



Headworks's MBBR Process for SAFWA Plant in the Kingdom of Saudi Arabia

Background

Located in the Eastern Province, the Ministry of Water & Electricity of Dammam has seen very rapid development and increased population over the last few years. The existing treatment plant at SAFWA needed an upgrade to handle increased flow and stringent demands. The target was to find a solution that would not require any additional volume while being able to handle as much hydraulic load as possible on the existing clarifiers.

ActiveCell[®] moving bed biofilm reactor (MBBR) technology was selected to increase the hydraulic capacity of the existing activated sludge plant from 20,000 m³/d to 28,000 m³/d. The treatment solution provided by Headworks[™] Inc. will provide an increase in treatment capacity and improved effluent quality suitable for reuse.

Concept

The first part of the existing basin was converted to a pure Headworks MBBR roughing reactor. This allowed bulk removal of organic load by creating a high loading system in

Customer: Ministry of Water & Electricity,
Kingdom of Saudi Arabia
Industry: Municipal

front of the existing basin. The MBBR roughing reactor was designed with a 40 % fill fraction of Active Cell media. ActiveCell media is specifically designed to provide a large protected surface area and provides optimal conditions to support biofilm growth.

The MBBR roughing reactor acts as a pretreatment step in the overall process removing the majority of the BOD load, thereby allowing the remaining volume of the plant to be used for increased treatment capacity and nitrification.

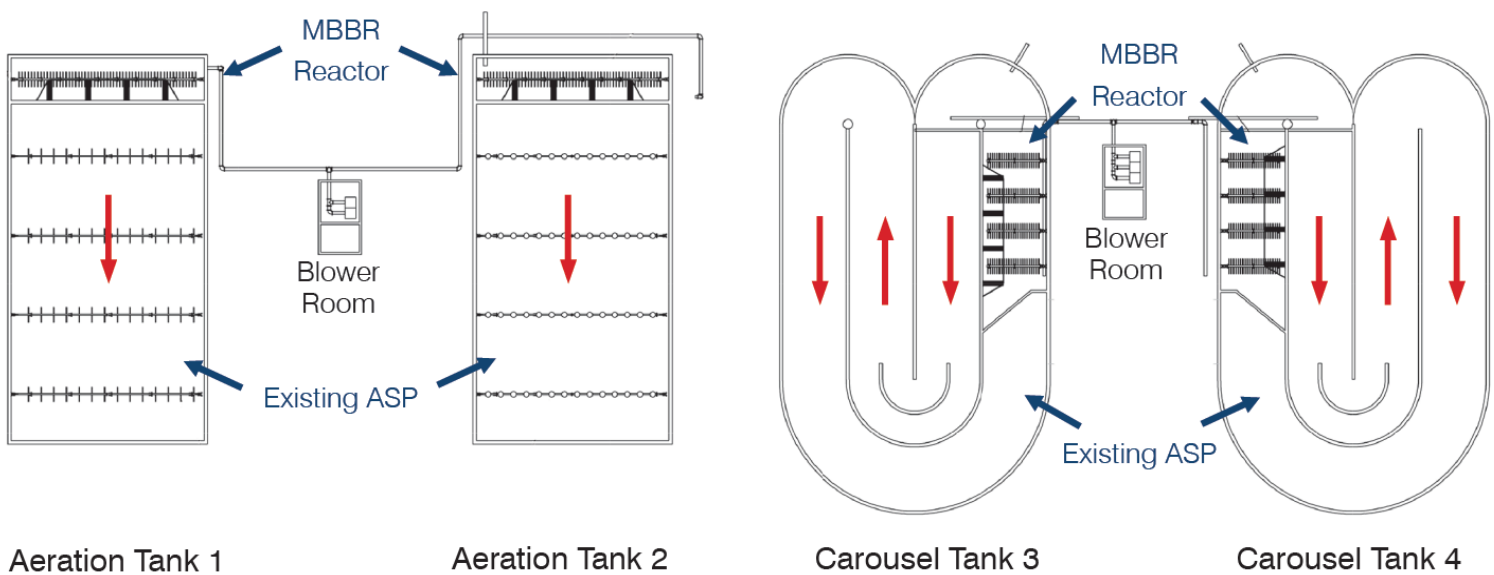
KEY FACTS

- **Wastewater Flow:** 28,000 m³/day (7.4 MGD)
- **BOD₅:** Influent 250 mg/L
Effluent < 10 mg/L
- **COD:** Influent 650 mg/L
- **TSS:** Influent 350 mg/L
Effluent < 10 mg/L
- **NH₃-N:** 35 mg/L
- **pH:** 6 - 9
- **Temperature:** 25 – 35 °C (77 – 95 °F)

Design

	Four parallel trains with combined sludge separation and RAS			
	Aeration Tank		Carousel Tank	
	1	2	3	4
MBBR Reactor Volume	324 m ³	324 m ³	255 m ³	255 m ³
Activated Sludge Volume	2,557 m ³	2,557 m ³	2,631 m ³	2,631 m ³
Filling of Media	40 %	40 %	40 %	40 %
ActiveCell Media	AC 920	AC 920	AC 920	AC 920
Total Aeration	3,320 m ³ /hr	2,300 m ³ /hr	6,350 m ³ /hr	6,350 m ³ /hr

Process Flow Diagramm



Conclusion

This project highlights one of the key strengths associated with MBBR technology. The plant will experience a 40 % increase in capacity while producing effluent quality that is suitable for reuse - all within the existing infrastructure. After the plant is commissioned at the start of 2013, this installation will showcase a novel solution for maximizing the use of existing assets for utilities and end users in the region.