Case Study

BIO-CEL® Wastewater Treatment for Irrigation - Turkey

MANN+HUMMEL

Case Study: Municipal BIO-CEL® MBR Modules

Provide MBR membrane modules capable of producing high quality effluent for irrigation purposes.

PROBLEM
Insufficient performance treating municipal wastewater for irrigation

SITE
Treatment plant in Konacik District, Bodrum, Turkey

OUTCOME
Successfully met & exceeded effluent requirements

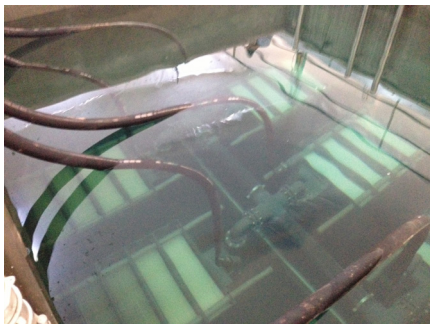
OBJECTIVE

A municipal Wastewater Treatment Plant (WWTP) in the Konacik district of Bodrum, Turkey sought to upgrade their existing 1500 m³/d (0.4 MGD) Membrane Bioreactor (MBR) plant, where the effluent is used for irrigation. BIO-CEL® MBR was selected for the project and 12 BIO-CEL® 400 modules were installed in two separate filtration tanks.

MATERIALS & METHODS

This wastewater treatment plant uses 12 BIO-CEL® 400 modules at the plant. Unit operations for the WWTP are as follows:

- Equalization tank
- Coarse screen (10mm)
- Fine screen (2mm)
- Basket screen (2mm)
- Denitrification tank
- Nitrification tank



BIO-CEL® 400 Modules Installed

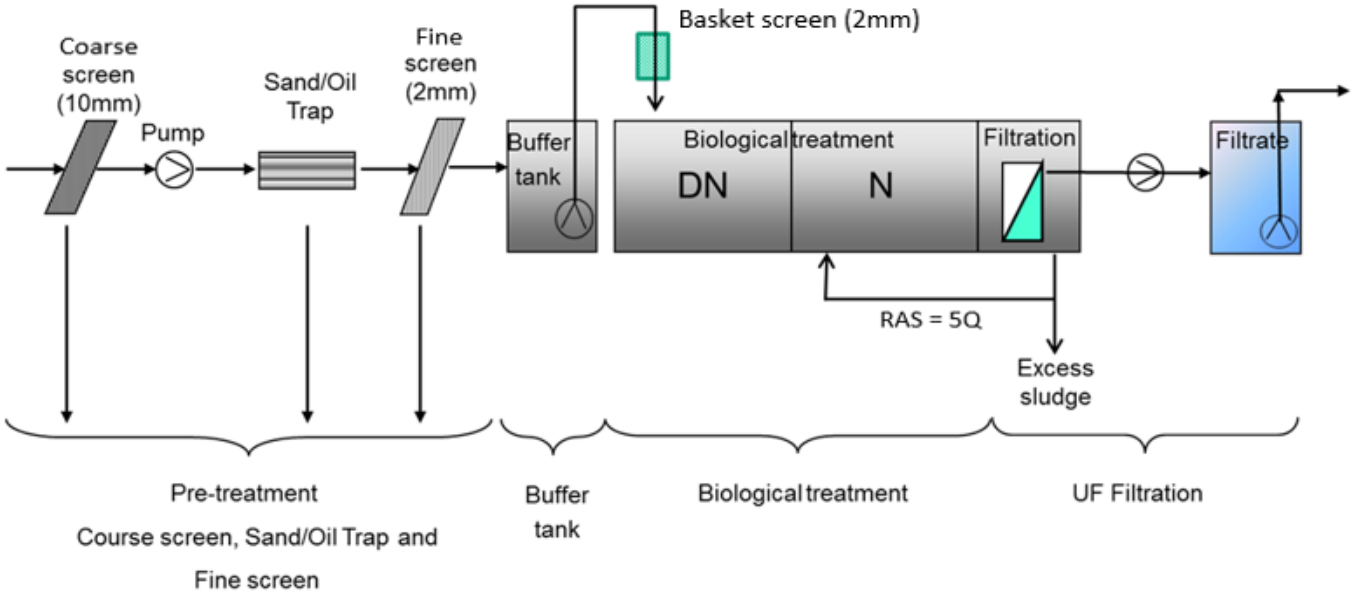


Figure 1 Configuration of biological and MBR process in Konacik

The results of this MBR system indicate that BIO-CEL® 400 modules can successfully treat municipal wastewater and produce quality effluent for irrigation.

Parameter	MBR Pollutant Removal Percentage
COD	93.4 %
BOD	98.3 %
Total Nitrogen	87.5 %
Total Phosphorus	87.5 %
TSS	95.8 %

CONCLUSION

Since the project's completion, plant performance has been stable and is reliably producing high-quality effluent suitable for irrigation. The BIO-CEL® 400 modules have demonstrated positive performance: Lower energy demand due to crossflow aeration via fine air bubble diffusers; easier maintenance due to BIO-CEL's membrane laminate that combines the advantages of flat sheet and hollow fiber membranes, allowing for backwash capability and increased durability; and a decreased risk of downtime for the plant from membrane damage due to BIO-CEL's self-healing effect.

Tables & Data

Table 1 Plant design

Parameter	Value
Modules	12 x BIO-CEL® 400
Total Membrane Area	4,800 m² (51,667 ft²)
Daily Average Flow	1,500 m³/d (0.4 MGD)
Peak Flow	87.5 m³/d (385 gpm)
MLSS	8-10 g/L
Solids Retention Time	20 days
Average Flux	13 LMH (7.6 GFD)
Avg. Transmembrane Pressure	60 mbar (0.87 psi)
Avg. Energy Consumption (MBR)	0.4-0.5 kWh/m³
pH	7-7.5
Minimum Temperature	15°C (59°F)

Table 2 BIO-CEL MBR Performance

Parameter	Raw Influent	MBR Effluent
COD (mg/L)	380	< 25
BOD (mg/L)	290	< 5
Total Nitrogen (mg/L)	80	< 10
Total Phosphorus (mg/L)	8	< 1
TSS (mg/L)	120	< 5
Ammonia (mg/L)	-	< 1

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