AquaMSBR® Cell Descriptions

A brief description of each of the seven treatment cells in the Aqua Modified SBR follows for this project. Following this description, a narrative is provided detailing the operations and status of each cell as it relates to accomplishing effluent objectives.

Cells #1 and #7

These cells will alternate as final clarifiers in the system. Effluent will be continuously discharged from either cell #1 or cell #7. In preparation for one of these cells becoming a clarifier, it will go through specific steps based upon achieving effluent objectives as well as to prepare it to become the final clarifier.

Cell #2

Cell #2 will operate continuously as the phased settler cell. The cell will receive a pumped recycled sludge flow from one of the cells (cell #1 or cell #7) that was previously a clarifier in order to reduce the accumulated solids concentration in this cell. Cell #2 operates as a sludge thickener and is never mixed or aerated. The sludge flow that is received from either cell #1 or cell #7 is thickened with the concentrated sludge flow going to cell #3 and the supernatant flow passing to cell #6.

Cells #3, #4 and #5

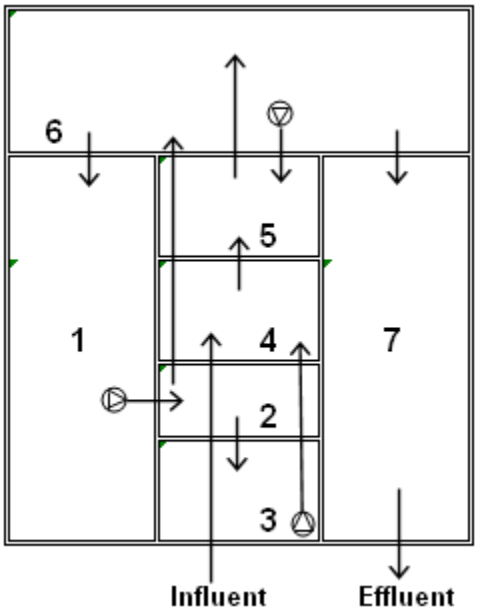
Each of these cells will always be completely mixed absent of aeration. Cell #3 operates as an anoxic cell to promote denitrification and receives the concentrated sludge under flow from cell #2 and discharges displaced flow to cell #4. Cell #4 will continuously receive all of the influent flow and the displaced flow from cell #3. Cell #4 operates as an anaerobic cell and promotes phosphorus release. Flow passes from cell #4 to cell #5 through the openings at the base of the cell wall between the cells. Cell #5 operates as a secondary anoxic cell to promote additional denitrification. Cell #5 receives flow from Cell #4 and a pumped recycle flow from cell #6 and discharges flow to cell #6 through the openings at the base of the cell wall between cells #5 and #6.

Cells #6

This cell is the main aeration cell and will be continuously aerated. It will handle the oxygen demand emanating from cell #5 and the cell #2 supernatant flow. Cell #6 will be primarily responsible for a majority of the BOD5 removal, nitrification and phosphorus uptake in the aerobic conditions present in this cell. Cell #6 will continuously recycle mixed liquor to cell #5 to enhance denitrification.

AquaMSBR® Phase Descriptions

AquaMSBR® - PHASE I
(0 minutes to 30 minutes)



Cell No. 1: Anoxic mixing; discharges pumped mixed liquor to Cell 2; receives displaced mixed liquor from cell #6.

Cell No. 2: Phased settler; receives pumped mixed liquor from cell #1; discharges settled mixed liquor to cell #3 as underflow; discharges supernatant to cell #6 by gravity flow.

Cell No. 3: Anoxic mixing; receives settled mixed liquor from cell #2; discharges displaced mixed liquor to cell #4.

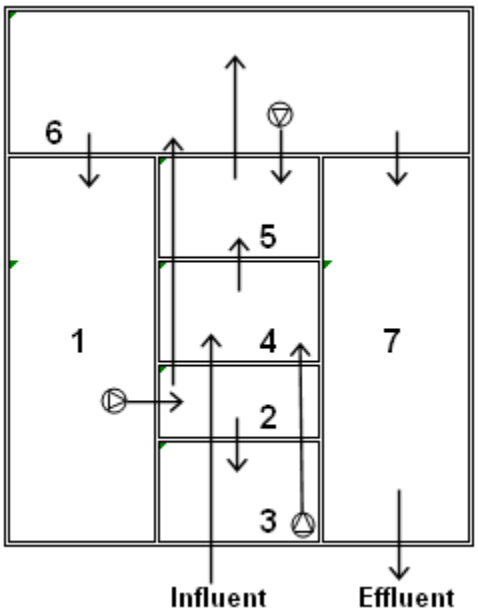
Cell No. 4: Anaerobic mixing; receives influent flow; receives displaced mixed liquor from cell #3; discharges displaced mixed liquor to cell #5.

Cell No. 5: Anoxic mixing; receives displaced mixed liquor from cell #4; receives pumped mixed liquor from cell #6; discharges displaced mixed liquor to cell #6.

Cell No. 6: Aeration and mixing; discharges displaced mixed liquor to cell #7; discharges displaced mixed liquor to cell #1; discharges pumped mixed liquor to cell #5; receives displaced mixed liquor from cell #5; receives displaced supernatant from cell #2.

Cell No. 7: Final clarifier; discharges effluent; receives displaced mixed liquor from cell #6.

AquaMSBR® - PHASE II
(30 minutes to 90 minutes)



Cell No.1: Aeration and mixing; discharges pumped mixed liquor to cell #2; receives displaced mixed liquor from cell #6.

Cell No.2: Phased settler; receives pumped mixed liquor from cell #1; discharges settled mixed liquor to cell #3 as under flow; discharges supernatant to cell #6 by gravity flow.

Cell No. 3: Anoxic mixing; receives settled mixed liquor from cell #2; discharges displaced mixed liquor to cell #4.

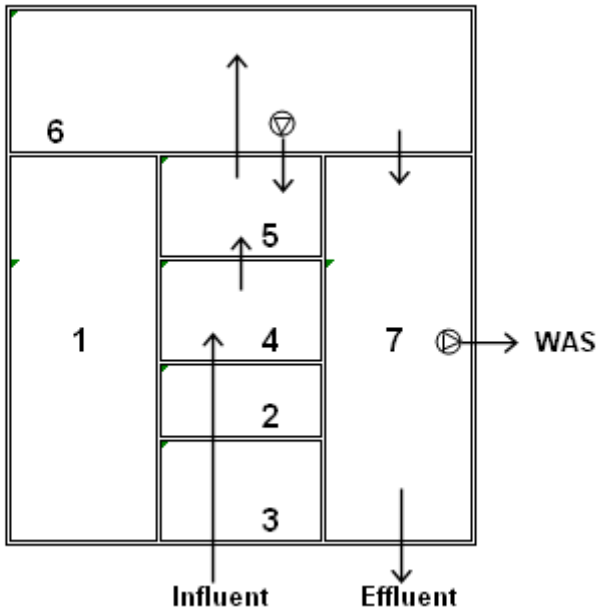
Cell No.4: Anaerobic mixing; receives influent flow; receives displaced mixed liquor from cell #3; discharges displaced mixed liquor to cell #5.

Cell No. 5: Anoxic mixing; receives displaced mixed liquor from cell #4; receives pumped mixed liquor from cell #6; discharges displaced mixed liquor to cell #6.

Cell No. 6: Aeration and mixing; discharges displaced mixed liquor to cell #7; discharges displaced mixed liquor to cell #1; discharges pumped mixed liquor to cell #5; receives displaced mixed liquor from cell #5; receives displaced supernatant from cell #2.

Cell No. 7: Final clarifier; discharges effluent; receives displaced mixed liquor from cell #6.

AquaMSBR® - PHASE III
(90 minutes to 120 minutes)



Cell No. 1: Pre-settling; mixing and aeration are absent; recycle pump is off; cell is hydraulically isolated with no inflow or outflow.

Cell No. 2: Phased settler; cell is hydraulically isolated with no inflow or outflow.

Cell No. 3: Anoxic mixing; cell is hydraulically isolated with no inflow or outflow.

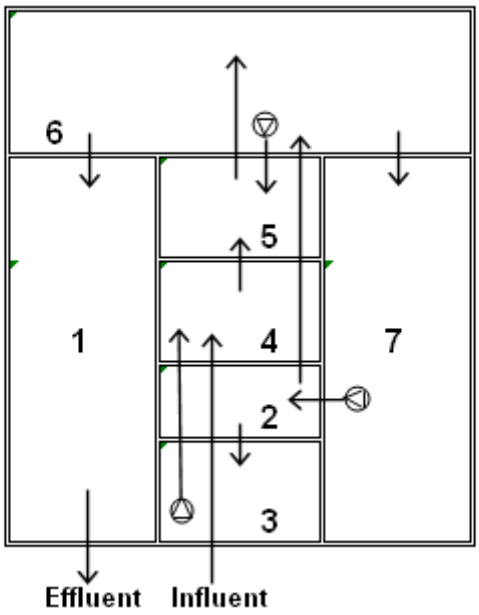
Cell No. 4: Anaerobic mixing; receives influent flow; discharges displaced mixed liquor to cell #5.

Cell No. 5: Anoxic mixing; receives displaced mixed liquor from cell #4; receives pumped mixed liquor from cell #6; discharges displaced mixed liquor to cell #6.

Cell No. 6: Aeration and mixing; discharges displaced mixed liquor to cell #7; discharges pumped mixed liquor to cell #5; receives displaced mixed liquor from cell #5.

Cell No. 7: Final clarifier; discharges effluent; receives displaced mixed liquor from cell #6; discharges waste activated sludge on a pre-selected time basis.

AquaMSBR® - PHASE IV
(120 minutes to 150 minutes)



Cell No. 1: Final clarifier; discharges effluent; receives displaced mixed liquor from cell #6.

Cell No. 2: Phased settler; receives pumped mixed liquor from cell #7; discharges settled mixed liquor to cell #3 as under flow; discharges supernatant to cell #6 by gravity flow.

Cell No. 3: Anoxic mixing; receives settled mixed liquor from cell #2; discharges displaced mixed liquor to cell #4.

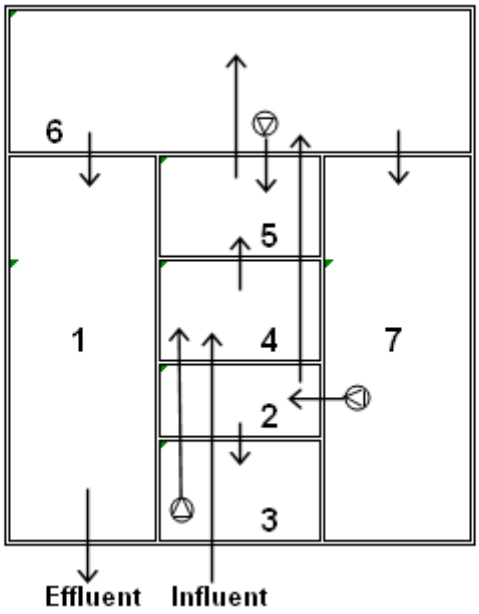
Cell No. 4: Anaerobic mixing; receives influent flow; receives displaced mixed liquor from cell #3; discharges displaced mixed liquor to cell #5.

Cell No. 5: Anoxic mixing; receives displaced mixed liquor from cell #4; receives pumped mixed liquor from cell #6; discharges displaced mixed liquor to cell #6.

Cell No. 6: Aeration and mixing; discharges displaced mixed liquor to cell #1; discharges displaced mixed liquor to cell #7; Discharges pumped liquor to cell #5; receives displaced mixed liquor from cell #5; receives displaced supernatant from cell #2.

Cell No. 7: Anoxic mixing; discharges pumped mixed liquor to cell #2; receives displaced mixed liquor from cell #6.

AquaMSBR® - PHASE V
(150 minutes to 210 minutes)



Cell No. 1: Final clarifier; discharges effluent; receives displaced mixed liquor from cell #6.

Cell No. 2: Phased settler; receives pumped mixed liquor from cell #7; discharges settled mixed liquor to cell #3 as underflow; discharges supernatant to cell #6 by gravity flow.

Cell No. 3: Anoxic mixing; receives settled mixed liquor from cell #2; discharges displaced mixed liquor to cell #4.

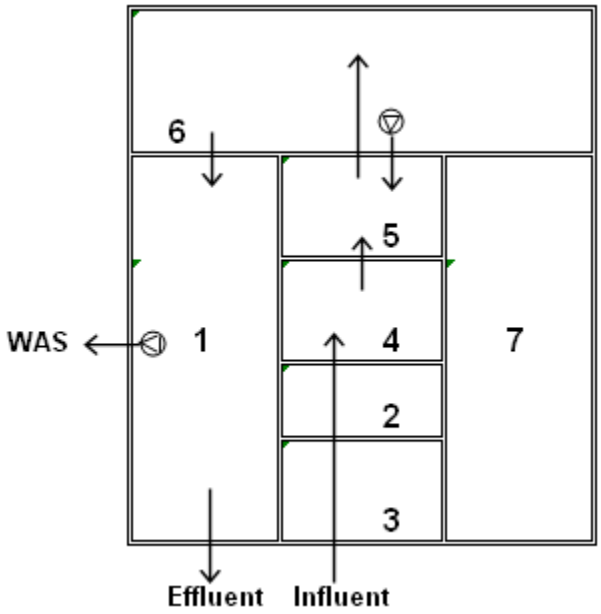
Cell No. 4: Anaerobic mixing; receives influent flow; receives displaced mixed liquor from cell #3; discharges displaced mixed liquor to cell #5.

Cell No. 5: Anoxic mixing; receives displaced mixed liquor from cell #4; receives pumped mixed liquor from cell #6; discharges displaced mixed liquor to cell #6.

Cell No. 6: Aeration and mixing; discharges displaced mixed liquor to cell #1; discharges displaced mixed liquor to cell #7; discharges pumped mixed liquor to cell #5; receives displaced mixed liquor from cell #5; receives displaced supernatant from cell #2.

Cell No. 7: Aeration and mixing; discharges pumped mixed liquor to cell #2; receives displaced mixed liquor from cell #6.

AquaMSBR® - PHASE VI
(210 minutes to 240 minutes)



Cell No. 1: Final clarifier; discharges effluent; receives displaced mixed liquor from cell #6; discharges waste activated sludge on a pre-selected time basis.

Cell No. 2: Phased settler; cell is hydraulically isolated with no inflow or outflow.

Cell No. 3: Anoxic mixing; cell is hydraulically isolated with no inflow or outflow.

Cell No. 4: Anaerobic mixing; receives influent flow; discharges displaced mixed liquor to cell #5.

Cell No. 5: Anoxic mixing; receives displaced mixed liquor from cell #4; receives pumped mixed liquor from cell #6; discharges displaced mixed liquor to cell #6.

Cell No. 6: Aeration and mixing; discharges displaced mixed liquor to cell #1; discharges pumped mixed liquor to cell #5; receives displaced mixed liquor from cell #5.

Cell No. 7: Pre-settling; mixing and aeration are absent; recycle pump is off; cell is hydraulically isolated with no inflow or outflow.