

MBBR Wastewater Treatment and Recycling System Case Study

CURRENT SITUATION ANALYSIS

As part of the NEOM Infrastructure Mountain Tunnel Project, the aim was to reliably treat domestic wastewater generated from kitchens and toilets on-site and prepare it for reuse.

The design flow rate of 600 m³/day needed to be managed through a modular system that could adapt to limited site space, be installed quickly, and ensure operational continuity. The treated water quality targets were defined to support advanced filtration for reuse.



PROJECT INFORMATION



NEOM Infrastructure
Mountain Tunnel Project



600 m³/day



Saudi Arabia

TECHNICAL SOLUTION APPROACH

Vatek Environmental Technologies designed the system as four steel packaged MBBR units and a containerised filtration line, integrating the mechanical equipment and automation infrastructure.

Each packaged unit combines an anoxic zone, a moving bed biofilm reactor, an activated sludge zone, and a lamella clarification stage. High surface area bio-media provide effective biological treatment within a compact footprint.

The treated water undergoes advanced treatment through chlorine dosing, multimedia filtration, and activated carbon filtration, while PLC-controlled pumps, mixers, blowers, and level monitoring equipment support process stability.

4 Modular Units · 1 Filtration Container · PLC Automation · Water Reuse



Modular and
Portable Design



Redundant Aeration



High Biofilm Surface
Area



Compact Footprint



Effluent Suitable for Reuse



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ACHIEVED RESULTS



The 600 m³/day solution was configured as four modular packaged MBBR units and a containerised filtration and water recovery line.

The anoxic, MBBR, and activated sludge stages support organic load and nitrogen removal, while the lamella clarification section provides solid-liquid separation within a compact footprint.

Following chlorination, the treated water undergoes advanced treatment through multimedia and activated carbon filters to support the water reuse target. PLC-controlled equipment and redundant blower and pump configurations enhance operational continuity.



KEY RESULTS



600 m³/day

Nominal Treatment Capacity



4

Modular Packaged MBBR Units



80 m³

Total MBBR Bio-Media Volume



280

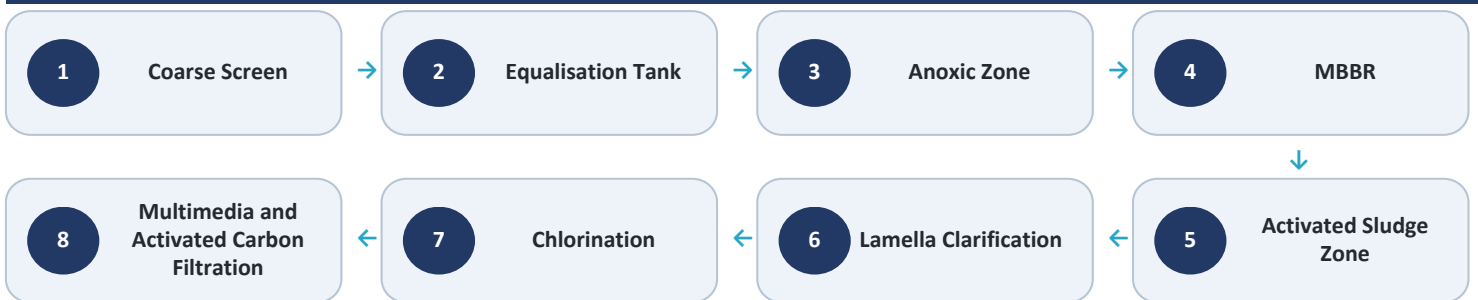
Fine-Bubble Disc Diffusers



< 10 MG/L

BOD₅ Effluent Target

PROCESS FLOW



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