

## A Case Study

# Sewage Treatment Plant for the City of Medinet Zayed, Abu Dhabi

## Introduction

Medinet Zayed is a fast growing city within the Abu Dhabi Emirate of the United Arab Emirates.

Abu Dhabi Municipality decided to provide sewage treatment facilities as part of the development plan for the city to cater for a daily sewage of 5000 m<sup>3</sup>/Day in Medinet Zayed complete with a collection network. The treated effluent is at a quality suitable for irrigation use which conforms to Abu Dhabi's highly acknowledged standards of improving environmental protection. Specifications were drawn up by Abu Dhabi Municipality and consultants KEO / Metcalf and Eddy to the latest international standards with due recognition for the emirates concern for environmental protection.

Merito secured the multi-million dollar project against tough competitive bidding and subsequently completed the project to the entire satisfaction of the authorities.

## Scope Of Work

This included the complete design, engineering, manufacture, supply, inspection and testing, site storage, installation, commissioning, performance test and training of personnel.

## Plant General Information

The sewage treatment facilities are extensive and mainly comprise the following units:



- Sewage Pumping Stations
- Sewage Treatment Plant
- Sludge Handling Facilities
- Effluent Pump station
- Irrigation Pump Station
- Electrical and Control Equipment
- Other works

## Plant Technical Characteristics

### Sewage Pumping Stations

Two pumping Stations are provided to pump the city sewage to the treatment plant. These stations are located



at a distance between five and seven kilometers from the plant. Each lift station is provided with two sewage grinders each having a capacity to handle sewage flow rates up to 500 m<sup>3</sup>/hr. Three pumps supply the sewage to the treatment site. The pump capacities range from 300 m<sup>3</sup>/hr to 460 m<sup>3</sup>/hr. The station equipment is installed 11 m below ground with appropriate ventilation and odor control equipment.

## Sewage Treatment Plant

This includes the following units:

- Raw Sewage Metering Station
- Aeration Tanks
- Clarifiers
- Traveling Bridge Gravity Filters
- Sludge Handling
- Gas Chlorinating Equipment
- Effluent Pumping Station
- Irrigation Pumping Station

## Aeration Tanks

The incoming raw sewage is metered and then enters four aeration tanks in two streams. A total of sixteen surface aerators (30 kW each) are installed to aerate the raw sewage.

## Clarifiers

The aerated water passes through two circular clarifiers 20 m in diameter. The clarified water flows into a peripheral launder over an adjustable weir plate. The clarifiers are equipped with a gear driven central cage and rake mechanism. Sludge is raked into a central cone at the bottom of the clarifier. The system has been designed to provide continuous sludge bleeding, sludge re-circulation and excess sludge discharge.

## Traveling Bridge Gravity Filters

The clarified water is treated in the gravity filters so as to further improve the quality of the water. The filters are provided with traveling bridge backwash equipment. The equipment is mounted on a frame structure which moves along the filter by a mechanism powered by a reversing motor. The backwash equipment comprising of a moving stainless steel hood and a submersible pump are mounted on to this bridge. Hydraulically sized orifices are provided to uniformly collect the backwash water.

## Sludge Handling

The clarifier sludge and plant drain flows are collected in a 140 cubic meter sludge holding tank. A Metering station measures and monitors the waste and re-circulation sludge flows. Aspirating aerators are provided in the sludge holding tank.





Thickened sludge is pumped to the sludge drying beds by means of progressive cavity type of pumps having a design pumping capacity of 170 m<sup>3</sup>/hr. Underflow from the sludge drying beds and decanted water from the sludge holding tank is returned to the inlet for further recovery.

### Gas Chlorinating Equipment

Complete chlorinating equipment is housed in a separate building. Two wall-mounted vacuum operated, solution feed, sonic flow type gas chlorinators are supplied to provide the chlorine solution to the chlorine contact tank and filters. An automatic switchover facility ensures the continuous supply of chlorine and the gas feed flow is automatically controlled.

Other equipment installed includes on-line chlorine analyzer, Chlorine leak detection and monitoring.

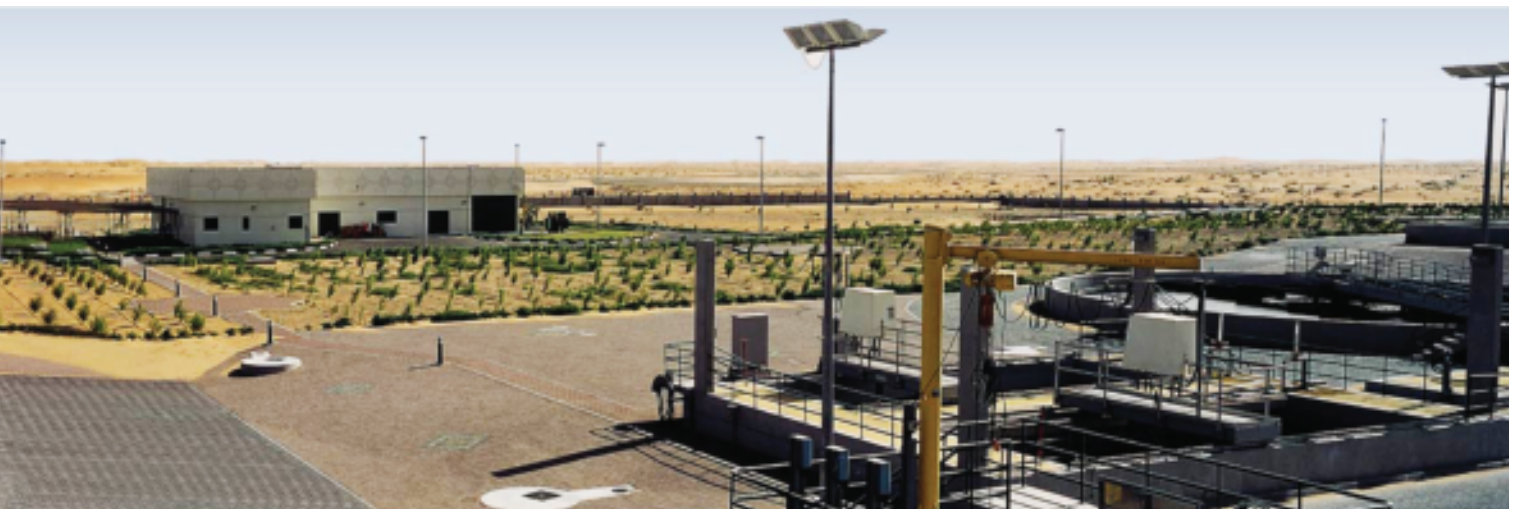
### Effluent Pumping Station

The treated water from the chlorine contact tank is stored in an effluent storage tank. Effluent pumps deliver water both for process use and supply to irrigation reservoir. A hydropneumatic tank provided on the process water line assures minimum supply pressure. The hydropneumatic tank is 20m<sup>3</sup> ASME stamped carbon steel pressure vessel. The associated compressors, controls and monitoring devices for automatic operation of the irrigation system are also supplied.



### Irrigation Pumping Station

The irrigation reservoir receives the treated water from the sewage treatment plant for storage and subsequent distribution. The reservoir is provided with inlet control valves and four sets of pumps supply water to the irrigation system. The water, passes through a further hydropneumatic tank so as to maintain a minimum pressure in the system.



## Electrical and Control Equipment

Electrical equipment includes MCC's, cabling, wiring, earthing, plant and street lighting, protection, etc. Four diesel generator sets are supplied for emergency electric supply. The generator sets prime rating varies from 87 kW to 1024 kW and are provided with both Auto/Manual Transfer switch (ATS/MTS) in line with the latest Water and Electricity Department requirements.

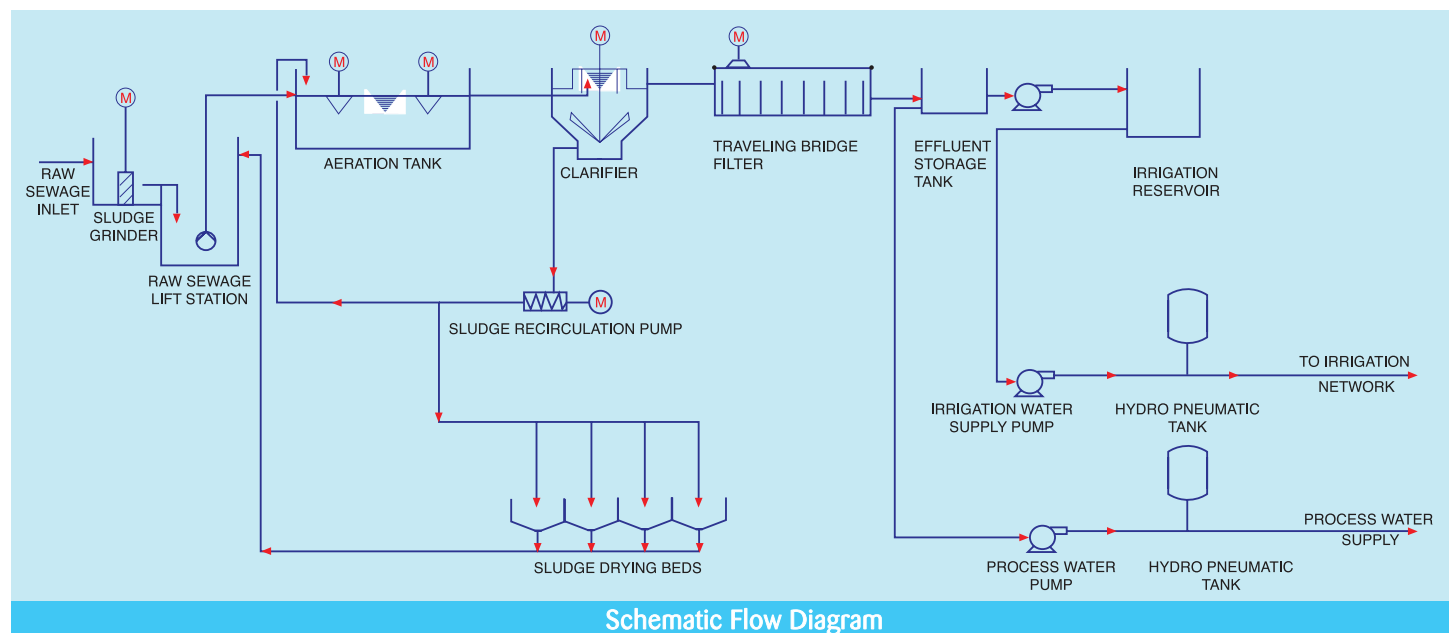
A central control panel monitors and controls the operation of the entire plant. A Mimic panel provides easy to understand graphic display of the various components of the plant and the status of each equipment is shown on the Mimic through illuminated LED's.

## SCADA

In addition, the plant is equipped with a telemetry and SCADA system. The whole system monitors the Medinet Zayed Sewage Treatment plant and also all other pumping stations within the city and sewerage systems in the western region of Abu Dhabi. The entire water treatment package for the



defined scope of work was commissioned in November 1998. Since that time the plant has been in continuous and trouble free operation. This has enabled the Authorities to achieve their objectives including the ability to increasingly turn the desert green.



Schematic Flow Diagram

Local presence, global know how

[www.metito.com](http://www.metito.com)

mcs 005