

6.4.5 CAS Aeration Basin #4 – Backup Operation for MBR

The Phase I Expansion only provided one MBR aeration basin. Piping was provided to use CAS Aeration Basin #4 as a backup to MBR Aeration Basin #5 until additional MBR aeration basins are constructed in future expansions. CAS Aeration Basin #4 is to be operated as a backup for only a short period of time so inspection and repairs to MBR Aeration Basin #5 can be performed.

There are a number of issues that must be addressed when operating CAS Aeration Basin #4 with the MBR. These include:

- Low Flow Operation – CAS Aeration Basin #4 has a smaller hydraulic and organic loading capacity than MBR Aeration Basin #5. The MBR process is fed primary influent when the basin is operated as a backup, therefore the organic loading is higher. This will work during summer season flows for short periods of time, but will not provide sustained treatment at design flow conditions.
- MBR Protection – CAS Aeration Basin #4 is not covered. This means that the membranes will not be protected from debris that blows or falls into the basin. It is recommended to not operate this basin when cottonwood seeds are present and that special consideration is taken to protect debris from entering the basin when tasks are being performed in the area of the basin.
- Intermediate Pump Operation – There is no flow meter for pacing the intermediate pumps when operating CAS Aeration Basin #4. Therefore, the intermediate pump(s) will need to be operated in HAND with a manual speed setpoint.
- Mixed Liquor Recycle Transfer Return Pumps – There is no flow meter for pacing the mixed liquor transfer return pumps when operating CAS Aeration Basin #4. Therefore, the MLTR pumps will need to be operated in HAND with a manual speed setpoint.
- Lime Feed Point – Lime must be fed to the MBR process. While feeding the MBR plant with primary influent, the lime must be fed to the aeration basin influent. This will require dosing the total plant flow.

Preparing CAS Aeration Basin #4 For Service

The first step in using CAS Aeration Basin #4 is to prepare it for service with the MBR treatment system. This will require the removal from service as an aeration basin for the CAS system and cleaning it for use with the MBR system.

Step 1: Remove Aeration Basin #4 From Service

Remove AB#4 from service from the CAS System. Isolate the basin from both primary effluent feed and RAS return.

Step 2: Close CAS Aeration Basin #4 Effluent Gate

Close the CAS Aeration #4 effluent gate to isolate the basin from the CAS MLSS effluent channel.



Aeration Basin #4 Effluent Gate

Step 3: Dewater CAS Aeration Basin #4

Dewater the aeration basin using the dewatering pump. The MLSS can be returned to the CAS Aeration basin influent channel for return to the system or can be wasted to the GBT to remove from the system.

Step 4: Clean Aeration Basin #4

Clean all debris on interior of basin. It is critical that no debris enters the MBR basins that can harm the membranes. Also clean all walkways on the deck of the basin to minimize any potential of debris falling into the basin

Shut Down Flow to MBR Aeration Basin #5

MBR Aeration Basin #5 must be removed from service prior to starting the flow to CAS Aeration Basin #4. The membrane basin operation can be left in automatic as it will go on standby when the flow to the system is shut down. The following procedures must be done so that the membrane system operation will not be affected during the transfer.

Step 1: Flush the Primary Effluent Line

The primary effluent line will accumulate solids during low flow periods. This is because the line was designed for build-out peak flow conditions for the MBR system. Increasing the flow to the MBR system for a short period of time will flush the line.

1. Place both fine screens in operation.
2. Check the flow to the treatment plant and increase the flow to the MBR system so that a minimum of 2-mgd of flow continues to the CAS plant or a maximum of 7-mgd is pumped to the MBR system.
3. Run the flow to the MBR system for a minimum of 20-minutes to provide adequate flushing of the line.
4. Monitor the fine screens to ensure that they do not become plugged.

Step 2: Shut Down the Intermediate Pump

The intermediate pumps pump to the MBR system. This pump is paced off of the flow meter on the influent side of MBR Aeration Basin #5. There will be no influent flow meter to pace the flow to the MBR system when using CAS Aeration Basin #5. The intermediate pump will need to be operated in manual.

1. Note the % Speed that the pump is operating. Write it down to use later when starting up the pump for operation of the system in Manual for CAS Aeration Basin #5.
2. On the HMI, shut the operating Intermediate Pump OFF.



Intermediate Pump #3

Step 3: Shut Off the Mixed Liquor Recycle Pumps on MBR Aeration Basin #5

1. On the HMI for MBR Aeration Basin #5, turn both MBR Mixed Liquor Recycle Pumps to OFF.

Step 3: Shut Off the Mixed Liquor Transfer Return Pumps

1. Note % Speed on the MLTR pump. Write it down for operating the system in manual mode.
2. On the HMI for the MBR basins, turn both MBR Mixed Liquor Transfer Return Pumps to OFF.
3. Lock and tag out both pumps at the MCC.

Step 4: Close the MLTR Valve on AB#5

This valve is located in the AB#5 gallery. This valve can be closed through SCADA.

Step 5: Confirm MBR Basins Go to Standby Mode

The flow to the MBR system is now OFF. Confirm that the MBR basins go to Standby Mode. This may be a full shutdown of the system. Need to confirm.

Step 6: Confirm that the UV Channels Turn Off

The operating UV channels will no longer be receiving flow from the MBR system. The channels will drain until a low channel level shuts off the UV lights. Confirm that all UV lights turn off.

Start Flow to CAS Aeration Basin #4

Once the MBR system is off and stabilized, the MLSS contained in MBR Aeration Basin #5 can be transferred to CAS Aeration Basin #4 and flow can be introduced into the system. This is done by pumping the MBR basin contents with the MBR Aeration Basin #4 Dewatering Pump to the fine screen effluent channel which then flows to CAS Aeration Basin #5.

Step 1: Close Primary Effluent Box Gate Valve

This valve is located on the south side of the primary effluent channel. This valve is closed to allow for the fine screen effluent to use the line between the fine screen building and AB#4.

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Primary Effluent Box Gate Valve

Step 2: Close Influent Pump Station Primary Effluent Isolation Valve

This valve is located in the lower level of the fine screen building in the intermediate pump station. This valve isolates the intermediate pump suction header from the line between the fine screen effluent channel and AB#4.



Intermediate Pump Station Primary Effluent Isolation Valve

Step 3: Open Primary Influent Box Gate Valve

This valve is located on the south end of the primary influent channel. This will provide feed of primary influent to the intermediate pump station suction header.



Primary Influent Box Gate Valve

Step 4: Open the CAS #4 Aeration Basin Isolation Valve

The CAS #4 Aeration Basin Isolation Valve is located in a box in the street between the primary effluent box and CAS AB#4. Opening this valve will allow the flow in the intermediate pump station feed line to flow backwards from the fine screen building to CAS AB#4.



CAS Aeration Basin #4 Isolation Valve

Step 5: Open the CAS Aeration Basin #4 Feed Valve

The primary feed line has now been isolated from the primary effluent channel and the intermediate pump suction header. The CAS AB#4 isolation valve has been opened so flow from the fine screen effluent channel will flow to CAS AB#4. The CAS Aeration Basin #4 Feed Valve is located in the intermediate pump station. Open this valve to start feed to AB#4.



Primary Influent CAS Aeration Basin #4 Feed Valve

Step 6: Confirm CAS Aeration Basin #4 Effluent Gate is Closed

The CAS Aeration Basin #4 effluent gate isolates the basin from the effluent channel keeping MLSS from the CAS system from backflowing into the basin. This gate needs to be closed to ensure that the MLSS from the two systems do not mix.



Close Aeration Basin #4 Effluent Gate

Step 7: Open the CAS Aeration Basin #4 Influent Valve

The CAS Aeration Basin #4 Influent Valve is located on the south side of the influent end of the aeration basin in Anoxic Zone #1. Open this valve at the gate operator.



CAS Aeration Basin #4 Influent Valve

Step 8: Open the MLTR Pump Header Valve to AB#4

The MLTR Pump Header Valve to AB#4 is located in the MBR gallery above the MLTR pumps. The MLTR return to AB#5 was isolated by closing the MLTR Valve at AB#5. To get the MLTR to AB#4, the MLTR return valve needs to be opened.



MLTR Pump Header Valve to AB#4

Step 9: Open the CAS Aeration Basin #4 Mixed Liquor Transfer Return Valve

The AB#4 MLTR valve is located at the front of the aerobic zone of the aeration basin near the middle of the basin. Open this valve at the local valve operator station for the valve.



CAS Aeration Basin #4 Mixed Liquor Transfer Return Valve

Step 10: Open the CAS MBR Basin Feed Valve From Aeration Basin #4

The AB#4 MBR Basin Feed Valve is located at the effluent end of the aeration basin. Open this valve at the local valve operator station for the valve.



CAS MBR Feed Valve From Aeration Basin #4

Step 11: Open AB#4 to MBR Channel Feed Valve

Valve is located in MBR building on the MBR channel. Open this valve at the local valve operator station for the valve.



AB#4 To MBR Channel Feed Valve

Step 12: Begin Dewatering MBR Aeration Basin #5

The dewatering pump for AB#5 is located in MBR gallery. Flow is pumped to the fine screen effluent channel.

1. Start dewatering pump to dewater AB#5 and transfer MLSS to AB#4. The dewatering pump is started and stopped SCADA.
2. Fill AB#4 to between 6-feet of liquid level
3. When the basin has 6-feet of MLSS in it, start diverting air to CAS AB#4 by manually opening air valves at the aeration basin. Take care not to drop pressure in the air header to CAS blowers.
4. Monitor the blower curve on the operating MBR blower as the basin level drops. When the blower approaches surge conditions, **SHUT BLOWER OFF**.



MBR Aeration Basin #5 Dewatering Pump

Step 13: Start Flow to MBR System

Once AB#4 has a minimum of 6-feet of MLSS in the basin and air is being added, flow can be introduced into the basin. Starting the one of the intermediate pumps does this. The intermediate pump must be operated in hand as there is no flow meter to control the pumps.

1. Start Intermediate Pump in MANUAL at previous setting that was noted prior to shutdown of the pump.
2. Allow CAS AB#4 to fill and begin feeding MBR basins.

Step 14: Begin Lime Feed to Primary Influent Box (Grit Basin)

Once the intermediate pumps are on, begin feeding lime to the system. The lime system flow pacing needs to be changed to pace on influent flow.

1. Open lime slurry feed valve to aerated grit basin influent channel.
2. Close lime slurry feed valve to primary effluent feed box.
3. Change flow pacing of lime system to plant influent on SCADA.
4. Start lime system feeder.



Lime Feed Point

Step 15: Start MBR Mixed Liquor Return Transfer Pumps

Monitor the level in aeration basin #4. Once the basin fills and begins transferring flow to the MBR basins, the MLTR pumps will need to be started. This is critical as once the MLTR Return Channel gets full, the system will be shut down on a high level alarm. There is no flow meter for the MLTR Return pumps, so they will need to be operated in manual mode.

1. Allow CAS AB#4 to be full and start feeding MBR basins. When flow begins overflowing the MBR basin weirs, start the MLTR pumps.
2. Start MLTR Pump in HAND at the % Speed noted earlier to get 4Q flow rate.
3. Monitor operation of pumps to confirm satisfactory operation.

Step 16: Start CAS Aeration Basin #4 MLSS Recycle Pump

Once the aeration basin is full, the CAS Aeration Basin #4 MLSS Recycle Pump can be started. This pump is located in the gallery between CAS Aeration Basins #3 and #4. The pump can be started on the VFD located in the RAS pump station. Operate at the same pump speed that was used when operated the pump for the CAS process.

Drain MBR Aeration Basin #5

MBR Aeration Basin #5 is being dewatered as the MLSS is being transferred to AB#4. Once the basin level gets to the diffuser level, flushing water can be added to the basin to dilute the basin contents and clean the basin. Two flushing water valves are located in the MBR gallery across from the MLTR pumps. There is one flushing water valve for each channel of the basin. Water is provided to this system from the W5 water pump located in the CAS nonpotable water pump station. Start the W5 water pump and open the flushing water valve. Monitor and adjust the flow rate to make sure that the flow is lower than the pumping rate of the dewatering pump.

Once the basin is drained, the basin can be hosed out. Take care to not damage the diffusers as the basin is being cleaned.

Transfer Flow Back From Aeration Basin #4 to MBR Aeration Basin #5

To transfer operation back to AB#5, the same process for sending flow to AB#4 must be followed in reverse direction. The major difference is that a portable pump must be used to dewater the basin. This can be done by pumping from AB#4 to the primary effluent channel and taking all of the MLSS through the fine screens or pumping directly to AB#5.