

*Engineering Design, Construction Management, and
Environmental Assessment Services
for
Secondary Cities Project in Egypt*

FINAL
ENVIRONMENTAL ASSESSMENT REPORT
FOR
LUXOR
WATER DISTRIBUTION, WASTEWATER COLLECTION &
CONVEYANCE, AND WASTEWATER TREATMENT

Submitted to:

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, CAIRO, EGYPT

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Table 3-1: New Wastewater Treatment Plant

Activity	Environmental Attributes										
	Physical Environment					Socio-Economic				Cultural & Aesthetic	
	Land	Water	Air	Biology	Energy	Human	Services	Industry	Agriculture	Cultural	Aesthetic
Construction Activities											
Taking and occupation of land											
Preparation and drainage of site	-1		-1	-1							
Transport of materials			-1			-1	-1				
Construction activities	-1		-1			-1	-1	+1			
Supply and storage of materials and other resources							-1				
Waste disposal	-1					-1	-1				-1
Work force and economics						+1					
Construction schedule						-1	-1				
Operation Activities											
Material handling and storage						-1					
Supply of materials and other resources		+/-2				+/-2	+/-1				-1
Plant operation and maintenance		+/-2	-1				+/-1				
Effluent and sludge disposal	-1	-2	-1	-2		+/-2			+/-1		-1
Work force						+2	-1				
Presence of facility	+1	+2	+1	+1		+2	+2		+2	+2	+2
No Action Alternative	-1	-2	-1	-1		-2		-1	-1	-2	-2

Table 3-2: Rehabilitation of Wastewater Treatment Plants

Activity	Environmental Attributes										
	Physical Environment					Socio-Economic				Cultural & Aesthetic	
	Land	Water	Air	Biology	Energy	Human	Services	Industry	Agriculture	Cultural	Aesthetic
Construction Activities											
Transport of materials			-1				-1				
Construction activities	-1		-1				-1	+1			
Supply of materials and other resources							-1				
Waste disposal	-1					-1	-1			-1	
Work force and economics						+1					
Construction schedule						-1	-1				
Operation Activities											
Material handling and storage						-1					
Supply of materials and other resources		+/-2				+/-2	+/-1			-1	
Plant operation and maintenance		+/-2	-1		-1		+/-1				
Effluent and sludge disposal	-1	-2	-1	-2		+1/2			+/-1	-1	
Work force						+2	-1				
Presence of facility	+1	+2	+1	+1		+2	+2		+2	+2	
No Action Alternative	-1	-2	-1	-1		-2		-1	-1	-2	

Table 3-3: Rehabilitation and Expansion of Water Distribution Network

Activity	Environmental Attributes										
	Physical Environment					Socio-Economic			Cultural & Aesthetic		
	Land	Water	Air	Biology	Energy	Human	Services	Industry	Agriculture	Cultural	Aesthetic
Construction Activities											
Occupation of land	-1						-1				
Preparation and drainage of site	-1		-1	-1		-1				-1	-1
Transport of materials						-1	-1				
Construction activities	-1		-1			-1	-1	+1		-2	-1
Supply of materials and other resources							-1				
Waste disposal	-1					-1	-1				-1
Work force and economics						+1					
Construction schedule						-1	-1				+/-2
Operation Activities											
Material handling and storage	-1					-1					
Sludge disposal	-1	-1				-1					
Supply of materials and other resources		+/-2				+/-2	+/-1				-1
System operation and maintenance		+/-2			-1	+/-2	+/-1	+/-1			
Work force						+2					
Presence of facility	+1	+1				+2	+2	+1		+1	+2
No Action Alternative	-1	-1				-2	-2	-1		-1	-2

Table 3-4: Rehabilitation and Expansion of Wastewater Collection System

Activity	Environmental Attributes										
	Physical Environment					Socio-Economic			Cultural & Aesthetic		
	Land	Water	Air	Biology	Energy	Human	Services	Industry	Agriculture	Cultural	Aesthetic
Construction Activities											
Occupation of land	-1						-1				
Preparation and drainage of site	-1		-1	-1		-1				-1	-1
Transport of materials						-1	-1				
Construction activities	-1		-1			-1	-1	+1		-2	-1
Supply of materials and other resources							-1				
Waste disposal	-1					-1	-1				-1
Work force and economics						+1					
Construction schedule						-1	-1				+/-2
Operation Activities											
Material handling and storage	-1					-1					
Sludge disposal	-1	-1				-1					
Supply of materials and other resources		+/-2				+/-2	+/-1				-1
System operation and maintenance		+/-2	-1	-1	-1	+/-2	+/-1	+/-1	+/-1		
Work force						+2					
Presence of facility	+1	+1				+2	+2	+1	+1	+1	+2
No Action Alternative	-2	-2	-1			-2	-2	-1	-1		-2

Table 5-1 Summary of Environmental Impacts - Luxor

Environmental Attribute	Type of Impact	Location	Work Phase	Proposed Mitigation Measures	Proposed Monitoring Measures	Significance and Characteristics of Impact
Land Use and Regional Planning	Change in land use of 40 ha of desert land to wastewater stabilization ponds	Wastewater stabilization ponds (WPS)	Construction			No Impact
Land Use and Regional Planning	Change in land use of 3 ha of urban land for pump stations and storage tanks	Luxor	Construction			No Impact
Land Use and Regional Planning	Change in land use of 700 ha of desert land to agriculture reuse	Agriculture farm	Operation	Following proper reuse scheme and standards for protecting the land quality	Bi-annual soil sampling for heavy metals, coliform, nematodes, TDS.	Beneficial/ Long
Climate	Climate changes	Project facilities	Construction /Operation			No Impact
Geology, Soil	Soil subsidence	PS, Sewer and pipe trenches	Construction	Engineering control by contractor to prevent soil subsidence	Photographic records for sensitive buildings in proximity of excavation before and after to monitor any possible resulting damage	No Impact
Geology, Soil	Excavation and Removal of Soil	WSP, PS	Construction	Project facilities located away from good quality or unique soil types		No impact
Geology, Soil	Soil disturbance	WSP, PS Sewer and pipe trenches	Construction		The contractor should inform proper authorities if any items of geological interest be encountered	No Impact
Air Quality	Removal of existing wastewater stabilization ponds and septic tanks resulting of intermittent odor generation	existing WSP and city roads	Construction	Mobilize finish and demobilize as quickly as possible to minimize odor problems Dump the construction wastes in designated disposal area		Minor adverse/ Short term

Table 5-1 Summary of Environmental Impacts - Luxor (Continued)

Environmental Attribute	Type of Impact	Location	Work Phase	Proposed Mitigation Measures	Proposed Monitoring Measures	Significance and Characteristics of Impact
Air Quality	Dust and Vehicle Emissions	Project Facilities	Construction	Dust suppression by water spraying		Minor adverse/ Short term
Air Quality	Noxious odors (H ₂ S etc..)	WSP, PS	Operation	Removal of sludge from the screens and grit chambers areas of the WSP Proper design of the PS to minimize odor and addition of positive ventilation if needed	Monitoring of H ₂ S every two weeks	Minor adverse / Long term
Air Quality	Noxious odors	Effluent disposal	Operation	Proper reuse scheme to minimize odor		No impact
Noise	Equipment Noise	Project facilities	Construction	Care during operation of constructure equipment to minimize noise levels		Minor adverse/ Short term
Noise	Facility noise, pump stations	PS	Operation	All major noise generating at PS will be enclosed in buildings		Minor adverse/ Short term
Water Supply	Impact on quantity and quality	City water distribution network	Operation	Proper maintenance of the system and following of inspection plan	Quarterly monitoring of THM, and Cl residual, (see the monitoring plan, Table 5-3)	Beneficial/ Long term
Water Supply	Effect of spare parts and other materials availability on the sustainability of the system	City water distribution network	Operation	Restructuring of the spare part supply system		Beneficial/ Long term
Groundwater quality	Effects of wastewater infiltration to the groundwater aquifer.	Groundwater aquifer	Operation	Proper maintenance of wastewater network and follow of inspection plan		Beneficial/ Long term

Table 5-1 Summary of Environmental Impacts - Luxor (Continued)

Environmental Attribute	Type of Impact	Location	Work Phase	Proposed Mitigation Measures	Proposed Monitoring Measures	Significance and Characteristics Impact
Surface water quality	Effect of disposing wastewater to the surface water ways, drains, canals and River Nile	Surface waters and River Nile	Operation	Proper operation and maintenance of the wastewater system Proper effluent reuse scheme following the standards	Monitor of the effluent every two weeks, for TSS, Total Nitrogen, Total phosphorus, BOD, Coliform, see Table 5-3	Beneficial/ Long term
Terrestrial habitat	Damage to habitat	WSP	Construction	Facilities away from environmentally sensitive areas		No impact
Terrestrial habitat	Impact of ponds and effluent water on migratory birds and other species	WSP, agriculture farm	Operation	Mutual contact between interested agencies Wildlife rescue training for facility workers Permitting qualified personnel to enter the facility		No impact
Aquatic habitat	Impact of disposing wastewater to the surface waters and River Nile	River Nile	Operation	Proper effluent reuse scheme following the standards	Monitor of the effluent every two weeks, for TSS, Total Nitrogen, Total phosphorus, BOD, Coliform, see Table 5-3	Beneficial/ Long term
Solid wastes disposal	Disposal of construction and operational wastes to a disposal area	Dedicated disposal area	Construction /operation	An engineered disposal area is required		No impact
Demographics	Effect on size and distribution of population	Luxor	Operation			Beneficial/ Long term
Work force	Impact on local workers	Luxor	Construction /Operation			Beneficial/ Long term
Public Safety	Impacts on public safety	Luxor	Construction	Strigent safety procedures to be enforced to protect workers and members of public		Minor adverse/ Short term

Table 5-1 Summary of Environmental Impacts - Luxor (Continued)

Environmental Attribute	Type of Impact	Location	Work Phase	Proposed Mitigation Measures	Proposed Monitoring Measures	Significance and Characteristics of Impact
Tourism activities	Improvement of the water and wastewater facilities	Luxor	Operation			Beneficial/ Long term
Industrial activities	Opportunities for local industries to supply materials	Luxor	Construction			No impact to Beneficial/ Long term
Agriculture activities	Impact of effluent reuse on agriculture production	Luxor	Operation	Proper agricultural and irrigation measures to achieve clean crop products	Sampling of the agriculture crops	Beneficial/ Long term
Quality of life	Improvements to public health due to the improved water supply and wastewater facilities	Luxor	Operation	Proper maintenance of the system following inspection and monitoring plans		Beneficial/ Long term
Transportation	Traffic impacts due to transportation of construction materials and construction activities	Luxor	Construction	Minimize unnecessary disruption by close coordination and scheduling with Police and Traffic departments Public awareness for the project activities		
Transportation	Traffic impact due to reduction of septage haulage waste	Luxor	Operation			
Telecommunication	Affect on existing network	Luxor	Operation			
Power Network	Affect on existing network	Electric network	Operation	Coordination between the authorities to resolve any power shortage problems.		No impact

Table 5-1 Summary of Environmental Impacts - Luxor (Continued)

Environmental Attribute	Type of Impact	Location	Work Phase	Proposed Mitigation Measures	Proposed Monitoring Measures	Significance and Characteristics of Impact
Utilities	Disruption to utilities, temporary or permanent relocation of utilities	Luxor	Construction	Contract responsible for coordinating work with utility services authorities and making good any damage Public awareness concerning schedules		Minor adverse/Short term
Education and social services	Impacts to education and social services	Luxor	Operation			No impact to be
Cultural (Archaeology)	Impact of the construction activities on the archaeological resources in Luxor	Luxor	Construction	Following of engineering and archaeological controls	Archaeological monitoring program, Table 5-2	
Aesthetics	Impacts of construction activities on the scenic and aesthetics	Luxor	Construction	Store material safely Proper scheduling of activities Public awareness for the project activities		Minor adverse/Short term
Aesthetic	Preserving the agriculture area	Agriculture area	Operation	Precaution for safe reuse scheme	Following of monitor plan for the effluent quality, Table 5.3	Beneficial

Table 5-2 Instructions During Construction Supervision

No.	Description
1	Dewatering water should be analyzed and compared to standards before dumping it in drains or sewerage system
2	Construction wastes should be dumped in city dump area.
3	Contractor shall preserve and protect materials of an archaeological, scientific or historical value.
4	Information about activities has to be conveyed to antiquities department. Antiquities control has to be applied during construction in Luxor area.
5	Public awareness program regarding the project activities, interruptions to utilities and change of routes, etc..
6	Avoid as much as possible damaging any plants and trees in the site
7	Safety precaution for the construction staff
8	Disinfected and flushing waters coming out of any pipe or storage tanks should not be dumped in sewer line or drains unless it complies with the standards.
9	Dust and smoke control according to standards
10	Noise control according to standards.
11	The contractor should provide and maintain sanitary facilities for his employees and his subcontractors.
12	Construct temporary construction access roads and detours as necessary to mitigate services construction interruptions.
13	Perform all work in a fire safe manner.

Table 5-3 Program for Archaeological Concerns

CDM has considerable background on wastewater projects that pass through areas of archaeological significant. These projects were in the Giza area at Nazlaht El Samaan and other adjacent areas.

The suggested archaeology program is as follows:

- 1- Assign an Egyptologist to monitor the excavation activities.
- 2- In situations where antiquities are encountered, process involving collaboration with the archaeological authorities will be implemented.
- 3- An official from the archaeological authorities can be on site with the assigned Egyptologist to facilitate obtaining all important data and its transfer to the archaeological authority.

Table 5-4 Inspection Program

No.	Description
A	<p>Wastewater Treatment Plants</p> <p>Mechanical and electrical equipment environmental concerns (leaks , uncovered wires etc..)</p> <p>Sludge removal (from screen area and sludge drying beds if any).</p> <p>Lagoon leaks, level of water for proper treatment.</p> <p>Safety precautions during maintenance procedures.</p>
B	<p>Wastewater collection network, pump stations and force mains</p> <p>Mechanical and electrical equipment environmental concerns (leaks , uncovered wires etc..).</p> <p>Sludge removal procedures (from screen area)</p> <p>Wet well cleaning and disposal procedures.</p> <p>Collection mains</p> <p>Control valves, check valves.</p> <p>Leakage of force main</p> <p>Safety precautions during maintenance procedures.</p>
C	<p>Water system</p> <p>Leakage of pipes (leak detection program)</p> <p>Control and valve chambers</p> <p>Safety precautions during maintenance procedures.</p> <p>Elevated and groundwater reservoirs safety and cleaning procedures</p>