

Arab Republic of Egypt

EGYPT INFRASTRUCTURE IMPROVEMENTS PROJECT

SECONDARY CITIES

Environmental Assessment

Scoping Statement

For

CITY OF LUXOR

**Groundwater Lowering of Antiquities Sites
on the West Bank**

**National Organization for Potable Water and
Sanitary Drainage (NOPWASD)**

**US Agency for International Development (USAID)
USAID Project No. 263-0236**

CDM International Inc.

In association with



Dr. Ahmed Abdel-Warith
Consulting Engineers



May 2007

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Acronyms and Abbreviations

AAW	Dr. Ahmed Abdel-Warith Consulting Engineers
CDM	CDM International Inc.
GOE	Government of Egypt
NOPWASD	National Organization for Potable Water and Sanitary Drainage
USAID	United States Agency for International Development
DI	Ductile Iron
EA	Environmental Assessment
ED/CM	Engineering Design and Construction Management
EIS	Environmental Impact Statement
FM	Force Main
HCC	House Connection Chamber
ID	Identification Number
HHS	Households
LE	Egyptian Pounds
MH	Manhole
PS	Pump Station
RCP	Reinforced Concrete Pipe
RR	Railroad
uPVC	Unplasticized Polyvinyl Chloride
VC	Vitrified Clay
WTP	Water Treatment Plant
WWISP	Water and Wastewater Institutional Support Project
WWWTP	Wastewater Treatment Plant
\$	United States Dollars

Weights and Measures

BOD ₅	5-day biochemical oxygen demand
COD	Chemical Oxygen Demand
Feddan	A unit of area equal to 4,200m ²
Hectare	A unit of area equal to 10,000m ²
lpcd	Liters per capita per day
lps	Liters per second
m	Meter
m ³ /hour	Cubic meters per hour
mg/L	Milligrams per liter
mm	Millimeters
m/s	Meter per second
NTU	Normal Turbidity Units
°C	Temperature in degrees Celsius
ug/L	Micrograms per Liter
uS/cm	Microsiemens per centimeter – unit of measure of conductivity. Equal to micromhos/cm in U.S. system of measurements
km	Kilometer



EGYPT INFRASTRUCTURE IMPROVEMENTS PROJECT ENVIRONMENTAL ASSESSMENT

LUXOR CITY

GROUNDWATER LOWERING OF ANTIQUITY SITES ON THE WEST BANK

ENVIRONMENTAL SCOPING STATEMENT

1. Introduction

The USAID-funded Egypt Infrastructure Improvements Project is preparing to implement recommendations to protect the Pharaonic antiquities on the west bank of the Nile River in the City of Luxor. The project is undertaken for the Government of Egypt (GOE) through its implementing agency, the National Organization for Potable Water and Sanitary Drainage (NOPWASD); the owner of the antiquities, the Supreme Council of Antiquities (SCA); and the United States Agency for International Development (USAID).

Background data and information for the proposed remedial activities were gathered and reported in the Effects of Groundwater on Pharaonic Monuments Report (SWECO, 24 May 1982), in the Salvation of Karnak and Luxor Temples Phase 1 Report (SWECO, 14 November 2002) and in Studies Conducted for the Installation of a Dewatering Program at the Amenhotep III site for Archaeological Excavation works. Additional information from geotechnical investigations and groundwater modeling within the specific project area will be used to determine the proposed remedial work required for sustainable groundwater lowering.

A map of the City of Luxor is shown in Figure 1. The main portion of the City of Luxor is located on the East Bank of the River Nile. The project area is directly across the river on the West Bank.

A great number of tombs, temples, and statues are located on the west bank of the Nile, mostly at the edge of the historic flood plain where it meets the Western Desert. Antiquities in the project area include the compound of Medinet Habu at the southern extremity, the tomb of the Pharaoh Seti I at the northern extremity, and many other sites in between. Also included is the compound of Amenhotep III, with the twin Colossi of Memnon, large statues of a seated personage located in the flood plain. These monuments are identified in Figure 1. The physical scale of two of them is evident in Figures 2 and 3.



Figure 2. Medinet Habu



Figure 3. Temple of Seti I.

These large structures were often built near the rather sharply-defined line between farmland and desert, as can be seen in Figure 1. This line has moved little over the past several millennia. There is irrigated farmland quite close to many of the structures (Figure 4).



Figure 4. Irrigated agriculture near the Seti I Temple.

2. Water use on Luxor's West Bank; Impacts on the Antiquities

The fine-grained alluvial soils of the Nile valley do not drain easily and need artificial drainage. Because of the hot-arid climate, irrigation water evaporates quickly, leaving behind salt which causes primary salinization.

Before the implementation of year-to-year storage at the Aswan High Dam, the Nile floods not only brought nutrient-rich silt to the fields, but would also leach away accumulated salts.

Construction of the High Dam four decades ago enabled a change from the historic flooding-draining annual cycle to perennial irrigation. However, farmers soon found that they had to apply more water to wash the accumulated salts into the ground below the root zone. This caused a rise in the water table to a few decimeters below the surface level. The soil then became waterlogged.

When the water table is less than two meters deep, capillary forces bring water to the surface, where the salts accumulate after evaporation. This is known as secondary salinization. By

1982 almost all the irrigated area in Egypt was potentially affected by salt, and at least half of the area (12,000 km²) was already more or less affected.

To avoid primary salinization it is essential to ensure quick infiltration of irrigated water, and to avoid secondary salinization the water table must be kept low.

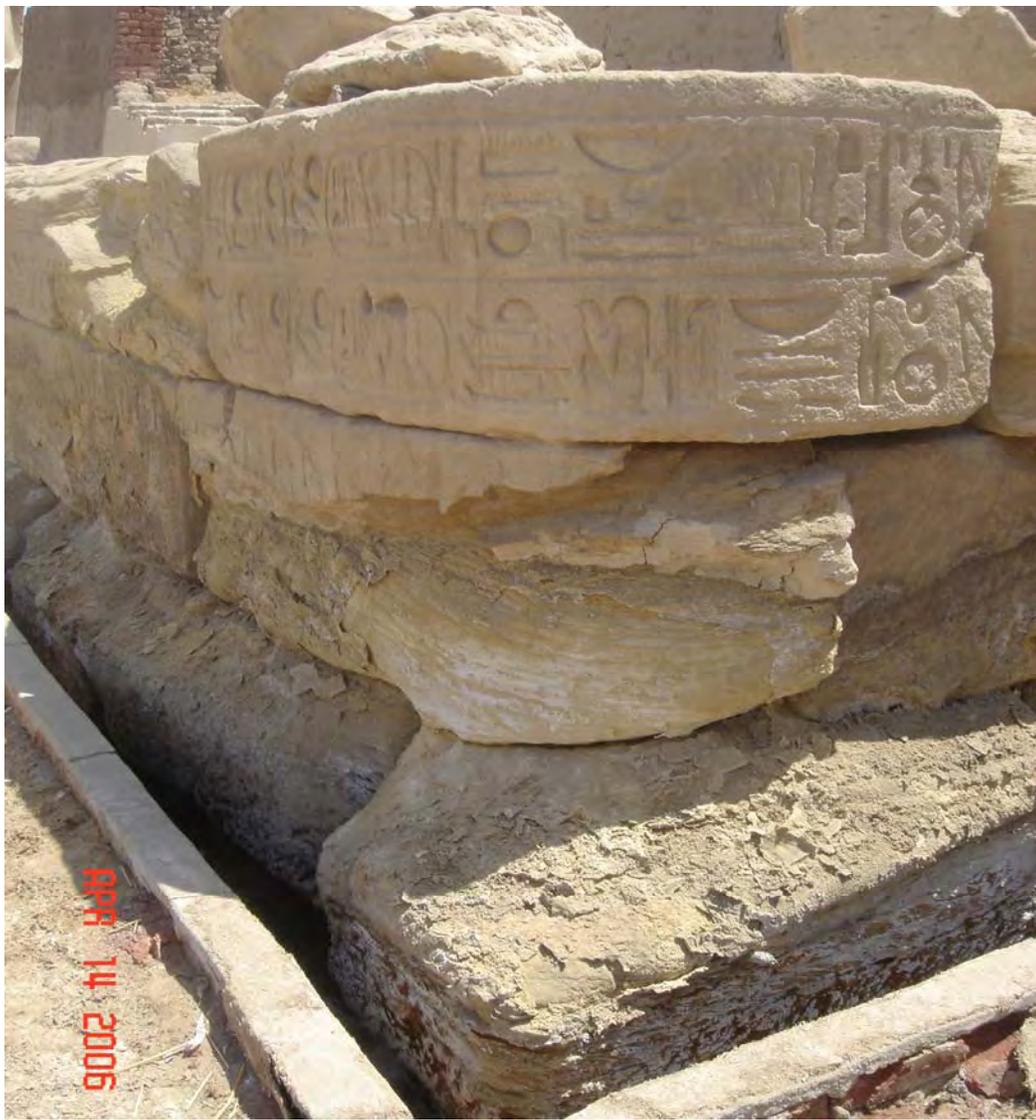
To this end, about 400 km² have been provided with tile drainage systems each year. However, farmers are not always willing to make this investment, and the government authorities have had difficulty in keeping open the drainage channels that are essential for proper functioning of the tile drainage underneath the farmlands.

Waterlogging and salination not only have severe adverse impacts on irrigated agriculture; at Luxor they also are causing extensive damage to the nearby Pharaonic monuments, temples, and statuary. These large structures were often built near the rather sharply-defined line between farmland and desert, as can be seen in Figure 4. This line has moved little over the past several millennia.

The antiquities are threatened by the increase in salinity of the groundwater contacting their foundations. As this water evaporates, the salts crystallize, causing rapid decay of the rock of which these temples, statues, and tombs are constructed. See Figures 5, 6 and 7.



Figure 5. Evidence of salt water damage to Pharaonic rock carvings.



Figures 6 and 7. Evidence of salt water damage to Pharaonic rock carvings.

3. The Infrastructure Improvements Project

The proposed solution is to permanently lower the groundwater table below and around the antiquities. Such a groundwater lowering program was recently completed on the East Bank, to address a similar situation threatening the foundations of the Luxor and Karnak temples. On the West Bank, remedial options being considered include groundwater lowering by installation of a cutoff wall, and/or permanent installation of a well field and drainage system.

Geotechnical formation at the site consists of the following layers (Misr Lab, 2005):

- A top layer of silty clay, extending to a depth of 9 m below the ground surface;
- A layer of sand, between 9 and 14 m beneath the ground surface;
- Layers of very stiff to hard silty clay, from 14 to at least 20 m (end of borings) beneath the surface.

Groundwater was encountered 1 m below the surface. The groundwater level in the sand layer is the same as that of the surface water in the top clay layer. The waters in the two layers appear to have similar chemical composition.

3.1. Candidate Engineering Solutions

Cutoff wall and shallow horizontal drains (Figure 8). Cutoff walls can be excavated using diaphragm walls equipment and filled with plastic concrete (bentonite, cement, sand, and water) to be keyed properly into the underlying hard clay formation. This cutoff wall is to prevent groundwater from entering the soil below the monument.

In order to control surface water that may come to the site, a system of horizontal drains should be installed at the intended final groundwater level, and covered with a steel screen. Horizontal perforated pipes can discharge water to corner sumps, from which water can be pumped out of the site to the nearest drain. This system would require minor maintenance.

Deepwells and vertical drains (Figure 8). This system consists of deepwells with submersible pumps to pump the groundwater from the sand aquifer to relieve the pressure on the bottom of the upper clay layer. In order to control the surface water and to allow the deepwells to affect the groundwater level all over the area, vertical sand drains should be used. The vertical sand drains would need to be closely spaced, with adequate diameter, and should penetrate the sand layer adequately.

The submersible pumps in the deep wells would be operated intermittently to keep the lowered groundwater level at the target elevation, with minimal influence on the monument. Discharge water can be sent to the nearest drain. This system would have a low construction cost.

Horizontal drainage with relief wells (Figure 9). This system uses horizontal drainage all around the site, together with relief wells to relieve the pressure on the bottom of the upper clay layer. Perforated pipes should be placed inside the trenches; the trenches should be filled with gravel, surrounded by filter fabric. The relief wells should penetrate the sand aquifer. Water entering a well can be drained either by gravity flow to a neighboring horizontal drain, or by submersible pumps operated intermittently. Water from the pipes and wells should be drained to corner sumps (manholes), and pumped from there to the nearest suitable drain outside the site. This system has low initial cost but needs frequent maintenance.

3.2. Further field studies planned and underway

A **groundwater modeling study** and further **geotechnical investigations** are presently underway, to characterize the flow gradients and the chemistry of the soil, the surface water, and the groundwater.

Complete archaeological surveys of the monuments and the surrounding areas should be conducted, including dimensions, elevations, and water elevations in nearby canals and drains, as recommended in more detail in Appendix F.

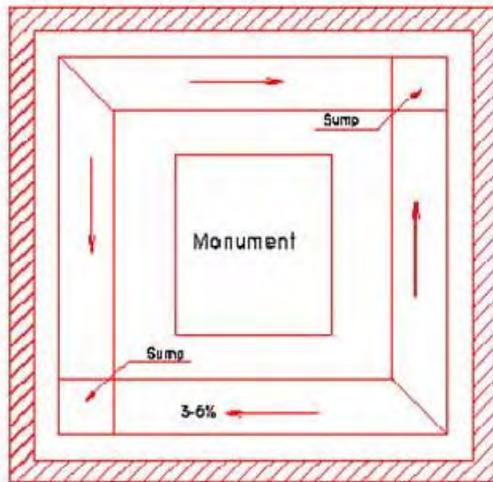
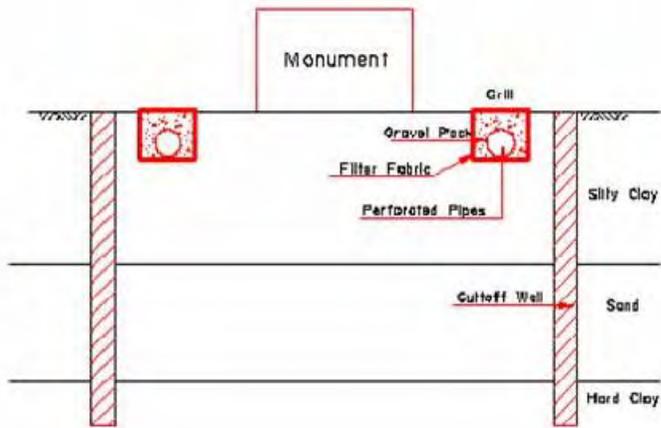


Fig. (1): Candidate Solution (1)
Cutoff Wall and Shallow Horizontal Drains

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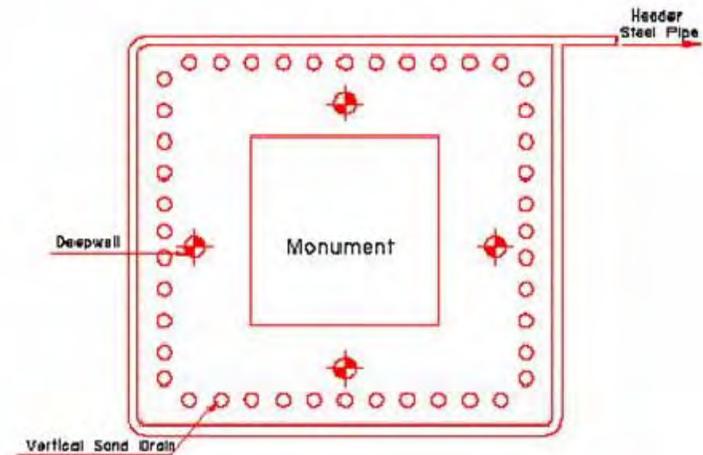
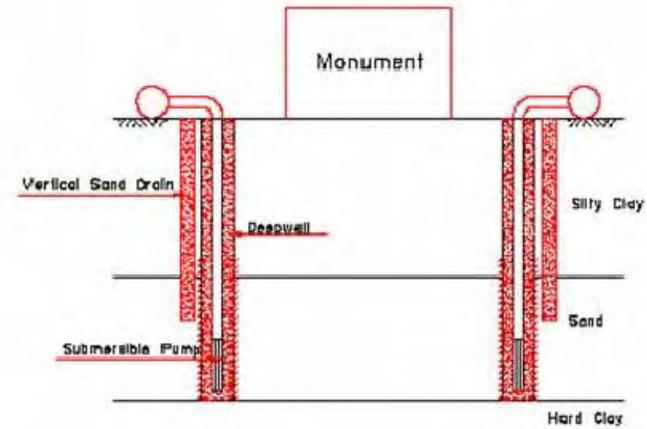


Fig. (2): Candidate Solution (2)
Deepwells and Vertical Drains

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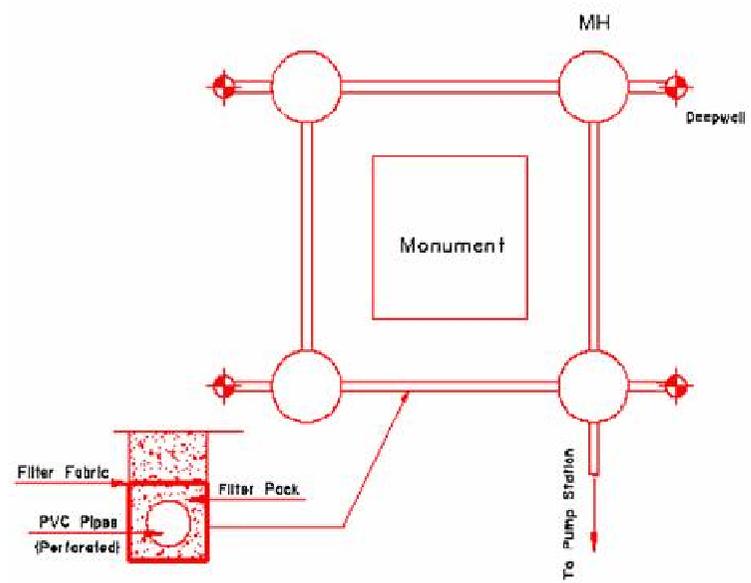
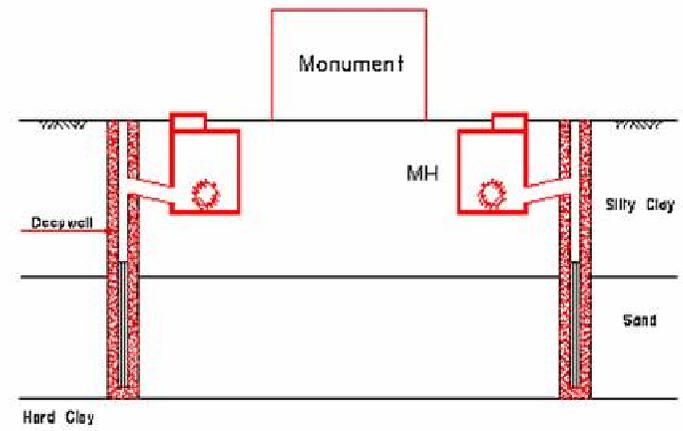
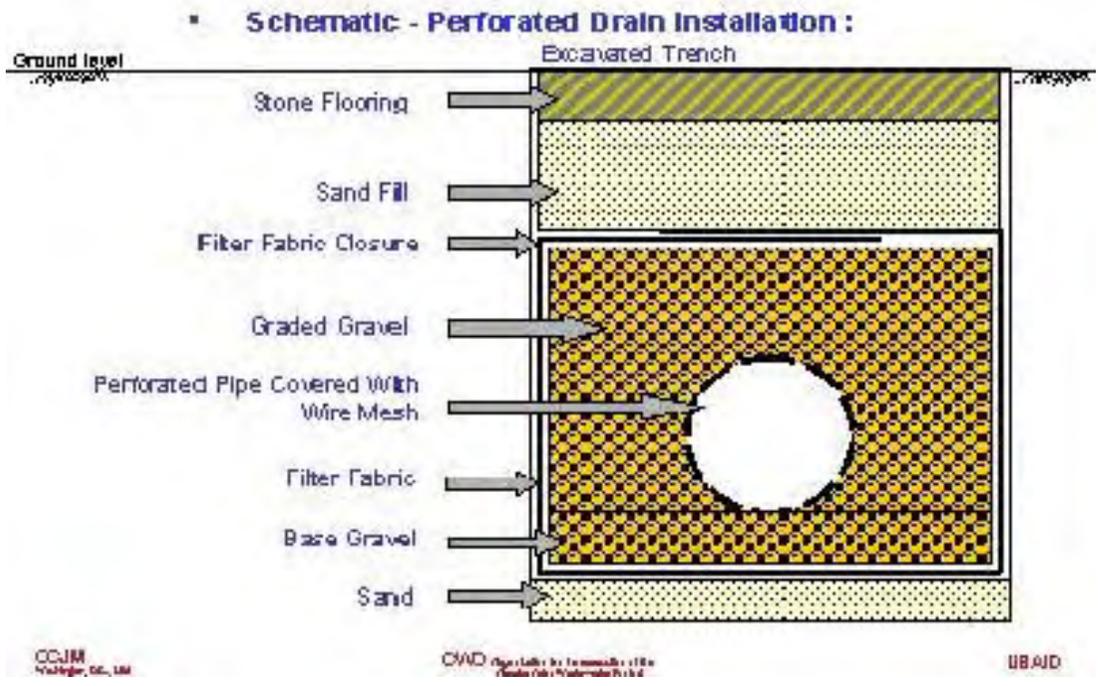


Fig. (3): Candidate Solution

TIBA
Consulting Engineers

4 The Environmental Assessment Process

For every USAID project there must be an Environmental Assessment (EA). The EA is a process used to identify and predict the environmental consequences of a newly planned activity and to assist in planning appropriate measures to reduce the adverse effects, and to maximize environmental benefits, before permitting the activity to proceed.

The EA is a practical and valuable means for guiding decision makers in charge of project implementation. It provides the decision makers with reasonably accurate information concerning existing environmental conditions, potentially significant environmental impacts and possible mitigation measures, monitoring programs, opportunities for environmental enhancement and environmental management plans.

The fundamental steps in the Environmental Assessment of a project are the Scoping Session, the Scoping Statement, the Environmental Assessment Report, and environmental monitoring of the project.

For a proposed project, “Scoping” is an EA activity which:

- Identifies those attributes of the environment for which there are concerns, and
- Provides a plan that enables the EA team to focus on those attributes.

Scoping is a shared responsibility where the proponent government agencies, the Luxor Governorate, USAID, and the public, all have a role. The Scoping Session is part of this process.

The Scoping Session is a meeting of key individuals involved with the project, including representatives from:

- the funding agency (USAID),
- the implementing agency, NOPWASD,
- the Owner, Supreme Council of Antiquities (SCA),
- the funding agency’s engineers,
- appropriate Egyptian national ministries (e.g. Housing, Agriculture),
- the Governorate,
- the Markaz,
- the Village,
- and interested local persons such as farmers, landowners, and businesspeople.

In the Scoping Session, usually held early in the project time schedule, the engineers tell what they intend to design and build, for whom, and where. The engineers also list the environmental impacts, good and bad, that can be anticipated, and to be dealt with properly. The other attendees are invited to add their own concerns and observations to the list, and so bring them to the attention of the government, the funding agency, and the engineers.

The **Environmental Scoping Statement** summarizes the proceedings of the Scoping Session (i.e. who was invited, who attended, and the environmental issues presented, raised, and discussed). The Scoping Statement sets the direction for the full EA report.

The Scoping Statement is formally reviewed by USAID. Once it is approved, engineering work on the project can begin, and the Environmental Assessment team can proceed to develop the full Environmental Assessment Report.

The **Environmental Assessment Report** shall describe this project, its beneficial and adverse impacts upon the local environment, and upon the health and well-being of the local residents. Based on the technical information gathered in past and present studies, and on the comments and questions raised in the Scoping Session, the Environmental Assessment Report is to:

- rate the environmental issues according to their importance,
- investigate further those issues deemed most important,
- recommend ways to minimize or at least mitigate the most significant of the foreseen adverse impacts,
- recommend ways to take advantage of the beneficial impacts,
and
- outline a scope and schedule for environmental monitoring.

A proposed outline for the Environmental Assessment Report may be found in Appendix E.

Ongoing monitoring of the project shall follow a scope and schedule to be set out in the EA Report.

5 Scoping Activities

5.1 Meetings with Governmental Agencies

The following government agencies were consulted by the team during this environmental process and/or during the study phase of the Luxor West Bank Groundwater Lowering work:

- Luxor City Office of the Governor
- NOPWASD
- Supreme Council of Antiquities (SCA) both in Cairo and Luxor
- Representatives of the Ministry of Agriculture in Luxor
- Representatives of the Ministry of Water Resources and Irrigation in Luxor
- Luxor City Water and Wastewater Operating Entity
- Various archaeologists working on the West Bank of Luxor
- The Chicago House
- American Research Center in Egypt (ARCE)

5.2 Scoping Session

5.2.1 Presentation of the Project

The scoping session was held on 24 April 2007 at 11:00 am in the Conference Hall of the City of Luxor located on the east bank Corniche. Copies of the Environmental Scoping Meeting agenda was prepared in English and Arabic (Appendix G) and distributed to participants at the meeting. The presentation was delivered predominately in Arabic and English presentations were translated into Arabic. The meeting was opened by CDM Project Manager, Rick Minkwitz, who described the Egypt Infrastructure Improvements Project and the purpose of the Environmental Assessment process. CDM/AAW Deputy Project Manager, Moustafa Tayeb, and EA Specialist, Dr Ashraf El-Sayed Ismail gave a powerpoint presentation describing the Luxor West Bank Groundwater Lowering project, the EA process and the potentially significant environmental issues. Comments, all verbal, were received following the presentation and have been summarized herein. The Scoping Session meeting was closed by the Luxor City General Secretary, Mohamed Abu Elalla.

5.2.2 Environmental Issues Mentioned in the Presentation

Potential environmental effects that have been identified, whether positive or negative, are listed below.

General

- Engineers on this project should be cognizant that village residences, and farming, have lain close to these antiquities for centuries. These activities may impact the project, and the project may impact these activities.
- The main thrust of the project is to protect the antiquities. Benefits that should accrue to the local residents include:
 - Improved public health due to more effective evacuation of wastewater;
 - Improved tourist economy.
- Consider the potential impact of construction activities on antiquities and on other services.
- Consider public safety, traffic control and interruptions during construction including interruptions of water or electric utility services.
- Consider the impact of groundwater lowering on the foundations of the antiquities, and of other structures and activity nearby:
 - Lowering the groundwater should remove the salt from having close contact with the foundation material.
 - Drying out the foundation material may have an adverse impact; the likelihood of this should be determined.

- Lowering the groundwater table at the proposed site would have a positive impact on nearby agricultural lands, leading to many benefits such mitigation of waterlogging, and improvement of crop production and soil characteristics. Note, however, that this collateral benefit is much more likely with the “deepwells/vertical drains” and the “horizontal drains/relief wells” alternatives than it is with the “cutoff wall/shallow horizontal drains” alternative.
- Be aware of any locations beyond the flood plain where the project may pass through deposits of expansive clays, which swell when wetted. In such locations, take measures to minimize the probability of wetting of this soil, and replace such soil with sand to the extent necessary.
- Where new pump stations are to be located, assess the impacts on land use, energy consumption and traffic control.
- Groundwater from runoff from the desert
- Consider operation and maintenance activities at these new pump stations, e.g. problems of noise.
- There will be a reduction in the cost and effort to dispose of wastewater: a positive socioeconomic impact on the villagers.
- Employment opportunities will be created for skilled, semiskilled and unskilled laborers during construction and operation & maintenance.
- Consider the potential impact of construction activities on antiquities.

Construction of the dewatering system

- There will be improvement in the form of a lowered water table within the residential area.
- Consider public safety, traffic control and interruptions during construction including interruptions of water or electric utility services.
- Where new pump stations are to be located, the impacts on land use, energy consumption and traffic control must be assessed.
- Consider operation and maintenance activities at these new pump stations, e.g. problems of noise, odors and disposal of screenings.

5.2.3 Comments Received as a result of the Scoping Session in Luxor

Impact of lowering the water table at West Bank of Luxor on the receiving water body

Comment: What would be the impact of discharging the water collected from dewatering process in the West Bank of Luxor into the River Nile or other nearby drain or canal?

Response: The initial laboratory analysis results of some samples collected from the project sites showed that quality of discharged collected water is complies with the Law 48. In addition, the load is expected to be minor compared with the load of any receiving water body.

Impact of lowering the water table at West Bank of Luxor on the public health

Comment: What would be the impact on public health of lowering the water table?

Response: There is a potential to have positive impacts and improvement of public health due to lowering water table at West Bank as described below:

- The residential area surrounding the project area has no house connections or sewerage system and they use holding tanks allow wastewater to infiltrate into the subsurface water in which will be moved out continuously through the proposed system.
- Stagnant water and wet wells are good media for fungi and algae growth and therefore are potential for health risk. Lowering the water table will reduce the health risk from water- related diseases.

The need for the proposed intervention of lowering the water table at West Bank of Luxor

Comment: The water level of River Nile is lower than the subsurface water level for both Luxor Banks and subsurface water movement from the valley to River Nile. So, what the need for intervention to lower the water table in the West Bank of Luxor?

Response: The intervention of lowering the water table in the West Bank of Luxor is an engineering work to accelerate the process in such a way that the target water table at the proposed sites level can be reached.

Comment: Has the target subsurface water table level to be reached been defined?

Response: Not yet, but this level would be clearly defined during the design phase.

Comment: Would lowering the water table at the West Bank have impact on the east bank?

Response: No, there is no relation between the water tables of the two banks. Any intervention of lowering water table at one bank will not impact the other.

Feasibility of the proposed interventions to lower the water table at West Bank of Luxor

Comment: The first proposed method (Cutoff wall) is not feasible. The third method (subsurface drain with lifting pump) would be the best solution.

Response: The proposed methods of lowering the water table are under study, and the most viable option will be implemented.

Recommendation for lowering water table at West Bank of Luxor and sustainability for any solution to be implemented

Comment: The surrounding agriculture area is main reason of having high water table at the proposed sites in the West Bank of Luxor. So, it's recommended to implement subsurface drainage system for the surrounding agriculture area.

Response: This is a valid recommendation, and will be considered in the proposed mitigation measures to be considered in the EA report.

Need for accurate data during the design phase

Comment: There is a need to have and use accurate data in design phase in order to have an appropriate and effective system.

Response: Indeed, this is a very important issue and is being considered. There is a need to have full cooperation between the design team and relevant authorities:

- to have information about utilities and services provided in the project area;
- to ensure that the utilities within the project area will not be impacted by project activities;
- and to collect available data needed in the design phase.

Recommended mitigation measures

Comment: How likely is it that the mitigation measures recommended in the EA report will actually be implemented?

Response: The EA report, including the Environmental Management Plan Chapter, will lay out the mitigation measures, and name the entity responsible for their implementation. The report will be disseminated to the relevant entities. The measures related to project implementation will be included in the tender documents.

Comment: What measures have been taken to reduce the impact of agriculture practice on water table?

Response: There are two measures that have been taken:

- 85 feddans of agricultural land near the project area have been designated as protected area. The understanding is that approximately 85 feddans of farmland to the north of the Amenhotep III complex will be purchased from

the farmers to minimize the impact of irrigation in this area of temples. There was no schedule for when this would be implemented.

- An agriculture area in the West Bank, however not in the immediate project area, is changed from flooded irrigation to modern irrigation through the CARE fund.

Comment: Will the project provide house connections and a sewerage system to the nearby residential areas?

Response: No, the project activities will be limited to lowering the water table within the project area. However, the extent of impact from nearby residential utilities will need to be considered in the site investigation phase.

Responsibility for operation and maintenance of the project

Comment: What would be the responsible authority or entity for operation and maintenance of the project?

Response: As on the East Bank, the Antiquities Authority is responsible for operation and maintenance of the project.

Appreciation from the stakeholders of the project area

We should look at the positive impacts as well as the negative impacts. Lowering the water table at the West Bank will provide good working condition for excavation work to find more archeological sites.

The community of the project area appreciates the proposed activities supported by USAID.

5.2.4 Written Statements Received

All comments were provided verbally at the meeting and there were no written statements.

5.3 Significant Issues to be Addressed in the Environmental Assessment

The significant issues to be addressed in the Environmental Assessment include:

- Establishing the locations and requirements for the permanent discharge of groundwater into the existing drains/canals of the West Bank.
- Consideration must be given to the potential for uncovering antiquities and for the protection of known antiquities.

- Although much of the proposed construction will be done in areas away from significant tourist and residential activity isolated areas will be close to these activities.
- Construction permits for both temporary and permanent construction activities will need to be established to ensure the project is viable and to address periods when cultivation will not be possible.

5.4 Issues to be Eliminated from Further Consideration

Issues that can be eliminated from further consideration include:

- Economic benefits from employment during construction and operation/maintenance of facilities will have limited positive benefits as will the cost benefit for having a new wastewater system rather than individual onsite systems
- Sufficient land for the required pump stations is available and there impact both during construction and operation on the surrounding areas will be negligible.

5.5 Schedule for Preparing the Environmental Analysis

The Environmental Assessment process will commence with the issuance of this Scoping Statement. The commencement of the site investigation work in early May 2007 will provide sufficient information to allow for an environmental analysis.

5.6 Proposed Approach to Address Significant Issues

Significant issues will be addressed as follows:

- Cooperation between the NOPWASD and Ministry of Water Resources and Irrigation will be implemented during the design phase to ensure that a coordinated process is established and implemented for selecting and receiving approvals for groundwater discharge.
- Provisions of the Antiquities Law will be incorporated into contract documents to ensure that antiquities if located during construction will be handled as required. Additionally, provisions for site archaeologists on site during construction to monitor excavation works to determine any archaeology 'hot spots'.
- Where the ultimate routing of the proposed groundwater lowering scheme impacts tourist and residential activities, it will be necessary to address during design the coordination requirements with the various West Bank officials so

that the impact will be minimized during construction. The requirements will be incorporated into construction documents.

- Cooperation between the NOPWASD and the various Ministries (Agriculture, Water Resources, Utilities, etc) will be established during the design phase to determine areas of conflict between construction and other land use to determine permit requirements.

References

- 1. Tiba Consulting Engineers, “Preliminary Report Groundwater Lowering”, April 2006**
- 2. SWECO, “Effects of Groundwater on Pharoanic Monuments”, May 1982**
- 3. SWECO, “Salvation of Karnak and Luxor Temples, Phase I Report”, November 2002**
- 4. Misr Lab and Dr M Elesawy, “Studies conducted for the Installation of a Dewatering Program at Amenhotep III site for archaeological excavation works,”**

APPENDIX A. List of government agencies and other organizations consulted by the environmental team during scoping and/or during the study phase of the Luxor West Bank Groundwater Lowering work

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- NOPWASD
- Supreme Council of Antiquities (SCA) both in Cairo and Luxor
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- Luxor City Water and Wastewater Operating Entity
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- The Chicago House
- American Research Center in Egypt (ARCE)

APPENDIX B. Detailed summary of comments received during the Luxor West Bank Scoping Session

Impact of lowering the water table at West Bank of Luxor on the receiving water body

Comment: What would be the impact of discharging the water collected from dewatering process in the West Bank of Luxor into the River Nile or other nearby drain or canal?

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Comment: The first proposed method (Cutoff wall) is not feasible. The third method (subsurface drain with lifting pump) would be the best solution.

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Recommendation for lowering water table at West Bank of Luxor and sustainability for any solution to be implemented

Comment: The surrounding agriculture area is main reason of having high water table at the proposed sites in the West Bank of Luxor. So, it's recommended to implement subsurface drainage system for the surrounding agriculture area.

Response: This is a valid recommendation, and will be considered in the proposed mitigation measures to be considered in the EA report.

Need for accurate data during the design phase

Comment: There is a need to have and use accurate data in design phase in order to have an appropriate and effective system.

Response: Indeed, this is a very important issue and is being considered. There is a need to have full cooperation between the design team and relevant authorities:

- to have information about utilities and services provided in the project area;
- to ensure that the utilities within the project area will not be impacted by project activities;
- and to collect available data needed in the design phase.

Recommended mitigation measures

Comment: How likely is it that the mitigation measures recommended in the EA report will actually be implemented?

Response: The EA report, including the Environmental Management Plan Chapter, will lay out the mitigation measures, and name the entity responsible for their implementation. The report will be disseminated to the relevant entities. The measures related to project implementation will be included in the tender documents.

Comment: What measures have been taken to reduce the impact of agriculture practice on water table?

Response: There are two measures that have been taken:

- 85 feddans of agricultural land near the project area have been designated as protected area. The understanding is that approximately 85 feddans of farmland to the north of the Amenhotep III complex will be purchased from the farmers to minimize the impact of irrigation in this area of temples. There was no schedule for when this would be implemented.
- An agriculture area in the West Bank, however not in the immediate project area, is changed from flooded irrigation to modern irrigation through the CARE fund.

Comment: Will the project provide house connections and a sewerage system to the nearby residential areas?

Response: No, the project activities will be limited to lowering the water table within the project area. However, the extent of impact from nearby residential utilities will need to be considered in the site investigation phase.

Responsibility for operation and maintenance of the project

Comment: What would be the responsible authority or entity for operation and maintenance of the project?

Response: As on the East Bank, the Antiquities Authority is responsible for operation and maintenance of the project.

Appreciation from the stakeholders of the project area

We should look at the positive impacts as well as the negative impacts. Lowering the water table at the West Bank will provide good working condition for excavation work to find more archeological sites.

The community of the project area appreciates the proposed activities supported by USAID.

APPENDIX C. List of Invitees to Scoping Session

The Luxor High Supreme Council provided the following list of individuals (English is a fair translation of attached Arabic report) contacted by telephone to attend the Scoping Session and to invite within their sector responsible individuals for the work.

Followup Department

Telephone notification

FROM LUXOR HIGH SUPREME COUNCIL

TO: The following

Serial No	Department	Received By	Telephone No
1	Luxor Electric Power Manager	Eng Hagag (personally)	2363841
2	Agriculture Gen Manager	Eng Fawzy	2384339
3	Roads Gen Manager	Mr. Sayed	2356507
4	Environmental Manager	Eng Madeha	2356508
5	Water Utility Manager	Adly	2372499
6	Irrigation Manager	Eng Ayman	2380124
7	Engineering Department Manager	Eng Sabry	2359863
8	Housing Manager	Eng Hassan	2361580
9	High supreme council	Eng Mohsen	2361265
10	Chief of the city local Council	Mr., Gad	2373815
11	Chief of the Traffic	Mohamed Sayed	2372304
12	Wastewater Utility Manager	Eng Mohamed AbZaed	2369267
13	Irrigation Manager in Armant	Eng AbdelRadee	2620627
14	Conference Hall Manager	AbdelMohsen	2370640
15	Dr. Health Manager	Mss Salwa	2373989
16	Baby Care Representative		
17	Hospitals Representative		
18	Accounts Manager	Mr. Sayed Zaky	2356506
19	Financial Manager	Mr. Sayed Metwaly	2371379
20	Public Relation Manager	Mr. Mohamed Abbas	2372423
21	Informations Dep	Mr. Badawe	
22	Al-Akhbar newspaper Rep		
23	AlWafed newspaper Rep		
24	ARAB CO Manager	Eng Ahmed ENahas	2374735

A meeting was decided on 24 April 2007 at The Conference Hall No 5 at 11 pm for the Egypt Infrastructure Improvement Project

FollowUp Department Manager
Ahmed AbdelHakem
20/Apr/07

RECEIVED
26 APR 2007

صفحه ۱ از ۱
الحفاظه

ایستگاه تصفیه

صورتجلسه کارگاه « ایستگاه تصفیه »

ردیف	شرح	م	تاریخ	موضوع	ملاحظات
۱	مهر گواهی دریافت	۱	۱۳۸۶/۰۴/۲۹	کتاب / مهر گواهی	
۲	مهر گواهی دریافت	۲	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۳	مهر گواهی دریافت	۳	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۴	مهر گواهی دریافت	۴	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۵	مهر گواهی دریافت	۵	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۶	مهر گواهی دریافت	۶	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۷	مهر گواهی دریافت	۷	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۸	مهر گواهی دریافت	۸	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۹	مهر گواهی دریافت	۹	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۱۰	مهر گواهی دریافت	۱۰	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۱۱	مهر گواهی دریافت	۱۱	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۱۲	مهر گواهی دریافت	۱۲	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۱۳	مهر گواهی دریافت	۱۳	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۱۴	مهر گواهی دریافت	۱۴	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	
۱۵	مهر گواهی دریافت	۱۵	۱۳۸۶/۰۴/۲۹	مهر گواهی / مهر گواهی	

این صورتجلسه در تاریخ ۱۳۸۶/۰۴/۲۹ در محل کارگاه تصفیه امضاء گردید.

مهر گواهی / مهر گواهی
۱۳۸۶/۰۴/۲۹

CDM / AAW
Fazl Infrastructure Improvements Project

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COPIES: CIRCULATION

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SUBJECT FILE

APPENDIX D. List of Participants at Scoping Session

Egypt Infrastructure Improvements Environmental Assessment Scoping Session

Luxor: 24 April 2007

Venue: Luxor

Meeting Attendance

Ser	Name	Organization/Position	Telephone
1	Fawzy Bassiouny Mahdy	General Manager of the Luxor Agricultural School	010 576 6460
2	Youssef Ahamed Abdel Latif	Member of City Local Council	010 345 7283
3	Ahmed Abou El-Hagag Sharkawy	Member of Public Relation – Luxor Supreme Council	012 575 8389
4	Mohamed Abbas Salama	Public Relation Manager - Luxor Supreme Council	012 160 9603
5	Abdel Hameed Ahmed Husseiny	Member of Public Relation – Luxor Supreme Council	010 132 1677
6	Sobhy Wadeea Garras	General Manager of International Conference Hall – Luxor	010 624 2972
7	Abdel Shafy Moustafa	Follow-up Department of Supreme Council	010 894 3003
8	Gamal El Deen Abdel Maged Moustafa	Inspector at the Environmental Affairs Department	010 441 4594
9	Abdel Sabbour Ahmed Mohamed	Head of West District Electricity Department	010 237 6121
10	Nabil Hakeem Dawood	Senior Technician/General Manager of the Environmental Affair	012 758 1330
11	Sayed Ahmed Mohamed	Road General Department	010 295 3194
12	Erian Riad Kamel	Manager of Water & Wastewater Laboratories	095 237 7159
13	Mohamed Abdel Aziz Sultan	Ministry of Housing and Urban Utilities	N/A
14	Mohamed Abu Zeid	Wastewater Department Manager	N/A
15	Ammer Mohamed Moustafa	Wastewater Department	N/A
16	Hassan Radwan Mohamed	Citizen from El Samman District	N/A
17	Gamal El-Hareef	Manager of Water Treatment Plant	N/A
18	Ramadan Rashwan El-Seedy	Electricity Network – Luxor	010 950 331
19	Soliman Ahmed Moustafa	Agricultural Department	235 6727
20	Ashraf Shafei Mohamed	Water and Irrigation Resources – Armant	262 0627
21	Hossam Hodhod	SCA	012 317 0262
22	Gharieb El Sawi	USAID	012 217 6314
23	Mohamed Hassan Mohamed	NOPWASD	010 542 3311
24	Noha El Maraghy	USAID	012 226 5224
25	Amani Loka	USAID	02 522 6750
26	Mamdouh Moubarak	Luxor – SCA	012 318 85
27	Saady El –Rawy	El-Samman District – SCA	535 3260
28	Reda Mohandess Moustafa	El-Samman District – SCA	N/A
29	Rashwan Ghazaly	El-Samman District – SCA	010 123 2400
30	Saady El Adly Omar	El-Samman District – SCA	010 083 0802
31	El-Zohairy Saied	Nagaa El- Kupahi Area Representative	236 0240
32	Refaat Selim	Ministry of Education Representative	N/A
33	Mohamed Abbas Saad	Ministry of Education Representative	010 984 2563

	Name	Organization/Position	
34	Mohamed Abdel Kader Hakeem	Nagaa El-Kupahi Area Representative	010 920 063
35	Ammer El-Rolly Hamed	Nagaa El-Kupahi Area Representative	012 320 563
36	Khalil Abu Ammer Mohamed	Electrical Network Department Representative	N/A
37	Samira Nicola	Head of PIU NOPWASD	304 2922
38	Mohamed Nader Abdel Wahab	Cairo SCA	735 8761
39	Richard Minkwitz	CDM	010 193 3030
40	Stephen Nielson	CDM	010 669 4247
41	Ashraf Ismail	CDM/AAW	012 7835558
42	Moustafa El-Tayeb	CDM/AAW	010 144 4609
43	Moenes Youannis	USAID	N/A
44	Jeremy Gustafson	USAID	N/A
45	Mohamed Abu El-Ela	General Secretary of Luxor High Council	N/A

APPENDIX E. Proposed Outline of the Environmental Assessment Report

ENVIRONMENTAL ASSESSMENT REPORT

Executive Summary (Arabic and English)

1. Introduction

1.1 Background

1.2 Proposed action

1.3 Environmental regulatory procedures

1.3.1 Egyptian environmental legislation

1.3.2 USAID environmental procedures

2. Project Description

2.1 Background

2.2 Layout and description of proposed facilities

2.3 Construction activities

2.4 Operation activities

3. Environmental Setting

3.1 Background

3.2 Physical environment

3.3 Socio-economic environment

3.4 Cultural and aesthetic environment

4. Environmental Effects

4.1. Background

4.2. Physical environment impacts

4.3. Cultural and aesthetic environmental impacts

4.4. No-action alternative

5. Mitigation, Monitoring and Management

5.1. Background

5.2. Physical environment

5.3. Socio-economic environment

5.4. Cultural and aesthetic environment

Appendices

List of EA preparers

Scoping Report

Public NGOs correspondence

APPENDIX F. Archaeology Report by Dr. Kent Weeks

LUXOR WEST BANK GROUNDWATER LOWERING PROJECT;

THE ARCHAEOLOGICAL COMPONENT

Kent R. Weeks

Director, Theban Mapping Project.

Professor Emeritus, American University in Cairo

The Luxor West Bank Groundwater Lowering Project (GLP) is intended to produce two significant results: (1) to lower groundwater levels in the area's agricultural zone to reduce water consumption and increase crop yields; (2) to reduce the damaging effects of rising groundwater on the foundations and fabric of ancient Egyptian monument. The following comments deal with the second of these goals.

Along the edge of the West Bank agricultural zone, and extending several meters into adjacent desert lands, the ancient Egyptians built scores of massive mortuary temples, dug hundreds of tombs, and erected over two hundred homes, storerooms, workshops, and shrines. Most of these ancient remains date from Egypt's New Kingdom, dynasties 18, 19, and 20, a 500-year-long period extending from about 1500 to 1000 B.C. A few are somewhat more recent (Late Dynastic, Ptolemaic, and Roman). Of the 36+ temples, only five are accessible today, and even they are seriously threatened by rising groundwater caused by over-irrigation of adjacent sugar cane fields. But the remaining 31 are salvageable, and could be made a significant part of the West Bank's archaeological heritage, if water levels are reduced. The tombs, houses, and other structures, have never been studied (they are known from ancient texts, not from archaeological work), but they, too, could form an important part of the archaeological record.

It is worthwhile saving these monuments from further destruction simply because they form a significant part of ancient Egypt's archaeological record. But equally important, they could form a major component of Egypt's tourist-based economy, which depends upon such ancient monuments to attract visitors. Currently, about 8,000 tourists visit the West Bank every day, contributing over one million Egyptian pounds daily to the country's economy. These numbers, which experts believe will double in the next decade, also place heavy pressures on archaeological sites. By cleaning and conserving the monuments in the GLP's area of work, the list of sites open to visitors could be significantly increased, thereby reducing the numbers of tourists at existing sites as they choose instead to visit these "new" monuments.

This requires several actions. First, an inventory of the archaeological remains in the GLP work area should be compiled. Existing maps, plans, and descriptions should be collected. New topographic maps should be produced. A geophysical survey using magnetometers can efficiently and economically locate precisely the monuments in the area and indicate their size, regardless of whether they have yet been excavated or not.

Second, condition reports should be made of the archaeological remains. These reports would include: descriptions of a building's material and its condition; current ground water levels; the location and environmental impact of such modern features as agricultural fields, roadways, homes and commercial buildings. Photographic surveys should accompany the written descriptions, as should general plans..

From these data, a management plan should be prepared to ensure the future protection of the monuments and guarantee that they can safely play a part of the area's future economic and touristic activities. Special attention should be paid to the installation of a sustainable groundwater lowering system, and a long-term monitoring system should be put in place to ensure that it effectively maintains the structural integrity of the monuments. Fences, signs, and other facilities should be designed to protect the monuments from vandalism and encroachment by modern building or agriculture.

The monuments in the GLP area should be evaluated and their safeguarding should be prioritized to ensure that those monuments most in need of help can be dealt with quickly and effectively. A similar list should describe how the monuments can play a role in future planning for the West Bank in a manner consistent with their protection for future generations of scholars, visitors, and native Egyptians to learn from and enjoy.

APPENDIX G
Scoping Session Agenda – English/Arabic

Arab Republic of Egypt

EGYPT INFRASTRUCTURE IMPROVEMENTS PROJECT

SECONDARY CITIES

Environmental Assessment

Scoping Session

For

CITY OF LUXOR

**Groundwater Lowering of Antiquities Sites
on the WestBank**

**National Organization for Potable Water and
Sanitary Drainage (NOPWASD)**

**US Agency for International Development (USAID)
USAID Project No. 263-0236**

CDM International Inc.

In association with



Dr. Ahmed Abdel-Warith
Consulting Engineers



May 2007

**LUXOR WEST BANK GROUNDWATER LOWERING
ENVIRONMENTAL SCOPING MEETING**

TABLE OF CONTENTS

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2. Project Description	3
3. Environmental Considerations and Key Issues	9
4. Potential Impacts to Groundwater Lowering	9
5. Outline of the Environmental Assessment Report	11

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Figure 2 – Location Map of Antiquities on the Luxor West Bank	4
Figure 3 – Photos of the Project Area	5
Figure 4 – Photos of Temple Foundation Deterioration	6
Figures 5 & 6 – Potential Methods for Groundwater Lowering	7 & 8

**EGYPT INFRASTRUCTURE IMPROVEMENTS
PROJECT
ENVIRONMENTAL ASSESSMENT**

CITY OF LUXOR

**GROUNDWATER LOWERING OF ANTIQUITIES SITES ON THE
WEST BANK OF LUXOR**

ENVIRONMENTAL SCOPING MEETING

1. Introduction

This paper and this meeting are to describe the measures to protect the Pharaonic antiquities on the west bank of the Nile River in the City of Luxor. The project is undertaken for the Government of Egypt (GOE) through its implementing agency, the National Organization for Potable Water and Sanitary Drainage (NOPWASD), the Owner of the Antiquities, Supreme Council of Antiquities (SCA) and the United States Agency for International Development (USAID).

Background data and information for the proposed remedial activities were gathered and reported in the Effects of Groundwater on Pharaonic Monuments Report (SWECO, 24 May 1982), in the Salvation of Karnak and Luxor Temples Phase 1 Report (SWECO, 14 November 2002) and in Studies Conducted for the Installation of a Dewatering Program at the Amenhotep III site for Archaeological Excavation works. Additional information from geotechnical investigations and groundwater modeling within the specific project area will be used to determine the proposed remedial work required for sustainable groundwater lowering.

A map of the City of Luxor is shown in Figure 1. The main portion of the City of Luxor is located on the East Bank of the River Nile. The project area is directly across the river on the West Bank.



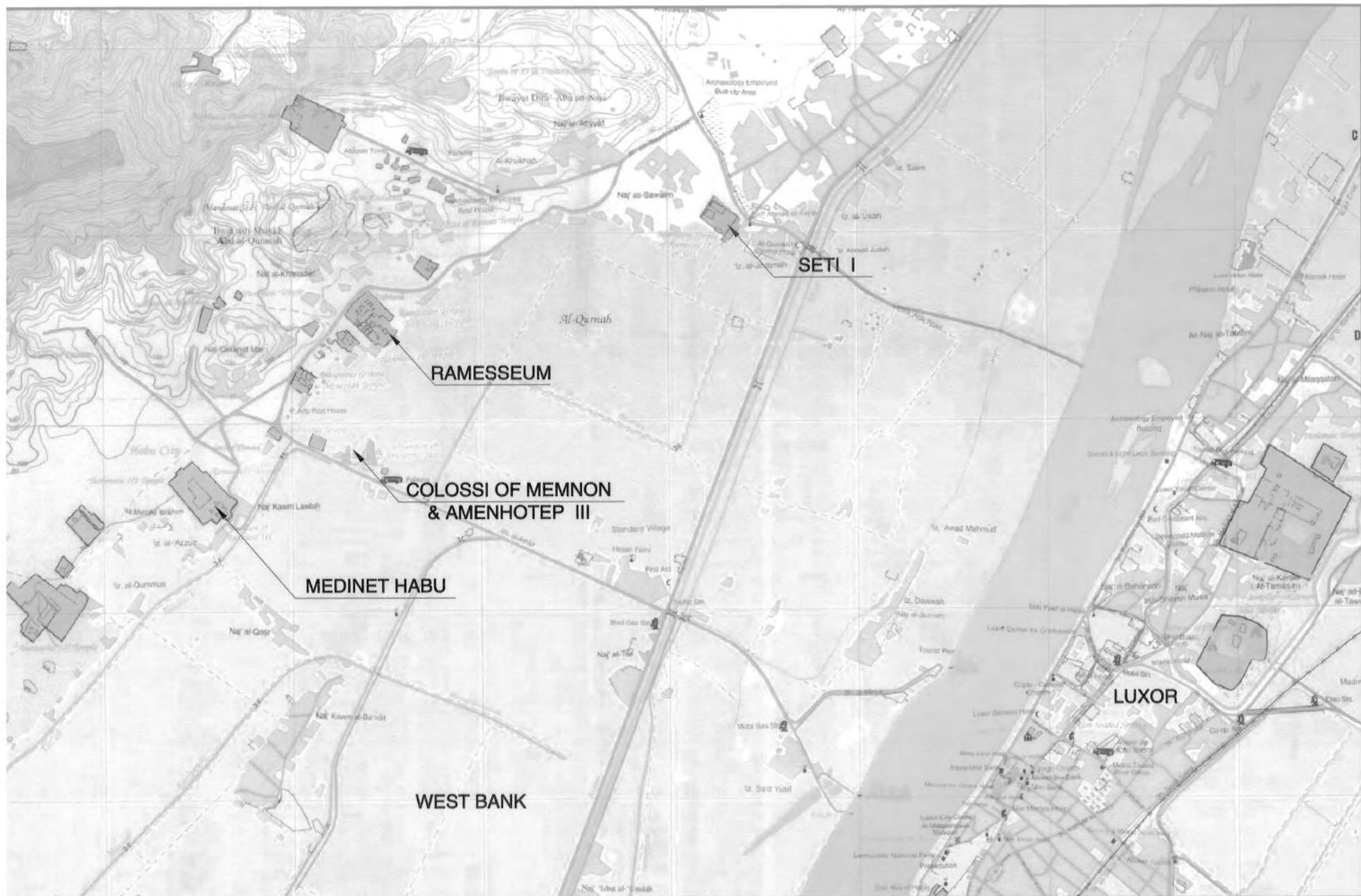
Figure 1. - LOCATION MAP LUXOR WEST BANK

2. Project Description

A great number of tombs, temples, and statuary are located on the west bank of the Nile, mostly at the edge of the historic flood plain where it meets the Western Desert. The antiquities include the compound of Medinet Habu at the southern extremity, the tomb of the Pharaoh Seti I at the northern extremity, and many other sites in between. Also included is the compound of Amenhotep III, with the twin Colossi of Memnon, large statues of a seated personage located in the flood plain. See Figure 2.

The intersection of farmland and desert has moved little over the past several millennia. However, following the closure of the Aswan High Dam four decades ago, the advent of extensive pumped irrigation has led to an increase in groundwater salinity. The antiquities are threatened by the increase in salinity of the groundwater contacting their foundations and damaging the rock of which the foundations of these temples, statues, and tombs are constructed. See Figures 3 and 4.

A groundwater lowering program was recently completed on the East Bank, to address a similar situation threatening the foundations of the Luxor and Karnak temples. On the West Bank, remedial options being considered include groundwater lowering, by installation of a cutoff wall and/or permanent installation of a well field and drainage system. See Figures 5 and 6. A groundwater modeling study and geotechnical investigations are presently under way.



**Figure 2 - LUXOR WEST BANK GROUNDWATER LOWERING
LOCATION MAP OF ANTIQUITIES**



Seti I Temple



Medinet Habu



Farmland on the West Bank in the Project Area

Figure 3 – Project Area Photos



Evidence of salt water damage to pharaonic rock carving

Figure 4 – Photos of Temple Foundation Deterioration

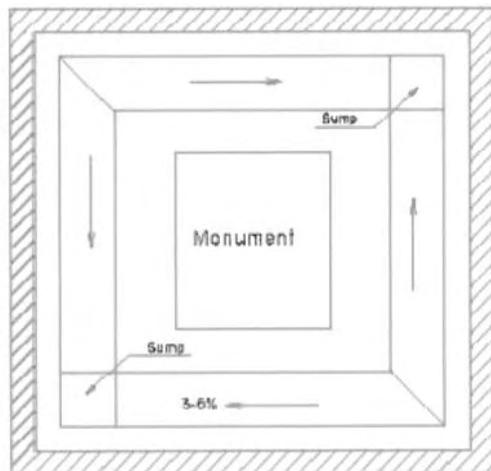
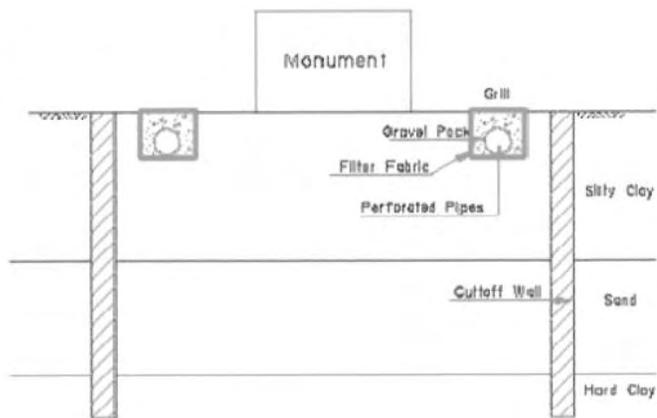


Fig. (1): Candidate Solution (1)
Cutoff Wall and Shallow Horizontal Drains

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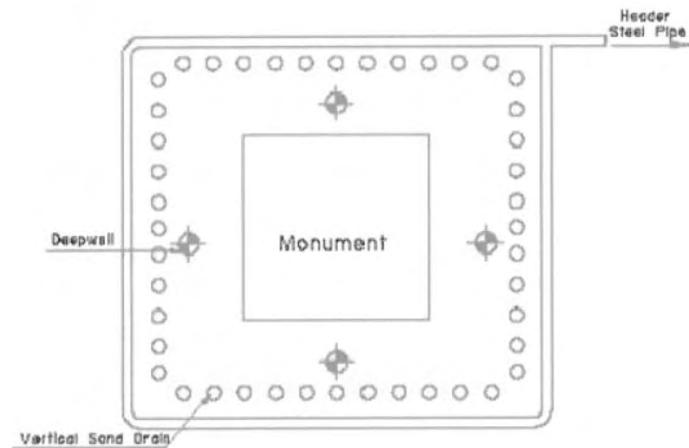
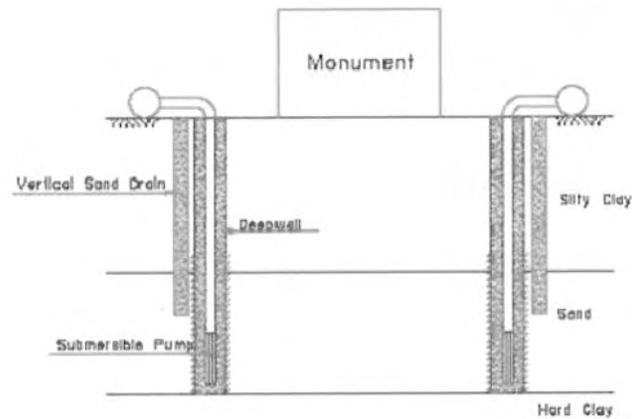


Fig. (2): Candidate Solution (2)
Deepwells and Vertical Drains

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Figure 5 - POTENTIAL METHODS FOR
GROUNDWATER LOWERING I

▪ Schematic - Perforated Drain Installation :

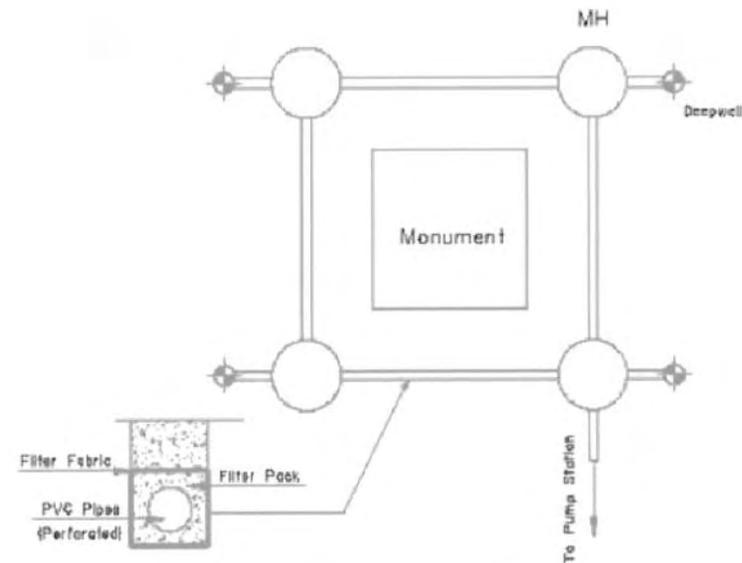
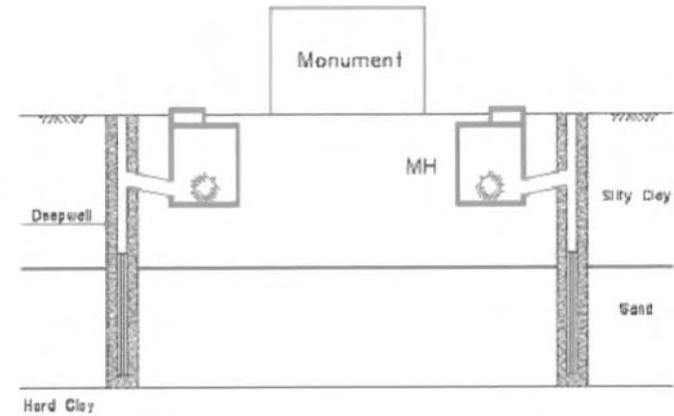
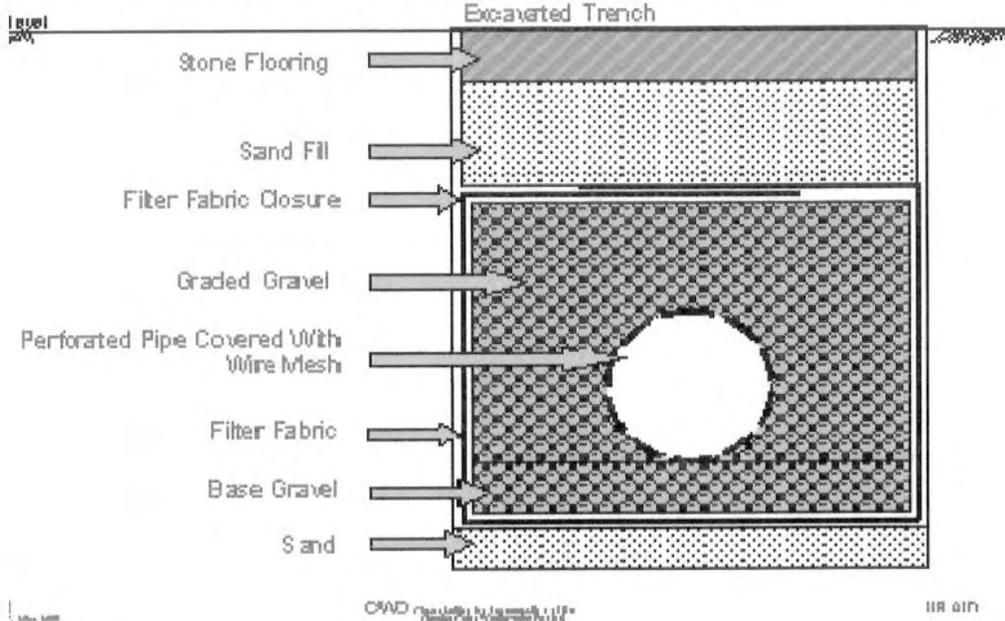


Fig. (3): Candidate Solution

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3. Environmental Considerations and Key Issues

The USAID-funded Egypt Infrastructure Improvements Project is conducting an Environmental Assessment (EA) of the proposed remedial activities for the Luxor West Bank. An EA is a process used to identify and predict the environmental consequences of a newly planned activity and to assist in planning appropriate measures to reduce the adverse effects and maximize environmental benefits before such activities are allowed to go ahead. It is a practical and valuable means for aiding decision makers as regards to project implementation.

The EA provides the decision makers with reasonably accurate information concerning existing environmental conditions, potentially significant environmental impacts and possible mitigation measures, monitoring programs, opportunities for environmental enhancement and environmental management plans.

“Scoping” is an EA activity which:

- Identifies those attributes of the environment for which there are concerns;
and
- Provides a plan that enables the EA team to focus on those attributes.

Scoping is a shared responsibility where the proponent government agencies, NOPWASD, Supreme Council of Antiquities, Supreme Council of Luxor and USAID, and the public, all have a role. The Scoping Meeting is part of this process.

4. Potential Impacts of the Groundwater Lowering Program

The following are potential effects that have been identified, whether positive or negative, that the Environmental Assessment process should consider:

- Engineers on this project should be cognizant that village residences, and farming, have lain close to these antiquities for centuries. These activities may impact the project, and the project may impact these activities.
- Existing antiquities that will be encountered during the construction program.
- The main thrust of the project is to protect the antiquities. Benefits that should accrue to the local residents include:
 - Improved public health due to more effective evacuation of groundwater;
 - Improved tourist economy.
- Consider the potential impact of construction activities on antiquities and on other services.
- Consider the potential impact of construction activities on the agricultural areas in the project area

- Consider the potential impact of construction on the tourist industry.
- Consider public safety, traffic control and interruptions during construction including interruptions of water or electric utility services.
- Consider the impact of groundwater lowering on the foundations of the antiquities, and of other structures nearby:
 - Lowering the groundwater should remove the water and salt source from having contact with the foundation material. It should be noted that residual salt deposits on the foundation stone should be removed to complete the salvation process.
 - Drying out the foundation material may have an adverse impact; the likelihood of this should be determined.
 - Lowering groundwater table (subsurface water) at the proposed site would be extended to have a positive impact on the near by agriculture lands leading to benefits such mitigating water logging, improving crop production and soil characteristics.
- Its worth to mention that the farmers near by the proposed project are overusing irrigation water (Irrigation water much higher than the water demand) leading to a major impact on the groundwater level at the proposed project. Other impacts due to such management would include:
 - Reduction on soil fertility and nutrients losses;
 - Enhancement of water logging of the agriculture lands;
- Be aware of any locations beyond the flood plain where the project may pass through deposits of expansive clays, which swell when wetted. In such locations, take measures to minimize the probability of wetting of this soil, and replace such soil with sand to the extent necessary.
- Where new pump stations are to be located, assess the impacts on land use, availability of electric power, availability of drainage areas to dispose of groundwater, energy consumption and traffic control.
- Groundwater runoff from the desert
- Consider operation and maintenance activities at these new pump stations, e.g. problems of noise.
- Determine locations to adequately dispose of groundwater.

5. Outline of the Environmental Assessment Report

In the next few months we plan to prepare an “Environmental Assessment Report” describing this project, its beneficial and adverse impacts upon the local environment, and upon the health and well-being of the people who live here.

The Environmental Assessment will be based on the technical information we have gathered so far, and the comments and questions that you bring to this meeting, the Environmental Scoping Session. In this meeting, we will tell you what we plan to do and how we plan to do it. We also must listen to your ideas and information.

The Environmental Assessment Report will be arranged according to the outline shown on the next page.

(PROPOSED OUTLINE)
ENVIRONMENTAL ASSESSMENT REPORT

Executive Summary (Arabic and English)

1. Introduction

1.1 Background

1.2 Proposed action

1.3 Environmental regulatory procedures

1.3.1 Egyptian environmental legislation

1.3.2 USAID environmental procedures

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4.4. No-action alternative

5. Mitigation, Monitoring and Management

5.1. Background

5.2. Physical environment

5.3. Socio-economic environment

5.4. Cultural and aesthetic environment

Appendices

List of EA preparers

Scoping Report

Public NGOs correspondence

جمهورية مصر العربية
مشروع تطوير البنية التحتية في مصر
مشروع المدن الثانوية

ورشه العمل

دراسة التأثيرات البيئية

خفض منسوب المياه الجوفية
للمناطق الأثرية بالضفة الغربية

مدينة الأقصر

الهيئة القومية لمياه الشرب و الصرف الصحي

الوكالة الأمريكية للتنمية الدولية

مشروع رقم 263-0236

CDM كامب دريسر أند ماكي العالمية

بالاشتراك مع



الهيئة الاستشارية - الدكتور أحمد عبد الوارث -

مهندسون استشاريون



USAID
FROM THE AMERICAN PEOPLE

مايو 2007

مشروع تطوير البنية التحتية فى مصر

خفض منسوب المياه الجوفية
للمناطق الأثرية بالضفة الغربية
مدينة الأقصر

المحتويات

صفحة رقم	البند
١	١. المقدمة
١	٢. وصف أعمال المشروع
٨	٣. الأعتبارات البيئية والمحاور الأساسية
٩	٤. التأثيرات المحتملة لبرنامج خفض منسوب المياه الجوفية بمنطقة المشروع.
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مشروع تطوير البنية التحتية في مصر خفض منسوب المياه الجوفية للمناطق الأثرية بالضفة الغربية مدينة الأقصر

دراسة التأثيرات البيئية

١. المقدمة

تهدف هذه الدراسة وورشه العمل المنعقدة إلى شرح وتوضيح ومناقشة محددات التأثيرات البيئية المتوقعة وتقييمها نتيجة تنفيذ أعمال خفض منسوب المياه الجوفية للمناطق الأثرية بالضفة الغربية لمدينة الأقصر لحماية الآثار الموجودة هناك، وذلك ضمن برنامج مشروع تطوير البنية التحتية في مصر الذي يتم بتمويل من الوكالة الأمريكية للتنمية الدولية USAID بمشاركة الهيئة القومية لمياه الشرب والصرف الصحي ممثل للحكومة المصرية.

ويعد المجلس الاعلى للآثار هو المالك النهائى للمشروع عقب الانتهاء من اعمال المشروع .

تعتمد هذه الدراسة علي كل البيانات والمعلومات التي تم تجميعها وأيضاً التي تضمنها تقرير تأثيرات المياه الجوفية على الآثار الفرعونية بمدينة الأقصر (سويكو - مايو ١٩٨٢) وتقرير الحفاظ على معابد الكرنك والأقصر - المرحلة الأولى (سويكو - نوفمبر ٢٠٠٢) والدراسات الخاصة بتنفيذ برنامج خفض منسوب المياه الجوفية بموقع أمنحتوب الثالث الخاص بأعمال التنقيب عن الآثار .
الشكل رقم "١" يوضح خريطه الاقصر ويظهر بها منطقة المشروع الواقعه على الضفه الغربيه لنهر النيل بالاقصر ، هذا وبالإضافة الى الدراسات السابق الاشاره لها فسوف يتم عمل ابحاث وتحليل للتربة وعمل نموذج مماثل لحركة المياه الجوفية لمنطقة المشروع وذلك بغرض تحقيق افضل واجدى طريقه لتنفيذ مشروع تخفيض منسوب المياه الجوفيه .

٢. وصف أعمال المشروع:

تقع الأقصر في قلب وادى النيل وتبعد عن القاهرة بمسافة ٦٧١ كيلومترا حيث يقسم نهر النيل مدينة الأقصر الى قسمين البر الشرقى والبر الغربى . وتعتبر محافظة الأقصر أولى محافظات مصر من ناحية الآثار ، حيث تضم المحافظة وحدها ثلث آثار العالم .

ومن أهم الآثار الفرعونية الموجودة فى البر الشرقى معبدى الأقصر والكرنك ، أما البر الغربى فتقع الآثار على الملاصقه لحدود الصحراء الشرقيه وتحتوى منطقة مدينة هابو التي تحتوى على مجموعة من المعابد الهامة التي تقع فى الناحيه الجنوبيه ومقبرة سيى الأول بالناحيه الشماليه وبينهما اثارات اخرى ، حيث تحتوى على امنحتوب الثالث والتمثالين الكبيرين لممنون . كما موضح بالشكل رقم "٢" .

وقد قام المصريون عبر العصور السابقة بالاستفادة القسوى من نهر النيل ومع بناء السد العالى الذى وفر لمصر حماية أمنة من مخاطر الفيضان والتوافر الدائم للمياه العذبة ونظرا للأنشطة التنموية والتغيرات التي طرأت على الوسط البيئى كنتيجة تلك الأنشطة كالتنمو السكانى المجاور للمناطق الأثرية والاستخدام المكثف

للأراضى الزراعية المحيطة أدى ذلك الى إرتفاع مناسيب المياه الجوفية مع زيادة الملوحة بها التى اثرت بشده على الاثار الموجوده بالمنطقه .

الشكلين "٣" و "٤" يوضحان تأثير اجسام وجدران الاثار بالمياه الجوفيه المرتفعه. وفى حالة مماثلة تم تناولها ودراستها وتنفيذها بالبر الشرقي حيث تم خفض المياه الجوفية التى تؤثر على معبدى الكرنك والأقصر.

فمطروح عدد من المرادفات لتخفيض المياه الجوفيه منها في البر الغربي عمل حوائط قاطعه مدفونه فى الارض وباعماق مناسبة حول المنطقه الاثريه للحيلولة من وصول المياه الجوفيه الى اساسات هذه المعابد و/او استخدام نظام تركيب شبكة مواسير متقبه مدعمه بابار سطحيه او عميقه حول منطقة المعبد لتجميع وصرف المياه الجوفيه.

الشكلين "٥" و "٦" يوضحان نماذج النظم المستخدمه.

الجدير بالذكر أنه جارى حاليا العمل فى دراسات نموذج حركة المياه الجوفية و اعمال المساحه ومراقبة الاثار والجسات وابحاث التربة .



CDM International Inc.

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operations

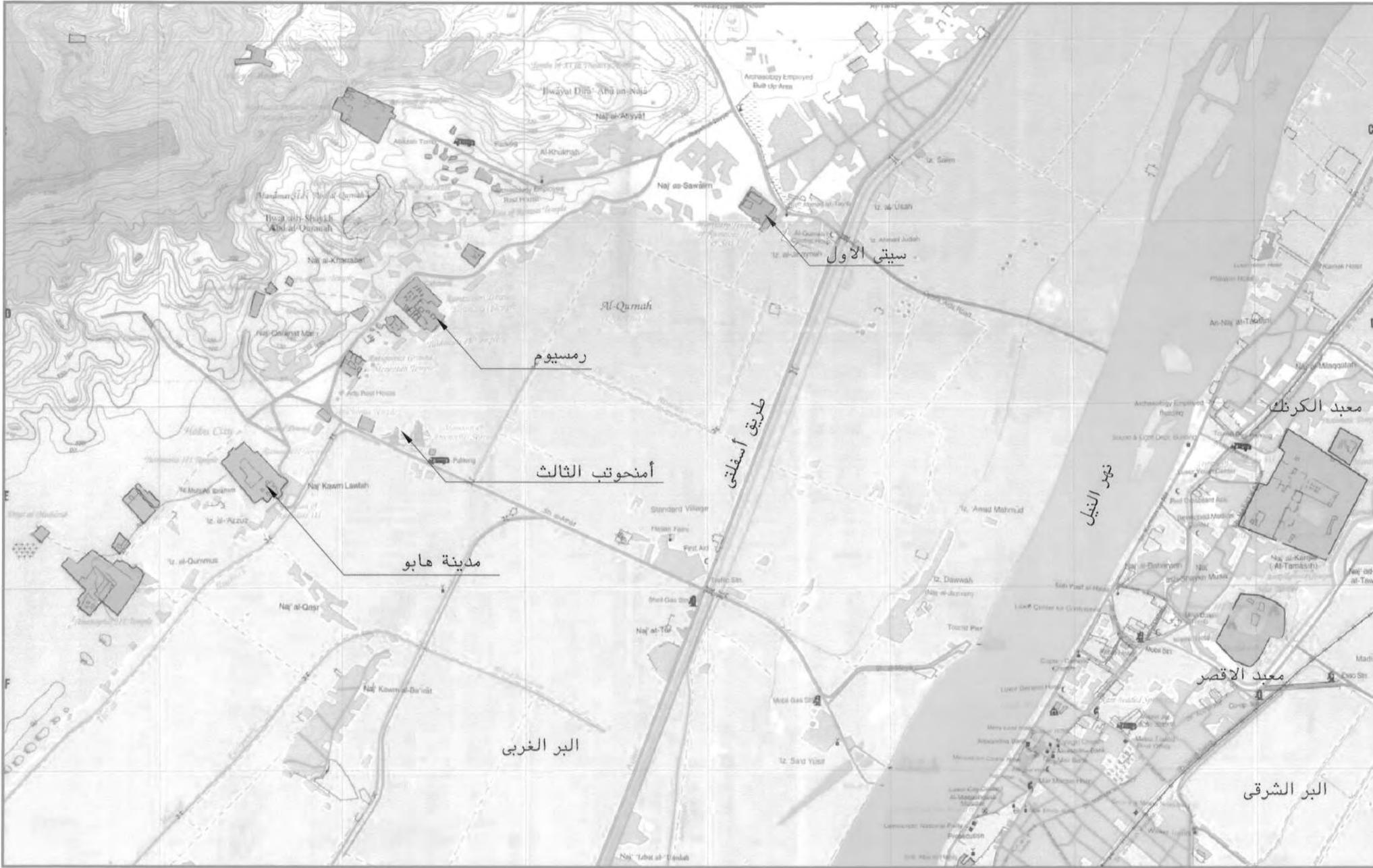


in association with
Dr. Ahmed Abdel-Warith
Consulting Engineers

شكل (١) - خريطة الموقع العام للبر الغربى بالاقصر
جويه



Contract No. 263-C-00-07-00010-10
Egypt Infrastructure
Improvements Project



شكل (٢) - مواقع الاثار التي تقع في نطاق المشروع
بالبر الغربي بالاقصر



معبد سيتي الأول

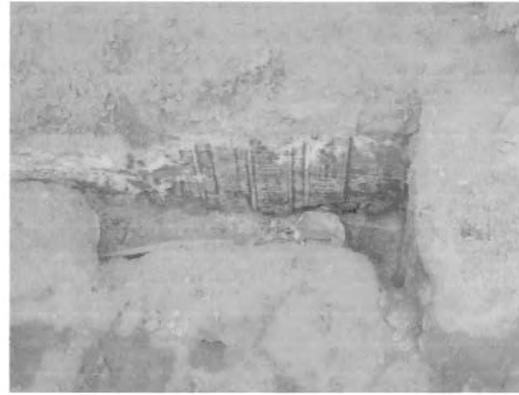


مدينة هابو



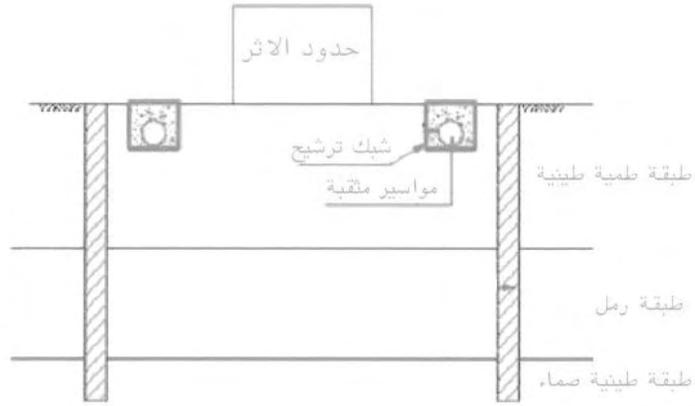
المنطقة المزروعة بمنطقة المشروع بالبر الغربي

شكل رقم (3) : صور فوتوغرافية لمنطقة المشروع



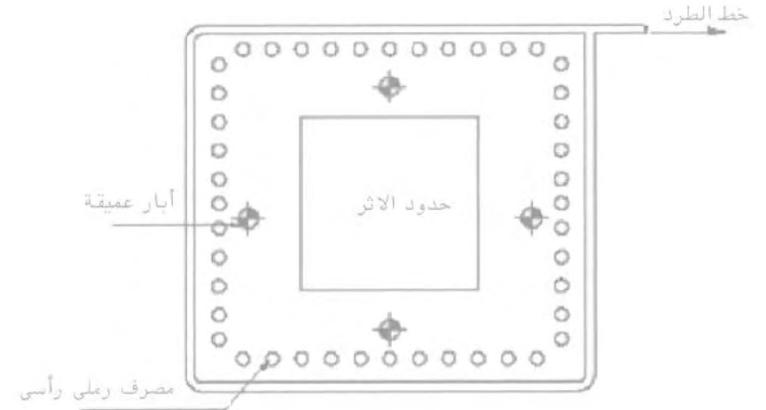
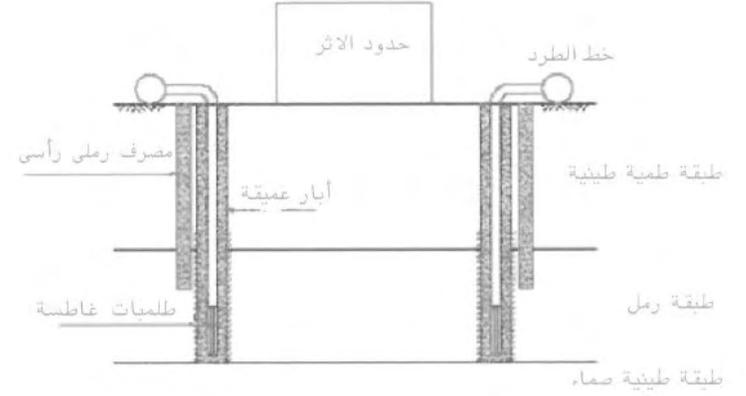
صور توضح تأثير الأملاح بالمياه الجوفية وتأثيرها السليبي على صخور المعابد

شكل رقم (4) : صور توضح التلف والتآكل الموجود بقواعد المعابد



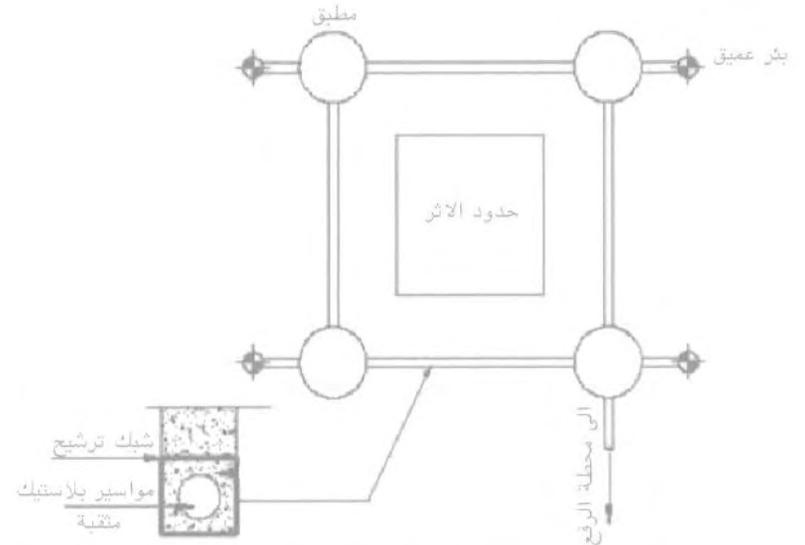
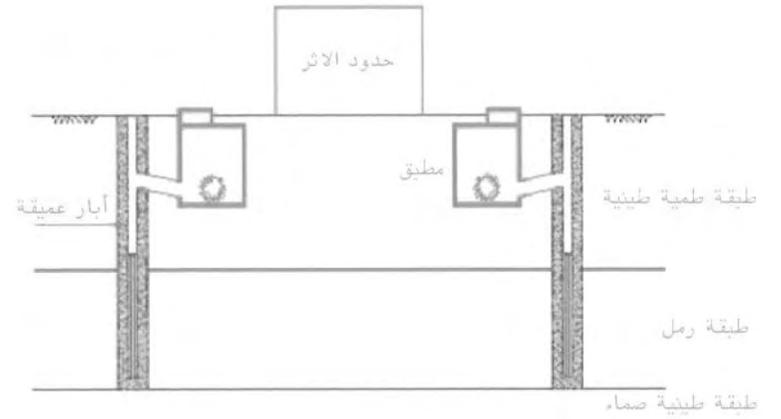
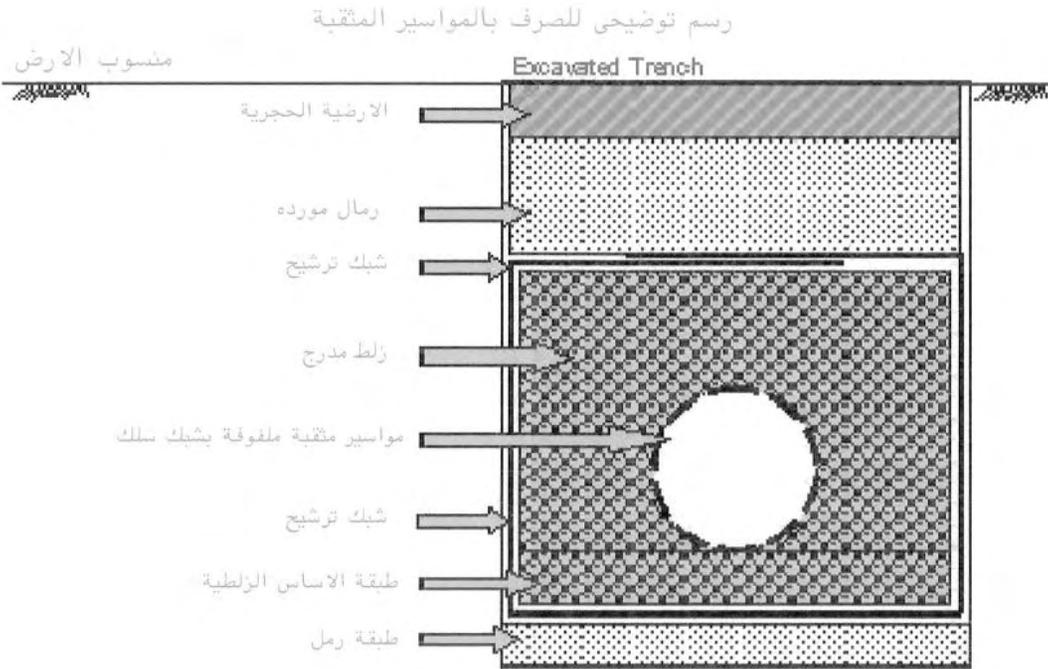
شكل (١) الحل المقترح رقم (١)
الحواض والمصارف الأفقية السطحية القاطعة

TIBA
Consulting Engineers



شكل (٢) الحل المقترح رقم (٢)
الابار العميقة و المصارف الرأسية

TIBA
Consulting Engineers



شكل (٣) الحل المقترح رقم (٣)

TIBA
Consulting Engineers

٣. الاعتبارات البيئية والمحاور الأساسية

يوكب تنفيذ المشروع الذي يتم تمويله بواسطة كلا من الوكالة الأمريكية للتنمية الدولية (USAID) بمشاركة الحكومة المصرية عمل دراسات التأثيرات البيئية المختلفة نتيجته تنفيذ أعمال خفض منسوب المياه الجوفية المقترحة للمناطق الأثرية في البر الغربي لمدينة الأقصر . وتهدف دراسة إجراءات التأثيرات البيئية الى تقييم الأثار المتوقعة نتيجة تنفيذ المشروعات المقترحة والمساعدة في اتخاذ كافة الاحتياطات اللازمة للحد من أى أضرار مستقبلية وضمان تعظيم الفوائد الممكنة قبل الشروع في تنفيذ هذه المشروعات وتعتبر هذه وسيلة ذات قيمة وعملية لمساعدة صناعي القرار في أعداد التخطيط والقيم والتنفيذ السليم والمناسب لهذه المشروعات .

يقدم التقييم البيئي أيضا لصانعي القرار معلومات كافية و دقيقة عن الحالة البيئية الحالية، وعن التغيرات المؤثرة المحتملة وبرامج المتابعة المطلوبة وإمكانيات تحسين البيئة وخطط الإدارة البيئية المصاحبة للمشروع المقترح .

يتضمن مجال أنشطه التأثيرات البيئية المهام الآتية :

- تحديد الخصائص البيئية موضع الاهتمام .
- أعداد خطة لفريق دراسة التأثيرات البيئية للتركيز علي هذه الخصائص .

تشارك مدينة الأقصر مع كافة الوزارات والجهات والهيئات المعنية والهيئة القومية لمياه الشرب والصرف الصحي والمجلس الاعلى للثأرو المجلس الاعلى للأقصر ومع الوكالة الأمريكية للتنمية الدولية (USAID) والمواطنين المقيمين بمنطقه الدراسة كلا بدوره في أعداد دراسة التقرير البيئي وبناء عليه فإن ورشه العمل هذه تعد جزء هام لا يتجزأ في إعداد هذه الدراسة .

٤ . التأثيرات المحتملة لبرنامج خفض منسوب المياه الجوفية بمنطقة المشروع

يجب أن يأخذ فريق العمل بالمشروع فى الاعتبار التأثيرات التالية :

- قرب المجتمعات السكانية القاطنة والزراعات والخدمات العامة من منطقة المشروع والتأثيرات المتبادلة بين المشروع والمجتمع .
 - تآثر بعض الآثار القائمة حاليا من اعمال التنفيذ .
 - بالرغم من إجراء الدراسة البيئية يودى الى معالجة الضرر الذى أصبح واقعا بالفعل على منطقة الآثار الأ أنها تودى الى فوائد أخرى للمجتمع منها :
 - ١ - تحسين حالة الصحة العامة من حيث التخلص من المياه الجوفية .
 - ٢ - الأبعاد الأقتصادية من حيث تنشيط التنمية السياحية .
 - الأخذ فى الأعتبار الأحتياطات الواجب مراعاتها أثناء تنفيذ المشروع بهدف حماية الآثار الفرعونية والنشاطات العمرانية مثل أعمال الحفر والردم وتعديل المناسيب .
 - احتمالات تآثر بعض الانشطه الزراعيه بمنطقة المشروع بسبب اعمال التنفيذ
 - مراعاة سلامة العاملين والمواطنين وضمان إستمرارية النشاطات الخدمية مثل الكهرباء وإمداد المياه.
 - القيام بالدراسات الهندسية اللازمة لتحديد التأثير الأيجابي للمشروع فى تخفيض منسوب المياه الجوفية وأبعاد خطر التملح على الآثار والمنشآت المجاورة لها كما يؤثر بالأيجاب على المباني والزراعات الموجودة بالمناطق المحيطة للمشروع ، وذلك مع ضرورة الأشراف على مراحل التنفيذ لمتابعة التأثير السلبى المحتمل وجوده .
 - الأخذ بعين الأعتبار النشاط الزراعى من حيث تحديد الأحتياجات المائية المختلفة فى المناطق المحيطة بالمشروع لتجنب التأثيرات السلبية المتبادلة بين منطقة المشروع والأراضى الزراعية المجاورة للحفاظ على مستوى مناسب من المياه والملوحة فى التربة للحصول على إنتاج زراعى أفضل .
 - وضع المقترحات الهندسية البيئية لتلافى التغيرات فى جريان المياه الجوفية وإعتراض المياه المتسربة لمناطق الحفر ، وبالتالي لا بد من إجراء لحماية البيئة ضد أسباب رفع أو إنتفاخ التربة والحد من وجود كميات كبيرة من المياه التى قد تتعرض لها المناطق المنخفضة .
 - الأختبار المناسب لمحطات الرفع المستخدمة بالمشروع مع مراعاة ضمان الأختبار المناسب لمواقع الرفع والتوافر الأامن للطاقة المستخدمة .
 - من المتطلبات الهامة عند دراسة شبكة الجريان لحركة المياه الجوفية ومعرفة الظروف الصحية المحيطة المتابعة المستمرة لتشغيل وصيانة الطلمبات المستخدمة مع تحديد المستويات القصوى للضوضاء الناشئة عن المعدات الميكانيكية والكهربائية .
- أيضا يتيح تنفيذ هذه المشروعات مزايا أخرى كبيرة . ولذا يستلزم الأمر أن تتم الأجراءات المخففة التالية عند الضرورة :

- أن يتم تخطيط أعمال تنفيذ المشروع على "مراحل عمل" لتقليل التأثيرات السلبية المصاحبة المؤقتة.
- الحد من تأثير الغبار والضوضاء خلال فترة التنفيذ .
- عمل تحويلة أو أى أحتياطات أخرى فى حالة تنفيذ عدايات للقنوات أو الترعى أو المصارف المطلوب مرور مواسير الصرف عبرها .
- عمل تثبيت لجوانب الحفر أو أى أجراءات ضرورية لتفادى أى تأثير أو التعرض لأنهبان للمنشآت القائمة خلال فترة التنفيذ .

- اتخاذ إجراءات تنفيذية هامة مثل تفادي استخدام المعدات الثقيلة داخل أو بجوار أماكن الحفر والمسارات المائية واتخاذ كل إجراءات لمنع انهيار الجوانب لتقليل تأثيرها على نوعية المياه الجارية وتفادي حدوث عكارة أو روبة بها.
- الاستخدام الأمثل لاحتياطات الأمن والسلامة مثل الشرائط الجاهزة أو البراميل الملونة للحفاظ على الأفراد في مناطق العمل التي يكثر بها أستعمالات الأفراد .
- التخطيط والتنسيق مع أدارت المرافق المختلفة لمنع أو تقليل أى أضرار أو اضطرابات قد تحدث في الخدمات أو المرافق الأخرى.
- التنسيق مع المجلس الأعلى للآثار لمنع أى تأثيرات على أى نوع من الآثار قد تكون موجودة أو قد يتم اكتشافها في منطقة العمل خلال التنفيذ.

٥. الخطوط العريضة لتقرير دراسة التأثيرات البيئية

من المخطط له خلال الشهور القليلة القادمة الانتهاء من أعداد تقرير دراسة التأثيرات البيئية ويتضمن شرح للمشروع ويتناول أيضا المنافع والأضرار المترتبة علي أعمال تنفيذ المشروع وتأثيرها على البيئة وكذلك علي الصحة العامة وعائدها علي المواطنين بالمنطقة .

يتم أعداد دراسة التأثيرات البيئية للمشروع بناء على المعلومات الفنية التي يتم تجميعها من الدراسات السابقة والمصادر الأخرى وأيضا الملاحظات والمناقشات والمقترحات والتوصيات التي تتم خلال ورشه العمل وكل الاجتماعات المتعلقة بهذا المشروع .

خلال هذا الاجتماع الموسع عرض أفكار استشارى المشروع والاستماع إلى الآراء والمعلومات والمقترحات الأخرى من كافة ممثلي الجهات المشاركة في هذا الاجتماع .

وسوف يحتوي تقرير دراسة التأثيرات البيئية الخطوط العريضة الموضحة في نهاية هذا التقرير :

(المحتويات المقترحة)

المحتويات المقترحة لتقرير التقييم البيئي

١- المقدمة

١-١ عام

٢-١ النشاطات المقترحة

٣-١ القوانين والتشريعات البيئية

١-٣-١ القوانين والتشريعات البيئية المصرية

١-٣-٢ الإجراءات البيئية للوكالة الأمريكية للتنمية الدولية

٢- وصف المشروع

١-٢ عام

٢-٢ مخططات وصف مكونات المشروع المقترحة

٣-٢ أنشطة التنفيذ

٤-٢ أنشطة التشغيل

٣- التوصيف البيئي

١-٣ عام

٢-٣ التأثير البيئي الطبيعي

٣-٣ البيئة الإجتماعية والإقتصادية

٤-٣ البيئة الثقافية والأثرية

٤- التأثير البيئي

١-٤ عام

٢-٤ التأثير البيئي الطبيعي

٣-٤ التأثير البيئي الثقافي والجمالي

٤-٤ البدائل المحدودة

٥- تخفيف الآثار الجانبية والمراقبة والأدارة

١-٥ عام

٢-٥ التأثير البيئي الطبيعي

٣-٥ البيئة الإجتماعية والإقتصادية

٤-٥ البيئة الثقافية والأثرية

ملاحق

- قائمة بفريق العمل لتقرير الدراسات البيئية
- تقرير المجال البيئي للمشروع
- مشاوره الجهات الغير حكومية