake, and the lake return pump station. Algae usually persists in the top two feet of water due to the higher water temperature at the surface and the ability of sunlight to travel through the water. The northwest corner sample was selected based on the abundance of algae visibly present at that location and the lack of visible algae on the lake surface at other locations. This sample was collected about elbow deep into the lake as recommended by the testing laboratory. The sample from the lake return pump station was assumed to be representative of the algae present at the lake inlet. The lake return pump station was run for several minutes to flush the inlet of algae and sediment that may have collected within the intake piping.

Algae tends to grow in warm conditions, therefore, the amount and type of algae present during the winter months may be different from those in the summer

due to variations of sustained temperature and sunlight. The weather before the sampling had an average temperature in the mid-seventies and was sunny. Therefore, the algae quantity during the summer months is anticipated to be higher than that sampled during this study.

The samples were sent to GreenWater Laboratories in Gainesville, FL tested for algae type and algae concentration. The identification showed that there is an abundance of blue-green algae or cyanobacteria, which was also found to be abundant in the Manatee County storage ponds directly to the north of the City of Venice. Manatee County has recently undergone a similar analysis of the algal content of their RCW storage ponds at each of three WRFs, with McKim & Creed as the Engineer-of-Record, and would be considered as being similar in the conditions that contribute to the algal growth. Due to differences in treatment process, the Manatee County ponds have a higher loading of phosphorous and nitrogen which would likely result in higher algae production than expected within the Eastside WRF storage lake.

Cyanobacteria exist in unicellular, colonial, and filamentous form. The identified dominate algal group within the samples was a colonial cyanophyte microcystis protocystis which is generally less than 10 microns. The most abundant and dominant algae for each sample is summarized in **Table 3-3** and **3-4**. The full report prepared by GreenWater Laboratories is provided in **Appendix D**.

Table 3-3: Algae Identification Summary

Sample - Northwest Corner of Lake			
Total Cell Count = 364,857 Cells/ml			
Most Abundant Algae		**Dominant Algae**	
Blue-Green *Cyanobacteria*		Colonial Cyanophyte *Microcystis Protocystic*	
Cell Count (cells/ml)	**% of Total Cells**	**Cell Count (cells/ml)**	**% of Most Abundant Cells**
323,294	88.60%	265,934	82.26%

Table 3-4: Algae Identification Summary

Sample - Lake Return Pump Station			
Total Cell Count = 654,424 Cells/ml			
Most Abundant Algae		**Dominant Algae**	
Blue-Green *Cyanobacteria*		Colonial Cyanophyte *Microcystis Protocystic*	
Cell Count (cells/ml)	**% of Total Cells**	**Cell Count (cells/ml)**	**% of Most Abundant Cells**
612,544	95.30%	595,328	97.19%

It was anticipated that the lake return pump station cell count would be less than the cell count in the northwest corner of the lake. This assumption was based on wind concentrating surface algae to the northwest corner of the lake during sampling versus a submerged inlet for the lake return pump station. The cell count for both samples was verified by GreenWater Laboratories. The reason for the higher lake return pump station cell count is unknown.

3.4.2 Particle Size Distribution Analysis

To determine the particle size and the distribution of particles in the 35 MG storage lake, two samples were collected on December 17, 2012 from the lake return pump station, and sent to the Nova Technologies laboratory in Tampa, FL to identify the particle size distribution. The samples were collected along the edge of the lake, elbow deep, at the northwest corner of the lake and vicinity of the lake inlet. The results are shown in **Table 3-5** and the complete report in **Appendix E**.

Table 3-5: Particle Size Distribution

Particle Size Range	Sample 1	Sample 2
	Particle Count/ml	Particle Count/ml
2 - 10um	2,665.3	2,727.2
10 - 20um	1,065.3	1,163.2
20 - 30um	159.0	171.8
30 - 40um	107.4	112.7
40 - 50um	52.3	55.5
50 - 60um	23.9	24.2
60 - 70um	25.6	26.6
70 - 80um	14.8	14.8
80 - 90um	9.2	9.9
90 - 100um	43.2	46.4
TOTAL	**4,166.0**	**4,352.2**

To determine the percentage of total particles that were less than 50 microns, the two samples were averaged. **Table 3-6** shows the percentage of particles in the City of Venice storage lake that were less than 50, 30, and 20 microns in comparison to the storage pond at the Manatee County SEWRF. In terms of particle size for both lakes, the majority of the particles are smaller than the filter mesh opening size. However, the volume of each particle was examined to determine the particle size based on volume.

Table 3-6: Particle Size Percentages

Location	Percentage of Particles		
	< 50 Microns	< 30 Microns	< 20 Microns
City of Venice	97.2%	93.3%	89.5%
Manatee County	100.0%	99.3%	97.1%

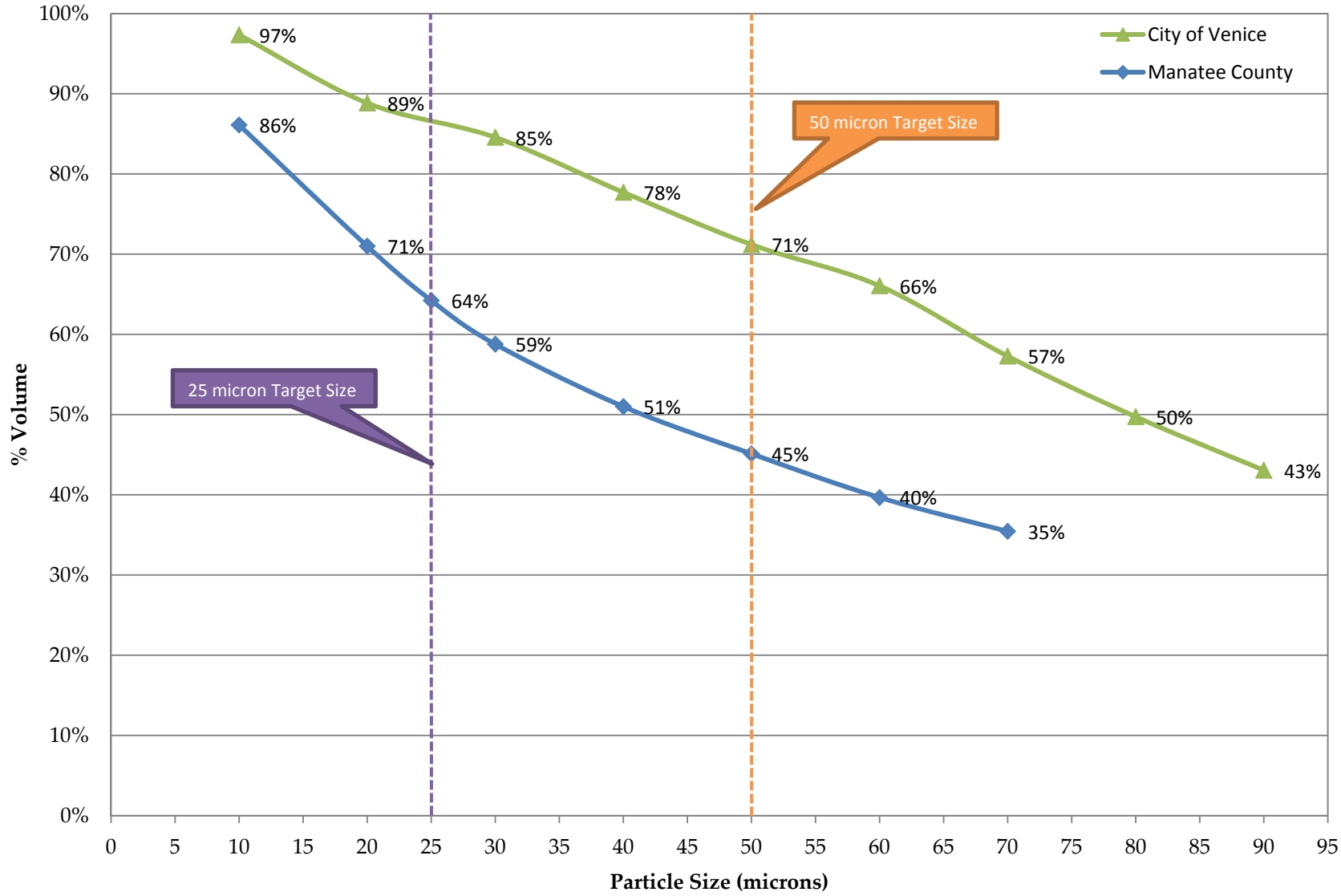
The volume of particles was calculated per milliliter assuming the particle size is the particle's diameter. The particle volume for each diameter was multiplied by

the corresponding particle count. The resulting volume by particle size was used to generate **Figure 3-2** which shows the volume of particles greater than the micron sizes of 10 to 90 for the City of Venice and 10 to 70 for Manatee County. This analysis illustrates the volume of particles that have the opportunity to be filtered based on the filter mesh size and sample results. For example, a 50 micron screen would have the opportunity to collect approximately 71% of the total particle volume from the City of Venice lake water and 45% of the particle volume from the Manatee County pond water.

The decrease in filter screen size from 50 to 25 microns for Manatee County showed an opportunity to collect 19% more particle volume. If the City of Venice decreased the filter screen size from 50 to 25 microns the increase in particles captured is 16%. Therefore, it is anticipated that the use of a 25 micron filter screen would give the City an opportunity to capture 87% of the particle volume within the Eastside WRF storage lake based on the samples. The increase in capture volume will increase the percentage of backwash, for example, the Nova disk filter pilot showed that backwash increased from 1% to 2% with the decrease in screen size.

Based on the Manatee County pilot study results to be discussed further in **Section 4**, algal enumerations and particle size distribution information presented above, 25 microns was selected as the minimum target particle removal size.

Figure 3- 2
% Volume Greater Than



4.0 FILTRATION TECHNOLOGY

The following three equipment selections were evaluated for filtration of the lake water:

- Salsnes Filter
- Nova Gravity Disk Filter
- Amiad ABW Strainer

The equipment was considered to be constructed in the location of the existing roughing filters and be supplied by the existing reclaimed water mains that return lake water from the lake return pump station to the northwest area of the plant. The discharge from the filters was evaluated to be tied into the influent pipeline to the ground storage tank or directly into the 7.5 MG tank. Unit redundancy for the lake filtration system components is not required by state regulations and not required by the City, therefore, it was not considered as a part of this analysis.

Research online and discussions with various filter equipment vendors did not reveal any new technology that should be considered in addition to the equipment listed above.

4.1 Salsnes Filter™

The Salsnes Filter™ is designed to provide primary treatment at wastewater treatment plants and other applications such as membrane pretreatment, food/dairy, fishing industry, pulp and paper, manure dewatering and tanneries. The Salsnes Filter™ removes solids by use of a continuously looped synthetic mesh screen that is offered in a compact and covered system providing a small footprint and odor containment. The mesh screen is available from 840 microns down to 30 microns. Solids are removed from the screen by use of an air knife and a periodic hot water wash which is activated to remove solids that may

adhere to the mesh. The screenings are collected in a hopper that feeds an auger press which dewaters the screenings to 25-40% solids.

A pilot study utilizing the Salsnes Filter™ was conducted at the Manatee County SWWRF from September 30, 2009 through October 7, 2009. During the pilot study, three mesh screen sizes were utilized (250, 90 & 55 micron) and samples were collected and analyzed. In summary, the mesh screen sizes utilized during the pilot did not remove significant amounts of solids until the 55 micron screen was used.

Based on the results of the pilot study and discussion with vendors, the Salsnes Filter™ is not anticipated to provide adequate removal of algae. With this type of filter the general rule of thumb is for 25% of the particles to be larger than filter mesh size. Based on the particle size distribution discussed in **Section 3.4.2** approximately 10% of the particles within the City of Venice storage lake are greater than 20 microns. The vendor of the Salsnes Filter therefore concluded that based on the algae particle size a proper mat will not form for effective algae removal. A similar technology, the Eco MAT™ was also examined and found to have the same limitation. The Salsnes and Eco MAT™ filters were therefore eliminated from further consideration in this report.

4.2 Nova Gravity Disk Filter

The Nova Water Technologies Ultrascreen® Microfilter is used for tertiary filtration and utilizes rotating stainless steel mesh screens. The microfilter uses dynamic tangential filtration with gravity providing the driving hydraulic head condition to remove solids from the water. This means that since the filter media is rotating, filtration occurs at an angle less than 90 degrees making the 15 to 25 micron mesh functionally smaller (similar to 10 microns) than when standing still. Continuous rotation presents a clean filtration surface for the incoming

flow at all times. Hydraulic loading rates may be as high as 16 GPM per square foot.

The biomass layer accumulates on the surface of the AISI 316 stainless steel mesh and strains out increasingly finer solids. When the influent level in the feed box rises to a preset depth, a level sensor actuates operation of the wash water pump. The back of the screen mesh is sprayed by low pressure water (20 to 60 psi) for a typical 5 to 10 second period. Each disk has a dedicated spray header for efficient washing. The waste wash water from each set of disks is collected in a common 304 stainless steel trough and exits the filter through a stainless steel drain. The backwash water volumes may be a low as 0.1 to 1.0 percent of the influent flow. Once the mesh is cleaned, the water level in the feed zone recedes to another pre-set level, where a second level sensor deactivates the wash water pump.

A second set of level sensors are used for turning the filter rotation on and off. At low level the filter disks rotation is stopped, and they are allowed to remain in a "filter ready" idle mode. Once flow resumes, the idle filter disks are energized to rotate and the normal filtration and wash cycles resume.

The fifth level sensor sends a signal to the control panel and/or SCADA system when an overflow situation occurs, and the filter has surpassed the peak hydraulic loading. A situation such as this may occur when there is a concentration of algae or influent flow rate in excess of the filter's design, foreign object, or there is a power failure.

The feed to the filter is introduced into the middle of each disk. Because each disk is split in two, the internals of the filter are easily accessible if service is required. The flow passes through the disks from the inside-out and the filtered water free-falls into the collection well and exits the outlet pipe. The periphery of each disk is sealed to the walls of the tank with long-lasting silicone rubber

seals which form a positive mechanical barrier and prevent the filtered effluent from mixing with the dirty influent.

Nova Water Technologies has proposed the Ultrascreen® Microfilter equipment for a 1.25 mgd average daily flow and 2.0 mgd maximum design flow with the following design data (see **Appendix G** for complete proposal):

- Number of Disks per Unit 8
- Area per Disk 22.0 ft²
- Total Area per Filter Unit 176 ft²
- Unit Loading Rate at 2.0 mgd 7.89 gpm/ft²
- Instantaneous Wash Water Demand 58 gpm
- Wash Water Pressure 60 psi maximum
- Total Wash Water as % of Feed Rate 0.5 to 1.0%
- Minimum Head Requirement, ft. 2.2

The Ultrascreen® Microfilter (model UL1604CS) units consist of the following equipment and materials:

- 316 SS tank (1 Unit)
- 316 SS filter disks
- Stainless steel covers with 2 handles per section
- 3 hp drive motor
- 5 hp backwash water pump
- Automatic sludge valve
- 125 LB ANSI flanges on all inlets/outlets
- 316 SS NEMA 4X control panel with HOA selector switches, starters, lights, alarms etc
- Level sensors (5 per unit)
- Required gauges and ball valves
- NEMA motors, UL controls

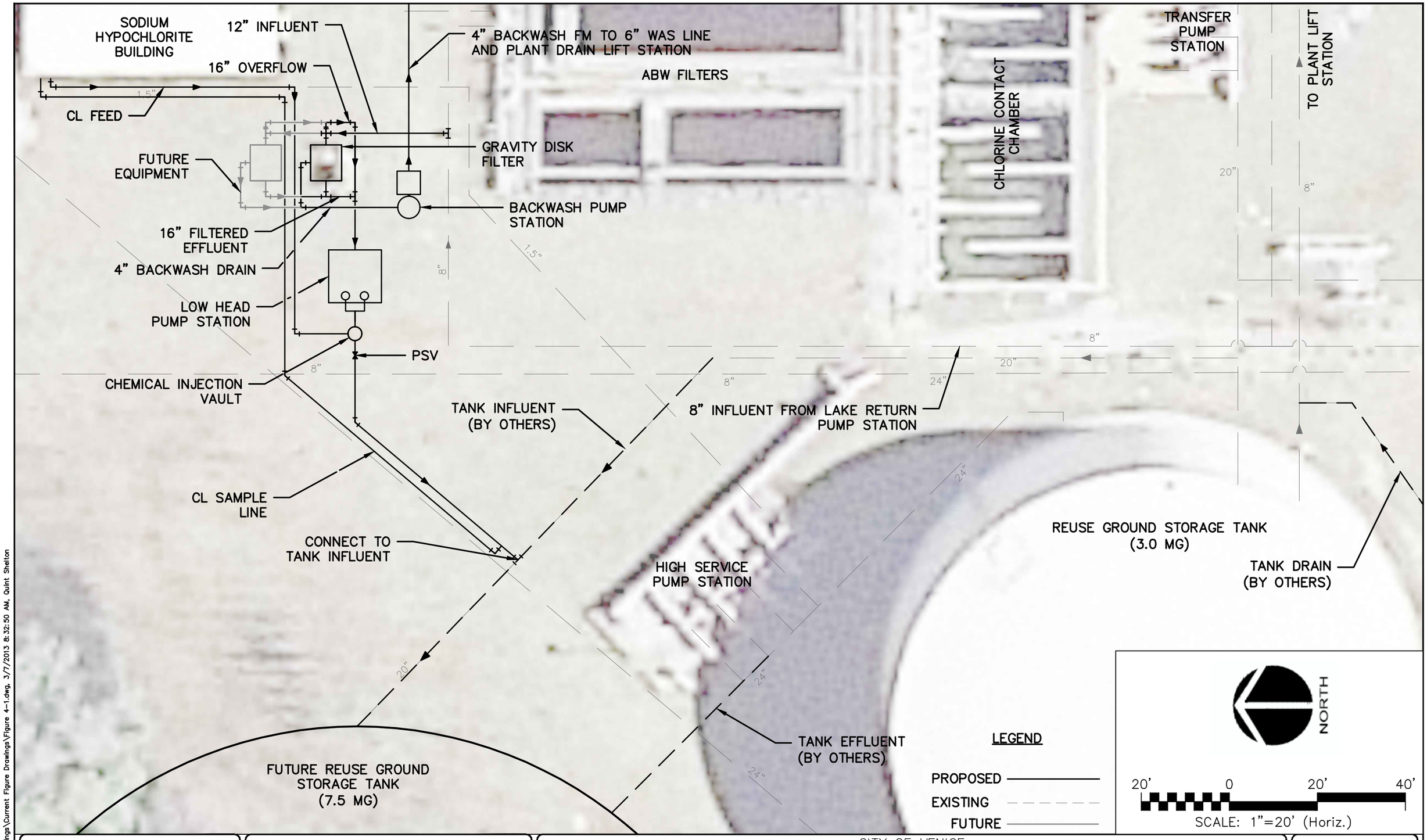
Each unit has a variable speed drive, with a range of 0 to 10 rpm, driven by one 3 hp drive. The UL1604CS has a 5 hp centrifugal wash water pump, which utilizes filtrate to wash the screens intermittently.

Standard controls on the UL1604CS include an HOA switch for the wash water pump, an HOA switch for the automatic sludge valve, an emergency stop pushbutton, running lights, timers for the wash water pump operation, and a series of level sensors for filter rotation control, wash water, pump control and an overflow condition signal in the event of a system malfunction, power failure, etc.

The proposed gravity disk filter would be fed by an existing 8-inch ductile iron reclaimed water main installed in 1991 from the lake return pump station. The existing 8-inch pipe is suitable for 1.25 mgd of flow based on pipe velocity and assumed to still be in a fair condition to continue to transmit flow based on the pipe age, material, and use. The pipe should be replaced with larger diameter PVC pipe once flows greater than 1.25 mgd are anticipated to insure reliable service. The existing 10-inch PVC pipe, which supplies the 8-inch pipe, was installed in 2001 and is assumed to be in good condition and adequate for flows up to 2.0 mgd. The 12-inch inlet and 16-inch outlet headers from the proposed filter are proposed to allow for future filter expansion. Two conceptual layouts for the Nova filter were developed based on the two potential discharge locations of the filter effluent. The discharge locations considered were:

- Option 1: Transmission of filter effluent by a low head pump station into the influent pipe of the existing and proposed ground storage tanks.
- Option 2: Transmission of the filter effluent by a low head pump station into a dedicated tank inlet on the future ground storage tank.

Conceptual layouts of the options are provided in **Figures 4-1** and **4-2**.



McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice
City on the Gulf

CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES EVALUATION REPORT

CONCEPT GRAVITY DISK FILTER LAYOUT
OPTION 1

MARCH 2013

4-1

S:\5883\0001\80-Drawings\Current Figure Drawings\Figure 4-1.dwg, 3/7/2013 8:32:50 AM, Quint Shelton

SODIUM HYPOCHLORITE BUILDING

12" INFLUENT

16" OVERFLOW

4" BACKWASH FM TO 6" WAS LINE AND PLANT DRAIN LIFT STATION

ABW FILTERS

CHLORINE CONTACT CHAMBER

TRANSFER PUMP STATION

TO PLANT LIFT STATION

CL FEED

GRAVITY DISK FILTER

BACKWASH PUMP STATION

16" FILTERED EFFLUENT

4" BACKWASH DRAIN

LOW HEAD PUMP STATION

8" INFLUENT FROM LAKE RETURN PUMP STATION

CHEMICAL INJECTION VAULT

PSV

CL SAMPLE LINE

CONNECT TO TANK

TANK INFLUENT (BY OTHERS)

TANK EFFLUENT (BY OTHERS)

FUTURE REUSE GROUND STORAGE TANK (7.5 MG)

HIGH SERVICE PUMP STATION

REUSE GROUND STORAGE TANK (3.0 MG)

TANK DRAIN (BY OTHERS)

LEGEND

PROPOSED

EXISTING

FUTURE

NORTH

20' 0 20' 40'

SCALE: 1"=20' (Horiz.)

McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice City on the Gulf

CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES EVALUATION REPORT

CONCEPT GRAVITY DISK FILTER LAYOUT
OPTION 2

MARCH 2013

4-2

The layouts include the option to expand the filtration system by adding additional filtration units as well as supporting infrastructure such as a backwash pump station for the filter backwash, low head pump station to transmit the filter effluent to the ground storage tanks, replacement lake return pump station pumps, and the addition of a sodium hypochlorite pump for chemical injection into the filter effluent. A preliminary opinion of project cost for the Nova filter installation is provided in **Table 4-1**. Equipment cut sheets of the Nova filter are included in **Appendix F**.

Table 4-1: Nova Gravity Disk Filter
Engineer's Preliminary Opinion of Project Cost

Item	Description	Amount	
1	Civil	$	34,000[1]
2	Mechanical	$	389,000
3	Structural	$	7,000
4	Supporting Infrastructure	$	354,000
5	Electrical	$	83,000
6	Instrumentation	$	82,000
	Construction Subtotal	**$**	**949,000**
7	30% Contingency	$	285,000
	Construction Total	**$**	**1,234,000[2]**
8	Engineering & CEI	$	309,000[3]
	Project Total	**$**	**1,543,000**

1. Cost includes improvements to the lake return pump station and replacing the 8-inch influent pipe with 12-inch pipe.
2. Both options have the same preliminary estimate of construction cost.
3. Engineering & CEI services based on 25% of construction cost with limited site observation.

4.3 Amiad Automatic Self Cleaning Strainer

The Amiad Water Systems Automatic Self-Cleaning Strainer was the final filter technology investigated to provide filtering of the water from the storage lake.

In order to meet the proposed maximum design capacity of 2.0 mgd, a strainer assembly with 4 strainers has been selected to filter the lake water. Each strainer will have an 8-inch diameter inlet and outlet, a 25-micron screen, and a peak capacity of 2.0 mgd producing a differential pressure of less than 2 psi when operating with clean water. Each strainer will have an 8-inch butterfly valve on its inlet, and an 8-inch check valve and 8-inch butterfly valve on its outlet. The waste backwash outlet for each strainer will be 4-inches in diameter. A minimum reclaimed waterline pressure of 30 psi is required to operate the backwash system. The proposed strainer assembly will include a 12-inch inlet header and a 12-inch outlet header with isolation valves arranged for bypassing the strainers during emergencies. The strainer assembly will have space allotted for future strainers.

The proposed strainer assembly will be located just north of the ABW Filters and replace the existing roughing filters. The proposed strainer assembly will receive the reclaimed water discharge from lake return pump station. Modifications will be made to the existing reclaimed water transmission mains to redirect the water through the proposed strainers. The existing 8-inch DIP from the lake return pump station will be connected to the proposed strainers. At the discharge end of the strainer assembly, an 8-inch motor-operated butterfly valve, piping and isolation valves will be connected to the existing 20-inch DIP influent pipe to GSTs (Option 1) or directly to the 7.5 MG ground storage tank (Option 2). A back pressure sustaining valve will be installed in the strainer effluent pipe to provide a constant 30 psi for backwashing. Where required, isolation valves will be installed in the proposed piping. The pumps at the lake return pump station will need to be upsized to 40 hp pumps to provide adequate pressure for filtration.

The operation of the strainers is summarized as follows:

Each proposed strainer has four stainless steel screen elements and four cleaning mechanisms inside its steel housing. Reclaimed water will flow into each

strainer to a sealed screen element. As the reclaimed water flows through the screen, solids will be trapped on the interior of the screen, which will cause an increase in differential pressure between the inlet and outlet of the strainer. The differential pressure will increase and the flow decrease until a backwash is needed. The backwash cycle for each strainer element can be actuated in 4 different ways:

1. Timer
2. Differential Pressure Switch
3. Manual Operation
4. Continuous Backwash

The normal procedure is to set up each strainer element to be backwashed at selected intervals using its timer. The differential pressure switch for each strainer will activate the backwash system for each strainer element during normal operation when the differential pressure is greater than 7 psi. The differential pressure switch will override the timed backwash operation mode. Upon activation of the backwash mode for each strainer element, a backwash arm which covers a small area of the screen will begin to rotate, and a waste backwash valve will open to discharge to atmospheric conditions. The backwash system operates on the differential pressure between the pipeline pressure (greater than 30 psi) and the atmosphere (14.7 psi). The screen area covered by the backwash arm will be backwashed while the remainder of the screen will continue normal straining operation. A small portion of the water that flows through the screen to its exterior will be used to drive the solids, dirt and debris off of the screen and into the backwash arm due to the high velocity of the water through the isolated section of screen. The backwash water will be discharged to a proposed backwash pump station to be sent to the plant drain pump station or WAS line to sludge storage. The backwash flow for each strainer element will be regulated by a manual throttling valve. Approximately 1 percent of the flow

through each strainer element will be used for the backwash operations. The normal backwash cycle for each strainer element uses 132 gallons of water over a time period of 36 seconds at a flow rate of 220 GPM. Each strainer will have its own PLC control panel with differential pressure switches, timers, and selector switches for the timed, differential pressure, manual and continuous modes of backwash operation. The control panel allows for sequential operation of the 4 cleaning mechanisms inside one housing, one-by-one, in pairs, or all 4 at the same time. The strainer units will also have a master controller.

Each strainer will have a 1/2-hp electric motor to drive the backwash arm. The motor will be provided to operate on 230/460 volts 3-phase power.

Each strainer will be fabricated from the following materials:

- Filter Housing and Lid: Epoxy coated carbon steel
- Screens: 316 Stainless Steel four-layer weave wire (50 micron openings)
- Exhaust Valve: Epoxy coated cast iron and natural rubber
- Seals: Teflon, synthetic rubber
- Controls: Aluminum, Brass, Stainless Steel, Nylon, PVC

Conceptual layouts of the two options are provided in **Figures 4-3** and **4-4**.

The layouts includes the option to expand the filtration system by adding additional filtration units as well as supporting infrastructure such as a backwash pump station for the filter backwash, replacement lake return pump station pumps, and addition of a sodium hypochlorite pump for chemical injection into the filter effluent. The replacement lake return pump station pumps were preliminary sized as 40 hp so increased pressure is available to the Amiad filters and for filling the ground storage tanks.

SODIUM HYPOCHLORITE BUILDING

BACKWASH PUMP STATION

4" BACKWASH FM TO 6" WAS LINE AND PLANT DRAIN LIFT STATION

ABW FILTERS

CHLORINE CONTACT CHAMBER

TRANSFER PUMP STATION

TO PLANT LIFT STATION

CL FEED

CONCRETE PAD

AUTOMATIC SELF CLEANING STRAINER (TYP. x4)

8" EFF (TP.)

PSV

CHEMICAL INJECTION VAULT

8" INFLUENT FROM LAKE RETURN PUMP STATION

CL SAMPLE LINE

REUSE GROUND STORAGE TANK (3.0 MG)

TANK DRAIN (BY OTHERS)

HIGH SERVICE PUMP STATION

CONNECT TO TANK

TANK INFLUENT (BY OTHERS)

TANK EFFLUENT (BY OTHERS)

FUTURE REUSE GROUND STORAGE TANK (7.5 MG)

1.5"
8"
20"
24"

LEGEND

PROPOSED

EXISTING

FUTURE

NORTH

20' 0 20' 40'

SCALE: 1"=20' (Horiz.)

McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice City on the Gulf

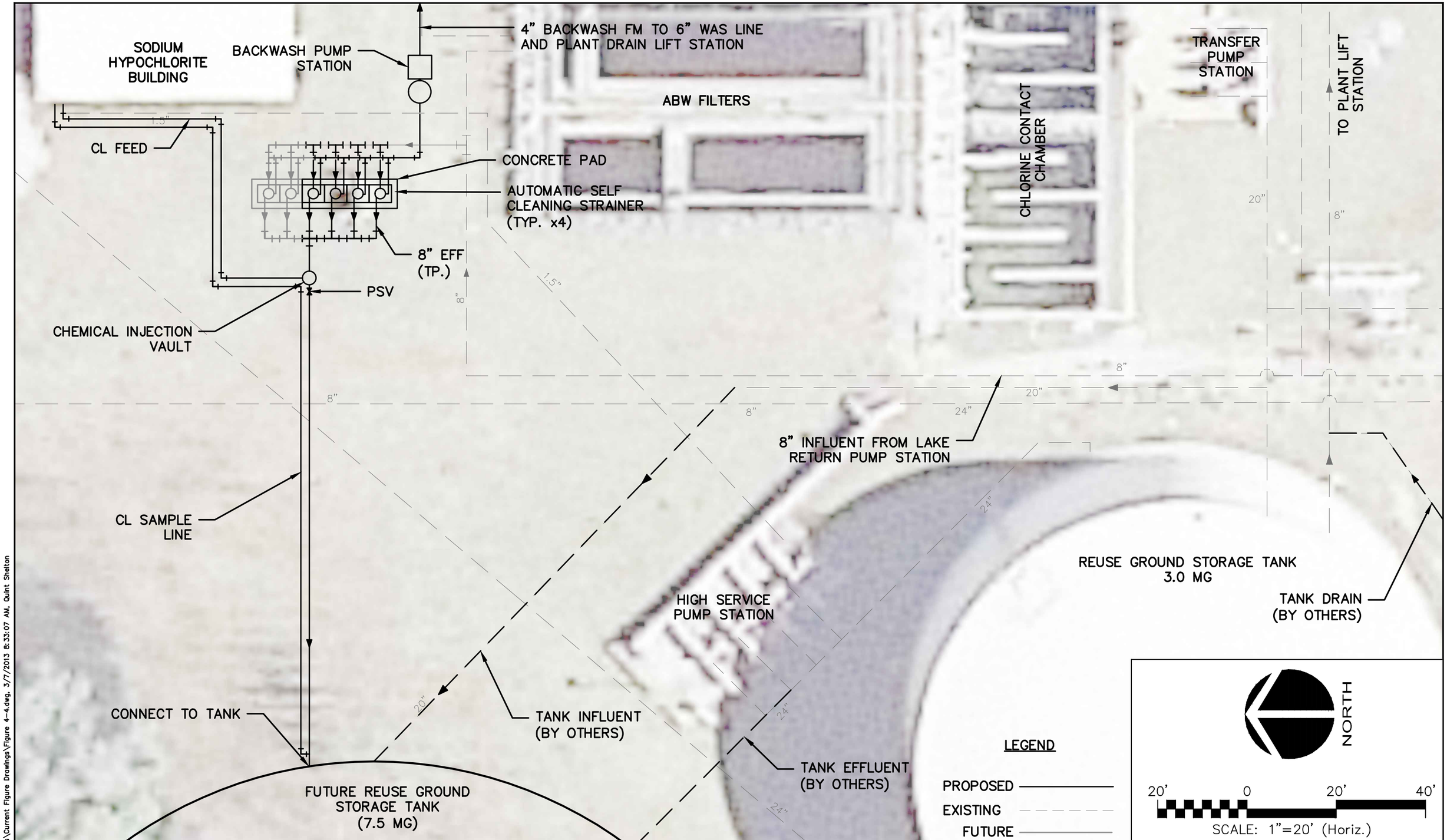
CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES EVALUATION REPORT

CONCEPT PRESSURE STRAINER LAYOUT
OPTION 1

MARCH 2013

4-3

S:\5883\0001\60-Drawings\Current Figure Drawings\Figure 4-3.dwg, 3/7/2013 8:33:02 AM, Quint Shelton



McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice
City on the Gulf

CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES EVALUATION REPORT

CONCEPT PRESSURE STRAINER FILTER LAYOUT
OPTION 2

MARCH 2013

4-4

S:\35883\00011\60-Drawings\Current Figure Drawings\Figure 4-4.dwg, 3/7/2013 8:33:07 AM, Quint Shelton

A preliminary opinion of project cost for the Amiad filter installation is provided in **Table 4-2 (**see **Appendix H** for complete proposal). The difference in costbetween the two aforementioned filter discharge pipe layout options was negligible. Equipment cut sheets of the Amiad filter are included in **Appendix F**.

Table 4-2: Amiad Strainer Filter
Engineer's Preliminary Opinion of Project Cost

Item	Description	Amount
1	Civil	$ 36,000 [1]
2	Mechanical	$ 451,000
3	Structural	$ 20,000
4	Supporting Infrastructure	$ 224,000
5	Electrical	$ 83,000
6	Instrumentation	$ 82,000
	Construction Subtotal	**$ 896,000**
7	30% Contingency	$ 269,000
	Construction Total	**$ 1,165,000[2]**
8	Engineering & CEI	$ 291,000[3]
	Project Total	**$ 1,456,000**

1. Cost includes improvements to the lake return pump station and replacing the 8-inch influent pipe with 12-inch pipe.
2. Both options have the same preliminary estimate of construction cost.
3. Engineering & CEI services based on 25% of construction cost with limited site observation.

4.4 Manatee County SWWRF Pilot Test Results

Pilot testing of both the Nova and Amiad filters were conducted at the North Pond of the Manatee County SWWRF as part of the Manatee County Southeast Water Reclamation Facility Final Lake Filtration System Basis of Design Report prepared in December 2010 by McKim & Creed. The objective of the pilot testing was to refine the equipment selected by the filter manufacturers and to measure the performance of the filters. The time and location of the pilot test was selected based on the abundance of algae within the North pond. The pilot tests were conducted between July and August 2010. As discussed in **Sections 3-4** and **3-5**

the characteristics of water stored in the Manatee County SWWRF North Pond are similar to the water within the Eastside WRF storage lake. The results of the pilot testing were therefore assumed to be applicable to this lake filter evaluation. A summary of the testing procedure and results are provided in the following sections.

4.4.1 Nova Water Technologies Pilot

The Nova unit pilot tested was a single UL1001 Ultrascreen® Disk Filter with 17 square feet of filter area. Screen sizes of 20 and 25 micron were tested at loading rates of 4, 8, and 12 gpm/sf. Backwash volume ranged from 0.19% to 0.57% of the influent flow for the 25 micron screen and 1.22% to 2.19% with the 20 micron screen. The Nova filter's effectiveness at removing particles greater than 50 micron is summarized in **Table 4-3**.

Table 4-3: Nova Pilots Results Summary

Mesh Size (µm)	Flow (gpm/ft²)	Average Influent PSD (counts/ml) (Total, 50-200 µm)	Average Effluent PSD (counts/ml) (Total, 50-200 µm)	% Particle Removal (50-200 µm)	Backwash %
25	4	15	0	100%	0.33
25	8	9	2	78%	0.19
25	12	33	13	61%	0.57
20	4	17	4	76%	1.88
20	8	11	4	64%	2.19
20	12	23	6	74%	1.24

4.4.2 Amiad Pilot

The Amiad pilot unit consisted of a single SAF 4500 Disk Strainer with 4.84 sf of filtration area. Screen sizes of 25 and 50 micron were tested at loading rates of 11 and 24 gpm/sf. Backwashing occurred approximately every 1 minute and 30 seconds when using the 25 micron screen loaded at 11 gpm/sf and every 5

minutes and 40 seconds when using the 50 micron screen loaded at 24 gpm/sf. Lab results for the particle size distribution of influent and effluent flow were indeterminate due to the laboratory equipment used in support of the Amiad pilot test not being capable of measuring at the necessary detection limits. The Amiad pilot test results were therefore unavailable for comparison to the Nova pilot test results.

4.5 Filter Evaluation

The Manatee County pilot studies for the two filter technologies were evaluated based on 50 micron removal, which is the minimum target size of sand and algae removal to help prevent sprinkler heads from becoming clogged as discussed in **Section 3.3**. The Nova filter demonstrated during the pilot testing that it was effective at removing particles larger than 50 microns. Due to the lack of particle size distribution results for the Amiad filter its effectiveness at removing particles larger than 50 microns is unknown. Pilot testing of the Amiad filter at the Eastside WRF storage lake is beyond the scope of this report but would allow for a more detailed comparison of the two filter technologies. The cost for a 50 micron Amiad screen is anticipated to be approximately $82,000 less than the Nova filter installed with a 50 micron screen when evaluating the cost of the filter equipment only. The additional infrastructure required within the Eastside WRF to support the new filter equipment adds to the overall construction cost of installing lake filter technologies. The selected discharge location of the filtered effluent was largely inconsequential to project cost. Assuming filter effluent will be sent directly to the ground storage tanks, the cost of the 50 micron Nova filters is anticipated to cost approximately $251,000 more than a 50 micron Amiad filter in part due to the need for a low head pump station downstream of the Nova filter (See **Table 4-4**).

Table 4-4: Nova Gravity Disk Filter vs. Amiad Filter – 50 Micron Preliminary Opinion of Construction Cost

Description	Amount[1]
Nova Filter (with supporting Infrastructure)	$ 1,234,000
Amiad Filter (with supporting Infrastructure)	$ 983,000
Difference	**$ 251,000**

1. Costs with supporting infrastructure including improvements to the lake return pump station and replacing the 8-inch influent pipe with 12-inch pipe.

The filters were evaluated based on operational flexibility. The Nova filter has effectively the same cost whether a 25 or 50 micron screen is installed. This is due to the ability to exchange the stainless steel filter mesh within the filter enclosure. This provides the City with flexibility to change the filter mesh size to alter the amount of algae removal and frequency of backwash if necessary. The number of Amiad strainers doubles from two to four to achieve 25 micron filtration at 2.0 mgd. Assuming filter effluent will be sent directly to the ground storage tanks, the cost of a 25 micron Nova filter is anticipated to cost approximately $69,000 more than a 25 micron Amiad filter as shown in **Table 4-5**.

Table 4-5: Nova Gravity Disk Filter vs. Amiad Filter – 25 Micron Preliminary Opinion of Construction Cost

Description	Amount[1]
Nova Filter (with supporting Infrastructure)	$ 1,234,000
Amiad Filter (with supporting Infrastructure)	$ 1,165,000
Difference	**$ 69,000**

1. Costs with supporting infrastructure including improvements to the lake return pump station and replacing the 8-inch influent pipe with 12-inch pipe.

The filters were both evaluated based on complexity. Complexity considers the amount of different pieces of equipment required to achieve the removal criterion. Systems comprised of a high number of different equipment pieces require more training, stocking of spare parts and attention to maintenance schedules than systems comprised of a repeated common piece of equipment. Both the Nova and Amiad equipment complexity were considered to be similar.

5.0 RECOMMENDATIONS

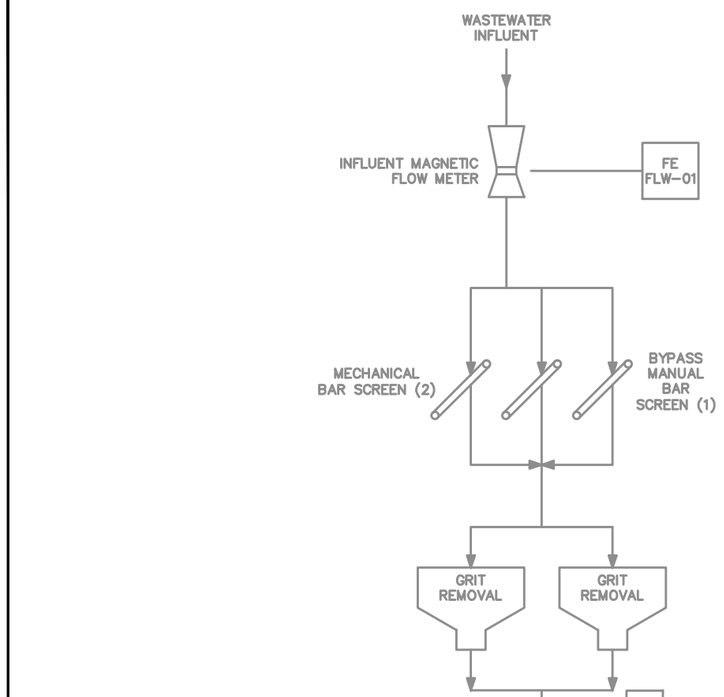
The Nova gravity disk filter is recommended to filter the lake water at the Eastside WRF based on the following criteria:

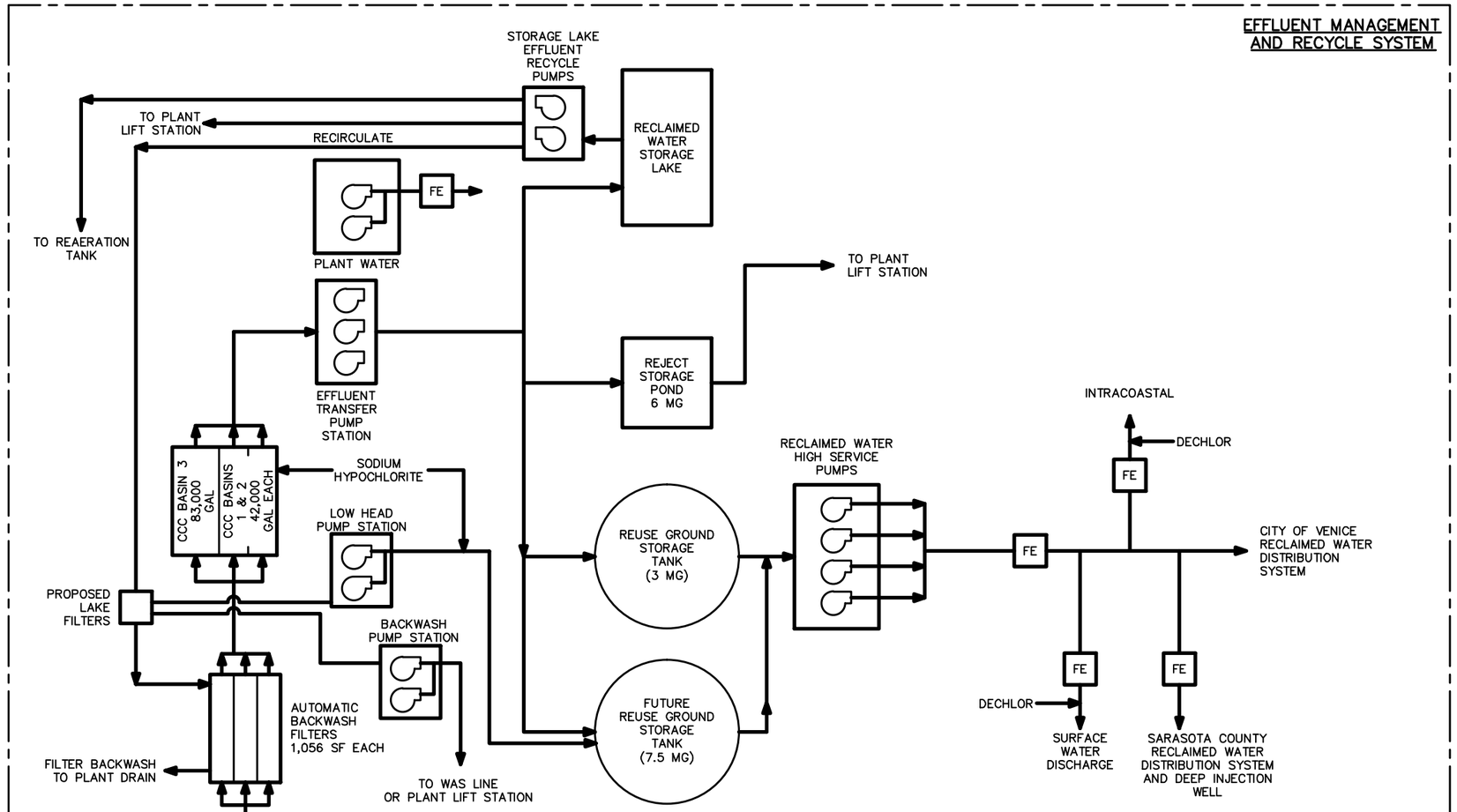
- Demonstrated ability to filter algae from the lake water during the Manatee County pilot testing.
- Minimal equipment complexity, quality of materials, and ease of maintenance.
- Flexibility to use various size stainless steel meshes without altering the number of filter units.

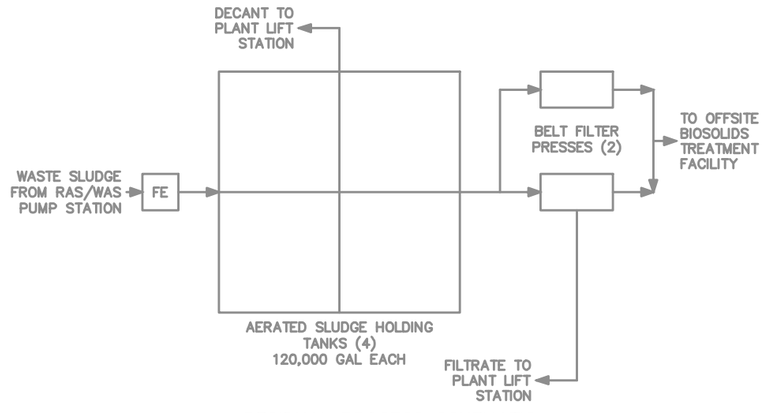
The filter equipment should be model UL1604CS and be sized for a maximum loading rate of 7.89 gpm/sf at 2.0 mgd. Since there is negligible cost difference between the 50 and 25 micron screens and considering the Nova pilot demonstrated that reasonable backwash rates, loading rates, and filter areas can be maintained at the 25 micron size, it is recommended a 25 micron screen be used. A 25 micron screen would allow the opportunity to collect 16% more particle volume than a 50 micron screen based on the samples from the Eastside storage lake. A proposed process flow schematic incorporating the Nova gravity disk filter and supporting infrastructure is provided in **Figure 5-1**.

5.1 Filter Influent

It is recommended that the existing 8-inch DI pipe from the lake return pump station be replaced with 12-inch PVC pipe to reduce the velocity during peak flows from approximately 9 fps to 4 fps. The existing 10-inch PVC pipe upstream of the 8-inch may remain since it is assumed to be in acceptable condition given its pipe material and 12 year service life. The approximate length of the 8-inch pipe to be replaced is 700 feet with an increase in total project cost of $30,000.







RESIDUAL PROCESS SCHEMATIC

McKIM&CREED
378 Interstate Court
Sarasota, Florida 34240
Phone: (941)379-3404, Fax: (941)379-3530
EB0006691
www.mckimcreed.com

Venice City on the Gulf

CITY OF VENICE
LAKE FILTRATION SYSTEM ALTERNATIVES EVALUATION REPORT

EASTSIDE WRF PROPOSED FLOW SCHEMATIC

MARCH 2013

5-1

S:\5883\0001\80-Drawings\Current Figure Drawings\Figure 5-1.dwg, 3/7/2013 8:33:16 AM, Quint Shelton

5.2 Filter Effluent

It is recommended that effluent from the filter be pumped by a new low head pump station into the ground storage tank to fully remove comingling the compliance streams, to provide constant head and to prevent response time limitations. Particles less than 25 microns are anticipated to pass through the Nova filter and result in elevated turbidity levels and chlorine demand within the ground storage tank. As such chlorine demand testing of the storage lake return water should be conducted to verify the potential feed rates required, but it is anticipated to be similar to Manatee County pond water which had a chlorine demand of approximately 2 mg/l. A dedicated sodium hypochlorite feed pump should be installed in the chlorine building to provide adequate dosage for a 1 mg/l chlorine residual. A backup chemical feed pump is recommended for redundancy. A sample loop downstream of the lake filter effluent is recommended to monitor the chlorine residual of effluent entering the ground storage tank.

Historical discharges into Curry Creek are associated with times when the storage lake is full and the Sarasota County deep injection well is unavailable. Generally surface water discharge into Curry Creek has included water from the storage lake as a preparation measure for anticipated high flows at the WRF. It is unknown if the lake filter effluent blended with plant effluent will exceed any of the regulated parameters at the Curry Creek discharge as outlined in the operating permit (see **Appendix C**). Should the water quality exceed the monitored parameters, the City should implement an operating protocol to prevent the introduction of water from the storage lake while discharging into Curry Creek.

Snails have not been reported in the City's reclaimed water system piping and were not reported as part of the lake filter pilot testing at Manatee County. There have however been instances of snails within the reclaimed water

distribution system of Sarasota County and the City of Cape Coral. The recommended lake filters are anticipated to be effective at removing snails larger than the screen mesh opening and therefore effective at removing snails that may clog sprinkler irrigation heads. Assuming snail larvae are small enough to pass through the filters, the addition of chlorine is anticipated to reduce the potential for biological growth within the distribution system. Since snails are currently not an identified problem within the City's reclaimed water distribution system and a source of snails entering the reclaimed water system has not been identified, no specific action is recommended at the time of this report.

5.3 Filter Backwash

Plant water or filter effluent may be used for backwash water. Based on preliminary discussions with FDEP, the filter backwash may not be returned to the storage lake. Since the return of lake water to the head of the treatment process has historically increased effluent turbidity, filter backwash is not recommended to be sent to the plant drain pump station during periods of heavy algal loading. It is recommended that the backwash water be sent directly to the sludge holding basins during periods of heavy algal loading for blending and mixing with waste activate sludge and decanted prior to sending to the gravity belt thickener for thickening.

The estimated quantity of backwash volume for the gravity disk filters during a peak flow and loading condition is 20,000 gpd. At the current plant permitted capacity of 6.0 mgd 3MADF, this reduces the City's storage by 2 days given a total sludge storage tank volume of 550,000 gallons. This reduces the sludge storage from 9 days to 7 days prior to any dewatering, decanting or thickening with an average sludge concentration reduction from an assumed 8,000 mg/l to 6,540 mg/l. The City has the ability to thicken sludge and return to the holding tanks. Assuming the City thickens to a 2% solids concentration (or 20,000 mg/l),

the sludge storage would be reduced from 24 days to 22 days by the same estimated backwash volume. See **Appendix I** for spreadsheet printouts.

A small submersible pump lift station should be constructed to send the backwash water to the sludge holding tanks or the plant drain lift station. The backwash lift station should consist of the following:

- 5′ Diameter, 9′ Deep Fiberglass Wetwell 1
- Submersible Pumps 2 (one duty/one redundant)
- Pump Capacity Each 100 gpm @ 30-ft
- 3′ X 3′ X 3′ Valve Vault 1
- Control Floats 4
- 4″ Check Valve 2
- 4″ Ball Valve 2
- 4″ Auxiliary Pump Out 1
- NEMA 4x Control Panel 1
- 4″ C-900 PVC Discharge Forcemain 800-ft
- SSGuide Rails And Lifting Cables 1

5.4 Low Head Pump Station

Effluent from the Nova filter discharges via gravity. A low head pump station consisting of a wetwell and two vertical turbine pumps should be installed to transfer the filtered effluent to the ground storage tanks. The low head pump station should consist of the following:

- 12′ Diameter Wetwell, 12′ Deep. 1
- Vertical Turbine Pumps 2 (one duty one standby)
- Pump Capacity Each 1,388 gpm @ 42-ft
- Ultrasonic Level Transducer 1
- NEMA 4X Control Panel 1

5.5 Electrical System

The existing operations building houses the main distribution gear for the Venice Eastside WRF. There are several Motor Control Centers (MCC) in the building that will be capable of providing the necessary power for the lake filtration equipment. An existing 1500 KW generator provides back-up power.

A single 480VAC, 3 phase feeder will be routed from the existing MCCs to the disk filters. A new 480VAC, 3 Phase, panel board will distribute power to the filter control panels and the back wash pump station control panel as required. New and existing duct bank will be utilized between the filtration equipment and the operations building for this feeder.

A dry type step down transformer and 120/208VAC 3 Phase, 4 wire panel board will provide additional distribution for any local receptacles, lighting, controls etc. required for the lake filtration equipment.

The low head transfer pump station will utilize VFDs which will be installed inside the operations building. Power wire and conduit will be routed from the drives in the building to the pumps.

Equipment rack(s), fabricated from concrete posts and aluminum strut channel, will be provided for mounting the distribution equipment, disk filter control enclosures, disconnects and instruments.

All electrical enclosures, panelboards, transformers, etc. will be NEMA 4X/SST.

Exposed conduit will be rigid aluminum. Below grade conduit will be concrete encased Sch. 40 PVC conduit. Power and control wiring will be XHHW-2 stranded copper.

The existing lake return pump station will be modified to install larger pumps to meet the projected maximum lake withdrawal of 2.0 mgd. The existing pump

control panel will be replaced. The existing 175 Amp 480V power feed to the lake return pump station has adequate capacity for the increased pump capacity.

5.6 Instrumental, Controls & SCADA

The existing Instrumentation and SCADA System at the Eastside WRF consists of a distributed plant control system providing monitoring and operating capability from a centralized computer system. All plant operations have been directly wired into a system of PLC-based area SCADA Control Panels, located at various locations through the facility. The SCADA control panels utilize Schneider Electric Modicon Quantum PLCs as the hardware platform with interaction between control panels and to the plant central control system occurring using a fiber optic cable-based Modbus Plus communications system.

Process control strategies are managed from the PLC control panels with decisions based upon local process conditions and operator settings as entered from the control room SCADA computers. The overall system is monitored and managed from the centralized control room, which provides views into the process through computer equipment running General Electric (GE) Proficy (previously referred to as I-Fix) Human-Machine Interface (HMI) software.

As part of this project, a new area SCADA control panel will be added to the existing plant control system for monitoring and control of the plant additions. The panel will be inserted into the fiber optic ring to maintain and utilize the fiber optic fault tolerant configuration. This panel will monitor the gravity disk lake filter system, the backwash pump station and the low head pump station local equipment. The low head pump station VFDs, located in the operations building electrical room, will be monitored and controlled from that area SCADA panel. The sodium hypochlorite metering pump will be monitored and controlled, along with the existing metering pumps and storage tank, through the existing SCADA panel.

The lake filters and backwash pump station will include self-contained local control panel control systems utilizing relay-based controls for operation. These controls will also provide process monitoring and alarm signals to the new SCADA panel.

PLC application programming will be provided for the new and modified SCADA control panels. Software modifications will also be provided for the existing HMI system including new graphic screens for the lake filters, backwash pump station and low head pump station. Graphic screens will be modified to include new equipment for the sodium hypochlorite feed system. The SCADA system database, alarming and historical data collection will also be upgraded to reflect these additions. All software services should be provided by an approved and qualified system integration firm identified as part of the design process.

Field measurement instrumentation will be provided to monitor such process values as level, pressure and flow. Equipment will be chosen to match the City's preferred equipment manufacturers to minimize spare part inventories and ensure the ability of the City's technical staff to rapidly diagnose, repair and return the equipment to service. Equipment will be wired to the PLC control panels for monitoring from the centralized control system.

5.7 Other Considerations

Algae reduction measures within the storage lake may be considered by the City as a supplement to the recommended lake filter equipment. The intent was to identify potential treatments that may reduce the volume of algae entering the filter equipment. The following treatments were considered.

- Chemical additives
- Aerators
- Intake elevation adjustment

Copper sulfate is a common herbicide used to kill a wide range of aquatic plants and algae. It effectively works by introducing an excess amount of copper which kills plant growth. Copper is also toxic to fish at low dosages of 1-5 ppm. Copper can be introduced by various forms, such as crystal or liquid, but in general it breaks down in a matter of days limiting the duration of its effectiveness. The affected plant and aquatic life may settle on the bottom of the lake if it is negative buoyant causing increased lake maintenance due to sediment buildup on the bottom of the lake. The introduction of copper or other equivalent chemical treatment may reduce the algae load on the filters, potentially allowing for smaller filters, but any cost savings may be offset by ongoing chemical costs.

The SolarBee surface aerator floats on the lake surface and circulates the upper water zone to control algae blooms. The system is solar powered and utilizes a battery to store excess power for nighttime operation. The minimum intake depth is 28-inches and it is rated to operate in shallow or dry lake conditions without damage. The equipment is typically tethered to the shore at two points to prevent movement. There are currently no applications of the SolarBee in Florida reuse lakes. Two case studies for application in reuse lakes located in Utah and California were provided by SolarBee as examples of their effectiveness (See **Appendix J**). Pilot testing during times of peak algae blooms is suggested to verify the manufacturer claims and measure the effectiveness at reducing the volume of algae within the storage lake.

The depth of the lake return pump station intake can impact the amount of algae entering the lake return pump station and subsequently the lake filters. As previously discussed, algae usually persists in the top two feet of water. As the water level drops and the water surface approaches the inlet pipe, the concentration of algae is anticipated to increase. The lake return intake pipe invert is currently set at 2 feet above the bottom of the lake per the record

drawings. Based on City anecdotal evidence, lowering the lake level below the invert elevation has historically caused the liner to float. The potential for the liner to float given various combinations of lake depths and groundwater levels are beyond the scope of this analysis so the existing intake pipe invert of 2 feet above the bottom of the lake was assumed to be the minimum to prevent liner flotation. A 45° or 90° flared fitting attached to the intake pipe and pointing toward the lake bottom lowers the depth of water entering the intake pipe without altering the minimum water level within the lake or inside of the lake return pump station. Extending the intake pipe beyond the lake slope may be necessary to create adequate separation from the lake bottom and prevent the fitting from touching the liner. A stainless steel mesh at the end of the flared fitting, similar to what is currently installed at the end of the inlet, would prevent large objects from entering the pump station.

APPENDIX A

Definitions

Abbreviations

3-MADF	3-Month Average Day Flow
ABW	Automatic Backwash
BOD	Biochemical Oxygen Demand
DMR	Daily Monitoring Report
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
gpm	Gallons per Minute
HOA	Hand-Off-Auto
hp	Horse Power
LB	Pound
MG	Million Gallons
mg/L	Milligrams per Liter
mgd	Million Gallons per Day
NTU	Nephelometric Turbidity Unit
PLC	Programmable Logic Controller
psi	Pounds per Square Inch
RCW	Reclaimed Water
rpm	Revolutions per Minute
RWS	Reclaimed Water System
SCADA	Supervisory Control and Data Acquisition
SS	Stainless Steel
TSS	Total Suspended Solids
WRF	Water Reclamation Facility

APPENDIX B

References

References

Atkins. 2012. "Construction Plans for Eastside Water Reclamation Facility 7.5 MG Ground Storage Tank 60% Review."

Boyle Engineering. May 2000. "Construction Plans for Eastside Wastewater Treatment Plant Expansion."

CDM. April 1991. "City of Venice Wastewater Treatment Plant Improvements East Side Wastewater Treatment Plant Record Drawings."

CDM. July 1992. "City of Venice Seasonal Storage Facilites Record Drawings."

Everfilt. October 2000. "Everfilt Installation, Operation, and Maintenance Manual Pond Return Roughing Filter for Venice Eastside Waste Water Treatment Plant."

Haman, Dorota and Zazueta, Fedro. October 2011. "AE57- Media Filters for Trickle Irrigation in Florida." University of Florida IFAS Extension.

Haman, Dorota and Zazueta, Fedro. October 2011. "AE61- Screen Filters in Trickle Irrigation Systems." University of Florida IFAS Extension.

Haman, Dorota and Zazueta, Fedro. June 2003. "AE65- Settling Basins for Trickle Irrigation in Florida." University of Florida IFAS Extension.

McKim & Creed. October 2012. "City of Venice Reclaimed Water Master Plan."

McKim & Creed. December 2010. “Manatee County Southeast Water Reclaimed Facility Final Lake Filtration System Basis of Design Report.”

Shock, C. October 2006. “EM 8782- Drip Irrigation: An Introduction.” Oregon State University’s Publication

APPENDIX C

FDEP Operating Permit

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
Southwest District Office
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

STATE OF FLORIDA
DOMESTIC WASTEWATER FACILITY PERMIT

PERMITTEE:

City of Venice

PERMIT NUMBER: FL0041441 (Major)
PA FILE NUMBER: FL0041441-011-DW1P/NR
ISSUANCE DATE: December 12, 2011
EXPIRATION DATE: December 11, 2016

RESPONSIBLE AUTHORITY:
Mr. Lenox E. Bramble, P.E.
Utilities Manager
401 West Venice Avenue
Venice, FL 34285
lbramble@ci.venice.fl.us
(941) 480-3333

FACILITY:

City of Venice Eastside AWWTF
3510 East Laurel Road
Venice, FL 34285
Sarasota County
Water Body Identification (WBID) No. 2009
Latitude: 27° 07' 56" N Longitude: 82° 24' 05" W

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and applicable rules of the Florida Administrative Code (F.A.C.) and constitutes authorization to discharge to waters of the state under the National Pollutant Discharge Elimination System. The above-named permittee is hereby authorized to operate the facilities shown on the application and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

TREATMENT FACILITIES:

Operation of an existing 6.0 MGD three-month rolling average daily flow (3MRADF) Type I advanced wastewater treatment (Bardenpho process) domestic wastewater treatment plant. The plant consists of preliminary treatment followed by dual four-stage Bardenpho process trains, four clarifiers (each with a surface area of 5,675 ft^2), three dual media (sand and anthracite) automatic backwash traveling bridge filters (each with a surface area of 1,056 ft^2) and a liquid chlorination system consisting of three contact chambers with a combined capacity of 167,000 gallons. Aeration is provided at the chlorine contact chambers when surface discharge is necessary. Waste sludge is discharged to four aerated holding tanks and dewatered by two belt filter presses. This plant provides advanced wastewater treatment with high-level disinfection.

Sub-standard effluent that fails to meet the standards for public access irrigation is diverted to a six-million gallon capacity, clay-lined reject pond for return to the headworks of the plant. Reclaimed water is stored in either a 3.0 million gallon above-ground storage tank or is directed to a 35-million gallon on-site lined storage pond. All reclaimed water stored in the lined storage pond can be filtered and disinfected again, if necessary, before being sent to the reuse system.

DISPOSAL:

Surface Water Discharge: An existing 3.0 MGD annual average daily flow (AADF) permitted discharge to Curry Creek (Class III Fresh Water, WBID No. 2009) and thence to Roberts Bay at Discharge Location (D-001) which is an aerated cascade flowing into Curry Creek. The point of discharge is located approximately at latitude 27 ° 6' 55" N, longitude 82 ° 24' 4" W.

Reclaimed water is discharged into stormwater storage lake system, Capri Isles Golf Course North, which intermittently overflows to Curry Creek, D-002.

Reclaimed water is discharged into stormwater storage lake system, Capri Isle Golf Course South, which intermittently overflows to Curry Creek, D-003.

Reclaimed water is discharged into stormwater storage lake system, Bird Bay Golf Course, which intermittently overflows to Roberts Bay, D-004.

Reclaimed water is discharged into stormwater storage lake system, Island Beach, which intermittently overflows to Red Lake, D-005.

REUSE:

Land Application: An existing 3.0 MGD annual average daily flow (AADF) permitted capacity slow-rate public access (R-001) consisting of the boundaries of the City of Venice. Reclaimed water is used for irrigation of public-access areas (residential lawns, golf courses, parks and playgrounds, highway medians and rights-of way and landscaped areas) within the areas identified in Figure 1-1, titled "City of Venice Wastewater Service Area", by Malcolm Pirnie/Arcadis (Attached).

Land Application: An existing 2.5 MGD annual average daily flow (AADF) permitted capacity slow-rate public access (R-002) consisting of discharge to Sarasota County's South Master Reuse System, FLA176303, under an interagency agreement.

INTERNAL OUTFALL:

An existing discharge of reclaimed water limited to 1.0 mgd annual average daily flow discharge location (R-003) of reclaimed water to the Venice Reverse Osmosis Concentrate Disposal system, regulated under Industrial Wastewater Permit No. FL0035335 located approximately at latitude 27° 06' 04" N, longitude 82° 26' 17" W.

IN ACCORDANCE WITH: The limitations, monitoring requirements and other conditions set forth in Pages 1 through 30 of this permit.

I. RECLAIMED WATER AND EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

A. Surface Water Discharges

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge effluent from Outfall D-001 to Curry Creek. Such discharge shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow (D-001)	MGD	Max	3.0 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-02	See Cond.I.A.6
Flow (Curry Creek)	CFS	Min	47.0	Single Sample	Continuous	Recording Flow Meter with Totalizer	FLW-06	See Cond.I.A.4
BOD, Carbonaceous 5 day, 20C	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Nitrogen, Total (as N)	mg/L	Max	3.0 3.75 4.5 6.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Phosphorus, Total (as P)	mg/L	Max	1.0 1.25 1.5 2.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
Nitrogen, Total as N	Lbs/Year	Max	6370 Report	Annual Total Monthly Total	Monthly	Calculation	EFD-01	See Cond.I.A.5
Oxygen, Dissolved (DO)	mg/L	Min	7.0	Single Sample	7 Days/Week	Grab	EFD-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Meter	EFA-01	See Cond.I.A.3

FACILITY: City of Venice Eastside AWWTF PERMIT NUMBER: FL0041441
PERMITTEE: City of Venice

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.A.7
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.A.8
Total Residual Chlorine (For Dechlorination)	mg/L	Max	0.01	Single Sample	7 Days/Week	Grab	EFD-01	
Dichlorobromomethane	µg/l	Max	22.0 Report	Annual Average Single Sample	Monthly	Calculation Grab	EFD-01	
Dibromochloromethane	µg/l	Max	34.0 Report	Annual Average Single Sample	Monthly	Calculation Grab	EFD-01	
Acute Whole Effluent Toxicity	Percent	Min	100	Single Sample	Quarterly	24-hr FPC	EFD-01	See Cond. I. A. 9

2. Effluent samples shall be taken at the monitoring site locations listed in Permit Condition I. A. 1. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
EFD-01	Prior to discharge to Curry Creek
FLW-02	Flow meter prior to discharge to Curry Creek
FLW-06	Flow meter in Curry Creek

3. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

4. The permittee is allowed to discharge up to 3.0 MGD, calculated as a annual average flow at outfall D001, provided the streamflow in the Curry Creek is 47 cfs or above in the direction toward Roberts Bay, 24 hours prior to discharge.

5. The twelve month annual maximum Total Nitrogen loading shall not exceed 6370 lbs per year. This shall be calculated on a monthly basis by summing the total pounds of nitrogen discharged based on the monthly nitrogen average and flow discharged at D001. If there is no flow discharged in that month the nitrogen loading shall be considered zero.

6. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

7. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

8. A minimum of 1.0 mg/L total residual chlorine must be maintained for a minimum contact time of 15 minutes based on peak hourly flow. *[62-600.440(5)(b) and (6)(b)]*

9. Acute Whole Effluent Toxicity Testing

The permittee shall initiate the series of tests described below only during discharge events The permittee shall comply with the following whole effluent toxicity testing requirements and initiate the series of tests described below within 60 days of permit issuance, unless otherwise directed by the Department in writing, to evaluate chronic whole effluent toxicity of the discharge from outfall D-001 to Curry Creek.

a. Effluent limitation

(1) Whole effluent acute toxicity shall not exceed in any routine or in any additional follow-up test an LC50 of less than 100% effluent. [Rules 62-302.200(1), 62-302.500(1)(a)4., 62-4.244(3)(a), and 62-4.241(1)(a) or 2(a), F.A.C.]

b. Monitoring frequency

(1) The "routine" toxicity tests specified shall be conducted *once every three months.*

c. Sampling Requirements

(1) All routine tests will be conducted on four separate grab samples collected at evenly-spaced 6-hour intervals over a 24-hour period and used in four separate tests in order to catch any peaks of toxicity and to account for daily variations in effluent quality. Each sample shall be analyzed for total residual chlorine and pH at the time of sample collection and reported on the chain of custody.

d. Test Requirements

(1) Routine Tests: All routine tests shall be conducted using a control (0% effluent) and a minimum of five dilutions: **100%, 75%, 50%, 25%**, and **12.5%** effluent.

(2) The permittee shall conduct 96-hour acute static renewal multi-concentration toxicity tests using the daphnid, **Ceriodaphnia dubia**, and the bannerfin shiner, **Cyprinella leedsi**, concurrently.

(3) All test species, procedures and quality assurance criteria used shall be in accordance with **Methods for Measuring Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms**, EPA-821-R-02-012, or the most current edition. Any deviation of the bioassay procedures outlined herein shall be submitted in writing to the Department for review and approval prior to use. In the event the above method is revised, the permittee shall conduct acute toxicity testing in accordance with the revised method.
(4) The control water and dilution water shall be moderately hard water as described in EPA-821-R-02-012, Table 7, or the most current edition.

e. Quality Assurance Requirements
(1) A standard reference toxicant (SRT) quality assurance (QA) acute toxicity test shall be conducted with each species used in the required toxicity tests either concurrently or initiated no more than 30 days before the date of each routine or additional follow-up test conducted. Additionally, the SRT test must be conducted concurrently if the test organisms are obtained from outside the test laboratory unless the test organism supplier provides control chart data from at least the last five monthly acute toxicity tests using the same reference toxicant and test conditions. If the organism supplier provides the required SRT data, the organism supplier's SRT data and the test laboratory's monthly SRT-QA data shall be included in the reports for each companion routine or additional follow-up test required.
(2) If the mortality in the control (0% effluent) exceeds 10% for either species in any test, the test for that species (including the control) shall be invalidated and the test repeated. The repeat test shall begin within 14 days after the last day of the invalid test.
(3) If 100% mortality occurs in all effluent concentrations prior to the end of any test and the control mortality is less than 10% at that time, the test (including the control) shall be terminated with the conclusion that the test fails and constitutes non-compliance.
(4) Additional follow-up tests shall be evaluated for acceptability based on the concentration-response relationship, as required by EPA-821-R-02-012, Section 12.2.6.2. or the most current edition., and included with the bioassay laboratory reports.

f. Reporting Requirements
(1) Results from all required tests shall be reported on the Discharge Monitoring Report (DMR) as follows:
(a) Routine Test Results: If an LC50 >100% effluent occurs in the test for the test species, ">100%" shall be entered on the DMR for that test species. If in any of the four a LC50 <100% effluent occurs, the lowest calculated LC50 effluent concentration shall be entered on the DMR for that test species.
(b) Additional Follow-up Test Results: For each additional test required, the calculated LC50 value shall be entered on the DMR for that test species and the 95% confidence limits.
(2) A bioassay laboratory report for the routine test shall be prepared according to EPA-821-R-02-012, Section 12, Report Preparation and Test Review or the most current edition, and mailed to the Department at the address below within 30 days after the last day of the test.
(3) For additional follow-up tests, a single bioassay laboratory report shall be prepared according to EPA-821-R-02-012, Section 12, or the most current edition and mailed within 30 days after the last day of the second valid additional follow-up test.
(4) Data for invalid tests shall be included in the bioassay laboratory report for the repeat test.
(5) The same bioassay data shall not be reported as the results of more than one test.
(6) All toxicity laboratory reports shall be submitted to:

Department of Environmental Protection
Southwest District Office
13051 N. Telecom Parkway
Temple Terrace, FL 33637-0926
Telephone No.: (813) 632-7600

g. Test Failures
(1) A test fails when the test results do not meet the limits in 9.a.(1).
(2) Additional Follow-up Tests:
(a) If a routine test does not meet the acute toxicity limitation in 9.b.(1) above, the permittee shall notify the Department at the address above within 21 days after the last day of the failed routine test and conduct two additional follow-up tests on each species that failed the test in accordance with 9.d.
(b) The first test shall be initiated within 28 days after the last day of the failed routine test. The remaining additional follow-up tests shall be conducted weekly thereafter until a total of two valid additional follow-up tests are completed.

(c) The first additional follow-up test shall be conducted using a control (0% effluent) and a minimum of five dilutions: 100%, 75%, 50%, 25%, and 12.5% effluent. The permittee may modify the dilution series in the second additional follow-up test to more accurately bracket the toxicity such that at least two dilutions above and two dilutions below the target concentration and a control (0% effluent) are run. All test results shall be statistically analyzed according to the Appendices in EPA-821-R-02-012, or the most current edition.

(3) In the event of three valid test failures (whether routine or additional follow-up tests) within a 12-month period, the permittee shall notify the Department within 21 days after the last day of the third test failure.
(a) The permittee shall submit a plan for correction of the effluent toxicity within 60 days after the last day of the third test failure.
(b) The Department shall review and approve the plan before initiation.
(c) The plan shall be initiated within 30 days following the Department's written approval of the plan.
(d) Progress reports shall be submitted quarterly to the Department at the address above.
(e) During the implementation of the plan, the permittee shall conduct quarterly routine whole effluent toxicity tests in accordance with 9.d Additional follow-up tests are not required while the plan is in progress. Following completion or termination of the plan, the frequency of monitoring for routine and additional follow-up tests shall return to the schedule established in 9.b.(1) If a routine test is invalid according to the acceptance criteria in EPA-821-R-02-012, or the most current edition, a repeat test shall be initiated within 14 days after the last day of the invalid routine test.

[62-620.100(3)(j), 62-620.610(18), 62-620.620(1)(g) & 62-302.530(62), F.A.C]

10. Discharge of reclaimed water to the lakes listed in the table below at Capri Isles Golf Course North stormwater storage lake system D-002 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36121	Capri Isles Golf Course North	8.72	Curry Creek

11. Discharge of reclaimed water to the lakes listed in the table below at Capri Isle Golf Course South stormwater storage lake system D-003 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36122	Capri Isle Golf Course South	8.79	Curry Creek

12. Discharge of reclaimed water to the lakes listed in the table below at Bird Bay Golf Course stormwater storage lake system D-004 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36124	Bird Bay Golf Course	12.08	Roberts Bay

13. Discharge of reclaimed water to the lakes listed in the table below at Island Beach stormwater storage lake system D-005 shall only occur when the elevation of the water in the lake is less than the corresponding control elevation listed in the table below. A list of all days during a month on which discharges from the lake to the receiving water body occurred shall be attached to the DMR form. For each day on which discharge occurred, the approximate number of hours of discharge shall be noted. *[62-610.830(1) and (3)]*

Monitoring Location Site Number	Name of Storage Lake/Description of Monitoring Location	Control Elevation (ft. NGVD)	Receiving Water Body
STM-36128	Island Beach	6.95	Red Lake

B. Reuse and Land Application Systems

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to direct reclaimed water to Reuse System R-001. Such reclaimed water shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow to R-001 Venice MRS	MGD	Max	3.0 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-07	See Cond.I.A.4
BOD, Carbonaceous 5 day, 20C	mg/L	Max	20.0 30.0 45.0 60.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
Nitrogen, Total (as N)	mg/L	Max	Report	Single Sample	Monthly	24-hr FPC	EFA-01	
Phosphorus, Total (as P)	mg/L	Max	Report	Single Sample	Monthly	24-hr FPC	EFA-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Meter	EFA-01	See Cond.I.B.3
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.B.5
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.B.6
Turbidity	NTU	Max	Report	Single Sample	Continuous	Meter	EFB-01	See Cond.I.B.7
Giardia	CYSTS/100 L	Max	Report	Single Sample	Every Two Years	Filtered	EFA-01	See Cond.I.B.10
Cryptosporidium	OOCYSTS/100 L	Max	Report	Single Sample	Every Two Years	Filtered	EFA-01	See Cond.I.B.10

2. Reclaimed water samples shall be taken at the monitoring site locations listed in Permit Condition I. B. 1. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
FLW-03	Flow meter after the high service pumps
FLW-07	(FLW-03) - (FLW-05 + FLW-04 + FLW-02)

3. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

4. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

5. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

6. The minimum total chlorine residual shall be limited as described in the approved operating protocol, such that the permit limitation for fecal coliform bacteria will be achieved. In no case shall the total chlorine residual be less than 1.0 mg/L. *[62-600.440(5)(b); 62-610.460(2); and 62-610.463(2)]*

7. The maximum turbidity shall be limited as described in the approved operating protocol, such that the permit limitations for total suspended solids and fecal coliforms will be achieved. *[62-610.463(2)]*

8. The treatment facilities shall be operated in accordance with all approved operating protocols. Only reclaimed water that meets the criteria established in the approved operating protocol(s) may be released to system storage or to the reuse system. Reclaimed water that fails to meet the criteria in the approved operating protocol(s) shall be directed to reject storage for subsequent additional treatment or disinfection. The operating protocol(s) shall be reviewed and updated periodically to ensure continuous compliance with the minimum treatment and disinfection requirements. Updated operating protocols shall be submitted to the Department for review and approval upon revision of the operating protocol(s) and with each permit application. *[62-610.320(6) and 62-610.463(2)]*

9. Instruments for continuous on-line monitoring of total residual chlorine and turbidity shall be equipped with an automated data logging or recording device. *[62-610.463(2) & .865(8)(d)]*

10. Intervals between sampling for Giardia and Cryptosporidium shall not exceed two years. Sampling results shall be reported on DEP Form 62-610.300(4)(a)4 which is attached to this permit. (If additional sampling is required in accordance with the attached form, only one additional sampling event will be required within the two year monitoring frequency) This form shall be submitted to the Department and to DEP's Reuse Coordinator in Tallahassee. *[62-610.463(4)]*

B. Reuse and Land Application Systems

11. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to direct reclaimed water to Reuse System R-002. Such reclaimed water shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow to R-002 Sarasota County South MRS	MGD	Max	2.5 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-04	See Cond.I.B.14
BOD, Carbonaceous 5 day, 20C	mg/L	Max	20.0 30.0 45.0 60.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Grab	EFA-01	See Cond.I.B.13
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.B.5
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.B.16
Turbidity	NTU	Max	Report	Single Sample	Continuous	Meter	EFB-01	See Cond.I.B.17

12. Reclaimed water samples shall be taken at the monitoring site locations listed in Permit Condition I. B. 11. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
FLW-04	Flow meter prior to discharge to SCSMRS

13. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

14. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

15. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

16. The minimum total chlorine residual shall be limited as described in the approved operating protocol, such that the permit limitation for fecal coliform bacteria will be achieved. In no case shall the total chlorine residual be less than 1.0 mg/L. *[62-600.440(5)(b); 62-610.460(2); and 62-610.463(2)]*

17. The maximum turbidity shall be limited as described in the approved operating protocol, such that the permit limitations for total suspended solids and fecal coliforms will be achieved. *[62-610.463(2)]*

18. The treatment facilities shall be operated in accordance with all approved operating protocols. Only reclaimed water that meets the criteria established in the approved operating protocol(s) may be released to system storage or to the reuse system. Reclaimed water that fails to meet the criteria in the approved operating protocol(s) shall be directed to reject storage for subsequent additional treatment or disinfection. The operating protocol(s) shall be reviewed and updated periodically to ensure continuous compliance with the minimum treatment and disinfection requirements. Updated operating protocols shall be submitted to the Department for review and approval upon revision of the operating protocol(s) and with each permit application. *[62-610.320(6) and 62-610.463(2)]*

19. Instruments for continuous on-line monitoring of total residual chlorine and turbidity shall be equipped with an automated data logging or recording device. *[62-610.463(2) & .865(8)(d)]*

C. Internal Outfall

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the permittee is authorized to discharge effluent from Outfall R-003 to the Venice Reverse Osmosis Concentrate Disposal System. Such discharge shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow (R-003)	MGD	Max	1.0 Report	Annual Average Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-05	See Cond.I.C.4
BOD, Carbonaceous 5 day, 20C	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0 6.25 7.5 10.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Nitrogen, Total (as N)	mg/L	Max	3.0 3.75 4.5 6.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Phosphorus, Total (as P)	mg/L	Max	1.0 1.25 1.5 2.0	Annual Average Monthly Average Weekly Average Single Sample	Monthly Monthly Weekly 5 Days/Week	Calculation Calculation Calculation 24-hr FPC	EFA-01	
Solids, Total Suspended	mg/L	Max	5.0	Single Sample	4 Days/Week	Grab	EFB-01	
pH	s.u.	Min Max	6.0 8.5	Single Sample Single Sample	Continuous	Meter	EFA-01	See Cond.I.C.3
Coliform, Fecal	Percent #/100mL	Max	75 25	Monthly Average Single Sample	Monthly 4 Days/Week	Calculation Grab	EFA-01	See Cond.I.C.5
Chlorine, Total Residual (For Disinfection)	mg/L	Min	1.0	Single Sample	Continuous	Meter	EFA-01	See Cond.I.C.6
Dichlorobromomethane	µg/l	Max	Report Report	Annual Average Single Sample	Monthly	Grab	EFF-001	
Dibromochloromethane	µg/l	Max	Report Report	Annual Average Single Sample	Monthly	Grab	EFF-001	

2. Effluent samples shall be taken at the monitoring site locations listed in Permit Condition I. C. 1. and as described below:

Monitoring Location Site Number	Description of Monitoring Location
EFA-01	After disinfection and prior to dechlorination
EFB-01	After filtration and prior to disinfection
EFF-001	RO concentrate discharge at D-002 of Industrial Wastewater Permit No. FL0035335
FLW-05	Flow meter prior to discharge to City of Venice RO

3. Hourly measurement of pH during the period of required operator attendance may be substituted for continuous measurement. *[Chapter 62-601, Figure 2]*

4. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

5. Over a 30-day period, at least 75 percent of the fecal coliform values shall be below the detection limits. No sample shall exceed 25 fecal coliforms per 100 mL. No sample shall exceed 5.0 mg/L of total suspended solids (TSS) at a point before the application of the disinfectant. Note: To report the "% less than detection," count the number of fecal coliform observations that were less than detection, divide by the total number of fecal coliform observations in the month, and multiply by 100% (round to the nearest integer). *[62-600.440(5)(f)]*

6. A minimum of 1.0 mg/L total residual chlorine must be maintained for a minimum contact time of 15 minutes based on peak hourly flow. *[62-600.440(5)(b) and ((6)(b)]*

D. Other Limitations and Monitoring and Reporting Requirements

1. During the period beginning on the issuance date and lasting through the expiration date of this permit, the treatment facility shall be limited and monitored by the permittee as specified below and reported in accordance with Condition I.D.10:

			Reclaimed Water Limitations		Monitoring Requirements			
Parameter	Units	Max/Min	Limit	Statistical Basis	Frequency of Monitoring	Sample Type	Monitoring Site Number	Notes
Flow (Total Plant)	MGD	Max Max	6.0 Report	3MRADF Monthly Average	Continuous	Recording Flow Meter with Totalizer	FLW-01	See Cond.I.D.4
Percent Capacity, (3MRADF/Permitted Capacity) x 100	Percent	Max	Report	Monthly Average	Monthly	Calculation	FLW-01	
BOD, Carbonaceous 5 day, 20C	mg/L	Max	Report	Monthly Average	Weekly	24-hr FPC	INF-01	
Solids, Total Suspended	mg/L	Max	Report	Monthly Average	Weekly	24-hr FPC	INF-01	
Biosolids Quantity (Transferred to BTF)	Dry Tons	Max	Report	Single Sample	Monthly	Calculation	RMP-1	See Cond. I.D.8
Biosolids Quantity (Landfilled)	Dry Tons	Max	Report	Single Sample	Monthly	Calculation	RMP-2	See Cond. I.D.8

2. Samples shall be taken at the monitoring site locations listed in Permit Condition I. D. 1. and as described below:

Monitoring Location	Description of Monitoring Location
FLW-01	Influent flow meter
INF-01	At headworks prior to treatment and ahead of return activated sludge line.
RMP-1	Quantity of biosolids transferred to Biosolids Treatment Facility.
RMP-2	Quantity of biosolids transferred to Landfill.

3. The three-month rolling average daily flow to the treatment plant shall not exceed 6.0 MGD. [62-600.400(3)]

4. Influent samples shall be collected so that they do not contain digester supernatant or return activated sludge, or any other plant process recycled waters. *[62-601.500(4)]*

5. Recording flow meters and totalizers shall be utilized to measure flow and calibrated at least annually. *[62-601.200(17) and .500(6)]*

6. Parameters which must be monitored as a result of a surface water discharge shall be analyzed using a sufficiently sensitive method to assure compliance with applicable water quality standards and effluent limitations in accordance with 40 CFR (Code of Federal Regulations) Part 136. All monitoring shall be representative of the monitored activity. *[62-620.320(6)]*

7. The sample collection, analytical test methods and method detection limits (MDLs) applicable to this permit shall be in accordance with Rule 62-4.246, Chapters 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate. The list of Department established analytical methods, and corresponding MDLs (method detection limits) and PQLs (practical quantitative limits), which is titled "FAC 62-4 MDL/PQL Table (April 26, 2006)" and is available at http://www.dep.state.fl.us/labs/library/index.htm. The MDLs and PQLs as described in this list shall constitute the minimum acceptable MDL/PQL values and the Department shall not accept results for which the laboratory's MDLs or PQLs are greater than those described above unless alternate MDLs and/or PQLs have been specifically approved by the Department for this permit. Any method included in the list may be used for reporting as long as it meets the following requirements:

   a) The laboratory's reported MDL and PQL values for the particular method must be equal or less than the corresponding method values specified in the Department's approved MDL and PQL list;
   b) The laboratory reported MDL for the specific parameter is less than or equal to the permit limit or the applicable water quality criteria, if any, stated in Chapter 62-302, F.A.C. Parameters that are listed as "report only" in the permit shall use methods that provide a MDL, which is equal to or less than the applicable water quality criteria stated in 62-302, F.A.C.; and
   c) If the MDLs for all methods available in the approved list are above the stated permit limit or applicable water quality criteria for that parameter, then the method with the lowest stated MDL shall be used.

   Where necessary, the permittee may request approval of alternate methods or for alternative MDLs or PQLs for any approved analytical method. Approval of alternate laboratory MDLs or PQLs are not necessary if the laboratory reported MDLs and PQLs are less than or equal to the permit limit or the applicable water quality criteria, if any, stated in Chapter 62-302, F.A.C. Approval of an analytical method not included in the above-referenced list is not necessary if the analytical method is in accordance with 40 CFR 136 or as deemed acceptable by the Department. *[62-4.246, 62-160]*

8. The permittee shall provide safe access points for obtaining representative influent, reclaimed water, and effluent samples which are required by this permit. *[62-601.500(5)]*

9. In the absence of a laboratory analysis, to estimate the dry tons generated by a facility that transports liquid biosolids, the average value of 1.5% solids may be used. The following formula may be used to convert gallons to dry tons when the estimated percent solids is 1.5%:

   (gallons X 8.34 lb/gal X 0.015) / (2000 lb/ton) = dry tons.

If the percent solids is known, substitute the known % solids for "0.015" in the formula above. The gallons produced and used for the above calculation shall be reported on the Discharge Monitoring Report (DMR), Part B. During months when biosolids are not transferred to a Biosolids Treatment Facility or to a landfill, the permittee should record MNR for Monitoring Not Required on the DMR. *[62-640.650(5)(a)]*

10. Monitoring requirements under this permit are effective on the first day of the second month following permit issuance. Until such time, the permittee shall continue to monitor and report in accordance with previously effective permit requirements, if any. During the period of operation authorized by this permit, the permittee shall complete and submit to the Department Discharge Monitoring Reports (DMRs) in accordance with the frequencies specified by the REPORT type (i.e., monthly, toxicity, quarterly, semiannual, annual, etc.) indicated on the DMR forms attached to this permit. Monitoring results for each monitoring period shall be submitted in accordance with the associated DMR due dates below, unless specified elsewhere in the permit.

REPORT Type	Monitoring Period	Due Date
Monthly or Toxicity	first day of month – last day of month	28th day of following month
Quarterly	January 1 - March 31 April 1 – June 30 July 1 – September 30 October 1 – December 31	April 28 July 28 October 28 January 28
Semiannual	January 1 – June 30 July 1 – December 31	July 28 January 28
Annual	January 1 – December 31	January 28

The permittee may submit either paper or electronic DMRs. The permittee must use the attached DMR as a template, without altering the original format or content unless approved by the Department. Completed DMRs shall be submitted to the Department's Southwest District Office at the address specified in Permit Condition I.D.14 by the twenty-eighth (28th) day of the month following the month of operation. Paper copies postmarked by the 28th meet the intent of this requirement. If submitting electronic DMRs, portable document format (pdf) is preferred. Data submitted electronically is equivalent to data submitted on signed paper DMRs only when bearing an original signature. DMRs shall be submitted for each required monitoring period including months of no discharge.

[62-620.610(18)][62-601.300(1),(2), and (3)]

11. During the period of operation authorized by this permit, reclaimed water or effluent shall be monitored annually for the primary and secondary drinking water standards contained in Chapter 62-550, F.A.C., (except for asbestos, color, and corrosivity). Twenty-four hour composite samples and grab samples where appropriate shall be used to analyze reclaimed water or effluent for the primary and secondary drinking water standards. These monitoring results shall be reported to the Department annually on the DMR under monitoring group number RWS-01. During years when a permit is not renewed, a certification stating that no new non-domestic wastewater dischargers have been added to the collection system since the last reclaimed water or effluent analysis was conducted may be submitted in lieu of the report. The annual reclaimed water or effluent analysis report or the certification shall be completed and submitted in a timely manner so as to be received by the Department by June 28 of each year. Approved analytical methods identified in Rule 62-620.100(3)(j), F.A.C., shall be used for the analysis. If no method is included for a parameter, methods specified in Chapter 62-550, F.A.C., shall be used. *[62-601.300(4)][62-601.500(3)][62-610.300(4)]*

12. The permittee shall submit an Annual Reuse Report using DEP Form 62-610.300(4)(a)2. on or before January 1 of each year. *[62-610.870(3)]*

13. The permittee shall maintain an inventory of storage systems. The inventory shall be submitted to the Department at least 30 days before reclaimed water will be introduced into any new storage system. The inventory of storage systems shall be attached to the annual submittal of the Annual Reuse Report. *[62-610.464(5)]*

14. Unless specified otherwise in this permit, all reports and other information required by this permit, including 24-hour notifications, shall be submitted to or reported to, as appropriate, the Department's Southwest District Office at the address specified below:

Florida Department of Environmental Protection
Domestic Wastewater Program
Southwest District Office
13051 N. Telecom Parkway
Temple Terrace, Florida 33637-0926
Email Address: firstname.lastname@dep.state.fl.us

Phone Number - 813-632-7600
FAX Number - 813-632-7662

All reports and other information shall be signed in accordance with the requirements of Rule 62-620.305, F.A.C. *[62-620.305]*

II. BIOSOLIDS MANAGEMENT REQUIREMENTS

1. Biosolids generated by this facility may be transferred to a Biosolids Treatment Facility (BTF) or disposed of in a Class I solid waste landfill. Transferring biosolids to an alternative biosolids treatment facility does not require a permit modification. However, use of an alternative biosolids treatment facility requires submittal of a copy of the agreement pursuant to Rule 62-640.880(1)(c), F.A.C., along with a written notification to the Department at least 30 days before transport of the biosolids. *[62-620.320(6), 62-640.880(1)(c)]*

2. The permittee shall not be held responsible for treatment and management violations that occur after its biosolids have been accepted by a permitted biosolids treatment facility with which the source facility has an agreement in accordance with subsection 62-640.880(1)(c), F.A.C., for further treatment, management, or disposal. *[62-640.880(1)(b)]*

3. Disposal of biosolids, septage, and "other solids" in a solid waste disposal facility, or disposal by placement on land for purposes other than soil conditioning or fertilization, such as at a monofill, surface impoundment, waste pile, or dedicated site, shall be in accordance with Chapter 62-701, F.A.C. *[62-640.100(6)(b) & (c)]*

4. If the permittee intends to accept biosolids from other facilities, a permit revision is required pursuant to Rule 62-640.880(2)(d), F.A.C. *[62-640.880(2)(d)]*

5. The permittee shall keep records of the quantities of biosolids generated and transferred to another facility, or landfilled. *[62-640.650(4)(a)]*

6. The treatment, management, transportation, use, land application, or disposal of biosolids shall not cause a violation of the odor prohibition in subsection 62-296.320(2), F.A.C. *[62-640.400(6)]*

7. Storage of biosolids or other solids at this facility shall be in accordance with the Facility Biosolids Storage Plan. *[62-640.300(4)]*

8. Biosolids shall not be spilled from or tracked off the treatment facility site by the hauling vehicle. *[62-640.400(9)]*

9. Florida water quality criteria and standards shall not be violated as a result of land application of biosolids from this facility. *[62-640.400(2)]*

10. The permittee shall keep hauling records to track the transport of biosolids between facilities. The hauling records shall contain the following information:

Required of Source Facility	Required of BTF
Date and Time Shipped	Date and Time Received
Amount of Biosolids Shipped	Amount of Biosolids Received
Degree of Treatment (if applicable)	Name and ID Number of Source Facility
Name and ID Number of Biosolids Management Facility or Treatment Facility	Signature of Hauler
Signature of Responsible Party at Source Facility	Signature of Responsible Party at Biosolids Treatment Facility
Signature of Hauler and Name of Hauling Firm	

These records shall be kept for five years and shall be made available for inspection upon request by the Department. A copy of the hauling records information maintained by the source facility shall be provided upon delivery of the biosolids to the biosolids treatment facility. The BTF permittee shall report to the Department within 24 hours of discovery any discrepancy in the quantity of biosolids leaving the source facility and arriving at the biosolids treatment facility. *[62-640.880(4)]*

III. GROUND WATER REQUIREMENTS

Operational Requirements

1. For the Part III Public Access system, all ground water quality criteria specified in Chapter 62-520, F.A.C., shall be met at the edge of the zone of discharge. The zone of discharge shall extend horizontally 100 feet from the application site or to user's site property line, whichever is less, and vertically to the base of the surficial aquifer. *[62-520.200(23)] [62-522.400 and 62-522.410]*

2. The ground water minimum criteria specified in Rule 62-520.400 F.A.C., shall be met within the zone of discharge. *[62-520.400 and 62-520.420(4)]*

3. During the period of operation authorized by this permit, the permittee shall sample ground water in accordance with this permit and the approved ground water monitoring plan prepared in accordance with Rule 62-522.600, F.A.C. *[62-522.600][62-610.463,]*

4. The following monitoring wells shall be sampled in accordance with the monitoring frequencies specified in Permit Condition III.5. for Reuse System R-001. Quarterly sampling must be reasonably spaced to be representative of potentially changing conditions.

Monitoring Well ID	Alternate Well Name and/or Description of Monitoring Location	Depth (Feet)	Aquifer Monitored	New or Existing
MWC-05	Capri Isles GC - 16802 (CI-1)	13	Surficial	existing
MWI-01	Capri Isles GC - 36014 (CI-2)	23	Surficial	existing
MWI-06	Capri Isles GC - 36015 (CI-3)	21	Surficial	existing
MWC-06	Capri Isles GC - (CI-4)	17.5	Surficial	existing
MWC-09	Capri Isles GC - (CI-5)	15.1	Surficial	existing
MWC-07	Capri Isles GC - (CI-1A)	15.5	Surficial	existing
MWB-02	Lake Venice GC - 36011 (MW-1A)	22	Surficial	existing
MWI-07	Lake Venice GC - 36012 (MW-3)	20	Surficial	existing
MWI-08	Lake Venice GC - 37341 (MW-8A)	22	Surficial	existing
MWC-08	Lake Venice GC - (MW-9)	15	Surficial	existing
MWB-03	Curry Creek Park - (BI-1B)	17	Surficial	existing
MWI-05	Bay Indies Subdivision - (BI-1I)	17	Surficial	existing
MWC-04	Bay Indies Subdivision - (BI-1C)	17	Surficial	existing

MWB = Background; MWI = Intermediate; MWC = Compliance

[62-522.600][62-610.463]

5. The following parameters shall be analyzed for each of the monitoring well(s) identified in Permit Condition III.4.

Parameter	Compliance Well Limit	Units	Sample Type	Monitoring Frequency
Water Level Relative to NGVD	Report	FEET	In-situ	Quarterly
Nitrogen, Nitrate, Total (as N)	10	MG/L	Grab	Quarterly
Solids, Total Dissolved (TDS)	500	MG/L	Grab	Quarterly
Arsenic, Total Recoverable	10	UG/L	Grab	Quarterly
Chloride (as Cl)	250	MG/L	Grab	Quarterly
Cadmium, Total Recoverable	5	UG/L	Grab	Quarterly
Chromium, Total Recoverable	100	UG/L	Grab	Quarterly
Lead, Total Recoverable	15	UG/L	Grab	Quarterly
Coliform, Fecal	4	#/100ML	Grab	Quarterly
pH*	6.5 to 8.5	SU	In-situ	Quarterly
Sulfate, Total	250	MG/L	Grab	Quarterly
Turbidity*	Report	NTU	In-situ	Quarterly
Sodium, Total Recoverable*	160	MG/L	Grab	Quarterly
Specific Conductance*	Report	UMHO/CM	In-situ	Quarterly
Temperature (C), Water*	Report	DEG.C	In-situ	Quarterly
Oxygen, Dissolved (DO)*	Report	MG/L	In-situ	Quarterly

*The field parameters shall be sampled per DEP–SOP-001/01, FS 2200 Ground Water Sampling and recorded, (see Figure FS 2200-2 Ground Water Purging Procedure and Form FD 9000-24, Ground Water Sampling Log). The field parameters to be reported on Part D of GW DMR shall be the last sample recorded.

[62-522.600(11)(b)] [62-601.300(3), 62-601.700, and Figure 3 of 62-601][62-601.300(6)] [62-520.300(9)]

6. If the concentration for any constituent listed in Permit Condition III. 5. in the natural background quality of the ground water is greater than the stated maximum, or in the case of pH is also less than the minimum, the representative natural background quality shall be the prevailing standard. *[62-520.420(2)]*

7. In accordance with Part D of Form 62-620.910(10), water levels shall be recorded before evacuating wells for sample collection. Elevation references shall include the top of the well casing and land surface at each well site (NGVD allowable) at a precision of plus or minus 0.1 foot. *[62-610.463(3)(a),]*

8. Ground water monitoring wells shall be purged prior to sampling to obtain representative samples. *[62-601.700(5)]*

9. Analyses shall be conducted on unfiltered samples, unless filtered samples have been approved by the Department's Southwest District Office as being more representative of ground water conditions. *[62-520.300(9)]*

10. Ground water monitoring test results shall be submitted on Part D of Form 62-620.910(10) in accordance with Permit Condition I.D.10. *[62-520.600(11)(b)] [62-601.300(3), 62.601.700, and Figure 3 of 62-601] [62-620.610(18)]*

11. For permit renewal, the permittee shall submit, to the Southwest District Office, the results of sampling monitoring wells specified in the Department-approved monitoring plan for the primary and secondary drinking water parameters included in Chapter 62-550, F.A.C., (excluding asbestos, acrylamide, Dioxin, butachlor, epichlorohydrin, pesticides, and PCBs, unless reasonably expected to be a constituent of the discharge or an artifact of the site). Sampling shall occur no sooner than 180 days before submittal of the renewal application. *[62-520.600(5)(b)]*

12. If any monitoring well becomes damaged or inoperable, the permittee shall notify the Department's Southwest District Office immediately and a detailed written report shall follow within seven days. The written report shall detail what problem has occurred and remedial measures that have been taken to prevent recurrence. All monitoring well design and replacement shall be approved by the Department's Southwest District Office prior to installation. *[62-520.600] [62-620.320(6)]*

13. All piezometers and wells that are not reasonably expected to be used are to be plugged and abandoned in accordance with the subsection 62-532.500(4), F.A.C. The permittee shall submit a written report to the Department's office that issued the permit providing verification of the plugging including the well abandonment log when available. *[62-520.600(6)(k)]*

IV. ADDITIONAL REUSE AND LAND APPLICATION REQUIREMENTS

Part III Public Access System(s) (R-001/ R-002)

1. Use of reclaimed water is authorized within the general service areas identified in Figure 1-1, titled "City of Venice Wastewater Service Area", by Malcolm Pirnie/Arcadis (Attached). The following uses of reclaimed water are authorized within this general service area: Aesthetic Purposes (decorative ponds, pools, and fountains), Athletic Complexes and Parks, Golf Course Irrigation, Golf Courses, Residential Developments, Residential Irrigation. *[62-620.630(10)(d)]*

2. This reuse system includes the following major users (i.e., using 0.1 MGD or more of reclaimed water):

User Name	User Type	Capacity (MGD)	Acreage
Lake Venice Golf Course	Golf Course Irrigation	0.41	200
Venetian Golf & River Club	Golf Course/Residential	0.40	232
Well Field Park	Park	0.27	100
Waterford Golf Course	Golf Course Irrigation	0.23	110
Capri Isles Golf Course North	Golf Course Irrigation	0.20	85
Bird Bay West Golf Course	Golf Course Irrigation	0.11	
Totals		1.62	

[62-610.800(5)][62-620.630(10)(b)]

3. New major users of reclaimed water (i.e., using 0.1 MGD or more) may be added to the reuse system using the general permit described in Rule 62-610.890, F.A.C., if the requirements in this rule are complied with. Application for use of this general permit shall be made using Form 62-610.300(4)(a)1. *[62-610.890]*

4. Cross-connections to the potable water system are prohibited. *[62-610.469(7)]*

5. A cross-connection control program shall be implemented and/or remain in effect within the areas where reclaimed water will be provided for use. *[62-610.469(7)]*

6. The permittee shall conduct inspections within the reclaimed water service area to verify proper connections, to minimize illegal cross-connections, and to verify the proper use of reclaimed water. Inspections are required when a customer first connects to the reuse distribution system. Subsequent inspections are required as specified in the cross-connection control and inspection program. *[62-610.469(7)(h)]*

7. If a cross-connection between the potable and reclaimed water systems is discovered, the permittee shall:

   a. Immediately discontinue potable water and/or reclaimed water service to the affected area.

   b. If the potable water system is contaminated, clear the potable water lines.

   c. Eliminate the cross-connection.

   d. Test the affected area for other possible cross-connections.

e. Within 24 hours, notify the Southwest District Office's domestic wastewater and drinking water programs.

f. Within 5 days of discovery of a cross-connection, submit a written report to the Department detailing: a description of the cross-connection, how the cross-connection was discovered, the exact date and time of discovery, approximate time that the cross-connection existed, the location, the cause, steps taken to eliminate the cross-connection, whether reclaimed water was consumed, and reports of possible illness, whether the drinking water system was contaminated and the steps taken to clear the drinking water system, when the cross-connection was eliminated, plan of action for testing for other possible cross-connections in the area, and an evaluation of the cross-connection control and inspection program to ensure that future cross-connections do not occur. *[62-555.350(3) and 62-555.360][62-620.610(20)]*

8. Maximum obtainable separation of reclaimed water lines and potable water lines shall be provided and the minimum separation distances specified in Rule 62-610.469(7), F.A.C., shall be provided. Reuse facilities shall be color coded or marked. Underground piping which is not manufactured of metal or concrete shall be color coded using Pantone Purple 522C using light stable colorants. Underground metal and concrete pipe shall be color coded or marked using purple as the predominant color. *[62-610.469(7)]*

9. In constructing reclaimed water distribution piping, the permittee shall maintain a 75-foot setback distance from a reclaimed water transmission facility to public water supply wells. No setback distances are required to other potable water supply wells or to any nonpotable water supply wells. *[62-610.471(3)]*

10. A setback distance of 75 feet shall be maintained between the edge of the wetted area and potable water supply wells, unless the utility adopts and enforces an ordinance prohibiting potable water supply wells within the reuse service area. No setback distances are required to any nonpotable water supply well, to any surface water, to any developed areas, or to any private swimming pools, hot tubs, spas, saunas, picnic tables, barbecue pits, or barbecue grills. *[62-610.471(1), (2), (5), and (7)]*

11. Reclaimed water shall not be used to fill swimming pools, hot tubs, or wading pools. *[62-610.469(4)]*

12. Low trajectory nozzles, or other means to minimize aerosol formation shall be used within 100 feet from outdoor public eating, drinking, or bathing facilities. *[62-610.471(6)]*

13. A setback distance of 100 feet shall be maintained from indoor aesthetic features using reclaimed water to adjacent indoor public eating and drinking facilities. *[62-610.471(8)]*

14. The public shall be notified of the use of reclaimed water. This shall be accomplished by posting of advisory signs in areas where reuse is practiced, notes on scorecards, or other methods. *[62-610.468(2)]*

15. All new advisory signs and labels on vaults, service boxes, or compartments that house hose bibbs along with all labels on hose bibbs, valves, and outlets shall bear the words "do not drink" and "no beber" along with the equivalent standard international symbol. In addition to the words "do not drink" and "no beber," advisory signs posted at storage ponds and decorative water features shall also bear the words "do not swim" and "no nadar" along with the equivalent standard international symbols. Existing advisory signs and labels shall be retrofitted, modified, or replaced in order to comply with the revised wording requirements. For existing advisory signs and labels this retrofit, modification, or replacement shall occur within 365 days after the date of this permit. For labels on existing vaults, service boxes, or compartments housing hose bibbs this retrofit, modification, or replacement shall occur within 730 days after the date of this permit. *[62-610.468 & 62-610.469]*

16. The permittee shall ensure that users of reclaimed water are informed about the origin, nature, and characteristics of reclaimed water; the manner in which reclaimed water can be safely used; and limitations on the use of reclaimed water. Notification is required at the time of initial connection to the reclaimed water distribution system and annually after the reuse system is placed into operation. A description of on-going public notification activities shall be included in the Annual Reuse Report. *[62-610.468(6)]*

17. Routine aquatic weed control and regular maintenance of storage pond embankments and access areas are required. *[62-610.414 & 62-610.464]*

18. Overflows from emergency discharge facilities on storage ponds shall be reported as an abnormal event to the Department's Southwest District Office within 24 hours of an occurrence. The provisions of Rule 62-610.800(9), F.A.C., shall be met. *[62-610.800(9)]*

V. OPERATION AND MAINTENANCE REQUIREMENTS

1. During the period of operation authorized by this permit, the wastewater facilities shall be operated under the supervision of an operator certified in accordance with Chapter 62-602, F.A.C. In accordance with Chapter 62-699, F.A.C., this facility is a Category I, Class A facility and, at a minimum, operators with appropriate certification must be on the site as follows:

   A Class C or higher operator 24 hours/day for 7 days/week. The lead operator must be a Class A.

   [62-620.630(3)] [62-699.310] [62-610.462]

2. The lead operator shall be employed at the plant full time. "Full time" shall mean at least 4 days per week, working a minimum of 35 hours per week, including leave time. A certified operator shall be on-site and in charge of each required shift and for periods of required staffing time when the lead operator is not on-site. An operator meeting the lead operator classification level of the plant shall be available during all periods of plant operation. "Available" means able to be contacted as needed to initiate the appropriate action in a timely manner. *[62-699.311(10), (5) and (1)]*

3. The application to renew this permit shall include an updated capacity analysis report prepared in accordance with Rule 62-600.405, F.A.C. *[62-600.405(5)]*

4. The application to renew this permit shall include a detailed operation and maintenance performance report prepared in accordance with Rule 62-600.735, F.A.C. *[62-600.735(1)]*

5. The permittee shall maintain the following records and make them available for inspection on the site of the permitted facility:

   a. Records of all compliance monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation and a copy of the laboratory certification showing the certification number of the laboratory, for at least three years from the date the sample or measurement was taken;

   b. Copies of all reports required by the permit for at least three years from the date the report was prepared;

   c. Records of all data, including reports and documents, used to complete the application for the permit for at least three years from the date the application was filed;

   d. Monitoring information, including a copy of the laboratory certification showing the laboratory certification number, related to the residuals use and disposal activities for the time period set forth in Chapter 62-640, F.A.C., for at least three years from the date of sampling or measurement;

   e. A copy of the current permit;

   f. A copy of the current operation and maintenance manual as required by Chapter 62-600,. F.A.C.;

   g. A copy of the facility record drawings;

   h. Copies of the licenses of the current certified operators; and

   i. Copies of the logs and schedules showing plant operations and equipment maintenance for three years from the date of the logs or schedules. The logs shall, at a minimum, include identification of the plant; the signature and certification number of the operator(s) and the signature of the person(s) making any entries; date and time in and out; specific operation and maintenance activities; tests performed and samples taken; and major repairs

made. The logs shall be maintained on-site in a location accessible to 24-hour inspection, protected from weather damage, and current to the last operation and maintenance performed.

j. Records of biosolids quantities, treatment, monitoring, and hauling for at least five years.

[62-620.350]

VI. SCHEDULES

Section VI is not applicable to this facility.

VII. INDUSTRIAL PRETREATMENT PROGRAM REQUIREMENTS

This facility is not required to have a pretreatment program at this time. *[62-625.500]*

VIII. OTHER SPECIFIC CONDITIONS

1. The permittee shall apply for renewal of this permit at least 180 days before the expiration date of the permit using the appropriate forms listed in Rule 62-620.910, F.A.C., including submittal of the appropriate processing fee set forth in Rule 62-4.050, F.A.C. The existing permit shall not expire until the Department has taken final action on the application renewal in accordance with the provisions of 62-620.335(3) and (4), F.A.C. *[62-620.335(1)-(4)]*

2. Florida water quality criteria and standards shall not be violated as a result of any discharge or land application of reclaimed water or residuals from this facility. *[62-620.320(9) and 62-302.500(2)(e)][62-610.850(1)(a) and (2)(a)]*

3. In the event that the treatment facilities or equipment no longer function as intended, are no longer safe in terms of public health and safety, or odor, noise, aerosol drift, or lighting adversely affects neighboring developed areas at the levels prohibited by Rule 62-600.400(2)(a), F.A.C., corrective action (which may include additional maintenance or modifications of the permitted facilities) shall be taken by the permittee. Other corrective action may be required to ensure compliance with rules of the Department. Additionally, the treatment, management, use or land application of residuals shall not cause a violation of the odor prohibition in Rule 62-296.320(2), F.A.C. *[62-600.410(8) and 62-640.400(6)]*

4. The deliberate introduction of stormwater in any amount into collection/transmission systems designed solely for the introduction (and conveyance) of domestic/industrial wastewater; or the deliberate introduction of stormwater into collection/transmission systems designed for the introduction or conveyance of combinations of storm and domestic/industrial wastewater in amounts which may reduce the efficiency of pollutant removal by the treatment plant is prohibited, except as provided by Rule 62-610.472, F.A.C. *[62-604.130(4)]*

5. Collection/transmission system overflows shall be reported to the Department in accordance with Permit Condition IX. 20. *[62-604.550] [62-620.610(20)]*

6. The operating authority of a collection/transmission system and the permittee of a treatment plant are prohibited from accepting connections of wastewater discharges which have not received necessary pretreatment or which contain materials or pollutants (other than normal domestic wastewater constituents):

   a. Which may cause fire or explosion hazards; or

   b. Which may cause excessive corrosion or other deterioration of wastewater facilities due to chemical action or pH levels; or

   c. Which are solid or viscous and obstruct flow or otherwise interfere with wastewater facility operations or treatment; or

   d. Which result in the wastewater temperature at the introduction of the treatment plant exceeding 40°C or otherwise inhibiting treatment; or

e. Which result in the presence of toxic gases, vapors, or fumes that may cause worker health or safety problems.

[62-604.130(5)]

7. The treatment facility, storage ponds, rapid infiltration basins, and/or infiltration trenches shall be enclosed with a fence or otherwise provided with features to discourage the entry of animals and unauthorized persons. *[62-600.400(2)(b)]*

8. Screenings and grit removed from the wastewater facilities shall be collected in suitable containers and hauled to a Department approved Class I landfill or to a landfill approved by the Department for receipt/disposal of screenings and grit. *[62-701.300(1)(a)]*

9. The permittee shall provide verbal notice to the Department as soon as practical after discovery of a sinkhole within an area for the management or application of wastewater, wastewater residuals (sludges), or reclaimed water. The permittee shall immediately implement measures appropriate to control the entry of contaminants, and shall detail these measures to the Department in a written report within seven days of the sinkhole discovery. *[62-4.070(3)]*

10. The permittee shall provide adequate notice to the Department of the following:

    a. Any new introduction of pollutants into the facility from an industrial discharger which would be subject to Chapter 403, F.S., and the requirements of Chapter 62-620, F.A.C. if it were directly discharging those pollutants; and

    b. Any substantial change in the volume or character of pollutants being introduced into that facility by a source which was identified in the permit application and known to be discharging at the time the permit was issued.

    Adequate notice shall include information on the quality and quantity of effluent introduced into the facility and any anticipated impact of the change on the quantity or quality of effluent or reclaimed water to be discharged from the facility.

    [62-620.625(2)]

IX. GENERAL CONDITIONS

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit are binding and enforceable pursuant to Chapter 403, Florida Statutes. Any permit noncompliance constitutes a violation of Chapter 403, Florida Statutes, and is grounds for enforcement action, permit termination, permit revocation and reissuance, or permit revision. *[62-620.610(1)]*

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviations from the approved drawings, exhibits, specifications or conditions of this permit constitutes grounds for revocation and enforcement action by the Department. *[62-620.610(2)]*

3. As provided in subsection 403.087(7), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor authorize any infringement of federal, state, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit or authorization that may be required for other aspects of the total project which are not addressed in this permit. *[62-620.610(3)]*

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title. *[62-620.610(4)]*

5. This permit does not relieve the permittee from liability and penalties for harm or injury to human health or welfare, animal or plant life, or property caused by the construction or operation of this permitted source; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department. The permittee shall take all reasonable steps to minimize or prevent any discharge,

reuse of reclaimed water, or residuals use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. *[62-620.610(5)]*

6. If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee shall apply for and obtain a new permit. *[62-620.610(6)]*

7. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control, and related appurtenances, that are installed and used by the permittee to achieve compliance with the conditions of this permit. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to maintain or achieve compliance with the conditions of the permit. *[62-620.610(7)]*

8. This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit revision, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition. *[62-620.610(8)]*

9. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, including an authorized representative of the Department and authorized EPA personnel, when applicable, upon presentation of credentials or other documents as may be required by law, and at reasonable times, depending upon the nature of the concern being investigated, to:

   a. Enter upon the permittee's premises where a regulated facility, system, or activity is located or conducted, or where records shall be kept under the conditions of this permit;

   b. Have access to and copy any records that shall be kept under the conditions of this permit;

   c. Inspect the facilities, equipment, practices, or operations regulated or required under this permit; and

   d. Sample or monitor any substances or parameters at any location necessary to assure compliance with this permit or Department rules.

   [62-620.610(9)]

10. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data, and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except as such use is proscribed by Section 403.111, Florida Statutes, or Rule 62-620.302, Florida Administrative Code. Such evidence shall only be used to the extent that it is consistent with the Florida Rules of Civil Procedure and applicable evidentiary rules. *[62-620.610(10)]*

11. When requested by the Department, the permittee shall within a reasonable time provide any information required by law which is needed to determine whether there is cause for revising, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also provide to the Department upon request copies of records required by this permit to be kept. If the permittee becomes aware of relevant facts that were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be promptly submitted or corrections promptly reported to the Department. *[62-620.610(11)]*

12. Unless specifically stated otherwise in Department rules, the permittee, in accepting this permit, agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 62-302.500, F.A.C., shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard. *[62-620.610(12)]*

13. The permittee, in accepting this permit, agrees to pay the applicable regulatory program and surveillance fee in accordance with Rule 62-4.052, F.A.C. *[62-620.610(13)]*

14. This permit is transferable only upon Department approval in accordance with Rule 62-620.340, F.A.C. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department. *[62-620.610(14)]*

15. The permittee shall give the Department written notice at least 60 days before inactivation or abandonment of a wastewater facility and shall specify what steps will be taken to safeguard public health and safety during and following inactivation or abandonment. *[62-620.610(15)]*

16. The permittee shall apply for a revision to the Department permit in accordance with Rules 62-620.300 and the Department of Environmental Protection Guide to Wastewater Permitting at least 90 days before construction of any planned substantial modifications to the permitted facility is to commence or with Rule 62-620.325(2) for minor modifications to the permitted facility. A revised permit shall be obtained before construction begins except as provided in Rule 62-620.300, F.A.C. *[62-620.610(16)]*

17. The permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. The permittee shall be responsible for any and all damages which may result from the changes and may be subject to enforcement action by the Department for penalties or revocation of this permit. The notice shall include the following information:

    a. A description of the anticipated noncompliance;

    b. The period of the anticipated noncompliance, including dates and times; and

    c. Steps being taken to prevent future occurrence of the noncompliance.

    [62-620.610(17)]

18. Sampling and monitoring data shall be collected and analyzed in accordance with Rule 62-4.246, Chapters 62-160 and 62-601, F.A.C., and 40 CFR 136, as appropriate.

    a. Monitoring results shall be reported at the intervals specified elsewhere in this permit and shall be reported on a Discharge Monitoring Report (DMR), DEP Form 62-620.910(10), or as specified elsewhere in the permit.

    b. If the permittee monitors any contaminant more frequently than required by the permit, using Department approved test procedures, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.

    c. Calculations for all limitations which require averaging of measurements shall use an arithmetic mean unless otherwise specified in this permit.

    d. Except as specifically provided in Rule 62-160.300, F.A.C., any laboratory test required by this permit shall be performed by a laboratory that has been certified by the Department of Health Environmental Laboratory Certification Program (DOH ELCP). Such certification shall be for the matrix, test method and analyte(s) being measured to comply with this permit. For domestic wastewater facilities, testing for parameters listed in Rule 62-160.300(4), F.A.C., shall be conducted under the direction of a certified operator.

    e. Field activities including on-site tests and sample collection shall follow the applicable standard operating procedures described in DEP-SOP-001/01 adopted by reference in Chapter 62-160, F.A.C.

    f. Alternate field procedures and laboratory methods may be used where they have been approved in accordance with Rules 62-160.220 and 62-160.330, F.A.C.

    [62-620.610(18)]

19. Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule detailed elsewhere in this permit shall be submitted no later than 14 days following each schedule date. *[62-620.610(19)]*

20. The permittee shall report to the Department any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five days of the time the permittee becomes aware of the circumstances. The written submission shall contain: a description of the noncompliance and its cause; the period of noncompliance including exact dates and time, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

    a. The following shall be included as information which must be reported within 24 hours under this condition:

        1. Any unanticipated bypass which causes any reclaimed water or effluent to exceed any permit limitation or results in an unpermitted discharge,

        2. Any upset which causes any reclaimed water or the effluent to exceed any limitation in the permit,

        3. Violation of a maximum daily discharge limitation for any of the pollutants specifically listed in the permit for such notice, and

        4. Any unauthorized discharge to surface or ground waters.

    b. Oral reports as required by this subsection shall be provided as follows:

        1. For unauthorized releases or spills of treated or untreated wastewater reported pursuant to subparagraph a.4 that are in excess of 1,000 gallons per incident, or where information indicates that public health or the environment will be endangered, oral reports shall be provided to the Department by calling the **STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519**, as soon as practical, but no later than 24 hours from the time the permittee becomes aware of the discharge. The permittee, to the extent known, shall provide the following information to the State Warning Point:

            a) Name, address, and telephone number of person reporting;

            b) Name, address, and telephone number of permittee or responsible person for the discharge;

            c) Date and time of the discharge and status of discharge (ongoing or ceased);

            d) Characteristics of the wastewater spilled or released (untreated or treated, industrial or domestic wastewater);

            e) Estimated amount of the discharge;

            f) Location or address of the discharge;

            g) Source and cause of the discharge;

            h) Whether the discharge was contained on-site, and cleanup actions taken to date;

            i) Description of area affected by the discharge, including name of water body affected, if any; and

            j) Other persons or agencies contacted.

        2. Oral reports, not otherwise required to be provided pursuant to subparagraph b.1 above, shall be provided to the Department within 24 hours from the time the permittee becomes aware of the circumstances.

    c. If the oral report has been received within 24 hours, the noncompliance has been corrected, and the noncompliance did not endanger health or the environment, the Department shall waive the written report.

[62-620.610(20)]

21. The permittee shall report all instances of noncompliance not reported under Permit Conditions IX. 17., 18. and 19. of this permit at the time monitoring reports are submitted. This report shall contain the same information required by Permit Condition IX. 20 of this permit. *[62-620.610(21)]*

22. Bypass Provisions

    a. Bypass is prohibited, and the Department may take enforcement action against a permittee for bypass, unless the permittee affirmatively demonstrates that:

        1. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and

        2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

        3. The permittee submitted notices as required under Permit Condition IX. 22. b. of this permit.

    b. If the permittee knows in advance of the need for a bypass, it shall submit prior notice to the Department, if possible at least 10 days before the date of the bypass. The permittee shall submit notice of an unanticipated bypass within 24 hours of learning about the bypass as required in Permit Condition IX. 20. of this permit. A notice shall include a description of the bypass and its cause; the period of the bypass, including exact dates and times; if the bypass has not been corrected, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent recurrence of the bypass.

    c. The Department shall approve an anticipated bypass, after considering its adverse effect, if the permittee demonstrates that it will meet the three conditions listed in Permit Condition IX. 22. a. 1. through 3. of this permit.

    d. A permittee may allow any bypass to occur which does not cause reclaimed water or effluent limitations to be exceeded if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Permit Condition IX. 22. a. through c. of this permit.

    [62-620.610(22)]

23. Upset Provisions

    a. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed contemporaneous operating logs, or other relevant evidence that:

        1. An upset occurred and that the permittee can identify the cause(s) of the upset;

        2. The permitted facility was at the time being properly operated;

        3. The permittee submitted notice of the upset as required in Permit Condition IX. 20. of this permit; and

        4. The permittee complied with any remedial measures required under Permit Condition IX. 5. of this permit.

    b. In any enforcement proceeding, the burden of proof for establishing the occurrence of an upset rests with the permittee.

    c. Before an enforcement proceeding is instituted, no representation made during the Department review of a claim that noncompliance was caused by an upset is final agency action subject to judicial review.

    [62-620.610(23)

Executed in Hillsborough County, Florida.

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Jeffrey S. Greenwell, P.E.
Water Facilities Administrator
Southwest District

APPENDIX D

Algae Identification and Enumeration

McKim & Creed Algal ID and Enumeration Report

Prepared: December 31, 2012
Prepared By: GreenWater Laboratories

Project No.: 5883-0003 (City of Venice Lake Filtration)

Samples: 2 (Collected on 12/10/12)

1. Lake Return Pump Station
2. NW Corner of Storage Pond

Sample 1: Lake Return Pump Station

Total cell numbers in the Lake Return Pump Station sample collected on 12/10/12 were 654,424 cells/mL. Blue-green algae (Cyanobacteria; 623,544 cells/mL) were the dominant algal group in the sample accounting for 95.3% of total cell numbers. Other algal groups in the sample were diatoms (Bacillariophyta; 3,848 cells/mL), green algae (Chlorophyta; 5,433 cells/mL), microflagellates (Miscellaneous; 196 cells/mL) and yellow-green algae (Xanthophyta; 21,402 cells/mL). The most abundant species was the colonial cyanophyte *Microcystis protocystis* (595,328 cells/mL; Figs. 1-2). A total of 30 species were observed in the sample with green algae and blue-green algae the most diverse algal groups with 13 and 11 taxa observed respectively.

Total numbers of potentially toxigenic cyanobacteria (PTOX Cyano) were 596,841 cells/mL (91.2% of total cell numbers). PTOX Cyano species present included *Microcystis protocystis* (595,328 cells/mL), *Microcystis botrys* (1,485 cells/mL) and *Microcystis wesenbergii* (28 cells/mL).

Sample 2: NW Corner of Storage Pond

Total cell numbers in the NW Corner of Storage Pond sample collected on 12/10/12 were 364,857 cells/mL. Blue-green algae (Cyanobacteria; 323,294 cells/mL) were the dominant algal group in the sample accounting for 88.6% of total cell numbers. Other algal groups in the sample were diatoms (Bacillariophyta; 4,163 cells/mL), green algae (Chlorophyta; 8,812 cells/mL), microflagellates (Miscellaneous; 157 cells/mL) and yellow-green algae (Xanthophyta; 28,431 cells/mL). The most abundant species was the colonial cyanophyte *Microcystis protocystis* (265,934 cells/mL). A total of 34 species were observed in the sample with green algae and blue-green algae the most diverse algal groups with 15 and 13 taxa observed respectively.

Total numbers of potentially toxigenic cyanobacteria (PTOX Cyano) were 267,767 cells/mL (73.4% of total cell numbers). PTOX Cyano species present included *Microcystis protocystis* (265,934 cells/mL), *Microcystis botrys* (1,563 cells/mL) and *Microcystis wesenbergii* (270 cells/mL).

Fig. 1 *Microcystis protocystis* 100X (scale bar = 100µm)

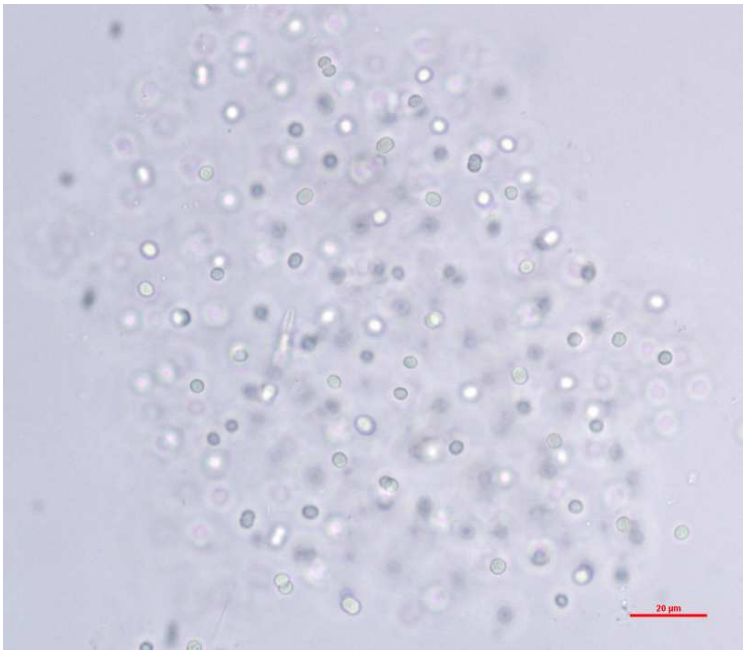
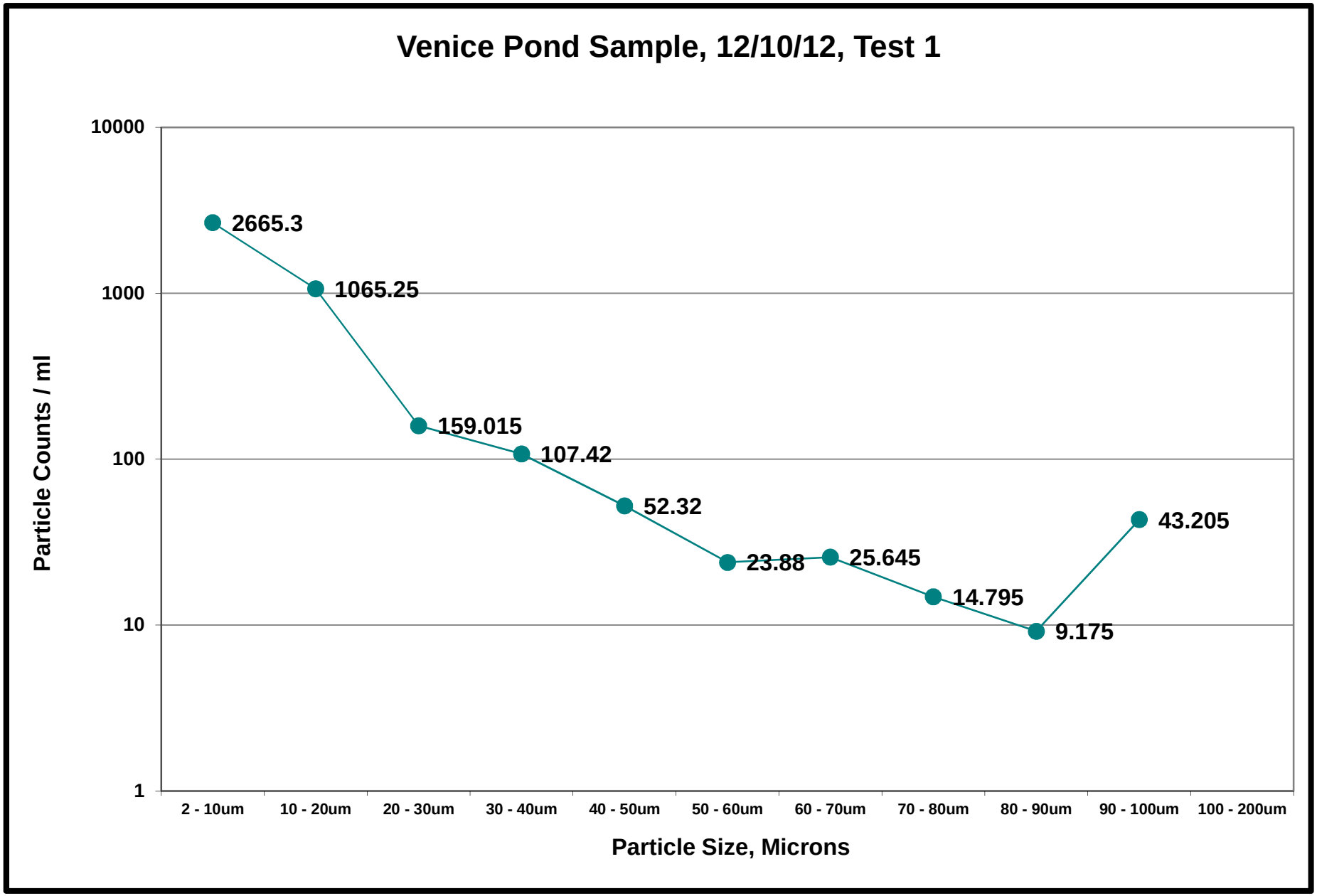
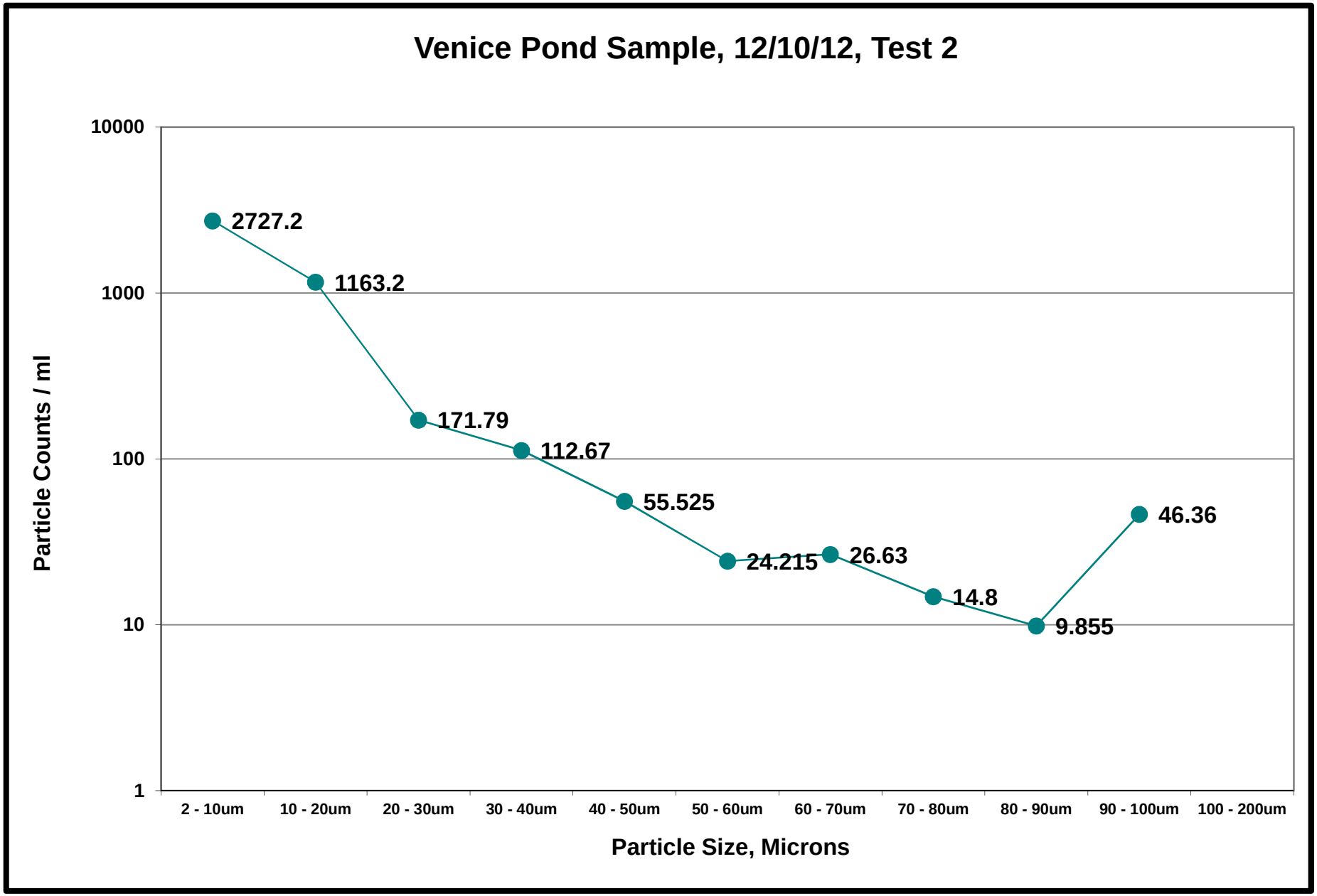


Fig. 2 *Microcystis protocystis* 400X (scale bar = 20µm)

APPENDIX E

Particle Size Distribution Analysis


Venice Pond Sample, 12/10/12, Test 1
Particle Counts / ml
10000
1000
100
10
1
2665.3
1065.25
159.015
107.42
52.32
23.88
25.645
14.795
9.175
43.205
2 - 10um
10 - 20um
20 - 30um
30 - 40um
40 - 50um
50 - 60um
60 - 70um
70 - 80um
80 - 90um
90 - 100um
100 - 200um
Particle Size, Microns


Venice Pond Sample, 12/10/12, Test 2
Particle Counts / ml
10000
1000
100
10
1
2727.2
1163.2
171.79
112.67
55.525
24.215
26.63
14.8
9.855
46.36
2 - 10um
10 - 20um
20 - 30um
30 - 40um
40 - 50um
50 - 60um
60 - 70um
70 - 80um
80 - 90um
90 - 100um
100 - 200um
Particle Size, Microns

APPENDIX F

Equipment Cut Sheets

TROJAN TECHNOLOGIES SALSNES FILTER

Advanced Primary Treatment

SALSNES FILTER

The Salsnes Filter can relieve primary treatment burden at municipal and industrial wastewater treatment plants in a very small footprint, saving major infrastructure investment and space. Salsnes Filters are compact, completely covered systems which are easy to maintain. Screenings dewatering and odor containment are integrated parts of the machine.

The Salsnes Filter removes organic and inorganic solids as fine as 15-30 micron. It removes high percentages of TSS and particulate BOD in wastewater. For most municipal applications, this means removal of 40-70% TSS and 30% BOD.

The Salsnes Filter cost-effectively reduces the organic load on downstream processes. Reduced load means more capacity in existing plants and smaller downstream processes (with resulting cost savings) in new plants.

When compared with sedimentation as primary sewage treatment, the Salsnes Filter typically requires less than 50% of the capital investment and less than 10% of the footprint.

Salsnes capacities range from 5000 GPD to 10 MGD+

Applications

With over 240 installations as of 2007, the Salsnes Filter has been used effectively for:

- Primary Wastewater Treatment
- Membrane Pretreatment
- Fishing Industry
- Food / Dairy Industry
- Pulp and Paper Industry
- Hog Manure Dewatering
- Poultry Rendering Facilities

How it works

The Salsnes Filter removes solids on a continuous-loop fine mesh screen. As the screen moves, it carries solids out of the flow and drops them into a hopper. An auger press dewaters the collected screenings while screened wastewater flows through the unit.

As the screen rotates, a patented air-blower system forces the retained screenings off the mesh and into the screenings hopper, virtually eliminating solids carry-over. Additionally, a patented hot water wash periodically removes any grease or other solids that may adhere to the mesh.

Superior Performance
Removal of 40-70% TSS and 30% BOD

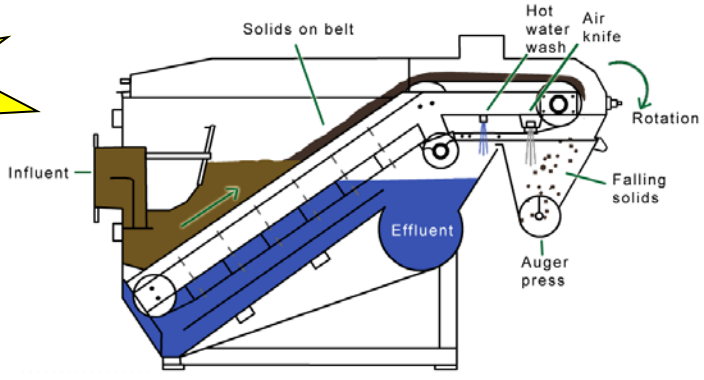
Self-Cleaning Operation
Patented air cleaning system

Cost-Effective
Small footprint, low capital cost, low maintenance

Screenings Dewatering
25-40% solids in dewatered screenings

Effective Environmental Solution
Compact and efficient solution reduces the impact on the environment

Scum thickening too!



Salsnes Operation Diagram

BLUE WATER TECHNOLOGIES INC

For more information, please contact Blue Water:

Blue Water for a Green World®

(888) 710-2583, sales@blueh2o.net, www.blueh2o.net

BLUE WATER TECHNOLOGIES, INC.

The Salsnes Filter can remove solids as fine as 15-30 microns. The mesh size can be varied depending on the application.

The screen is cleaned as it moves along the conveyor. The solids drop into a hopper. An optional hot water wash cleans grease and oil.

In the hopper, a screw press dewaters the solids to a cake with up to 40% solids.

The dewatered screenings will pass the Paint Filter Test. They are generally suitable for land filling; they have also been used as fuel for cogeneration.

Salsnes supplies standard equipment ranging in sizes suitable for small communities to large cities. There is no limitation in flow capacity designs. The Salsnes Filter is available in four unique models which can be customized for varying capacities, with up to 3.7 MGD in a single unit.

Salsnes Filter Capacities & Dimensions

Data	Model #			
	SF 1000[1]	**SF 2000**	**SF 4000**	**SF 6000**
Flow Range[2]	0.23-0.48 MGD	0.43-0.93 MGD	0.88-1.87 MGD	1.73-3.76 MGD
TSS Removal Efficiency	40-70%			
Cake Solids %	25-40%			
Length	48”	74”	91”	102”
Width	42”	64”	85”	107”
Height	51”	52”	52”	65”
Weight	850 lbs	1050 lbs	1275 lbs	1600 lbs

(1) Model SF1000 has an integral air blower within the filter enclosure.
(2) Capacities shown are based on municipal sewage of 250 mg/L TSS using a 350 micron screen. The capacity is significantly higher on diluted wastewater.

See the video of a Salsnes Filter in action at www.blueh2o.net/salsnes.

Contact your Blue Water Representative to:

- obtain a third-party engineering report on Salsnes Filter performance,
- learn more about how the Salsnes Filter solution may fit into a specific plant,
- arrange a pilot demonstration at a plant.

Blue Water is proud to offer a broad platform of water treatment technologies, from primary wastewater treatment to advanced effluent polishing steps to environmental remediation processes. We strive to meet our customers’ needs cost-effectively, considering both capital expense and ongoing operations and maintenance costs. Additionally, we keep an eye on the future by looking for sustainability in our technologies, including environmentally friendly materials and energy conservation.

Blue Water for a Green World®

BLUE WATER TECHNOLOGIES ECOMAT FILTER

ADVANCED PRIMARY TREATMENT

Eco MAT™

Advanced Phosphorus Removal

Blue Water Technologies, Inc. is the industry leader in delivering wastewater solutions in both municipal and industrial applications. Specializing in water treatment to compliance for discharge including trace metals and low-level nutrients, Blue Water is committed to development of processes to satisfy the challenging needs of customers around the world. As an integral piece to wastewater treatment processes Blue Water provides the most advanced primary treatment and solids recovery option available, the Eco MAT™ rotating belt filter (RBF).

Eco MAT™ RBF installation sites are supplied with a process that integrates decades of process improvement and Blue Water's own design enhancements from years of experience delivering rotating belt filters to the North American market. Blue Water integrates proprietary control systems and ancillary equipment designed to complement the Eco MAT™ RBF, delivering a solution that saves our customer's time, space and money.

Industrial screenings applications are equally appropriate for the Eco MAT™ RBF. Blue Water has successfully proven the reliability of this technology in multiple industrial applications.

1.5 MGD Plant, Eco MAT Model EM-15

Applications

The Eco MAT Rotating Belt Filter can be effectively used for:

- Primary Wastewater Treatment
- Membrane Pretreatment
- Agriculture
- Aquaculture
- Dairy Industry
- Grit Removal
- Pulp and Paper Industry
- Poultry
- Beef
- Textiles
- Tanneries
- Sludge & Scum Thickening
- Fruit and Vegetable Processing

Engineers around the world have found rotating belt filters to be an efficient and economical solution to a variety of wastewater challenges dueto its small footprint and its flexibility to be arranged in multiple configurations. In new municipal wastewater plants, the Eco MAT™ RBF replaces traditional primary clarification. In existing plants, these filters can be integrated to expand primary clarification, relieve solids and BOD loading to the secondary system, or provide treatment for combined sewer overflow (CSO). Engineers have maximized the use of existing infrastructure while expanding plant capacities by installing the Eco MAT™ RBF and thus reallocating the capacity of traditional clarifiers to the secondary system. Contact your Blue Water Sales Representative today for case studies.

- **Superior Performance**
- **30-70% TSS and 20-40% BOD reduction**
- **Fully automated, Self-cleaning**
- **Patent-pending cleaning system**
- **1/10 the footprint of traditional clarification**
- **1/5 the life-cycle cost**
- **Integrated Dewatering**
- **20-40% solids dewatered in screenings**

BLUE WATER TECHNOLOGIES

For more information, please contact **Blue Water**:
888.710.2583 | sales@blueh2o.net | www.bluewater-technologies.com

How It Works

The Eco MAT™ RBF removes solids through the use of a continuous-loop fine mesh belt screen. As the screen moves it acts like a conveyer and carries solids out of the incoming wastewater. A patent-pending cleaning system discharges the solids from the belt screen and deposits them into the screenings hopper, virtually eliminating any solids carry-over. Periodic hot-water flushes further clean the belt screen by removing oil and grease that may accumulate over time. A screw press dewaters the collected screenings between 20-40% dry solids while screened wastewater continuously passes through the unit.

The Eco MAT™ RBF removes between 40-70% TSS and 20-40% BOD from wastewater and the unique design allows for removal of organic and inorganic solids as fine as 15-30 micron. The Eco MAT™ RBF units are compact, completely enclosed low-maintenance solutions for wastewater. The integral odor containment of the design allows for indoor installation in a clean environment, and the Eco MAT™ filter was designed for food-grade compatible maintenance in an FDA regulated environment. Blue Water offers additional equipment for conveyance, dewatering, and bio-solids reuse as applications require.

1.0 MGD wastewater treatment plant, plant retro-fit.

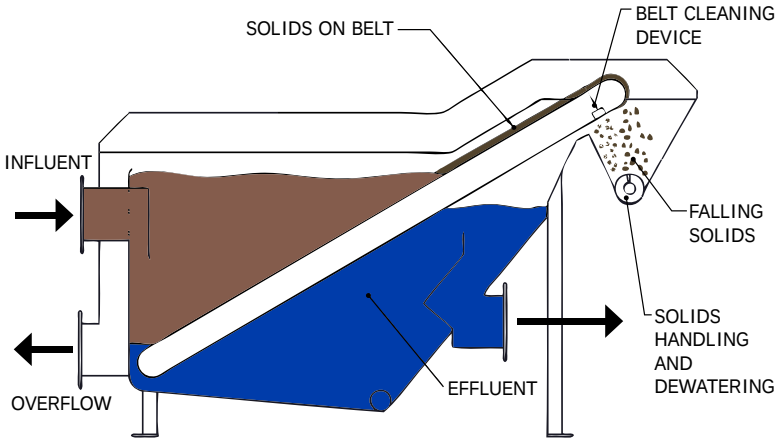
Blue Water supplies standard equipment ranging in sizes suitable for small communities to large cities. There is no limitation in flow capacity designs. The Eco MAT™ RBF is available in three unique models that can be customized for varying capacities and redundancy, facilitating treatment in excess of 3 MGD (11,400 m3/day) in a single unit. Blue Water also provides the duplex unit designs for redundancy, as well as cartridge units for channel mounting that can be more economical for plants treating 20 to 100+ MGD.

Eco MAT™ (RBF) Capacities & Dimensions

Model	Flow (gpm)	Flow (MGD)	Length (In.)	Width (In.)	Height (In.)
EM-3	347	0.50	62	55	60
EM-10	695	1.00	105	87	65
EM-15	1181	1.70	129	80	77
EM-30	2361	3.40	129	121	77

The solids drop into a hopper and the screen is cleaned as it moves past the rollers. Optional hot water wash cleans oil and grease.

Dewatering screens pass paint filter test. Generally suitable for land filling.



Eco MAT™ RBF Operation Diagram

BLUE WATER TECHNOLOGIES

For more information, please contact **Blue Water**:
888.710.2583 | sales@blueh2o.net | www.bluewater-technologies.com

Manufacturer's representative:

NOVA WATER TECHNOLOGIES ULTRASCREEN MICROFILTER

nova water technologies

Pure Innovation.™

The Ultrascreen® Microfilter

The Ultrascreen® Microfilter (U.S. Patent No. 6,500,331) uses the patented concept of "dynamic-tangential filtration," an innovative approach to applying disk filters for tertiary treatment. This concept easily integrates into existing wastewater treatment plants without requiring changes to your current process or any special civil work. The Ultrascreen® Microfilter comes standard with all wetted parts in AISI 304 or 316 stainless steel construction. The covers are made of durable and lightweight polyethylene to facilitate operation and maintenance.

"Dynamic-tangential filtration" is made possible by disks that continuously rotate, presenting a fresh filtration surface to the incoming flow at all times. The flow through the openings in the media occurs at angles less than 90 degrees, which when combined with the rotational speed of the disks, makes the openings in the mesh functionally smaller than when they are standing still. This is analogous to trying to throw a snow ball through an open window of a moving car. The faster the car moves, the harder it is for the smaller solid, the snowball, to pass through the larger opening. Refer to Figure No.1.

As the disks rotate, a layer of biomass accumulates on the surface of the AISI 304 stainless steel mesh and strains out increasingly finer solids. When the influent level in the feed box rises to a preset limit, a sensor actuates operation of the backwash pump. Each disk has a dedicated spray header for efficient washing. The wash water from each set of disks is collected in a common 304 stainless steel trough and exits the filter through a stainless steel drain, for return to the head of the plant or to the biological process.

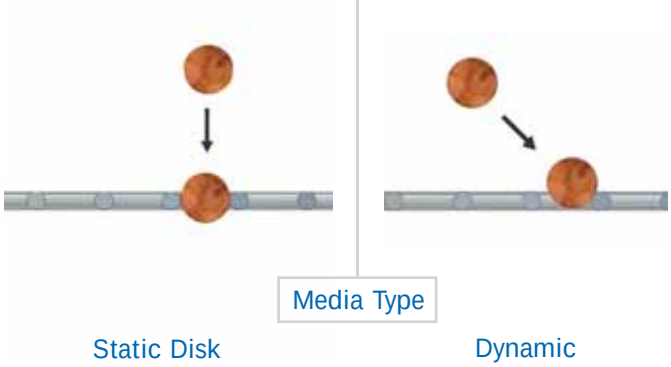
The Ultrascreen® uses woven stainless steel as a filtration medium thus eliminating the need to change filter cloths. The stainless steel weave also allows the Ultrascreen® to handle higher hydrostatic heads (see Figure No. 2), which translates to more efficient use of the total available filtering surface lowering your overall footprint.

As shown in Figure No. 3, the feed to the filter is introduced into the middle of each "disk." As each disk is split in two halves, the internals of the filter are easily accessible if service is required. The flow passes through the disks from the inside-out and the filtered water free-falls into the collection well and exits the outlet pipe. The periphery of each disk is sealed with flexible seals, which form a positive mechanical barrier and prevents the filtered effluent from mixing with the dirty influent. Effluent integrity is assured!

Another benefit of the Ultrascreen® is performance optimization. Speed, wash cycle timing, and the level of fluid in the feed zone are all variable. The Ultrascreen® is therefore the right choice for all types of treatment plants and operating conditions. Performance optimization like this is not possible with static disk filters.

Figure No. 1

Typical Influent Particle



Figures No. 2 & 3

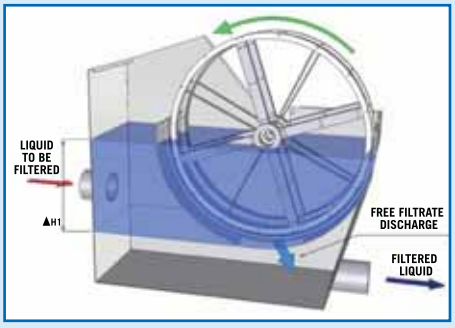


Figure No. 2

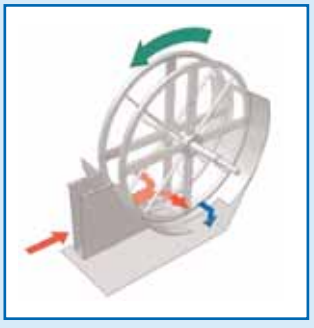


Figure No. 3

The Ultrascreen® Microfilter

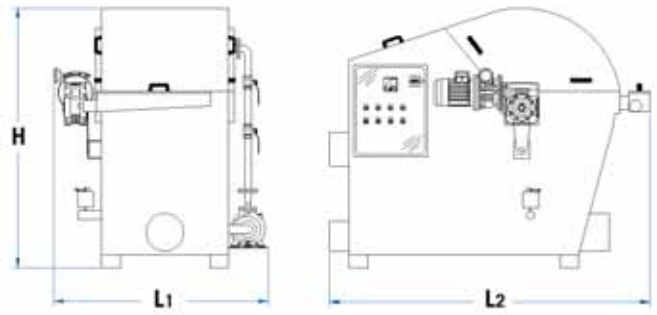
Unique Features

- Dynamic-tangential filtration
- Stainless steel filter media
- Continuously rotating disks
- All stainless steel construction
- Variable speed

Benefits

- Finer filtration with larger openings
- No cloths to replace
- Loading Rates as high as 12-15 gpm/sq.ft.
- Longer life with low maintenance
- Flexible operation
- Reject rates as low as 0.1-0.5% of the feed

Figure No. 4 - Refer to chart below



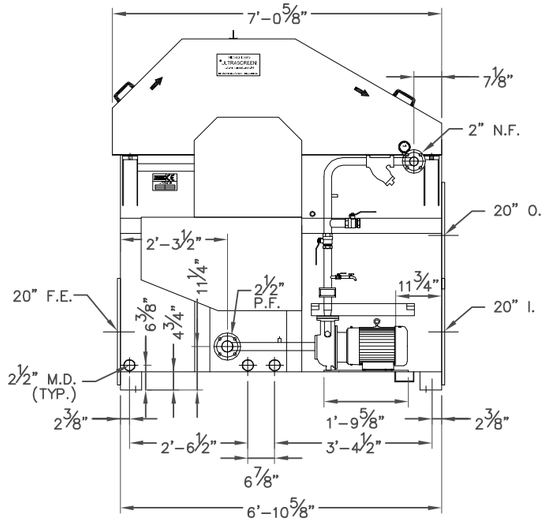
MODEL	H	L1	L2	INSTALLED HORSEPOWER		WEIGHT		TYPICAL FLOWRATES, gpm	
	Ft.	Ft.	Ft.	Filter	Wash Pump	Empty Lbs.	Operating Lbs.	Avg.	Peak
UL 1001	4'11"	3'5"	6'1"	1	2	900	2000	102	204
UL 1351	6'2"	4'0"	7'9"	2	2	1540	3685	186	372
UL 1601	7'0"	4'7"	8'7"	3	5	2090	6160	264	528
UL 1352	6'2"	6'0"	7'9"	3	2	2080	4970	377	744
UL 1602	7'0"	6'4"	8'7"	5	5	3300	9020	528	1056
UL 1603	7'0"	8'1"	8'7"	5	7.5	4950	13860	792	1584
UL 1604	7'0"	10'1"	8'7"	7.5	7.5	5500	15400	1050	2100
UL 1605	7'0"	12'1"	8'7"	7.5	7.5	6050	16500	1320	2640
UL 1606	7'0"	13'0"	8'7"	10	7.5	6600	17600	1578	3156

Note: All dimensions are approximate. Flowrates are based on a typical activated sludge process.

NUOVE ENERGIE® s.r.l.
Macchine e Tecnologie per la Depurazione delle Acque
Water Treatment Machinery and Technology
www.nuoveenergie.com

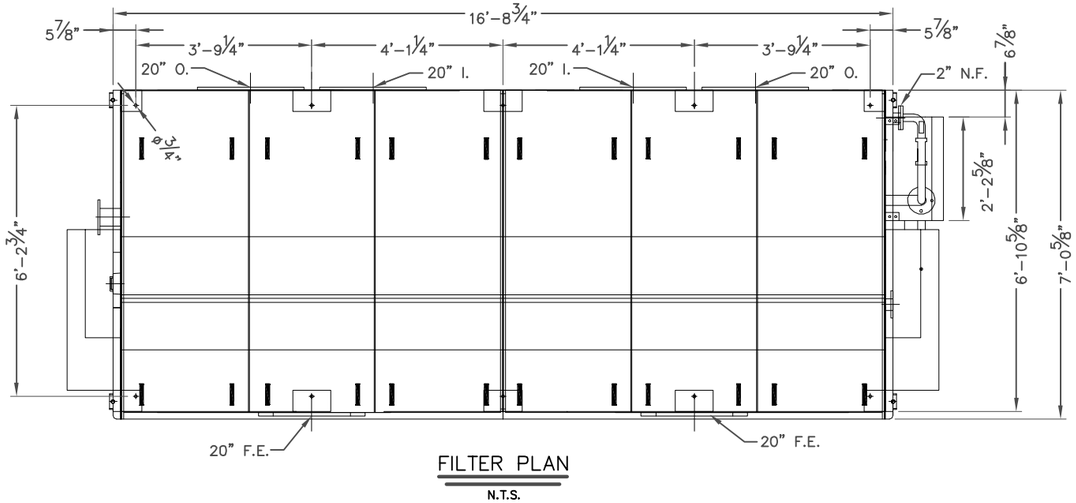
Nova Water Technologies,LLC - P.O. Box 23523 - Tampa, FL - 33623
P. 813.288.0533 F. 813.289.3566 www.novawt.com

nova water technologies



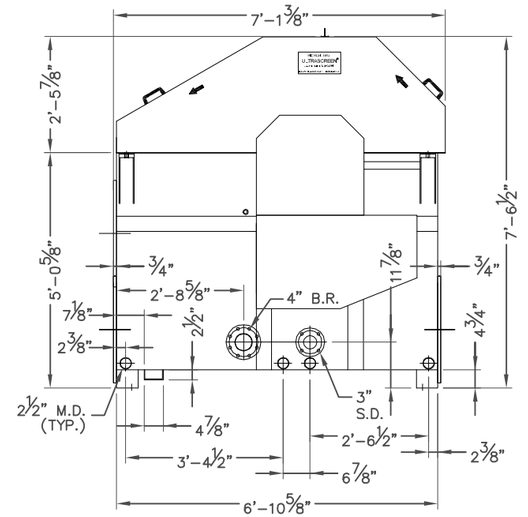
FILTER RIGHT SIDE

N.T.S.



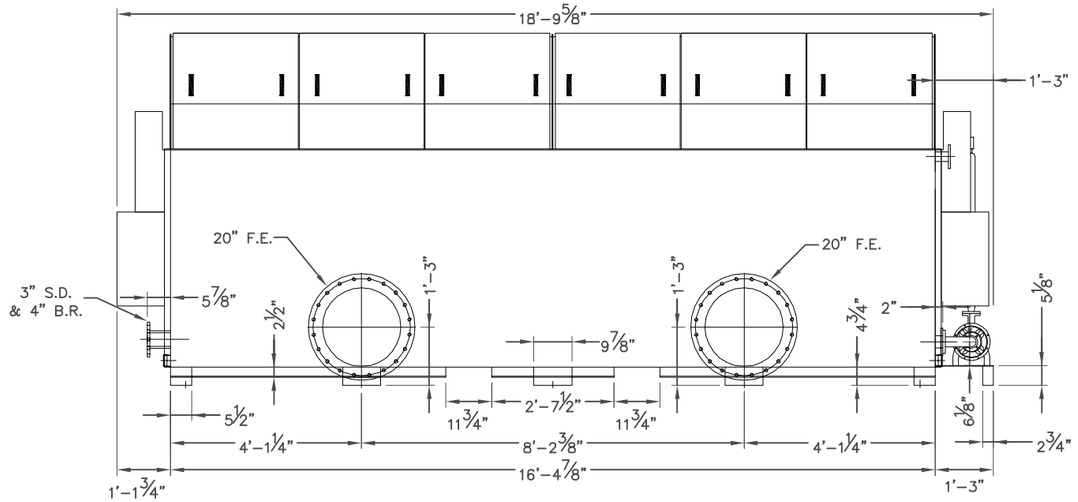
FILTER PLAN

N.T.S.



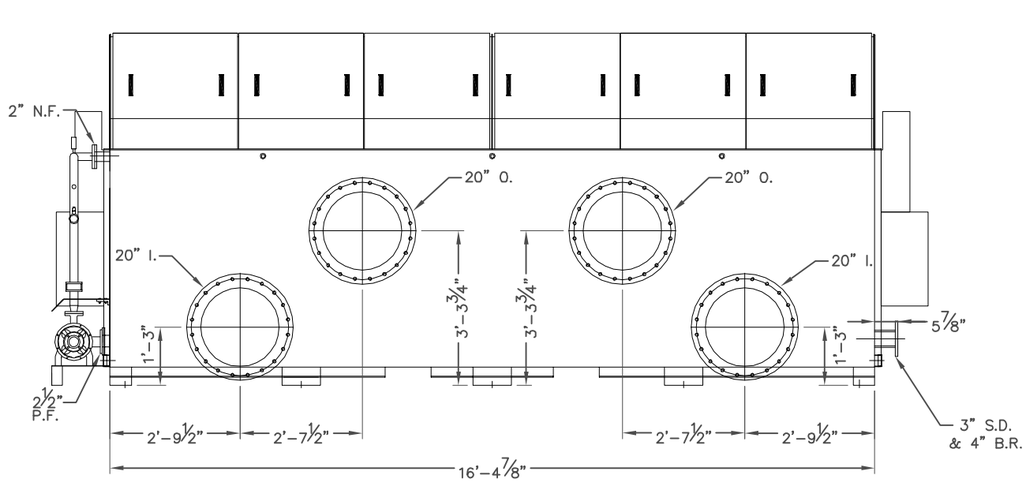
FILTER LEFT SIDE

N.T.S.



FILTER REAR

N.T.S.



FILTER FRONT

N.T.S.

ABBREVIATION SUMMARY

I.	INFLUENT	B.R.	BACKWASH REJECT
N.F.	NOZZLE FEED	S.D.	SEDIMENT DRAIN
P.F.	PUMP FEED	M.D.	MAINTENANCE DRAIN
F.E.	FILTERED EFFLUENT	O.	OVERFLOW

DRY WEIGHT: 11,700 lbs

WORKING WEIGHT: 38,000 lbs

NOVA #: UL1608CS
DATE: 1/28/2010
DIMENSIONS: SAE
PROJECT ENGINEER: T.S. & B.L.

UL1608CS
ULTRASCREEN® DISK FILTER
GENERAL ARRANGEMENT DRAWING
FOR
NOVA WATER TECHNOLOGIES, LLC.

NUOVE ENERGIE ADVANCED TECHNOLOGY

nova water technologies llc
P.O. BOX 23523, TAMPA, FL 33623
P: 813.286.0533, F: 813.289.3566

DRAWING NO.

1

AMIAD EBS PRESSURE STRAINER

amiad® WATER SYSTEMS | AMIAD

EBS Filters

The largest automatic self-cleaning filter for fine filtration

flow rates	filtration degrees	water for cleaning	minimum operating pressure
up to 7200 m^3/h (32000 US gpm)	800-10 micron	less than 1% of the total flow	2 bar (30 psi)

features:

- Large filtration area, reliable operating mechanism and simple construction make the EBS filter the ideal solution for filtration of high-flow and poor quality water to very finefiltration degrees
- Automatic flushing according to pressure differential and/or time
- No interruption of downstream flow during flushing
- Robust and reliable self-cleaning mechanism even on marginal operation conditions
- Minimal volume of reject water allows excellent operation during flush mode
- Applications: Water supply systems, Irrigation systems, Cooling Water, Wastewater Treatment, Industrial Pre-Filtration, etc.
- Industries: manufacturing, mining, water and wastewater treatment plants, turf and agriculture, etc.

How the EBS Filters Work

General

The Amiad EBS Series are automatic filters, with an electric self-cleaning mechanism.
The "EBS" filters range in flow-rates of up to 7200 m³/h (32000 US gpm), with screens designed ranging from 800-10 micron filtration degree. Inlet/Outlet flanges are available from 8"-36" diameter.

The Filtering Process

Raw water enters from the filter inlet (1) and passes through the screen (2). Clean water flows through the filter outlet (3). The gradual dirt buildup on the inner screen surface causes a filter cake to develop, with a corresponding increase in the pressure differential across the screen. A pressure differential switch (4) senses the pressure differential and when it reaches a pre-set value, the cleaning process begins.

The Self-Cleaning Process

Cleaning of the filter is carried out by the suction scanner (5) which spirals across the screen, the open exhaust valves creates a high velocity suction stream at the nozzle tip which "vacuums" the filter cake from the screen. During the self-cleaning process, which takes approximately 30 seconds, filtered water continues to flow downstream.

The Control System

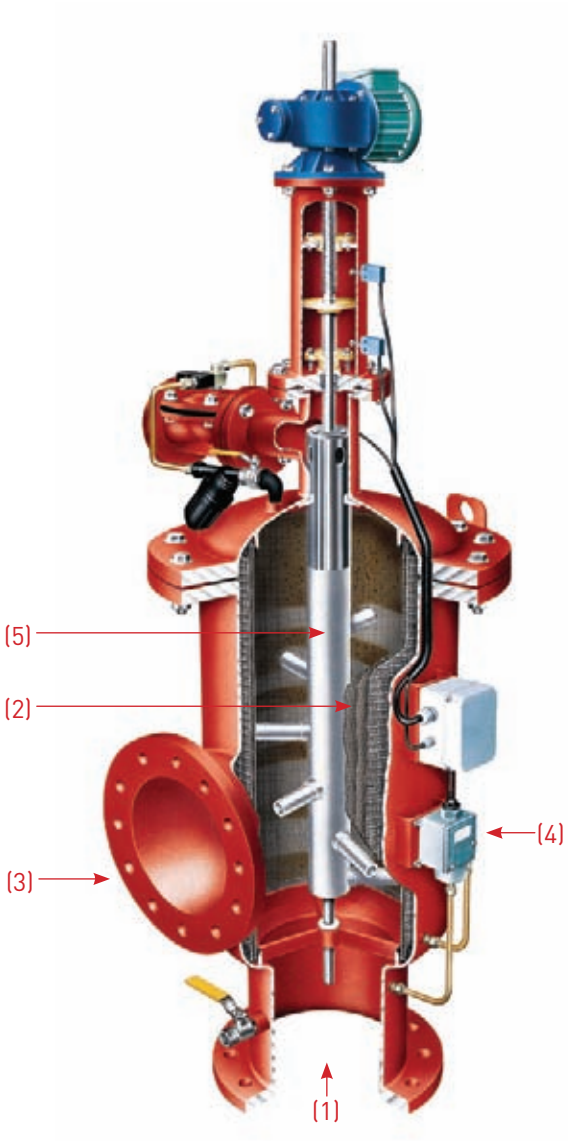
The "EBS" operation and cleaning cycle is controlled and monitored by a Programmable Logic Control (PLC).
The PLC allows maximum flexibility in control options and has many features that can be incorporated per customer's needs.
During the self-cleaning cycle the PLC controls a solenoid that operates the exhaust valve by means of a hydraulic command or compressed air.

The self-cleaning cycle begins under any one of the following conditions:

1. Receiving a signal from the Pressure Differential Switch
2. Time interval parameter set at the control board
3. Manual Start

The control board also provides:

- Optional continuous flush mode
- Flush cycles counter
- Alarm output – may be used to open a bypass, shut-off a pump, etc.



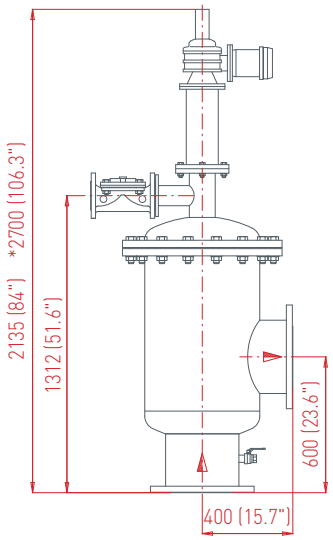
"EBS" Models

Amiad's "EBS" product-line consists of the following models:

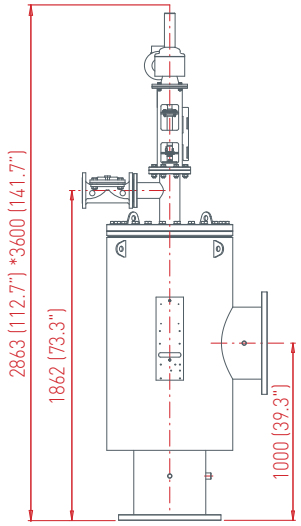
- EBS-10000 for up to 1200 m³/h (5300 US gpm)
- EBS-15000 for up to 1800 m³/h (8000 US gpm)
- Mega EBS 40000 which consists of four EBS-10000 screen elements for up to 4800 m³/h (21100 US gpm)
- Mega EBS 60000 which consists of four EBS-15000 screen elements for up to 7200 m³/h (32000 US gpm)

EBS 10000

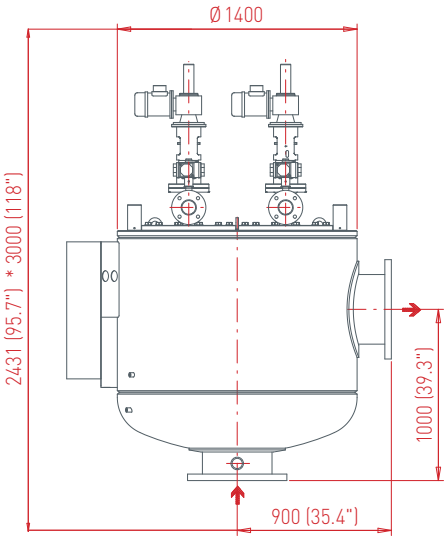
ON-LINE



EBS 15000

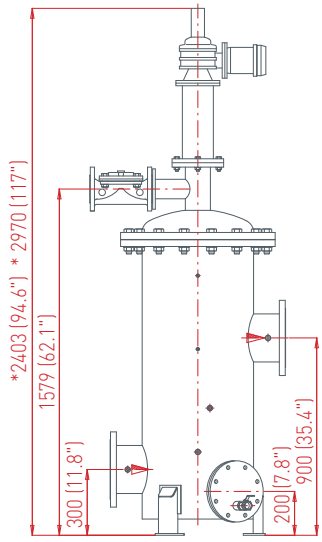


MEGA EBS 40000

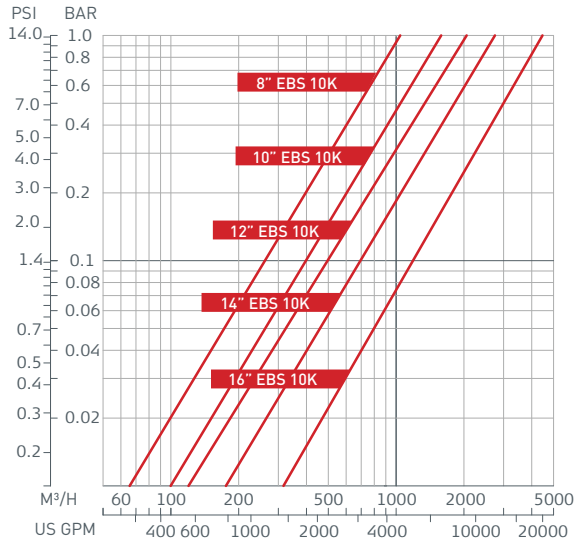


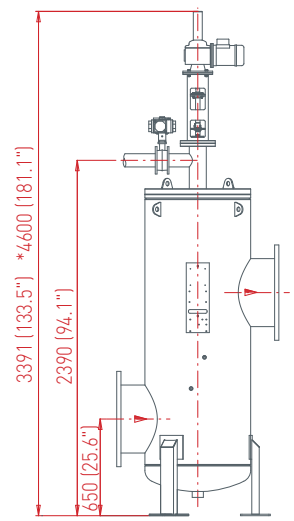
Dim. in mm (inch)
*Approx. length required for maintenance

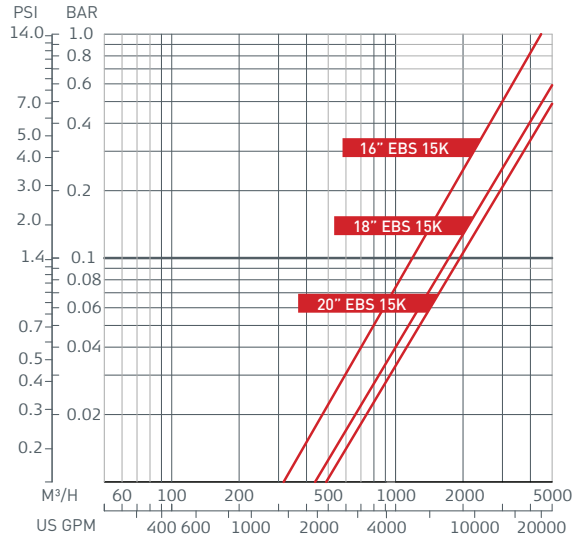
IN-LINE

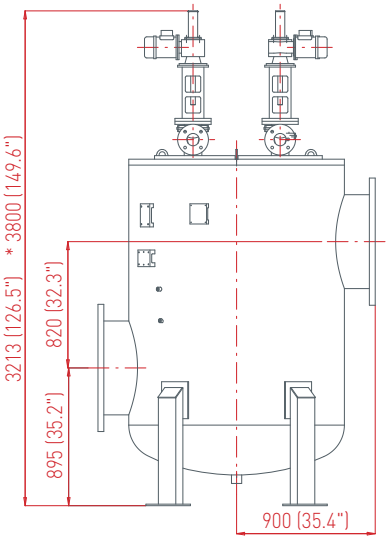


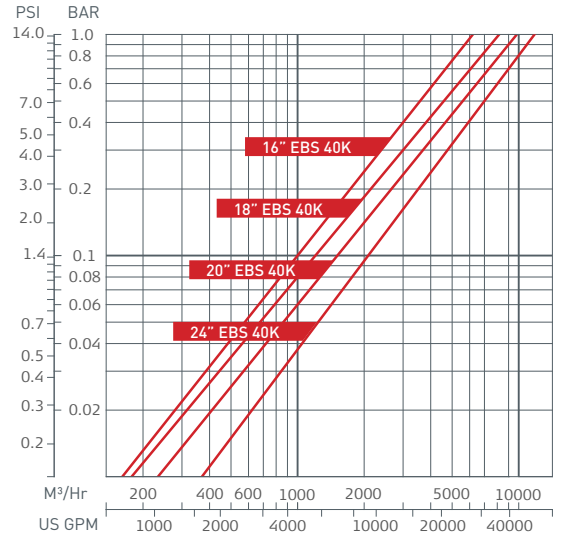
Head Loss Graphs











Dim. in mm (inch)

*Approx. length required for maintenance

Technical Specifications

Filter Type	EBS 10000	EBS 15000	Mega EBS 40000	Mega EBS 60000
General Data				
Maximum flow rate*	1200 m^3/h (5300 US gpm)	1800 m^3/h (8000 US gpm)	4800 m^3/h (21100 US gpm)	7200 m^3/h (32000 US gpm)
Inlet/Outlet diameter	8"-16" (200-400 mm)	10"-20" (250-500 mm)	16"-24" (400-600 mm)	20"–36" (500–900 mm)
Standard filtration degrees	Weave Wire Screen 800, 500, 300, 200, 130, 100, 80,50, 25, 10 micron			
Min. working pressure	2 bar (30 psi)			
Max. working pressure	10 bar (145 psi) 16 bar (232 psi) upon request			
Max. working temperature	60°C (140°F)			
Electrical Supply	3 phase, 220/380/440 VAC 50/60 Hz			
Weight [empty On-line models]	490 kg (1080 lb)	684 kg (1508 lb)	2250 kg (4960 lb)	6200 kg (13670 lb)

* Consult Amiad for optimum flow depending on filtration degree & water quality

Flushing Data				
Minimum flow for flushing (at 2 bar - 30 psi)	50 m^3/h (220 US gpm)	50 m^3/h (220 US gpm)	50 or 200 m^3/h (220 or 880 US gpm)*	50 or 200 m^3/h* (220 or 880 US gpm)*
Reject water volume per flush cycle	420 liter (111 US gallon)	500 liter (132 US gallon)	1680 liter (444 US gallon)	2000 liter (528 US gallon)
Flushing cycle time	30 seconds	36 seconds	30 or 120 seconds*	144 or 36 seconds*
Exhaust valve	3" (80 mm)	3" (80 mm)	4 units of 3" (4 units of 80 mm)	4 units of 3" (4 units of 80 mm)
Flushing criteria	Differential pressure of 0.5 bar (7 psi), time intervals and manual operation			

*One by one or all four screens simultaneously

Screen Data				
Filter area	10000 cm^2 (1500 in^2)	15000 cm^2 (2325 in^2)	40000 cm^2 (6200 in^2)	60000 cm^2 (9300 in^2)
Screen types	Four-layer Weave Wire stainless steel 316L			

Control and Electricity				
Rated operation voltage	3 phase, 220/380/440 VAC 50/60 Hz			
Electric motor 20 / 24 Gear output RPM	½ HP	½ HP	4 x ½ HP	4 x ½ HP
Current consumption	1.5 Amp	1.5 Amp	5 Amp	5 Amp
Control voltage	24 VAC			

***Construction Materials**	
Filter housing and lid	Epoxy or Polyester coated carbon steel 37-2
Cleaning mechanism	Stainless steel 316L, Acetal
Exhaust valve	Epoxy-coated cast iron, Natural rubber
Seals	Synthetic rubber, Teflon
Control	Aluminum, Brass, Stainless steel, PVC, Nylon

* Amiad offers a variety of construction materials and screens. Please consult us for specifications

Municipal

Industry

Irrigation

Headquarters
Amiad Water Systems Ltd. D.N. Galil Elyon 1, 12335, Israel,
Tel: 972 4 690 9500, Fax: 972 4 690 9391,
E-mail: info@amiad.com

North America
Amiad Filtration Systems, 2220 Celsius Avenue, Oxnard,
California 93030, USA, Tel: 1 805 988 3323, Fax: 1 805 988 3313,
E-mail: info@amiadusa.com

South America
Amiad Oil & Gas, Benito Nardone 2219,Montevideo, Uruguay,
Tel: 598 2 7117617, Fax: 598 2 7120816,
E-mail: amisur@adinet.com.uy

Chile
Amiad Andina, Carretera General San Martín 16.500 No 30,
Loteo Industrial Los Libertadores, Colina, Santiago de Chile,
Tel: 56 2 489 5100, Fax: 56 2 489 5101,
E-mail: amiadandina@amiad.com

Brazil
E-mail: amiad@amiad.com.br

Europe
Amiad Water Systems Europe SAS,Ilot No4 ZI La Boitardière,
37530 Chargé, Tel: 33 (0) 2 47 23 01 10, Fax: 33 (0) 2 47 23 80 67,
E-mail: info@amiadfrance.com

Germany
Amiad Filtration Solutions (2004) Ltd. Zweigniederlassung
Deutschland Prinz-Regent-Str. 68 a 44795 Bochum,
Tel: 49 (0) 234 588082-0, Fax: 49 (0) 234 588082-12,
E-mail: info@amiad.de

Turkey
FTS – Filtration & Treatment Systems, Istanbul yolu 26 Km,
Yurt Orta Sanayii, Saray, Ankara, Tel: 90 312 8155266/7,
Fax: 90 312 8155248, E-mail: info@fts-filtration.com

India
Amiad Filtration India Pvt Limited, 305 Sai Commercial Building
Govandi St Rd, Govandi Mumbai 400 088, Tel: 91 22-67997813/14,
Fax: 91 22-67997814, Email: info@amiadindia.com

China
Yixing Taixing Environtec Co., Ltd. 70 Baihe Chang, Xingjie Yixing
Jiangsu, 214204, Tel: 86 510 87134000, Fax: 86 510 87134999,
E-mail: marketing@taixing.cc

South-East Asia
Filtration & Control Systems Pte. Ltd., 19B Teo Hong Road,
088330 Singapore, Tel: 65 6 337 6698, Fax: 65 6 337 8180,
E-mail: fcs1071@pacific.net.sg

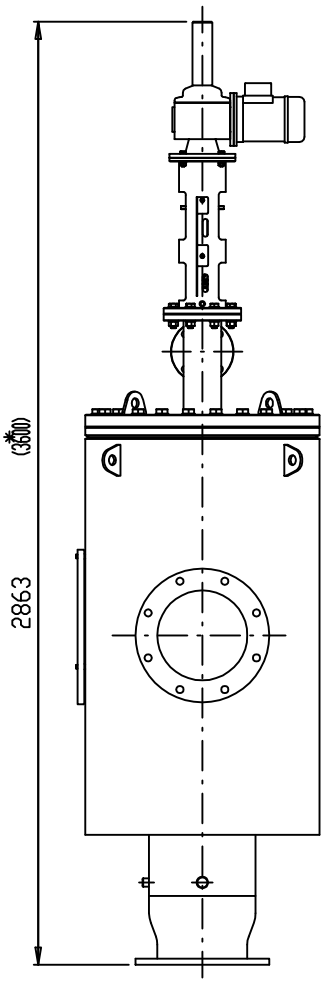
Australia
Amiad Australia Pty Ltd. 138 Northcorp Boulevard,
Broadmeadows, Victoria 3047,
Tel: 61 3 93585800, Fax: 61 3 93585888,
E-mail: sales@amiad.com.au

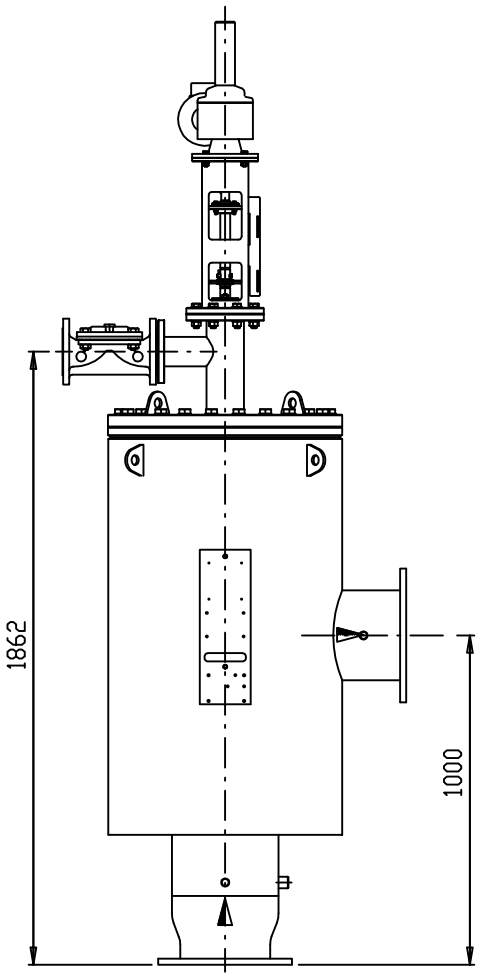
www.amiad.com

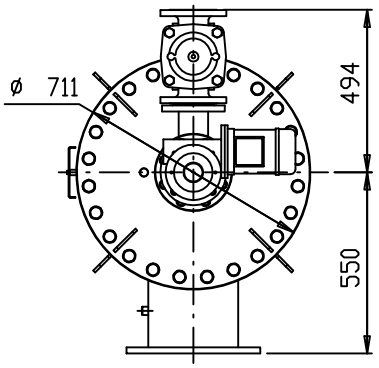
NP.00894/10.2011

amiad® WATER SYSTEMS

ARKAL FILTOMAT AMIAD





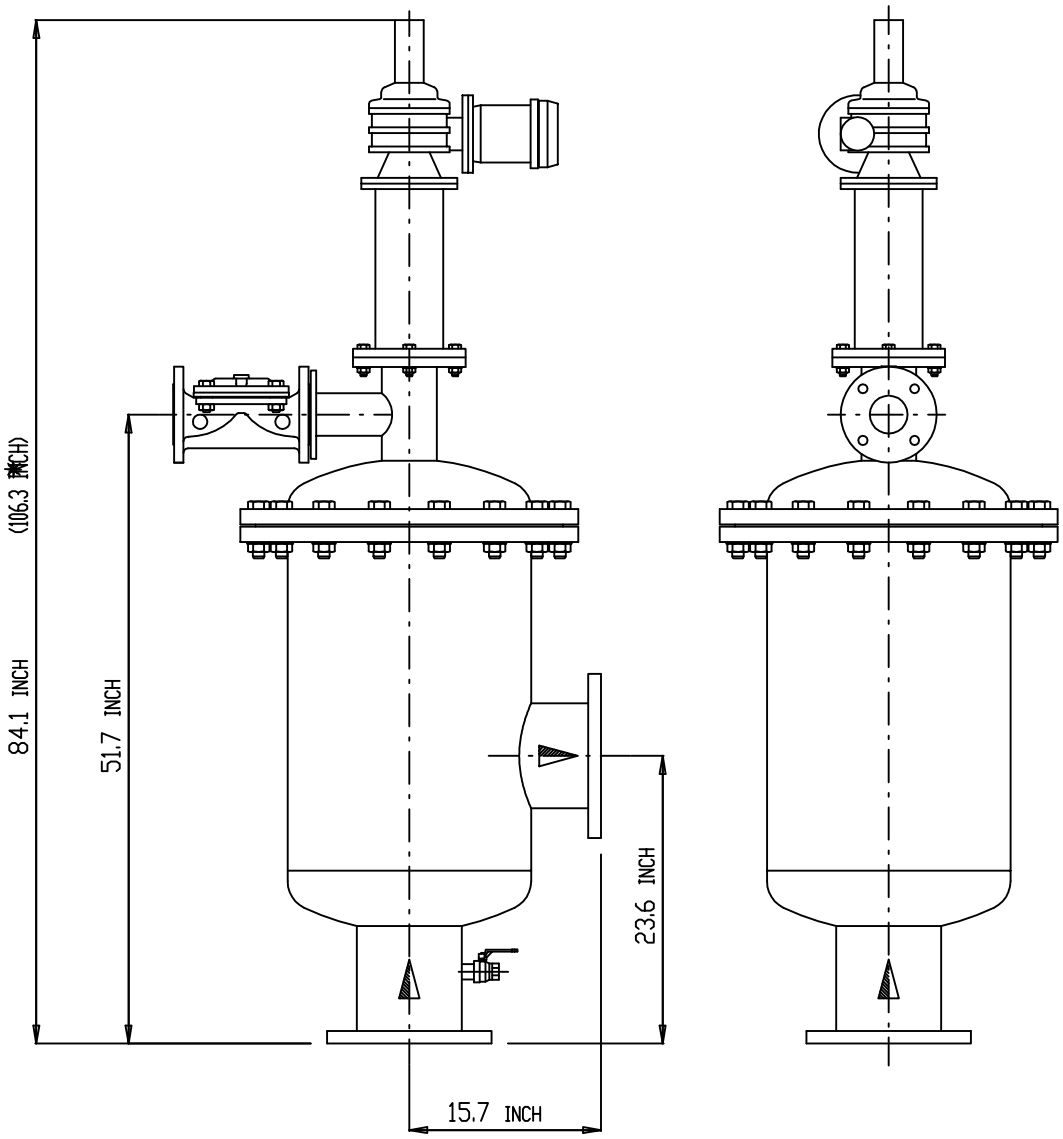


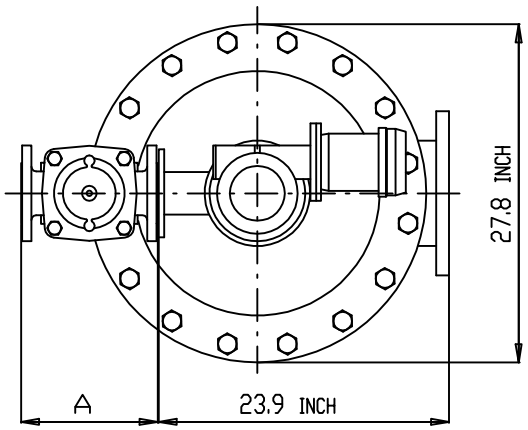
*APPROX. HEIGHT REQUIRED FOR MAINTENANCE.

10" EBS-15000 ON-LINE FILTER

CAT.NO. __-__-__-_	DRAWING NO. 110a620	DIMENSIONS IN MM
DRAWN BY: JANNA	APPRV:	
DATE: 30/04/08	SIGNED:	

amiad filtration systems





VALVE TYPE	A (inch)
GAL	11.2
RAM	9.8
RAFAEL	11.1

*APPROX. HEIGHT REQUIRED FOR MAINTENANCE.

8" EBS FILTER - SUCTION TYPE

CAT.NO. __-__-__-_	DRAWING NO. 1108410	DIMENSIONS IN INCH
DRAWN BY: JANNA	APPRV:	
DATE: 21/12/03	SIGNED:	

amiad filtration systems

APPENDIX G

Nova Water Technologies Proposal

Nova Water Technologies
Ultrascreen® Disk Filter

To:
McKim & Creed

For:
Venice

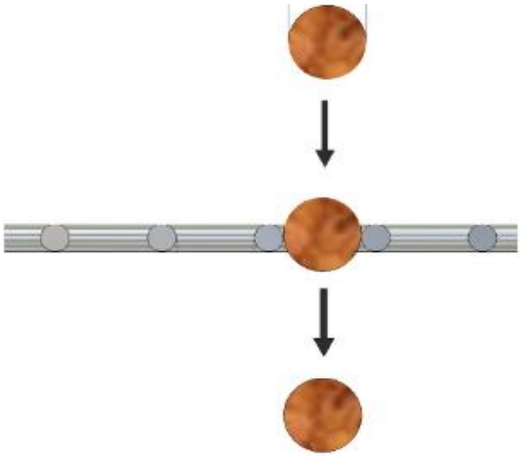
Represented by:
Dave Hartwig
Carter & VerPlanck, Inc.
813-240-1199

1.0 Introduction

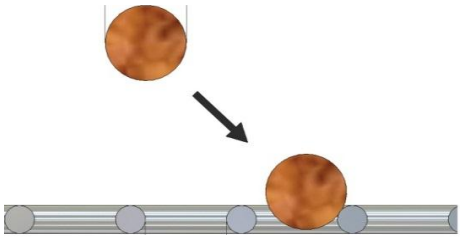
NOVA Water Technologies is pleased to offer equipment and services in accordance with our standard features. The basis of this proposal is compliant with the standard NOVA Water performance specifications and materials in 316 stainless steel. This proposal uses our Model UL1604CS disk filter.

2.0 Principle of Operation

The disks are always in slow rotation during normal operation. The water with TSS is fed at angles less than 90º, which is the basis for "dynamic tangential filtration." The rotation allows use of precision woven wire Stainless Steel micronic mesh, with micron ratings typically between 15 and 25 microns. The disk rotation presents these openings as if they were actually smaller than in a static orientation. This allows for the removal of particles smaller than 10 micron, while requiring minimal water for cleaning. This allows the unit to operate at higher loading rates and achieve equivalent effluent quality compared to static disk filters. This same principle has been proven consistently in the operation of rotatory drum screens, as on example.



Static Filtration – Particle Path



Dynamic Tangential Filtration – Particle Path

3.0 Mechanical Principles

The feed to the disks is introduced into a zone between, or “inside”, each set of disks (see Figure No. 1 below). Each disk is sealed to the walls of the tank by long lasting EPDM rubber seals to maintain filtration integrity and to prevent any short-circuiting. The feed passes through the filter mesh and freely falls into the filtrate zone below (Figure No. 2) and flows out of the effluent outlet. As TSS is captured the liquid level in the feed zone rises until it reaches a pre-set level. A sensor then initiates operation of the wash water pump and the back of the screen mesh is sprayed by low pressure water at 2 to 4 bar for typically one minute. Once the mesh is cleaned the level in the feed zone recedes to another pre-set level where a second level sensor deactivates the wash water pump. All of the solids cleaned from the fine filtration mesh are collected in a simple trough between the disks and leaves the filter under gravity flow. The reject troughs are connected to a common outlet and the concentrated wash water (reject) is sent for further treatment.

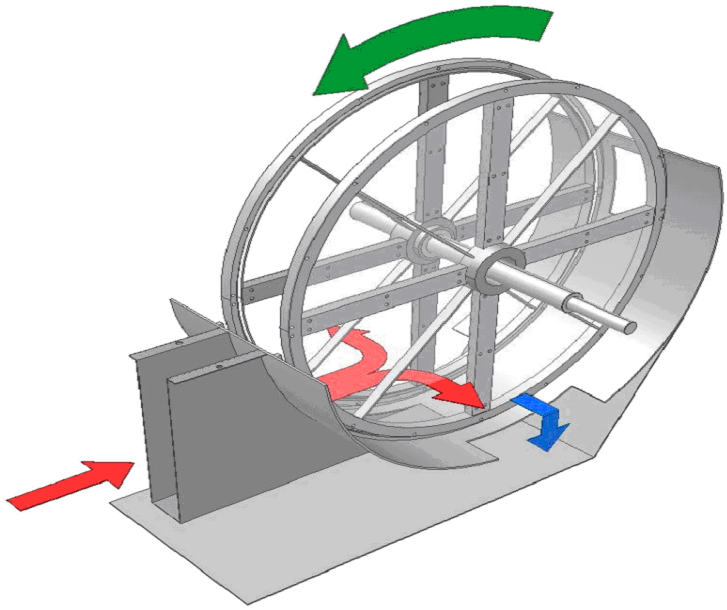


Figure No. 1
The filtration disks are arranged in pairs as show above

The level sensor is also used for turning the filter itself on and off. At low level the filter is de-energized and allowed to remain in a “filter ready” idle mode. This may occur in smaller plants during low flow periods of time. Once flow resumes the idle filter is energized and the normal filtration and wash cycles resume.

A level sensor will send a signal to the control panel when a high level condition or overflow situation occurs.

A situation such as this may occur when there is a significant upset in the plant or during a power outage.

The graphic below represents the typical flow condition during operation.

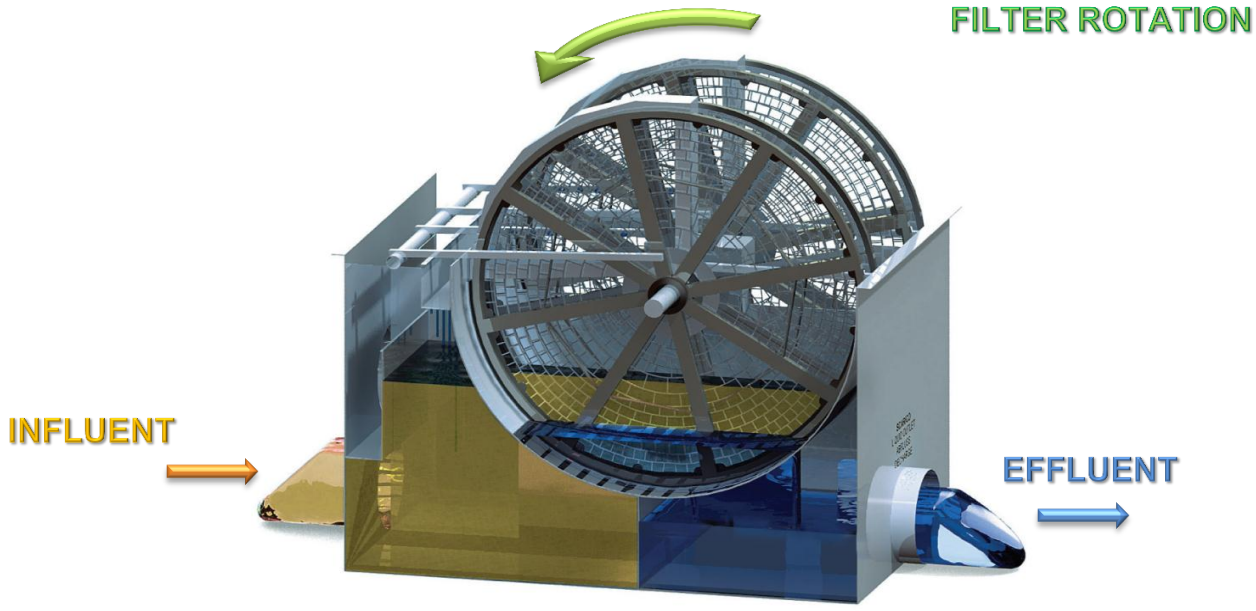


Figure No. 2
Improved filter design hydraulics results in significant increases in capacity

4.0 Plant Design Information

The filter is to be sized for:

	GPM	(MGD)
Average Daily Flow	868	(1.25)
Peak Daily Flow	1389	(2.00)

4.1 Design Information for Filter: UL1604CS

Number of filters	1	
Number of disks per filter	8	
Area per disk	22.0	sq.ft.
Total area per filter	176.0	sq.ft.
Loading rate at avg, 1 filters	4.93	gpm/sq ft
Loading rate at peak, 1 filters	7.89	gpm/sq ft
Filter Drive	(1) 3	hp
Wash Water pump	5.0	hp
Instantaneous Wash Water demand	58.0	gpm/unit
Wash water pressure	4	bar max
Total reject backwash wash water as % of the influent feed rate	0.5 - 1.0	%
Method of feeding filter	By Gravity or Pumped	
Maximum Head requirement	26.4	inches

4.2 Filter Performance Characteristics:

	Influent	Effluent
TSS	Avg. 0 mg/L Max. 0 mg/L	Less than 0 mg/L

5.0 Scope of Supply: UL1604CS

Image of Four (4) Model UL-1606-CS shown

- Qty (1) UL1604CS Ultrascreen® Disk Filter
- 316 stainless steel tank and framing
- 316L stainless steel filter mesh
- Qty (1) backwash pump (5 hp)
- Internal spray wash piping and nozzles
- Qty (1) Automatic sludge valve
- 316/316L stainless steel filter disks
- Ball valves and gauges as required
- NEMA compliant PLC control panel with 316SS enclosure, 480 VAC, 3 Phase, 60 Hz
- Chain & Sprocket drive system
- Filter Level Control Sensor as required
- 316SS covers with two handles per section for easy removal
- Qty (1) year manufacturer's standard warranty

6.0 Budgetary Equipment Cost Estimate

Budgetary Price Estimate for the scope of equipment as shown above is $ 265,000 USD

Any taxes or fees are not included. Any changes to NOVA's typical controls may result in additional cost.

Equipment freight to the jobs site, engineering submittals, and start-up services are included in the budget pricing. Budgetary estimates are valid for 180 days.

7.0 Typical Drawings: See attached

APPENDIX H

Amiad Proposal

BARNEY'S PUMPS INC.
LAKELAND • CORAL SPRINGS • JACKSONVILLE

CORPORATE OFFICES
2965 BARNEY'S PUMPS PLACE
LAKELAND, FL 33812-4209
P.O. BOX 3529
LAKELAND, FL 33802-3529
PHONE (863) 665-8500
FAX (863) 666-3858

February 20, 2013

Blake Peters, Samantha Jones
McKim & Creed Engineers
Sarasota, FL

RE: Venice Eastside WWTP Reclaim Pond Return Budget Pricing - Pumps and Strainers

Blake,

Per our conversations, please find the budget pricing requested for the Amiad Filters strainer systems we discussed, along with the pumps and associated items. These system budgets are based on 2.0 MGD flow rates and unconfirmed water quality. Drawings previously provided.

25-micron Filtration Degree

Quantity of FOUR (4) size 8" Amiad EBS 10000 on-line automatic backwashing strainer units
Quantity of ONE (1) quadruplex PLC-based filter control panel

Basic equipment pricing, as above: $250,000
Pricing adder to supply above as a skid system with piping, valves, base: $75,000

50-micron Filtration Degree

Quantity of TWO (2) size 10" Amiad EBS 15000 on-line automatic backwashing strainer units
Quantity of ONE (1) duplex PLC-based filter control panel

Basic equipment pricing, as above: $175,000
Pricing adder to supply above as a skid system with piping, valves, base: $50,000

Pump Station Components

Duplex 40 HP Hydromatic Pond Return Pumps: $30,000
Includes pumps with flanges, start-up, freight, etc. *Assumes using existing 6" elbows/rails.*)
Duplex 40 HP, 460V control panel, SS enclosure: $15,000 – 20,000 depending on specs.

Tank Fill Control Valve

Cla-Val hydraulic control valve, 8" 50-01 pressure sustaining valve: $8,000

If you have any questions about the scope, please do not hesitate to contact me.

Michael Vizza
Sales Engineer

APPENDIX I

Sludge Spreadsheet Calculations

	2010			2015			2020			2025		
FLOW AND PROCESS VARIABLES	AADF	5.19	MGD	AADF	5.64	MGD	AADF	6.02	MGD	AADF	6.40	MGD
		3,604	GPM		3,917	GPM		4,181	GPM		4,444	GPM
	MTMADF	5.71	MGD	MTMADF	6.20	MGD	MTMADF	6.62	MGD	MTMADF	7.04	MGD
		3,604	GPM		3,917	GPM		4,181	GPM		4,444	GPM
	PDF	10.75	MGD	PDF	11.65	MGD	PDF	12.41	MGD	PDF	13.17	MGD
		7,465	GPM		8,090	GPM		8,618	GPM		9,146	GPM
	PHF	11.42	MGD	PHF	12.41	MGD	PHF	13.24	MGD	PHF	14.08	MGD
		7,931	GPM		8,618	GPM		9,194	GPM		9,778	GPM
	MLSS	4,500	MG/L	MLSS	4,500	MG/L	MLSS	4,500	MG/L	MLSS	4,500	MG/L
	RAS	100%	%	RAS	100%	%	RAS	100%	%	RAS	100%	%
		5.19	MGD		5.64	MGD		6.02	MGD		6.40	MGD
		3604	GPM		3917	GPM		4181	GPM		4444	GPM
BIOSOLIDS	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%
	WAS FLOW	0.057	MGD	WAS FLOW	0.062	MGD	WAS FLOW	0.066	MGD	WAS FLOW	0.070	MGD
	WAS FLOW	57,100	GPD	WAS FLOW	62,000	GPD	WAS FLOW	66,200	GPD	WAS FLOW	70,400	GPD
	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS
	# OF UNITS	4		# OF UNITS	4		# OF UNITS	4		# OF UNITS	4	
	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS
	STORAGE	10	DAYS	STORAGE	9	DAYS	STORAGE	8	DAYS	STORAGE	8	DAYS
	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM
	# OF UNITS	2		# OF UNITS	2		# OF UNITS	2		# OF UNITS	2	
	OPERATION	33.31	HRS/WEEK	OPERATION	36.17	HRS/WEEK	OPERATION	5.52	HRS/DAY	OPERATION	5.87	HRS/DAY
BIOSOLIDS W/ BACKWASH	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%
	WAS FLOW	0.057	MGD	WAS FLOW	0.062	MGD	WAS FLOW	0.066	MGD	WAS FLOW	0.070	MGD
	WAS FLOW	57,100	GPD	WAS FLOW	62,000	GPD	WAS FLOW	66,200	GPD	WAS FLOW	70,400	GPD
	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS
	# OF UNITS	4		# OF UNITS	4		# OF UNITS	4		# OF UNITS	4	
	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%
	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD
	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L
	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%
	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD
	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS
	STORAGE	7	DAYS	STORAGE	7	DAYS	STORAGE	6	DAYS	STORAGE	6	DAYS
	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM
	# OF UNITS	2		# OF UNITS	2		# OF UNITS	2		# OF UNITS	2	
	OPERATION	44.98	HRS/WEEK	OPERATION	47.83	HRS/WEEK	OPERATION	50.28	HRS/WEEK	OPERATION	52.73	HRS/WEEK
BIOSOLIDS W/ BACKWASH & DEWATERING	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%
	WAS CONC	8,000	MG/L	WAS CONC	8,000	MG/L	WAS CONC	8,000	MG/L	WAS CONC	8,000	MG/L
	WAS FLOW	0.057	MGD	WAS FLOW	0.062	MGD	WAS FLOW	0.066	MGD	WAS FLOW	0.070	MGD
	WAS FLOW	57,100	GPD	WAS FLOW	62,000	GPD	WAS FLOW	66,200	GPD	WAS FLOW	70,400	GPD
	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS
	# OF UNITS	4		# OF UNITS	4		# OF UNITS	4		# OF UNITS	4	
	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%
	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD
	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L
	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%
	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD
	BLENDED CONC	6,106	MG/L	BLENDED CONC	6,220	MG/L	BLENDED CONC	6,306	MG/L	BLENDED CONC	6,385	MG/L
	DEWATERED 2%	23,540	GPD	DEWATERED 2%	25,500	GPD	DEWATERED 2%	27,180	GPD	DEWATERED 2%	28,860	GPD
	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS
	STORAGE	23	DAYS	STORAGE	22	DAYS	STORAGE	20	DAYS	STORAGE	19	DAYS
	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM
	# OF UNITS	2		# OF UNITS	2		# OF UNITS	2		# OF UNITS	2	
	OPERATION	44.98	HRS/WEEK	OPERATION	47.83	HRS/WEEK	OPERATION	50.28	HRS/WEEK	OPERATION	52.73	HRS/WEEK

	2030			6 MGD Permitted Capacity			7 MGD RERATE			8 MGD RERATE		
FLOW AND PROCESS VARIABLES	AADF	6.76	MGD	AADF	5.45	MGD	AADF	6.36	MGD	AADF	7.27	MGD
		4,694	GPM		3,788	GPM		4,419	GPM		5,050	GPM
	MTMADF	7.44	MGD	MTMADF	6.00	MGD	MTMADF	7.00	MGD	MTMADF	8.00	MGD
		4,694	GPM		3,788	GPM		4,419	GPM		5,050	GPM
	PDF	13.89	MGD	PDF	10.91	MGD	PDF	12.73	MGD	PDF	14.55	MGD
		9,646	GPM		7,576	GPM		8,838	GPM		10,101	GPM
	PHF	14.87	MGD	PHF	12.00	MGD	PHF	14.00	MGD	PHF	16.00	MGD
		10,326	GPM		8,333	GPM		9,722	GPM		11,111	GPM
	MLSS	4,500	MG/L	MLSS	4,500	MG/L	MLSS	4,500	MG/L	MLSS	4,500	MG/L
	RAS	100%	%	RAS	100%	%	RAS	100%	%	RAS	100%	%
		6.76	MGD		5.45	MGD		6.36	MGD		7.27	MGD
		4694	GPM		3788	GPM		4419	GPM		5050	GPM
BIOSOLIDS	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%
	WAS FLOW	0.074	MGD	WAS FLOW	0.060	MGD	WAS FLOW	0.070	MGD	WAS FLOW	0.080	MGD
	WAS FLOW	74,400	GPD	WAS FLOW	60,000	GPD	WAS FLOW	70,000	GPD	WAS FLOW	80,000	GPD
	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS
	# OF UNITS	4		# OF UNITS	4		# OF UNITS	4		# OF UNITS	4	
	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS
	STORAGE	7	DAYS	STORAGE	9	DAYS	STORAGE	8	DAYS	STORAGE	7	DAYS
	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM
	# OF UNITS	2		# OF UNITS	2		# OF UNITS	2		# OF UNITS	2	
	OPERATION	43.40	HRS/DAY	OPERATION	35.00	HRS/WEEK	OPERATION	40.83	HRS/WEEK	OPERATION	46.67	HRS/WEEK
BIOSOLIDS W/ BACKWASH	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%
	WAS FLOW	0.074	MGD	WAS FLOW	0.060	MGD	WAS FLOW	0.070	MGD	WAS FLOW	0.080	MGD
	WAS FLOW	74,400	GPD	WAS FLOW	60,000	GPD	WAS FLOW	70,000	GPD	WAS FLOW	80,000	GPD
	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS
	# OF UNITS	4		# OF UNITS	4		# OF UNITS	4		# OF UNITS	4	
	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%
	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD
	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L
	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%
	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD
	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS
	STORAGE	6	DAYS	STORAGE	7	DAYS	STORAGE	6	DAYS	STORAGE	6	DAYS
	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM
	# OF UNITS	2		# OF UNITS	2		# OF UNITS	2		# OF UNITS	2	
	OPERATION	55.07	HRS/WEEK	OPERATION	46.67	HRS/WEEK	OPERATION	52.50	HRS/WEEK	OPERATION	58.33	HRS/WEEK
BIOSOLIDS W/ BACKWASH	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%	WAS RATE	0.01	%
	WAS CONC	8,000	MG/L	WAS CONC	8,000	MG/L	WAS CONC	8,000	MG/L	WAS CONC	8,000	MG/L
	WAS FLOW	0.074	MGD	WAS FLOW	0.060	MGD	WAS FLOW	0.070	MGD	WAS FLOW	0.080	MGD
	WAS FLOW	74,400	GPD	WAS FLOW	60,000	GPD	WAS FLOW	70,000	GPD	WAS FLOW	80,000	GPD
	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS	TANK	137,735	GALLONS
	# OF UNITS	4		# OF UNITS	4		# OF UNITS	4		# OF UNITS	4	
	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%	BACKWASH	1	%
	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD	LAKE WATER	2	MGD
	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L	SOLIDS	700	MG/L
	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%	SOLIDS	0.07	%
	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD	BW FLOW	20,000	GPD
	BLENDED CONC	6,453	MG/L	BLENDED CONC	6,175	MG/L	BLENDED CONC	6,378	MG/L	BLENDED CONC	6,540	MG/L
	DEWATERED 2%	30,460	GPD	DEWATERED 2%	24,700	GPD	DEWATERED 2%	28,700	GPD	DEWATERED 2%	32,700	GPD
	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS	TOTAL VOLUME	550,940	GALLONS
	STORAGE	18	DAYS	STORAGE	22	DAYS	STORAGE	19	DAYS	STORAGE	17	DAYS
	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM	BELT PRESS	200	GPM
	# OF UNITS	2		# OF UNITS	2		# OF UNITS	2		# OF UNITS	2	
	OPERATION	55.07	HRS/WEEK	OPERATION	46.67	HRS/WEEK	OPERATION	52.50	HRS/WEEK	OPERATION	58.33	HRS/WEEK

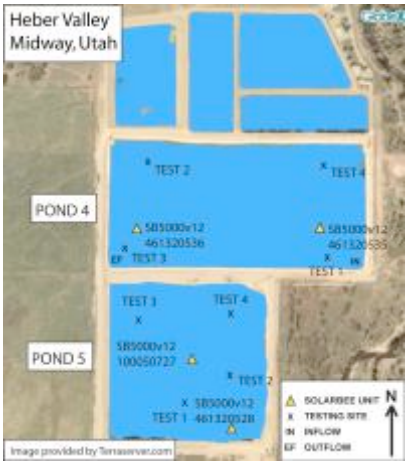
APPENDIX J

SolarBee Case Studies

SolarBee®
Circulating the World's Water
http://www.solarbee.com

Summarized Case Study (RU)
Heber Valley SSD
Midway, UT

Key Words: Midway, UT, effluent storage, water reuse, algae control, dissolved oxygen, odors, sludge digestion



Photos: Photo on left is an aerial view showing placement of the SolarBee units in effluent storage Cells #4 and #5. Photo on right shows a SolarBee in one of the ponds.

Owner: Heber Valley SSD, Scott Wright, Plant Manager; Tel: 435-654-2248, E-mail: hvssd@aol.com.

System Overview: This is the municipal wastewater treatment system for Midway, UT. The system includes three treatment ponds and two municipal effluent storage ponds (Cell #4 and Cell #5) on 92 acres, with a total flow rate of about 1.6 MGD. Cell #4 has a surface area of 41 acres, with a maximum depth of 15 ft. Cell #5 has a surface area of 31 acres, with a maximum depth of 15 ft. Heber Valley SSD utilizes the effluent water to irrigate agricultural land.

Reported Problem Before SolarBee Installation: The basins had a history of blue-green algae (cyanobacteria) blooms, surface scum, and odor issues in the ponds and when irrigating. Primary objectives were to provide long-distance circulation within both effluent storage basins in order to prevent blue-green algae blooms from forming and to control odors.

SolarBee Installation: Date: Between June 2006 - August 2007, installed four SB5000v12 units in the two effluent storage ponds, Cell #4 and Cell #5.

Results: Since the SolarBee installations, both Cells #4 and 5 have shown consistent and improved water quality. The owner has reported that the SolarBee units have controlled blue-green algae blooms and prevented odor issues within the ponds and while irrigating. The one exception was in the summer of 2011 when duckweed completely covered Cell #5 for several weeks, temporarily producing odors until the duckweed died back. Overall, the owner is very pleased with the results and the performance of the SolarBees over the years.

126-USUTWW-LOC336.001, L*ast updated: 3-13-12*

For information on SolarBee call 1-866-437-8076, or see *www.solarbee.com*

SolarBee®
Circulating the World's Water
http://www.solarbee.com

Summarized Case Study (RU)
Big Bear Area Regional Wastewater Agency
Big Bear City, CA

Key Words: Big Bear City, CA, municipal effluent storage, water reuse, algae control, aquatic weeds, odor control



Photos: First photo shows the algal mats in the effluent storage pond before the SolarBee was installed; second photo show treatment system and placement of the SolarBee; third photo shows the unit in the pond.

Owner: Big Bear Area Regional Wastewater Agency, CA. Joe Hanford, Plant Superintendent, Tel: 909-584-4520, E-mail: Jhanford@bbar.org.

System Overview: This is a secondary wastewater treatment plant serving the Big Bear region in Southern California. The system is comprised of an oxidation ditch and secondary clarifiers, and then discharges to a secondary effluent storage basin before ultimately being discharged to irrigate fields. The treated pond is a secondary effluent storage basin, 1.3 surface acres in area, 5 ft deep, and has a 1-day detention time.

Reported Problem Before SolarBee Installation: This pond had a history of aquatic weeds (Sago pond weed) and floating algal mats promoted by stagnant water and short-circuiting. This condition resulted in noxious odors.

SolarBee Installation: Date: April 2004, installed one SB4000 in the middle of the pond.

Results: There have been neither floating algal mats nor noxious odors since the installation of the SolarBee. The reduction of aquatic weeds was somewhat slower, but by 2006 they too were no longer a problem and have remained at lower densities since. Customer is very pleased with the algae and aquatic weed reductions, as well as consistent odor prevention, and reports that the SolarBee is "working great!".

121-USCARU-LOC346.001, *Last updated: 3-13-12*

City of Venice
Eastside Water Reclamation Facility
Final Lake Filtration System Alternatives Evaluation Report

March 2013

Prepared by:

McKIM&CREED

378 Interstate Court
Sarasota, FL 34240

ph: (941) 379-3404
fx: (941) 379-3530

www.mckimcreed.com