

Seawater Reverse Osmosis Desalination Plant - Al Galala, Suez Governorate, Egypt

A Case Study



Key Data

Location	Al Galala, Suez Governorate, Egypt
Plant Type	Seawater Reverse Osmosis Desalination Plant
Capacity	150,000m ³ /day
Use	Potable water
Client	Armament Authority of the Government of Egypt
End User	The Government of Egypt
Contract Type	Turnkey EPC with O&M for one year

Introduction

In line with the Egyptian government efforts to fortify water resources and reinforce water security, Egypt has witnessed a breakthrough in the development of lifeline water projects. The main objective behind this strategy is to address the low water levels of the Nile River, being the main source of fresh water used in various applications such as: drinking, agriculture, irrigation, industrial, among other potable uses.

One of the most iconic water projects among this growing portfolio is Al Galala Seawater Reverse Osmosis Desalination Plant (Al Galala SWRO) with a capacity of 150,000m³/day.

Al Galala city is one of the most ambitious projects in Egypt with the vision to become a world-class touristic and residential destination. The entire city is built on 19,000 acres loft land, on top of the highest plateau of Al Galala mountain with a breathtaking view of the Suez Gulf. The city is designed to include world-class hotels, water entertainment parks, an international marina, a commercial and residential complex and a university.

Al Galala SWRO project was developed by Merito, Orascom joint venture (JV), in accordance with the highest standards of quality, health and safety and with a full commitment to preserving the environment. Advanced energy saving technologies have been integrated in this project among which is reverse osmosis. Solid glass-lined steel GLS tanks, providing a wide array of tangible benefits, compared to cement or steel alternatives, have also been used.

Developing Al Galala SWRO was completed in record time despite the obvious challenges that by-factor being located in such an area. The plant is built opposite to a frequent flood site, creating the need to dig tunnels for seawater intake without affecting the main road then lifting desalinated water from coastal level to storage tanks over the mountain. The type of wet soil on which the project is built was also a challenge. However, all such obstacles were overcome and the JV surpassed the set timetable and successfully commissioned the plant and produced water sixteen months after commencement of construction works. The average industry standards for a project of such size and capacity is thirty months.

Scope of Work

A Turnkey EPC project including operation and maintenance for 1 year.

Main Scope of Work

- Detailed design and engineering for the entire project including intake, civil works, process, mechanical and electrical work
- Supply of equipment
- Marine works
- Civil works construction
- Installation, commissioning and startup
- Onshore and offshore training
- Supply of spare parts for 1 year
- Laboratory and workshop
- Operation and maintenance for 1 year

Scope of Supply

1. Intake and Outfall

- Seawater intake 1.6m diameter
- Seawater intake pumping station
- Brine outfall pipeline 1.4m diameter

Total pipelines length 1,200m

2. Pre-treatment

- Horizontal multi-media filters
- Chemical pre-treatment
- Micron filtration

22 Filters 3.8m Diameter 18m length

3. RO System

- Desalination reverse osmosis system
- Energy recovery system (by Isobaric pressure exchangers)
- RO cleaning and flushing system

10 RO Skids, 15,000m³/day each skid

4. Post-treatment

- Remineralization system by:
 - Calcite contactors
 - Co₂ injection system
 - Degasser with blending tank and pump station
- Product water GLS tanks 60,000m³ capacity
- Product water pump station

5. Electric and Automation

- Medium voltage switch gear
- Electric power panels
- Step down transformers
- Standby power generators
- Full automation and SCADA control system

20,000KVA standby generator set



Key Benefits

- Design of seawater intake and brine outfall fulfills environmental guidelines to sustain the rich marine life in the area.
- Reliable design assures a trouble free operation.
- Integrating a range of software (online hydraulic modelling and leak detection), hardware and services that integrates the concept of "Internet-of-things" and augments reality to monitor the plant's water and electricity network, ensures a timely and comprehensive online monitoring of the entire operations, consistent water quality and compliance to international standards and client specifications.
- Utilizing state of the art technology in energy recovery lowers energy consumption and carbon footprint to minimum level.
- Equipping the plant with standby generators secures 50% operating capacity for emergency situations and ensuring no downtime.

