



## International Middle East

### Client

Water Authority of Jordan

### Location

Amman, Jordan

## Mafraq Wastewater Treatment Plant and Reuse Application

### Project Highlights

- Provided engineering and construction services for project development, design-build tendering, and construction oversight
- Completed feasibility study and prepared design criteria
- Designed wastewater treatment plant to use treated waters for irrigation
- Working in potentially hostile environment with difficult security situations

### Project Description

CH2M HILL is an engineering contractor for the Mafraq Wastewater Treatment Plant, Jordan, in support of the Water Authority of Jordan (WAJ). Our services include design, reconstruction, and construction management under the USAID global water IDIQ contract.

In an earlier task, the CH2M HILL team completed the feasibility and population growth study and prepared design criteria for the wastewater plant. These form the basis of design-build-operate RFP documents for "best value" proposals by U.S. contractors. The project scope includes design and construction management of a plant to handle influent treated to Jordanian standards for reclaimed water reuse in agriculture.

The primary project benefits to the client were:

- Develop effluent reuse applications
- Strengthen WAJ capability in design-build-operate procurements
- Introduce the management contract concept for wastewater treatment plant operations and reuse
- Transfer technology in low technology, EPA compliant plant process systems
- Train plant operators
- Use CQC methods to ensure quality during design and construction
- Follow safe construction guidelines that meet OSHA standards in a developing Middle East application

Mafraq is located near the Syrian border and approximately an hour from Amman, a long distance to transfer imported construction materials. Contractor logistics were critical to the success of the project and are an important element of contractors' proposals.

Even so, CH2M HILL provided 95 percent of reconstruction and construction management services for this project under the USAID global water IDIQ contract. Under this contract to USAID, CH2M HILL's services included:

- Preparing conceptual and feasibility designs
- Environmental review
- Developing tender documents for a design-build-operate delivery
- Pre-qualifying review and analysis of proposed contractors
- Preparing tender analysis and contract agreement
- Providing construction supervision services support to the WAJ

In addition, we provided technical assistance to the Ministry of Water and Irrigation (MWI) and WAJ to identify users of the treated wastewater and their needs in terms of treated water quality, quantity, and schedule. Services included assisting WAJ in contracting for the management and operation of the reconstructed wastewater treatment plant and using the treated waters for irrigation.

The project was characterized by a fast-track design process using the three phases of design, material, and equipment to U.S. standards and codes, Contractor Quality Control (CQC), U.S. Environmental Protection Agency (USEPA) compliance, and safety during design and construction in accordance with the U.S. Army Corps of Engineers guidelines (USACE EM-385). Rapid deployment and full mobilization occurred in less than 60 days. The USAID-issued task order occurred in mid-June 2002. Nine days later, the CH2M HILL program manager was in-country.

USAID considers the Mafraq WWTP project a model project and an example for smaller communities in Jordan to follow. The significance of the Mafraq project has been reiterated by USAID on numerous occasions, and the project is being closely watched both by USAID and the WAJ.

CH2M HILL trained the local water management engineering and technical staff in system operations and monitoring and established maintenance procedures.

Our water management training included establishment and training of local farmer user groups on each distribution canal who monitor their own water use and control the main canal turnout gates to their own distribution canal as well as the on-farm water control structures. The on-farm irrigation systems are all gravity flow surface irrigation and shallow flooding with tail water reused on adjacent fields or returned to re-regulation reservoirs or lower canals.