# 6.1 MBR System Overview

## Process Overview

The MBR System is a membrane bioreactor treatment system that operates in parallel with the plant's CAS system. The MBR system has an average dry weather capacity of 4-mgd and a peak flow capacity of 10-mgd. This system is designed to be expanded to an average dry weather capacity of 24-mgd with a peak flow capacity of 60-mgd.

### Intermediate Pumping

The flow to the MBR system is taken from the primary clarifier effluent channel and pumped to the inlet channel of the fine screen building by the intermediate pumps. There are three intermediate pumps. The small pump has a capacity of 1.5 to 5.0-mgd and the two large pumps have a capacity of 2.0-mgd to 10.0-mgd. The system has been designed for the maximum flow through the primary clarifiers to be 60-mgd. When the flow to the plant reaches 58-mgd, the flow to the MBR system is changed from the primary effluent channel to the primary influent channel. The loading to the MBR process will not be affected, as the wastewater strength is low during these high flow events. The SCADA screen for this system is shown on ***Figure 6.1-1***.

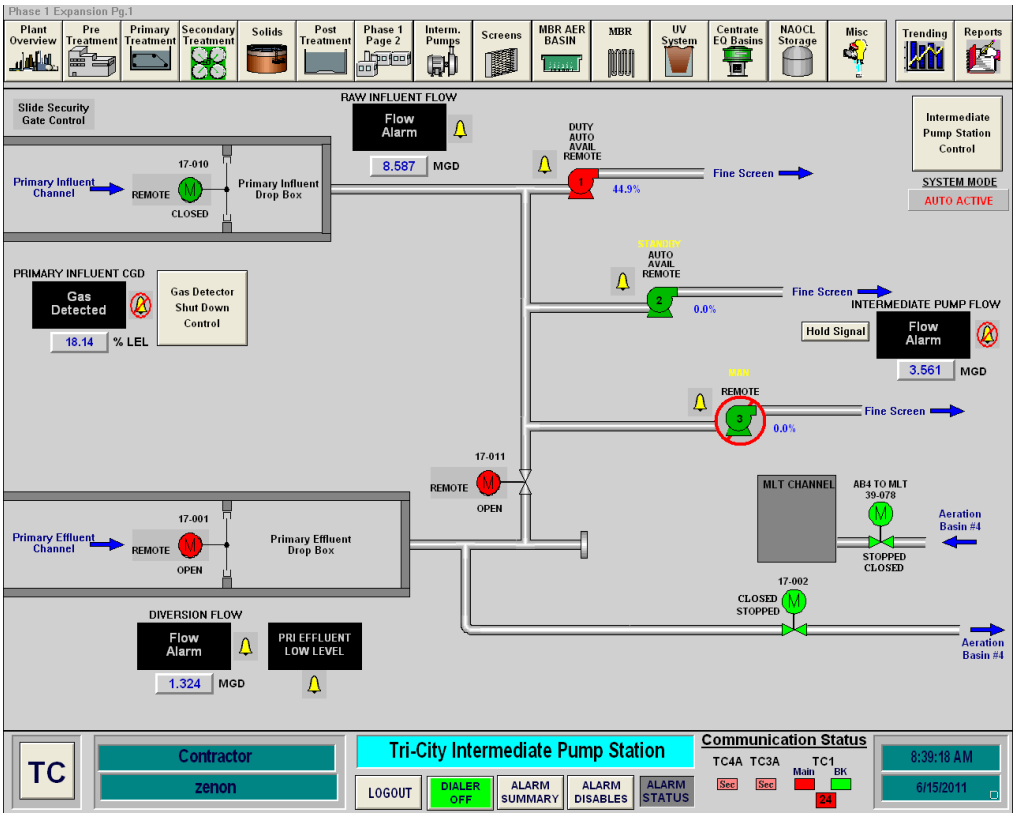


**Figure 6.1-1 – Intermediate Pump Station Main Screen**

### Fine Screening

The fine screens receive flow from the intermediate pumps. There are two fine screens with a peak hydraulic capacity of 15-mgd each. The screens have a punch-plate hole

size of 2-mm. The screenings that are removed by the screens are discharged into a sluice that transports the screenings to one of two rotary screens that wash the screenings. The washed screenings are discharged into hoppers that are discharged into the screenings truck for transport to a local landfill for final disposal. The SCADA screen for this system is shown on ***Figure 6.1-2***.

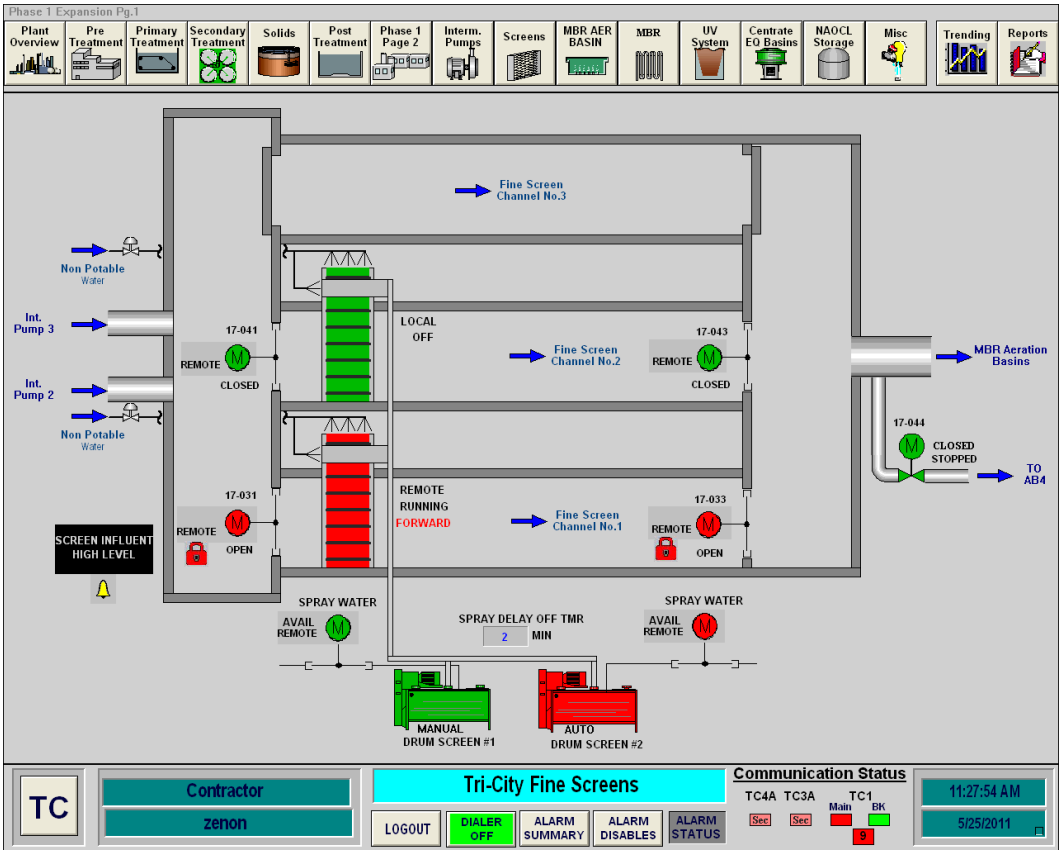


**Figure 6.1-2 – Fine Screening**

## MBR Aeration Basin

The MBR aeration basin (AB#5) receives flow from the fine screen building and provides the environment for the biomass to reduce the organics and nitrify the ammonia in the waste stream. The MBR aeration basin effluent goes to the MBR building for solids/liquid separation in the MBR basins. The MBR aeration basin is a 715,500-gallon basin. The basin is a two-pass plug flow basin with a length to width ratio of 18:1. The basin operates at a water level of 24-feet. The basin has one de-ox zone and three anoxic zones to provide for denitrification and an aerobic zone with four separate aeration zones for control of air to provide BOD removal and nitrification. The SCADA screen for this system is shown on ***Figure 6.1-3***.

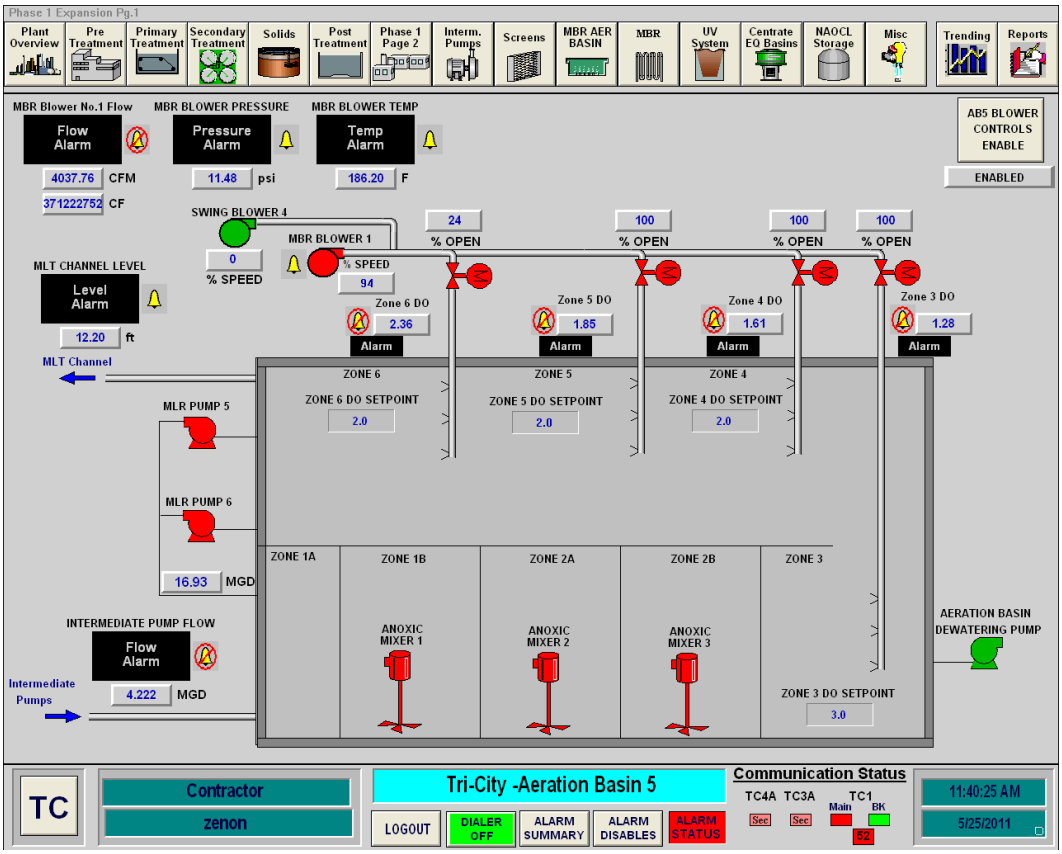


**Figure 6.1-3 – MBR Aeration Basin**

## MBR Building

There are four membrane basins located in the MBR Building. Each membrane basin is has space for 10 membrane cassettes. Each basin is equipped with 9 cassettes of hollow fiber membranes with a membrane surface area of 131,920-ft$^2$ each. Each membrane basin has a dedicated filtrate pump with a capacity of 2,031-gpm that pumps the filtrate to the UV building. The mixed liquor transfer return system consists of two 114,400 gpm pumps that return the filtered mixed liquor back to the aeration basin. The MBR system also has a number of ancillary systems that provide for the control and cleaning of the membranes. The SCADA screen for this system is shown on ***Figure 6.1-4***.

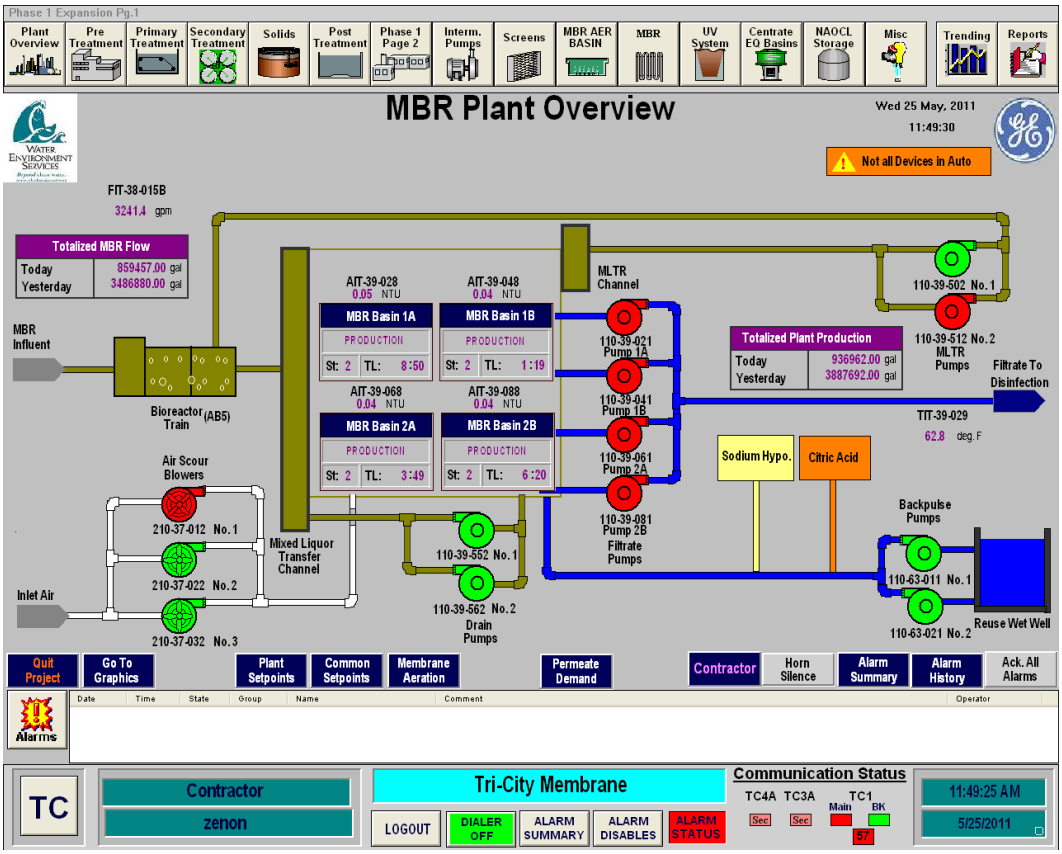


**Figure 6.1-4 – MBR Process**

## UV Building

The membrane filtrate is pumped to the UV Building for disinfection. The UV disinfection system consists of two UV channels with two UV modules in each channel. The UV system has bulbs in a vertical orientation with 40 bulbs in each module. The UV system dosage is maintained by turning bulbs on and off based on the MBR plant flow rate and quality of the treated effluent. The SCADA screen for this system is shown on ***Figure 6.1-5***.

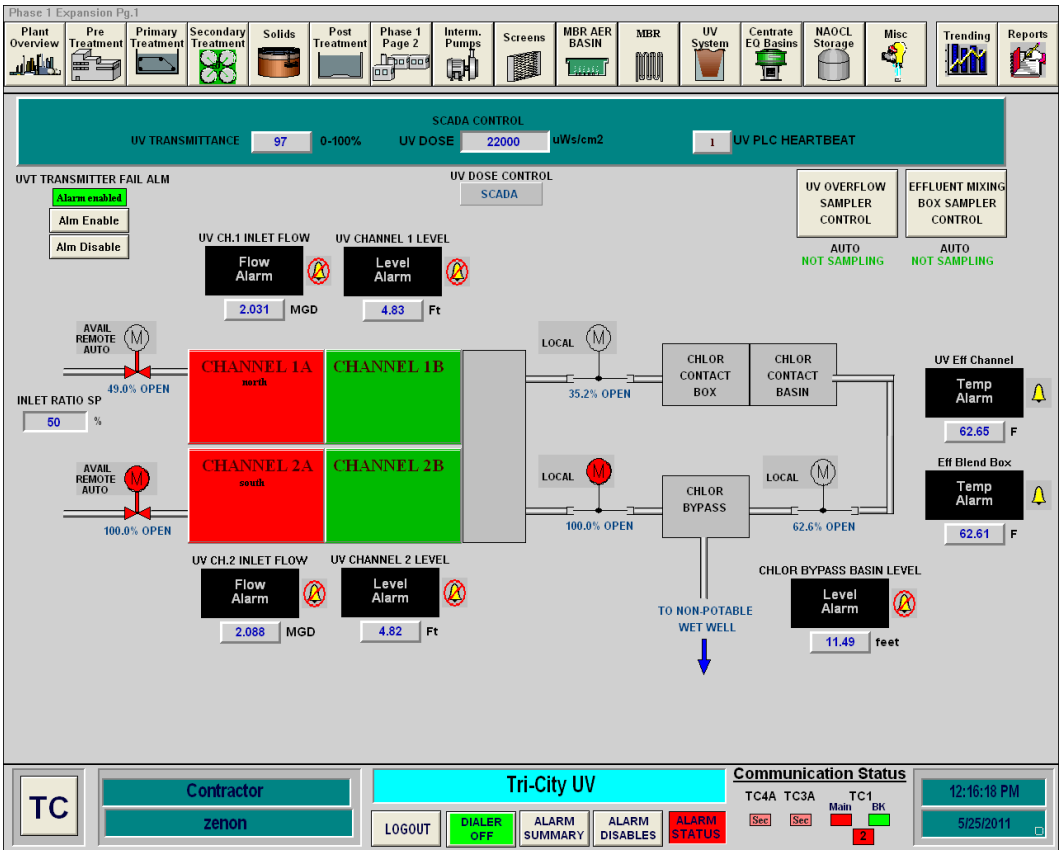


**Figure 6.1-5 – UV Disinfection**

## W3 Water Pumping

The water used in the treatment plant for non-potable uses such as tank sprays, hosedown and landscape irrigation is treated effluent from the UV effluent channel. This water is pumped from the W3 water pump station located in the lower level of the UV Building. The SCADA screen for this system is shown on ***Figure 6.1-6***.

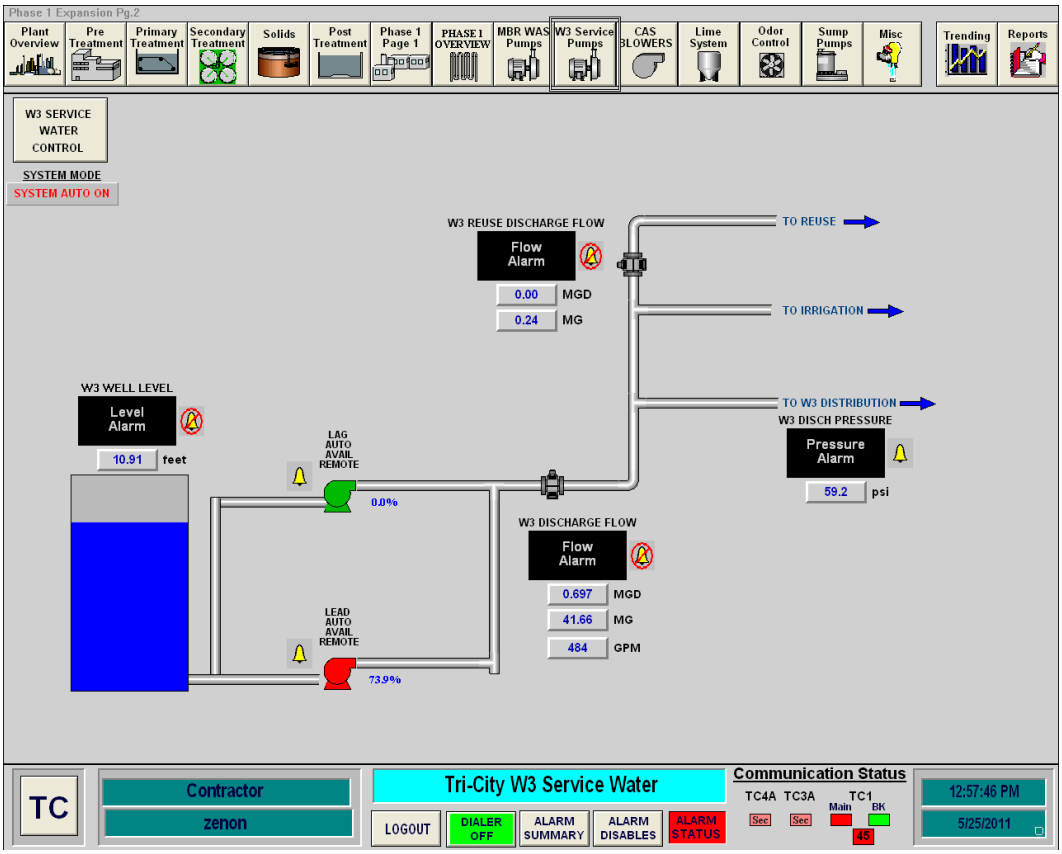


**Figure 6.1-6 – W3 Water System**

## Sodium Hypochlorite System

The sodium hypochlorite (NaOCL) system provides storage and pumping of sodium hypochlorite to the treatment plant. The MBR process uses sodium hypochlorite by clean the membranes. There are two pumping skids for membrane cleaning. One skid is for maintenance cleaning and one is for recovery cleaning. These pumps are controlled through the MBR process control system.

Sodium hypochlorite is also used as an additional disinfectant for the non-potable water system and the reuse system. Two pumps are provided that are flow paced to the non-potable water and reuse water flows to provided additional disinfection and odor control to the non-potable and reuse waters. The SCADA screen for this system is shown on ***Figure 6.1-7***.

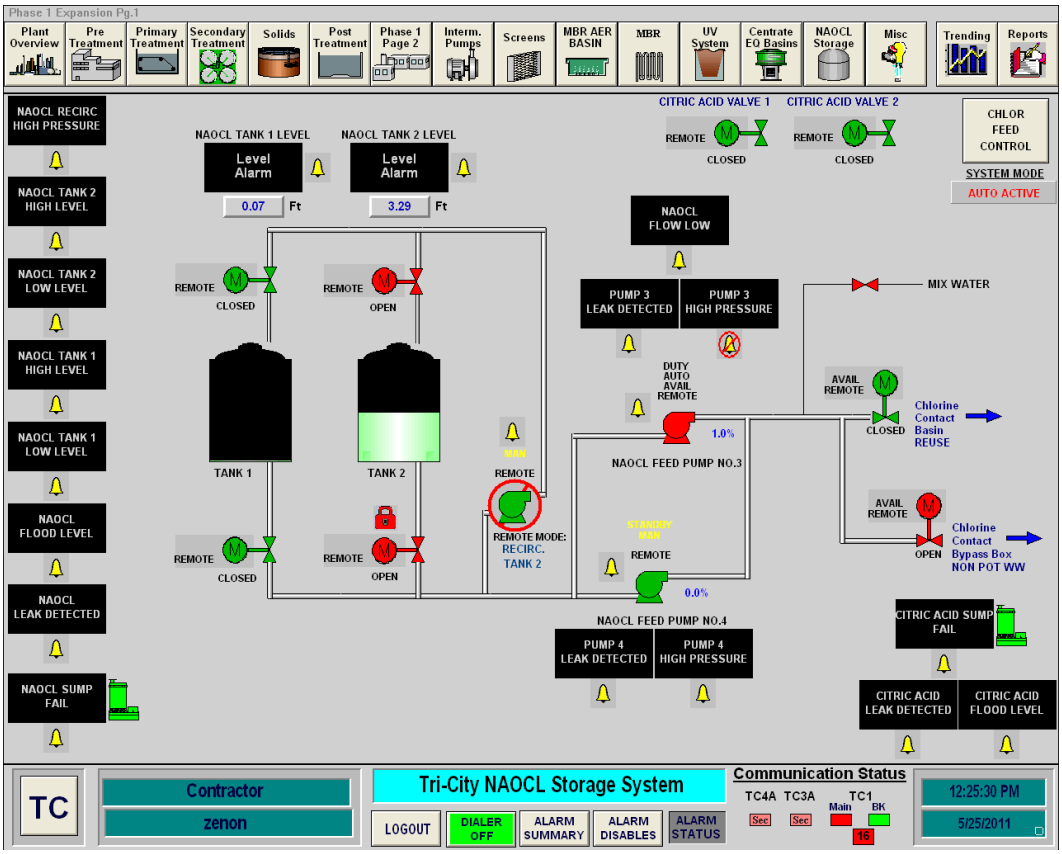


**Figure 6.1-7 – Sodium Hypochlorite Storage and Feed System**

## Lime System

The lime feed system **<9>** provides for storage and feed of lime to the treatment plant. The system receives hydrated lime from trucks that are unloaded into the lime silo. The stored lime is metered into a slurry tank where is mixed with water and discharged to either the influent channel to the aerated grit basins or the MBR primary effluent box. The lime feed system is flow paced to feed the proper dosage of lime for control of alkalinity and pH in the secondary processes. The SCADA screen for this system is shown on ***Figure 6.1-8***.

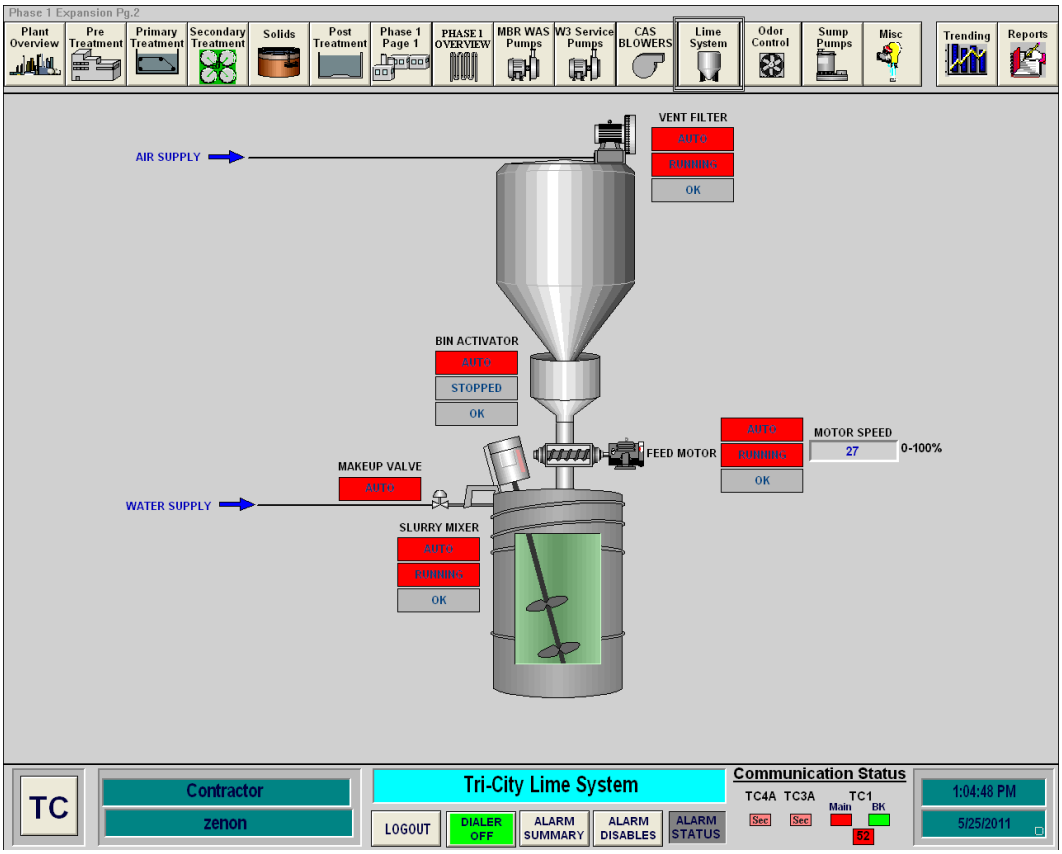


**Figure 6.1-8 – Lime Storage and Feed System**

## MBR System Master Plan

The MBR system has been designed for an ultimate average dry weather flow capacity of 24-mgd and a peak flow capacity of 60-mgd. The master plan for the MBR system expansion provides for expansion in 2-mgd to 4-mgd modules by the construction of up six 10-mgd intermediate pumps, five fine screen channels, five MBR aeration basins 24 membrane basins and the addition of additional UV modules in the existing UV channels.