



International

Africa

Client

Cairo Ministry of Housing

Location

Cairo, Egypt

El Maadi Tunnel Construction

Project Highlights

- Collaborated with local consultants on a multiyear, multimillion-dollar construction project to build rock tunnels to carry wastewater underneath greater Cairo
- Worked with project participants to resolve a number of issues, resulting in a shorter construction period
- Currently providing 12 months of defects liability (warranty) and maintenance services after construction



Project Description

Egypt suffers from a number of serious environmental problems, not the least of which are inadequate water and wastewater systems. The Nile, which is the main source of water in Egypt, is being polluted by discharges of untreated or partially treated domestic wastewater, industrial effluents, and agricultural drainage water. Each year, the Nile and its Rosetta and Damietta branches receive about 6 billion m³ of drainage water, 1.7 billion m³ of municipal wastewater, and 312 million m³ of industrial wastewater. The Mediterranean coastal water annually receives 765 million m³ of sewage and about 545 million m³ of industrial wastewater.

About 50 percent of the urban population has adequate connections to sewage services, but there is a market shortage of treatment plants in most governorates (provinces), and only about 5 percent of the rural population has access to sewer systems. The Egyptian Ministry of State for Environmental Affairs, and the Cairo and Alexandria governorates have been taking serious and increasingly successful steps to stop pollution from industrial sources into the Nile and the Mediterranean. As part of these efforts, the Cairo Wastewater Organization (CWO) is constructing a new collection and treatment system to serve the Cairo metropolitan area.

The Cairo Ministry of Housing contracted with CH2M HILL, in association with subcontractors KEO International Consultants of Kuwait, and Enviro-Civec Environmental Civil Engineering Consulting Center and Darweesh Consulting Engineering Ltd. of Egypt, to manage the construction of rock tunnels to carry wastewater in greater Cairo.

The El Maadi wastewater tunnels are the main interceptors in the southern suburbs of Cairo. The tunnels take the wastewater to a new primary and secondary treatment plant north of Cairo. The treated effluent is used for irrigation, and the solids from the treatment process are used to produce fuel and fertilizer. The El Maadi project was funded in part by the Kuwait Fund for Arab Economic Development, established in 1961—the same year of Kuwait's independence—as the first aid agency ever founded by a developing country. The project included two sewer tunnels and associated structures, along with four shafts to allow access for construction and maintenance. The area is densely populated and contains many archeological sites. The larger of the new tunnels connects at its



downstream end with the southern end of the East Bank wastewater spine tunnel. The tunnels, which are below the water table, were driven into limestone with a shallow layer of weathered rock. All structures were constructed with corrosion-resistant secondary lining.

CH2M HILL worked with project participants on a number of issues that reduced the construction time, including construction site layout, additional geotechnical exploration, and the use of rock bolts and shotcrete in place of reinforced concrete segments for initial support of shafts. The project was completed in December 2002.