



USAID | **EGYPT**
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PYRAMIDS PLATEAU GROUNDWATER LOWERING ACTIVITY

CONTRACT NO. EDH-I-00-08-00024-00

ORDER NO. 2

FINAL PROJECT REPORT SEPTEMBER 2012

IMPLEMENTED BY AECOM

September 2012

This document was produced for review by the United States Agency for International Development. It was prepared by AECOM.

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Submitted to:

USAID Egypt

Prepared by:

AECOM

DISCLAIMER:

The authors' views expressed in this document do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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LIST OF ACRONYMS

BOQ	Bill of Quantities
CAPWO	Cairo and Alexandria Potable Water Organization
CDC	Centers for Disease Control
CO	Contracting Officer
COR	Contracting Officer's Representative
COP	Chief of Party
DCOP	Deputy Chief of Party
FARA	Fixed Amount Reimbursement Agreement
GOM	Government of Mozambique
HIDP	Health Infrastructure Development Program
IHO	Integrated Health Office
LTTA	Long-term technical assistance
MISAU	Ministry of Health
NGO	Non-Governmental Organization
NOPWSD	National Organization for Potable Water and Sanitary Drainage
PEA	Programmatic Environmental Impact Statement
PEPFAR	President's Emergency Plan for AIDS Relief
PPGLA	Pyramids Plateau Groundwater Lowering Activity
PQM	Promoting the Quality of Medicines
QA/QC	Quality Assurance/Quality Control
QMS	Quality Management System
RHC	Rural Health Center
STTA	Short-term technical Assistance
TM	Technical Memorandum
ToR	Terms of Reference
USAID	United States Agency for International Development
USP	United States Pharmacopeia

1 BACKGROUND

Groundwater rise is a common problem in urban areas. It has been occurring in Cairo, Egypt, for a number of years, and it has reached Giza, where it is affecting antiquities, including the Sphinx. In the last decade, USAID has supported successful groundwater lowering projects near antiquities in Old Cairo, East Luxor, and West Luxor. USAID decided to support the Supreme Council of Antiquities (SCA) in a groundwater lowering project in Cairo; the objectives were to determine the causes of increased groundwater in the Pyramids Plateau and make recommendations for active groundwater lowering, to protect the antiquities from future degradation.

USAID awarded the Pyramids Groundwater Lowering Activity (PPGLA) to AECOM; local subcontractors on the AECOM team were Engineering Consultants Group (ECG) and Environmental Development Group (EDG). This is a task order in the USAID Global Architecture-Engineering Indefinite Quantity Contract. The contract was awarded on 29 October 2009 and was completed on 30 June 2012. This Final Project Report is the last project deliverable; it summarizes the activities performed and assesses the project's success.

2 MOBILIZATION

Introductory meetings were held at the offices of USAID, the Egyptian Implementing agency Cairo and Alexandria Potable Water Organization/ National Organization for Potable Water and Sanitary Drainage CAPWO/NOPWSD, and the SCA on 27, 28 and 29 October 2009 respectively. A kickoff meeting, attended by USAID and project staff, was held on 03 November 2009 at the Pyramids Plateau SCA office. AECOM, team members ECG and EDG, and key staff were introduced to the stakeholders; project roles and responsibilities were described; contact persons were identified; and initial project activities were described.

AECOM team members mobilized and began initial project activities on 01 November 2009. AECOM established an office established adjacent to ECG offices in Nasr City.



Project Kickoff Meeting and Site Visit

3 TASKS

3.1 Develop a Groundwater Model

3.1.1 TM1 – Review of Existing Information

The initial effort associated with developing a groundwater model was a review of existing information. Several past studies and activities had addressed groundwater in the area of the Sphinx. These studies and activities were reviewed, and relevant information was presented in Technical Memorandum (TM) No. 1 to place the PPGLA study in context and to see that previous work was fully taken into account. In particular, a considerable amount of field investigation had taken place, and knowledge from this work was valuable for the

present effort. The previous investigations were taken into account in the development of the field investigations program for this project. Notable investigations studies included:

- AMBRIC. 1989. Greater Cairo Wastewater Project. West Bank Project. Contract No. 27. Pyramids Area Sewers and Collectors
- AMBRIC. 1990. Greater Cairo Wastewater Project. West Bank Project. Sphinx Groundwater Study
- ECG. 2007. Mena House Oberoi Golf Course and Drainage System
- Cairo University. Feb 2008. Lowering of Groundwater at Wadi Temple and Sphinx Area – Final Technical Report

3.1.2 TM2 – Cause of Groundwater Rise

TM2, submitted on 23 December 2009, summarized the preliminary analyses of the potential causes of groundwater rise at the Pyramids Plateau. In particular, the effect of pumping curtailment at the El Ahram well fields, about 2.2 km north of the Sphinx, was estimated, as well as those of irrigation at Mena House Golf Course and of the Mansouriah Canal. The hydraulic properties of the aquifers in the area are important controlling factors relative to the groundwater rise, and this aspect was reviewed first.

The El Ahram well fields located north of the Pyramids Plateau included 24 wells discharging an average of an estimated 20,000 m³/day. These wells started pumping in the late 1960s and were stopped in September 2005. The preliminary analysis, using data from the AMRIC studies, concluded that it appeared that curtailment of pumping at the El Ahram well fields might be at least in part responsible for the groundwater rise observed in the area of the Sphinx. On the other hand, groundwater recharge due to irrigation of the Mena House golf course did not appear likely to have a significant effect. The above conclusions were based on simplified calculations and would later be confirmed by more detailed investigations. It remained possible that raised water levels in the Mansouriah Canal could have impacted groundwater levels at the Sphinx, but this could not be ascertained at the time TM2 was issued.

3.1.3 TM3 – Groundwater Conceptual Model

TM3, submitted 06 February 2010, described the groundwater flow conceptual model developed for this project. This conceptual model would serve as the basis for the groundwater numerical model that would be developed and used to evaluate potential sources of groundwater rise in the area of the Sphinx, and to optimize a permanent solution to lower groundwater to an acceptable level. The groundwater flow conceptual model is a description of the groundwater flow regime in the area, as driven by the site geomorphology, boundary conditions and aquifer stresses,



Figure 3-1. Model boundary conditions.

such as groundwater recharge and extractions.

The memorandum defined the USGS based software used (MODFLOW), relevant features of the site geomorphology, the groundwater flow conceptual model and plans for the actual groundwater model to be used including model setup, model boundary conditions (shown in Figure 3-1), and recharge.

3.1.4 TM4 - Groundwater Lowering Alternatives

This Technical Memorandum provided descriptions and an initial evaluation of alternative measures and systems that could be considered to lower groundwater levels at the Pyramids Plateau. The objective was to obtain a short list of alternatives that could be further developed in terms of their dimensions, flows, design, cost, and environmental impacts. TM4 considered preliminary groundwater target elevations and the performance of the then existing Cairo University dewatering system.

Alternatives considered included:

- Source Curtailment
- Vertical Wells
- Linear Drains in Trenches
- Linear Drains in micro-tunnels
- Vertical Wells with drains
- Horizontal Wells
- Cutoff Walls
- Restart of El Ahram Well Field

All but the “Vertical Wells with Drains” and “Cutoff Wall” alternatives were retained for further development.

3.1.5 Groundwater Modeling and Alternatives Assessment / Presentation and Workshop

On 31 March 2010 a presentation was given to the SCA, CAPW, NOPWSD and USAID to review the program input and resulting alternatives and cost benefit analysis. The presentation was divided into the following sections, much of which covered information previously presented in TMs 1 through 4, but with the model fully developed for the respective alternatives, and the alternative and cost benefit analysis having been completed.

1. Introduction
2. Review previous information
3. Field investigations
4. Groundwater lowering target
5. Groundwater model
6. Alternatives & Cost Benefit Analysis

3.1.5.1 Introduction

The introduction provided background on the problems at site, when they became apparent; a cross section of the pyramids plateau, showing the groundwater table relative to major antiquities; and an overview of the project scope of work.

3.1.5.2 Review of Previous Work

This portion of the presentation gave a fairly detailed background and reiterated much of the information presented in Technical Memorandum No. 1, discussed in 3.11 above. A brief overview of potential causes was covered.

3.1.5.3 Field Investigations

Field investigations performed as part of this presentation included:

- Pump tests in two new wells
- Pump test in one existing well
- A pump test of 8 existing wells
- Additional piezometers installed
- Geophysical surveys
- Topographical surveys

A summary of results was given, including transitivity and yield, with groundwater level drawdown and recovery curves presented.



Field investigations at the site

3.1.5.4 Groundwater Lowering Target

The methodology and results of establishing groundwater lowering target levels were presented. The bottom elevation of affected monument structures/foundations was determined. Due to the variations in capillary rise for differing subsurface conditions, test pits were dug and actual capillary rise was measured adjacent to several of the monuments. The bottom elevation of the foundation minus the base soil or stone capillary rise was generally used to determine the minimum target elevations in that area.

3.1.5.5 Groundwater Model

Development of the groundwater model consistent with approaches previously presented in TM-3 was discussed. However, the model had subsequently been expanded to perform the following objectives:

- Evaluate contributions of potential sources
- Evaluate groundwater lowering alternatives
- Size selected groundwater lowering alternatives

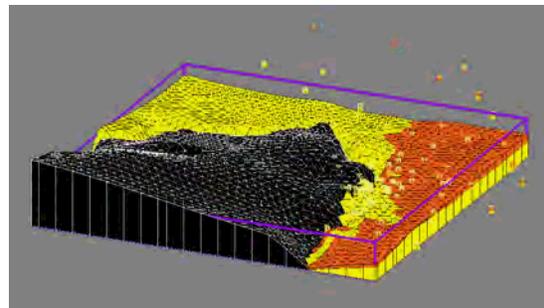


Figure 3-2. Conceptual groundwater model was expanded.

The groundwater model software, boundaries (4x4 kilometers), and supporting data were described. Model calibration scenarios and results were discussed in detail.

The resulting source impacts were described and quantified as follows:

Table 3-1.

Source	Model Simulation	Groundwater Level Change at Sphinx
El Ahram	Stop pumping	+1.1 m
Nazlet El Semman	Stop recharge from leakage	-0.09 m
Mena House Golf Course	Stop recharge from irrigation	- 0.05 m
Mansouriah Canal	Lower water level by 0.5 m	-0.05 m
	Reduce leakage by half	-0.02 m
Nile River	Lower by 1 m	- 0.72 m

Three alternative approaches toward resolution of the groundwater problem were presented:

- Vertical Wells
 - Cairo University wells in Workers Area activated
 - Additional wells in limestone
- Linear Drain
 - Phase 1: Sphinx area
 - Higher drain: Elevations = 10.4 – 11.9 m
 - Lower drain: Elevations = 9.4 – 10.9 m
 - Phase 2: Sphinx area + Workers area
- Linear Drain + Vertical Wells

All three simulations presented generally achieved the groundwater lowering goals.

3.1.5.6 Alternatives Considered

Advantages and disadvantages for alternatives considered (retained from TM-2) were presented:

- Source Curtailment
- Vertical Wells
- Linear Drains in Trenches
- Linear Drains with Vertical Wells
- Horizontal Wells
- Linear Drains with Horizontal Wells
- Restart of El Ahram Well Field

Conclusions Presented

Vertical well and linear drain trench options are most economical and require technologies and construction methods that are common in Egypt. Capital costs are lower for vertical wells. However, the linear drain trench option would require little to no maintenance in the touristic/antiquities area.

Recommendations Presented

Five alternatives were presented as being able to achieve program goals. Linear Drains constructed by open trench method appears to provide the best cost benefit of the alternatives considered.

3.1.6 Groundwater Modeling Report and Alternatives Evaluation

On 26 April 2010, AECOM formally submitted the Groundwater Modeling Report and Alternatives Evaluation. The information covered was essentially the same as that discussed above for the workshop. However, to address concerns over construction of open trench methods of construction in the area of the Sphinx, a combination of open cut linear drains with passive wells to the south of the temple, and a horizontal well were recommended.

During subsequent weeks, several discussions occurred between the stakeholders including SCA (which had been a proponent of the linear drain alternative), Cairo University, and other advisers



Figure 3-3. Locations of alternative features.

It became apparent that SCA was then leaning toward a vertical wells solution given concerns over deep excavation

On Tuesday 25 May 2010, the SCA formally selected Alternative No. 2, Vertical Wells.

3.2 Develop Engineering and Design and Bid Documents to Lower the Groundwater

Based on SCA alternative selection discussed in subpart 3.1.6 above, AECOM proceeded with the design effort. As AECOM proceeded with the design effort, it held several meetings with SCA and USAID, to discuss the groundwater lowering alternative selected by SCA and to finalize the proposed groundwater lowering target levels to use for the detail analyses and design. On 16 June 2012, AECOM provided a letter to SCA requesting confirmation of the target levels, which were formally confirmed by SCA on 24 June, allowing AECOM to proceed with finalization of the design.

On 21 June, AECOM learned that a new well was being drilled in limestone bedrock area for SCA in efforts to lower groundwater at the ongoing archeological excavation being conducted by SCA archeologists. AECOM revisited its groundwater model to take into account the additional well and incorporated impacts into its design.

The tender requirements and general conditions document (the Arabic language frontend document) was prepared for scheduled submittal to USAID and CAPW/NOPWASD on 01 July 2010. Draft technical documents were prepared for the selected groundwater lowering system.

During July 2010, NOPWSD took exception to AECOM's design approach, in which 18 vertical wells would be discharged into a common header, and indicated that they would not accept the design without an intermediate pump station. AECOM met with NOPWSD and USAID on 11 and 13 July 2010 meetings with NOPWSD to discuss this issue, explaining that the system operation would not be impacted by variations in operating scenarios and provided evidence of the same. AECOM argued correctly that an additional pump station would only add capital and operating cost as well as operation issues should the intermediate pump station fail. AECOM, through discussions with USAID, proceeded with the alternate design as directed by the implementing agency.

In parallel, AECOM further investigated the two alternatives and prepared hydraulic models and tabulated comparisons of pump and corresponding motor sizes for the two alternatives. Further meetings were held with NOPWSD, presenting additional supporting information. On 26 July 2010, AECOM provided NOPWSD with a detailed analysis of the two alternatives, recommending the deep well to a common header alternative as the best for Egypt, given the simplicity and reliability of the system. During a meeting on 29 July 2010 including USAID, NOPWSD, and SCA, SCA selected the common header alternative. AECOM redirected its efforts to finalizing the deep well to common header system design with a discharge to the Mansouria Canal.

NOPWASD and CPWO comments on the design were addressed in early August and incorporated into the tender documents. Further comments were incorporated by addenda during the bidding phase.

3.3 Complete an Environmental Assessment

Task 3 – Environmental Impact Assessment

A Public Consultation/Hearing meeting was held on 11 April 2010 with more than 80 people in attendance. AECOM's Senior Environmental Scientist Ms. Betsy Shreve-Gibb visited Cairo and the project area; she participated in and provided comments during finalization of the presentation prepared for the Public Hearing and during preparation of the scoping statement. The project's impact and the force main location in the main street were discussed during the Public Hearing. The primary outcome of the hearing was an alternate forcemain discharge route from what had previously been envisioned. A smaller side street was selected, avoiding a busier roadway with more businesses possibly being impacted, but with increased complexity given space constraints for construction equipment. Water samples were taken from wells, and water quality parameters were within maximum amounts allowed for discharge into irrigation canals. The Scoping Statement was submitted to USAID on 28 April 2010. After review with USAID, AECOM submitted the final document on 21 June for USAID, Washington review.

The AECOM team prepared a draft of the final Environmental Assessment Report and submitted it to USAID on 10 August for review. AECOM held discussions with USAID during August and September, addressing USAID's comments. The final draft EA report was submitted to USAID on 5 October 2010. USAID informed AECOM in December 2010 that the EA report had been approved by the USAID Environmental Assessment Division, in Washington, DC.

3.4 Provide Bidding Assistance

3.4.1 Prequalify Construction Contractors

CAPW/NOPWSD, in an email dated 19 June 2010, confirmed previous discussions in which they had elected not to proceed with an additional round of prequalification of construction contractors, but to move forward with previously prequalified construction contractors on similar projects. The list included:

Public Sector:

- Arab Contractors
- EGYCO

Private Sector:

- Orascom (ACI)
- Osman Group (OG)
- Samy Saad
- Hassan Allam Sons

3.4.2 Fixed Amount Reimbursement Agreement (FARA)

In June 2010, drawing on previous USAID examples, AECOM prepared a draft FARA agreement with FARA line item/stage descriptions remaining to be completed consistent with the bidding documents.

A further draft of the FARA agreement including stages consistent with the tender Bill of Quantities (BOQ) was prepared and submitted to USAID in August 2010 with USAID comments addressed in September.

Upon receipt of a successful tender during the bidding process, the AECOM team in communications with USAID prepared an analysis of the contract BOQ, updated the FARA stages, assigned stage amounts and prepared the final draft FARA document. On 23 February 2011, AECOM delivered the draft FARA document and a letter from USAID to CAPW for signatures, requesting a minimum of 10% funding commitment from CAPW. After some discussions with USAID, CAPW signed both the documents on 27 February 2011.

AECOM assisted in three amendments to the FARA as follows:

- No. 1: Incorporated the total Accepted Tendered Costs for the Construction of Pyramids Plateau Groundwater Lowering System in Giza - Egypt, and associated revised Schedule of Payments.
- No. 2: Extended the Completion Date for all works to be completed to 30 April 2012.
- No. 3: Increased the total FARA value to incorporate a first year of O&M to the scope of the work, and extend the completion date to 31 March 2013.

AECOM issued the final four of the 18 FARA stage certifications on 8 May 2011 consistent with the substantial completion certificate issued at that time.

3.4.3 Bidding Assistance

3.4.3.1 Initial Tender Period

Consistent with the requirements of the contract scope, AECOM prepared the Draft Tender Package, including Arabic language Volume I - Contract conditions and Tender requirements; Volume II - Technical Specifications, Volume III - Geotechnical Information, and the Drawing Folio. The package was submitted to CAPW on 09 August and to USAID, NOPWASD and SCA on 10 August for review. The package included a three week tender period with an 8 September 2010 opening date.

Final Tender Documents were prepared by the AECOM and were provided to CAPW on 16 August as scheduled for distribution to Contractors on 18 August 2010. Five contractors obtained the Tender Documents from CAPW. The Pre-Tender meeting was held on 23 August 2010 at the CAPW offices, and AECOM jointly with CAPW and USAID conducted a Pre-Tender site visit on 26 August 2010. The project site, existing features and facilities were briefly described and shown to the representatives from the five contractors. General informal was provided in response to questions from the attendees.

The tenderers communicated their concerns to CAPW and USAID that the three week tender preparation time was too short during the month of Ramadan, as the work days are short. CAPW and USAID accepted the concerns, and the tender date was extended by one week to 15 September. The tenderers again conveyed their concerns to CAPW and USAID that the one week extension was not sufficient for the reason that the four day Eid holidays were within that week which made the effective extension for only three days. Therefore, the tenderers requested one more week of extension to the tender date. CAPW and USAID accepted the concerns and extended the tender date by five more days to 20 September. Accordingly, AECOM updated the tendering process schedule.

CAPW issued Addenda Nos. 1 and 2 to extend the tender dates first to 15 Sept and then to 20 Sept. AECOM prepared four Addenda for issuance to the tenderers: one to record the Pre-Tender meeting summary, two for modifications/additions to the Tender Documents and one to responds questions received from tenderers.

On 19 September, CAPW and USAID accepted requests from tenderers and extended the tender period by one week to 27 September. Tenders were opened accordingly at CAPW offices. CAPW and the AECOM team began a parallel evaluation of the tenderer's technical proposals on 28 September at CAPW offices.

CAPW regulation prohibits making copies of documents included in submitted tenders or taking any document out of the CAPW premises. As a result, the AECOM team took notes to conduct an independent review of the Tenderers' Technical Proposals at CAPW offices, and completed the evaluation at AECOM team offices. AECOM completed its Draft Evaluation report and held meetings and discussions with CAPW and NOPWASD, assisted CAPW in moving the technical proposal evaluation process toward finalization and completion. A special meeting was held with the Chairman of CAPW/NOPWASD on 21 October attended by CAPW and NOPWASD senior officials. As a result of meetings and discussions with CAPW/NOPWASD, lists of clarifications required from the tenderers were prepared by AECOM team and submitted for CAPW's consideration. CAPW finalized the lists and sent them to the tenderers for responses, stipulated to be received by CAPW within three working days.

AECOM reviewed clarifications received from the tenderers at CAPW, and prepared and submitted the final technical evaluation report to CAPW with recommendations for consideration. The first tendering process was concluded on 11 November, when CAPW decided to re-tender the project because they felt that the tendered technical proposals were deficient.

3.4.3.2 Re-tender Period

AECOM submitted the revised tender documents just after the Eid Holiday to CAPW on 23 November as had been agreed and the documents were available to the Tenderers on 24 November. The four original tenderers picked up the documents from CAPW on 24 November. The re-tender due date established by CAPW was 30 November. The four Tenderers submitted their tenders to CAPW on 30 November, as scheduled.

CAPW received the re-tenders on 30 November 2010. AECOM team reviewed the re-tenders at CAPW offices using a fast track "Pass / Fail" criteria and held detail discussions and prepared clarifications required from the tenderers. AECOM then prepared and submitted the Final Technical Evaluation Report to CAPW with recommendations for consideration. The AECOM team assisted CAPW in reviewing clarifications received from tenderers. All four tenders passed the technical evaluation, and the financial tenders were opened on 30 December 2010. The Arab Contractors (AC) was the lowest apparent tenderer.

CAPW processed the financial tenders and published the results at CAPW on 09 January 2011. The Arab Contractors (AC) was selected as the successful tenderer and CAPW issued a letter of award accordingly.

- AECOM met with CAPW on 11 January to discuss the process for awarding and signing of the contract which was carried out by CAPW during the month with assistance from AECOM as and when it was required. AECOM team printed, bound and delivered four full contract document sets to CAPW on 16 January.
- AC submitted the performance bond guarantee; CAPW processed it on 26 January and began its internal contract-signing process, which continued through the month. AECOM team assisted as and when required.

Public protests began on 25 January, a National Holiday, leading to civil unrest throughout Egypt. AECOM team observed regular working hours and continued working through to the end of January. Public protests continued during the month at Tahrir Square in Cairo and across the country, resulting in widespread civil unrest, violence, looting, and a lack of police presence. Consistent with the DOS directive, based on the project status at the time, and in consideration of security conditions in Egypt at that time, AECOM temporarily evacuated its expatriate staff and dependents on 03 February. No activities were put on hold with respect to AECOM's ability to manage and execute the project activities remotely and locally, as the result of unrest in Egypt and staff evacuations.

The construction contract between CAPW, the implementing agency, and the Arab Contractors (AC) was executed on 10 February 2011.

3.5 Prepare a Monitoring Program for Monuments in the Project Area

In January 2010, AECOM began monitoring monuments prior to the start of field investigations and pumping tests. Additionally, existing monitoring data by Cairo University was obtained from SCA and helped establish a benchmark. The interim program for

monitoring of monuments and structures was performed while the field investigation activities were performed and continued for two additional months. The program ended at the end of April 2010 with no movement observed. Monitoring program results were submitted with the Task 1 Groundwater Modeling Report.

3.6 Provide a Schedule for the Project

AECOM prepared the Project Work Schedule and submitted it to USAID on 17 November 2009 along with the project Work Plan. The work schedule was updated monthly in response to USAID comments, logic was revised where necessary, and the schedule was updated to reflect work completed.

3.7 Provide Training to the Supreme Council of Antiquities Staff

During November 2009 and after discussions regarding the training program with SCA and USAID, AECOM prepared a draft training outline of the proposed program, and discussed it with and received acceptance from SCA and USAID after minor modifications. This assistance was intended to develop the capacity of SCA's staff to implement studies for similar antiquities projects in the future. The focus of the intended training was on Task 1, Develop a Groundwater Model, Task 2, Develop Engineering Design and Bid Documents, and Task 5, Preparation of a Monitoring Program.

The training program proposal for SCA staff was developed by the AECOM team including associated cost of the program and was submitted to USAID and SCA on 29 December for review and comment. After receiving no response from SCA to the program proposal, they indicated in February 2010 that the training program was not required.

3.8 Provide CM Services for the Construction Contract

3.8.1 Pre-construction activities and coordination

Beginning in January 2010, AECOM began preparations for the construction phase of the project by developing project specific CMC related forms, templates, logs, priority items list for the contractor, and a draft agenda for the pre-construction meeting. Initial activities intended to expedite activities included:

- Meetings on 16 and 27 January with AC at AECOM offices to discuss priority items that could be started prior to signing of the contract at contractor's own risk, such as, pre-construction survey along the proposed force main alignments, technical submittals for long lead items, and recoding of existing conditions of the Monuments and structures along work locations on site. On 18 January AECOM met with SC representatives and AC to review the work locations and existing survey control points and to answer questions.



Figure 3-5.

- AECOM formalized the list of priority items in a letter to the contractor on 14 February 2011.

After the resignation of President Hosny Mubarak on 11 February 2011, normalcy gradually returned with respect to public services, business activities and general safety. In view of the then upcoming pre-construction activities subsequent to signing of the construction contract on 10 February, the AECOM Project Manager was remobilized to Cairo on 24 February, with USAID approval.

- AECOM team prepared and finalized project specific construction management forms and formats for the construction phase of the project.
- AECOM prepared and finalized the agenda and a script of the pre-construction meeting if it were to be held prior to the project manager's remobilization to Egypt. The site turnover to the contractor and the pre-construction meeting did not occur during the month of February.
- AECOM team met with SCA at the project site on 27 February to schedule a date for the site handover to AC. SCA informed AECOM that a formal communication from SACA Zamalek office to the SCA site representatives is required to proceed with the site handing over. SCA site representatives and AECOM agreed to pursue the issue with the SCA Zamalek office in parallel.

Site Turnover: The site was formally turned over to AC by the SCA on 02 March 2011 marking the start of the eight (8) month construction period.

Pre-construction conference: On 3 March 2011, AECOM conducted a preliminary pre-construction meeting with AC in an effort to expedite priority activities. A formal Pre-construction conference was held on 10 March at the SCA site offices, in which the involved stake holders, representatives from the Giza Governorate, utility agencies and the traffic police were informed about the project and its components to be installed in public streets.

Project schedule: AC submitted a preliminary construction schedule on 22 March which was reviewed by AECOM with AC in subsequent meetings. Formal AECOM comments were provided to AC on 28 March. AC was to submit a revised and amended schedule providing details for key critical path activities to CMC for approval. AC resubmitted the construction schedule on 21 April which was accepted by AECOM as the base schedule for the project with the completion date of 1 November 2011. AECOM monitored and commented on the contractor's monthly schedule updates. Progress and necessary adjustments were discussed in weekly and monthly meetings as necessary.

Mobilization and Preconstruction Submittals: AECOM reviewed and approved the contractor's mobilization plan and assisted in coordination with the SCA regarding staging area and contractor's offices planning. AECOM approved the contractor's selected apartment to be provided for AECOM for the construction period. On 7 April 2011, AECOM relocated from its Nasr City office to the Contractor provided field office in Giza. In April 2011, and in addition to previous lists of critical lists of submittals, AECOM provided a comprehensive list of submittals to AC for guidance. This effort was largely done to help the contractor in its efforts to plan and make timely submittals

3.8.2 Contract Administration

Staffing: AECOM's continued with its COP and DCOP to lead the CM services effort, supported by an administrative assistant. Eng. Alaa Sobhy joined AECOM team as the Site Engineer beginning on 2 April 2011 and continued in this role into February 2012.

Monthly Progress Reports and Meetings: AECOM continued submitting monthly progress reports to USAID through the end of the contract. Monthly reports included major meeting summaries, contractor schedule updates, and variation order and submittal logs. AECOM held 15 monthly meetings from April 2011 through June 2012 with the contractor and stakeholder and prepared and submitted minutes accordingly.

Construction Contractor's Monthly Statement Review and Recommended Action: AECOM received, reviewed, and made recommendations for payment for 11 construction contractor progress payment certificates through June 2012, having recommended payment for Semi-Final Invoice No. 11 on 27 June 2012. The remaining invoices are to be processed directly by the implementing agency, CAPW.

Prepare Change Orders/Amendments as Required.

AECOM tracked both Potential Variation Orders (PVOs) and Potential Claims (PCs). Through the project, 7 PVOs were tracked and supporting information provided to CAPW. However, final approval on price generally remained with CAPWO's pricing committee at AECOM's demobilization at the end of June. Of the 15 PCs, 4 were denied, 6 remained outstanding and unsubstantiated awaiting Contractor's submission of supporting documentation and analysis, three were resolved without further issue, and two resulted in no cost time extensions through 30 April 2012.

3.8.3 Inspection and Construction Monitoring

AECOM inspected and monitored the construction contractor's activities throughout the construction period and until AECOM's demobilization on 28 June 2012. AECOM maintained a full time site engineer for the majority of the construction activities, into February 2012, who monitored activities and kept daily logs. Upon his departure, which occurred as field activities had slowed significantly, AECOM management tracked and monitored the contractor's activities.

AECOM also held and minuted weekly meetings with the contractor to ensure continued coordination and documentation of activities.

AECOM monitored materials delivered to site for proper storage and recommended payment accordingly.

3.8.4 Surveying, Design, and Engineering

AECOM verified the contractor's survey control and proposed final location of lines, valves, manholes, etc in coordination with client for final layout.

As previously mentioned, AECOM, prior to the start of construction provided the contractor with a critical list of submittals and subsequently with a comprehensive list of submittals in large part do to the Contractor's failure to develop its own list. AECOM reviewed approximately 476 contractor material and shop drawing submittals and resubmittals.

Additionally, AECOM reviewed and responded to contractor requests for informal (RFIs), 7 of which were received formally.

3.8.5 Monitoring Program

The preconstruction surveys of the proposed work locations on SCA property as well as on the public streets were completed and submitted by the contractor in April 2011 and reviewed by AECOM prior to the start of the work. Preconstruction photos and videos of structures near active construction locations were also taken as the work progressed and reviewed by AECOM.

Settlement/movement reference points were installed at existing structures and monuments during April 2012 and were monitored continually during the work. No movement was observed during the contract period prior to AECOM's demobilization.

3.8.6 Demobilization and Construction Contract Status

AECOM Demobilization

Consistent with AECOM's contract end date of 30 June 2012

AECOM submitted end of the project financial and government property and transferred reports to USAID. AECOM also transferred USAID owned equipment to SCA and performed project closing activities

Construction Contract Status

Substantial Completion: On 8 May 2012, AECOM issued to the construction contractor a Partial Substantial Completion Certificate indicating that the date of substantial completion was 2 May 2012 and thereby initiating the 12-month warranty period as of that date.

Outstanding Activities: During the final month (June 2012) of CMC services provided by AECOM, the groundwater lowering system commissioning and performance monitoring of the system continued. Handing over of the facilities over to SCA had been completed prior AECOM's demobilization. However, certain issues remained which will require the assistance of CAPW, the implementing agency, to finalize.

At the end of the month, based on the two weeks of system performance data submitted by the contractor to AECOM, the groundwater model indicated that the system is expected to maintain groundwater levels at or near to the target elevations in the Sphinx and the Gabel El Kibli areas. However, commissioning of the full system and long term uninterrupted dewatering operation need to be ensured as much as practicable. Interruptions in system operation slow groundwater lowering and as a result can significantly increase the time to achieve desired groundwater levels which would normally take months to achieve under uninterrupted operating conditions.

Notable items remaining outstanding upon AECOM's demobilization

- During the month of June 2012, the contractor reported that daily voltage surge during early morning hours was causing Automatic Transfer Switch to shut the pumps down and the standby generator to come on. Over time, the situation will affect performance of the system and potentially damage the pump motors. CMC, USAID and CAPW agreed that the problem should be resolved by providing Voltage

stabilizers. The Contractor was requested to provide a Voltage stabilizer of adequate capacity, one each at SMDB 1 and 2. At the time of AECOM demobilization, the Contractor was in the process of obtaining quotations estimated to be in the range of LE 200,000. A variation order would be issued accordingly for the work to be undertaken by the Contractor.

- AECOM in its letter no. 31 dated 10 May 2012 recommended that for safety and long term durability of the new pumping system, SCA contact the Electrical Authority to request replacement of the old dilapidated electrical panels at the power source transformers. Given that this is item is associated with utilities, AECOM believes that the contractor could be reimbursed for this corrective action by CAPW though the utility relocation item in the contract BOQ.
- During performance testing of Pump PA11, it was noted that the test results were not consistent with the pump performance curve. This issue remained unresolved at the time of AECOM's demobilization.
- The issue of significantly lower yield (6 to 7 m³/hr) at Well no. A16 remained unresolved at the time of AECOM's demobilization, as the second redevelopment of the well and retesting of the yield remained incomplete. Should pump yield and lower target groundwater elevations in that area of pump A16 be desired, a new well may be required to replace well A16 to improve its yield closer to the 24 m³/hr reported during the construction contractor's initial pumping tests, which were used to select the associated pump models and performance curves. Alternately, if target groundwater levels are satisfactory in that area, the well could be abandoned and pump and panels stored for spare parts.

The final punch list for remaining work to be completed was provided to the involved parties at the final weekly meeting prior to AECOM's demobilization.

AECOM remains committed and available to assist USAID with any questions that may arise in resolution of the outstanding items above or significant issues that may arise. We request that USAID contact us directly with any questions it may have.