AFRICAN DEVELOPMENT BANK

African Water Facility
Facilité africaine de l'eau
Mobilising Resources for Water in Africa

EGYPT

MASTER PLAN STUDY FOR THE REHABILITATION/REPLACEMENT OF MAJOR HYDRAULIC STRUCTURES ON THE NILE

Appraisal Report

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October 2009

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Currency Equivalents
(June 2009)

1 UA = 1,09806 Euro
1 UA = 8,70631 Egyptian Pound (LE)
1 Euro = 7,92881 Egyptian Pound (LE)

ACRONYMS AND ABBREVIATIONS

ADB	African Development Bank
AfDB	African Development Bank
AWF	African Water Facility
CFA	Cooperative Framework Agreement
CMP	Comprehensive Mitigation Plan
CSP	Country Strategy Paper
DSS	Decision Support System
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FAO	Food and Agriculture Organisation
GIS	Geographic Information System
GoE	Government of Egypt
IAPs	Interested and Affected Parties
IESIA	Integrated Environmental and Social Impact Assessment
IFAD	International Fund for Agricultural Development
ISL	International Short List procedure
IWRM	Integrated Water Resources Management
JICA	Japanese International Cooperation Agency
MALR	Ministry of Agriculture and Land Reclamation
MDG	Millennium Development Goal
MIC	Middle Income Country
MWRI	Ministry of Water Resources and Irrigation
NBI	Nile Basin Initiative
NWRP	National Water Resources Plan
QCBS	Quality and Cost-Based Selection process
RGBS	Reservoirs and Grand Barrages Sector
SCT	Study Coordination Team
SPN	Specific Procurement Notice
TAF	Technical Assistance Fund
UA	Units of Account
UNDB	United Nations Development Business

EGYPT: MASTER PLAN STUDY FOR THE REHABILITATION/REPLACEMENT OF MAJOR HYDRAULIC STRUCTURES ON THE NILE

LOGICAL FRAMEWORK

NARRATIVE SUMMARY HIERARCHY OF OBJECTIVE	EXPECTED RESULT	REACH	INDICATORS AND SOURCE	TARGETS AND TIMEFRAME	ASSUMPTIONS AND RISKS /MITIGATION MEASURES
Sector Goal {*2004 National Water Resources Plan (NWRP)*} Improve water resources management in Egypt by introducing sector reforms and through the implementation of improved water use and conservation programmes.	**Impact:** Improved water resources management contributes to ensuring water and food security in the country.	The population of Egypt of about 80 million; The Government of Egypt, Donors.	**Indicator** Amount of water saved annually due to effective water management. **Source** National irrigation water use surveys.	7 billion m³ of water saved annually as from 2017 compared to water use in 2004 (NWRP targets)	Assumptions The Government mobilizes the resources required to implement the programmes identified for improved water management.
Objective of the Study The objective of the study is to assess and design improvements of major hydraulic structures and thus contribute to the implementation of Egypt's Integrated Water Resources Management (IWRM) plan. This objective will be attained through: 1. Preparation of a Master Plan for the rehabilitation/ replacement of major hydraulic control structures on the Nile. 2. Preparation of a capital investment project for one priority major structure in order to facilitate the mobilisation of funds for implementation.	**Outcome:** 1. Funds mobilized for the rehabilitation /replacement of hydraulic structures on the Nile; 2. Improved water use efficiency and productivity	The Government of Egypt, Water and Agriculture Sector stakeholder, Donors.	**Indicator** Amount of funds mobilised for the rehabilitation or replacement of hydraulic control structures.	€ 250 millions mobilised for the rehabilitation of at least 1 hydraulic control structure by the end of 2015. A major barrage typically has a total length of over 150m (30 vents), commands an irrigation area of over 420ha (1 million feddans), has a discharge rate of over 3 million m^3 /day and can withstand a water head difference of about 4m.	Risk The GoE fails to obtain adequate financial support from donors. Mitigation Measures Study design includes the invitation of donors to workshops at key stages to facilitate the mobilization of resources at the end.
Study Components and Activities ***COMPONENT 1: Site Investigations, Development of a Geographic Information System (GIS) and Strategic Environmental Assessment (SEA)*** *Activities:* 1.1 Undertake inspection of structures and collect data. 1.2 Develop GIS database and prioritize the structures for safety evaluations. 1.3 Organize Report validation and technical workshops.	**Outputs** 1. GIS database developed and data entered for 200 structures inspected in 75 locations. 2. Priority list of structures for detailed investigations prepared. 3. Workshop reports	Consultants, MWRI/RGBS staff, Water Sector stakeholders.	**Indicator** 1. The use of a GIS database by the RGBS staff for the management of hydraulic control structures 2. Existence of a prioritized list of structures **Source:** Project Progress Reports, supervision missions and evaluation reports.	1. 200 structures inspected, data collected and entered into an operational GIS database, 15 months from study commencement date; 2. Prioritized list of structures prepared 16 months from study commencement date; 3. One technical workshop organized, 8 months from study commencement and one Report validation workshop organized, 12 months from study commencement date.	Risk Inadequate collaboration between the Consultant and the MWRI staff. Mitigation Measures Study design includes many workshops to facilitate communication between the Consultant and the MWRI staff.

COMPONENT 2: Safety Evaluations and Development of a Decision Support System Activities: 2.1 Carry out safety evaluations of the hydraulic structures. *2.2* Develop a Decision Support System (DSS) for prioritizing interventions on the structures. *2.3* Organize Report validation and technical workshops.	4. Decision Support System prioritizing interventions on the structures studied developed. 5. Workshop reports	As above	3. The use of a DSS by the MWRI for deciding interventions on hydraulic control structures	1. Safety evaluations carried out for 50 structures by the Consultant, 24 months from study commencement date and for 150 structures by the RGBS staff, 26 months from study commencement date and the DSS is developed and in use in the MWRI, 27 months from study commencement date. 2. Two technical workshops organized, 19 months from study commencement and 2 Report validation workshops organized, 27 months from study commencement date.	Risk MWRI staff fail to acquire sufficient knowledge to enable them effectively undertake the safety evaluation of 150 structures under the study. Mitigation Measures The design of the study includes effective training of staff by the Consultant as a verifiable deliverable.
COMPONENT 3: Development of a Master Plan and Preparation of detailed designs for one priority major ***structure.*** *Activities:* *3.1* Develop a Master Plan using information on the type of intervention, cost estimates, priorities and schedule for interventions for each structure. *3.2* Undertake the SEA of the Master Plan *3.3* Undertake detailed feasibility studies, including ESIA and prepare detailed designs and tender documents for one priority major structure. *3.4* Organize donors' conference /workshops.	6. Master Plan for the rehabilitation/ replacement of major hydraulic control structures on the Nile prepared. 7. SEA report prepared 8. Capital investment project for a major priority structure prepared 9. Workshop reports	As above	4. The use of a Master Plan by the MWRI for the mobilization of resources and the planning of interventions on hydraulic structures. 5. Existence of a validated SEA report. 6. Existence of ESIA report, detailed designs and tender documents for the top priority major structure identified under the study.	3. Master Plan developed and ready for validation, 33 months from study commencement date. 4. SEA report completed and validated 35 months from study commencement date. 5. Feasibility study reports, ESIA reports, detailed designs and tender documents prepared, 35 months from study commencement date. 6. Three technical workshops organized, 30 months from study commencement, 2 Report validation workshops organized, 27 months from study commencement and 1 donors' conference organized 36 months from study commencement date.	As above
COMPONENT 4: PROJECT MANAGEMENT Activities: **11**. Procurement of Consultancy services, supervision of studies, review and validation of reports and organization of workshops.	10. Consultancy Services procured, Report validation workshops and donors' conference organized and study reports reviewed and approved.	As above	7. Signed contract with a Consultant, number of Report validation workshops and donors' conference organized and number of reports reviewed and approved. **Source:** As above	7. Contract with a Consultant signed, 6 months from Grant Signature; 3 workshops, including 1 donors' conference organized, 36 months from study commencement date. All reports from Consultant reviewed and validated 36 months from study commencement date. Quarterly reports and Project Completion Report prepared on time.	
	Inputs *Funding of study:* AWF € 1 364 782; MIC TAF € 658 847 GoE € 496 457; TOTAL **€ 2 520 086**			Duration of study: 36 months, from study commencement date.	

EXECUTIVE SUMMARY

Background: The Government of Egypt (GoE) has requested funding from the African Water Facility (AWF) for the financing of the Master Plan Study for the Rehabilitation/Replacement of Major Hydraulic Structures on the Nile. The renewable water resources of Egypt stand at an average annual per capita share of about 800 m^3[1] as of 2004, placing the country in the category of countries suffering from "water scarcity". In this context of water scarcity, efficiency in water allocation and distribution is of great importance and this implies that the hydraulic control structures which include dams, barrages, regulators, weirs and navigation locks have to be in a good operational condition to achieve the desired efficiency. Given the age (over 100 years for some), the state of deterioration and the large number of these structures (over 200), and in order to ensure an efficient planning of future interventions, the GoE has identified the need for a Master Plan which will set the priorities and facilitate the mobilization of resources for capital investments.

Objective: The objective of the study is to assess and design improvements of major hydraulic facilities and thus contribute to the implementation of Egypt's Integrated Water Resources Management (IWRM) plan. The IWRM plan aims at improving water distribution and allocation efficiency and reducing the risks of flooding and damage to life and property in the case of the failure of hydraulic control structures in the country.

Description: The proposed study consists of three main components: i) Site Investigations and the development of a Geographic Information System (GIS) database, detailed inspections and data collection for 200 hydraulic structures in 75 locations; ii) Safety Evaluations and the development of a Decision Support System (DSS); and iii) the development of a dynamic Master Plan, the undertaking of a Strategic Environmental Assessment (SEA) of the Master Plan and the preparation of a capital investment project for one priority major structure identified under the study. A major barrage typically has a total length of over 150m (30 vents), commands an irrigation area of over 420ha (1 million feddans), has a discharge rate of over 3 million m^3 /day and can withstand a water head difference of about 4m. The capital investment project preparation will include detailed feasibility studies, detailed designs and the preparation of tender documents. These documents will be used in a resource mobilization conference at the end of the study to mobilize funds for the immediate implementation of the project.

Cost and financing: The study will be undertaken in a period of 36 months, after an estimated period of 6 months required for the activities leading up to grant effectiveness and for the procurement of the services of a consulting firm, making a total duration of 42 months from Grant signature. The total cost of the study is estimated at € 2 520 086 and will be co-financed by an AWF grant of € 1 364 782, a Middle Income Countries (MIC) Technical Assistance Funds (TAF) grant of €658 847 (26.1%) and a GoE contribution of € 496 457 (19.7%). The GoE funds are composed of € 370 789 (14.7%) in cash and an equivalent of €125 668 (5%) in-kind for the operating costs of the Study Coordination Team (SCT) that will be setup under, the Ministry of Water Resources and Irrigation, the Executing Agency.

Justification: The proposed study falls within the priority area of intervention of the AWF entitled "Investments to meet water needs – Project Preparation". The Master Plan to be prepared under the study will assist the GoE in the efficient planning of investments in the sector up to the year 2050. The capital investment project to be prepared, equally under the study, will facilitate the mobilization of funds for immediate investment, thereby fulfilling one of the major objectives of the AWF. The replacement of a major barrage as envisaged under this study will require the mobilization of about €250 millions, based on current estimates.

Recommendations: Based on a comprehensive assessment and an appraisal of the funding request in terms of relevance, effectiveness and sustainability, as well as the recipients capacity and credibility, an AWF grant of €1 364 782 is hereby recommended.

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[1] Egypt - IWRM Plan 2005: § 2.1

1. BACKGROUND

1.1 Origin of the Study

1.1.1 Egypt is an arid country with an overall average annual rainfall of just 18 mm, mainly occurring at the northern coast which receives about 150 mm of precipitation per year. The country is also experiencing rapid population growth: from about 40 million in 1978 to about 77 million in 2008 and the population is expected to reach about 95.4 million in the year 2020[2]. The renewable water resources of Egypt stand at an average annual per capita share of about 800 m^3[3] as of 2004, placing the country in the category of countries suffering from "water scarcity". Furthermore, projections forecast an average annual per capita share of renewable water resources of only 600 m^3 by 2025[4] due to population pressures and climate change and variability risks.

1.1.2 Food security and the agriculture sector in Egypt strongly depend on the Nile River water. Nile River water constitutes more than 95% of the water resources of Egypt and feeds the country's irrigation network, which underpins the country's agriculture sector. Egypt's agriculture sector constitutes an important component of the economy of the country, employing 35% of the labour force and contributing 20% of the export earnings of the country in 2005/2006[5]. The effects of water scarcity already include the reduction of cropping intensity and the annual production per feddan; in particular, the growing of rice is being prohibited in some areas of the country due to water scarcity, with a negative impact on the incomes of farmers.

1.1.3 In this context of water scarcity, the role of the hydraulic control structures on the Nile and the irrigation network is of high importance in ensuring that water is saved and subsequently released at the required flow rate and at the right time. This implies that the hydraulic control structures, which include dams, barrages, regulators, weirs and navigation locks, have to be in a good operational condition to achieve the desired efficiency. The major challenge is that most of the operational control structures in Egypt are quite old, having been built in the late 19th or early 20th century and their poor hydraulic performance now leads to loses of large volumes of water annually. These structures have deteriorated over time to an extent that their hydraulic performance, stability and overall safety is now a national concern.

1.1.4 The Government of Egypt (GoE) has been addressing the issue of the safety and the efficiency of the major hydraulic control structures on the Nile by rehabilitating or replacing some of these structures. In this regard, the GoE has constructed 7 major barrages on the Nile in replacement of dysfunctional ones, between 1989 and 2008. However, given the large number of these structures (over 200), and in order to ensure an efficient planning of future interventions, the GoE has identified the need for a Master Plan which will set the priorities and facilitate the mobilization of resources for capital investments. The 2007 – 2011 Country Strategy Paper (CSP) for Egypt equally identified the need for a Master Plan for the major hydraulic structures on the Nile in order to improve the knowledge of water resources and the irrigation sub-sector of the country.

1.1.5 The conveyance efficiency of the irrigation system in Egypt is equally a major concern and the GoE has been seeking external support aimed at improving the situation. In this regard, the African

[2] ADB statistics: Egypt – Country Profile, April 2008.

[3] Egypt - IWRM Plan 2005: § 2.1

[4] Egypt - IWRM Plan 2005: § 2.1

[5] Egypt: 2007 – 2011 CSP § 2.3.1

Water Facility is currently supporting the Comprehensive Study for the Rehabilitation of the Nubaria and Ismailia Canals on which about 1,300,000 families rely for their livelihood. The primary objective of the Study for the improvement of the Nubaria and Ismailia canals is to seek technically feasible and economically and socially viable solutions for efficient water control and system management in these two canals. The AfDB is equally supporting the sector through a Middle Income Countries (MIC) Technical Assistance Funds (TAF) grant for the financing of a study for the rehabilitation or the replacement of the Zefta barrage.

1.1.6 The data collected and the recommendations of the above studies as well as other studies being undertaken in the water and agriculture sectors in Egypt will be fed into the dynamic Master Plan to be prepared under this study in order to improve the quality of the results to be obtained in the implementation of the plan. The Master will improve the efficiency in decision-decision making in the rehabilitation/replacement of major hydraulic structures on the Nile and contribute to the improvement of the management of water resources in the country up to the planning horizon of 2050. The structures included in this study were selected by a MWRI Committee setup for this purpose; the Committee applied criteria related to the socio-economic importance of the structures to draw-up the list of 200 structures to be considered under the Master Plan study.

1.1.7 The funds requested from the African Water Facility (AWF) will also serve in the preparation of a capital investment project for one priority major hydraulic structure identified under the study, and thereby facilitate the mobilization of resources for its implementation.

1.2 Sectoral Priorities

1.2.1 The GoE has set the improvement of the efficiency of water use as a major priority in the water and agriculture sectors of the country. The strategies to address this priority have been elaborated in a number of policy documents including the Water Supply Management Vision 2050 and the 2004 National Water Resources Management Plan. The Egyptian Water Resources Management Policy 2000 – 2017 sets out a strategy to save 7 billion m³ of water annually, by 2017, through the implementation of a number of irrigation improvement projects as well as undertaking shifts in the cropping pattern.[6] The proposed Master Plan study is in alignment with these policies and strategies, as its outcomes will contribute to the attainment of these objectives.

1.2.2 Increasing pressure is being placed on Egypt's limited water resources by expanding population, industrial growth and agricultural expansion. In response to this constraint, the GoE has embarked on strategies to increase the availability of water resources through the reuse of drainage water from irrigation. The aim is to obtain about 9.6 billion m³ or 14% of the countries annual water requirements from drainage water by 2017[7]. The 2007 – 2011 CSP for Egypt indicates the improvement of drainage water reuse programs as an area to receive the Bank's support.

1.2.3 The protection of the environment and the Nile River from pollution is also a major concern in Egypt. The main source of pollution is domestic water use, which results in an annual discharge of about 3.8 billion m³ of wastewater into the Nile, of which only 35% is treated[8]. Industrial effluents contribute about 1.3 billion m³ per year of untreated wastewater discharged into surface waters. The GoE is responding to this challenge by elaborating a legal framework for the protection of the environment and the Nile River and through the adoption of strategies such as the National Program for

[6] Egypt: 2005 IWRM Plan §3.6.1

[7] Egypt: 2005 IWRM Plan Pg 50

[8] Egypt: 2005 IWRM Plan §2.3

Water Quality Management and Water Reuse, which aims at introducing modern pollution management techniques into the water sector. The Strategic Environmental Assessment (SEA) and the Environmental and Social Impact Assessment (ESIA) to be carried out under this study will be informed by the implementation of these policies and programmes in the formulation of their recommendations.

1.2.4 Egypt is currently implementing its Integrated Water Resources Management (IWRM) Plan, which was elaborated in 2005 and runs up to 2017. The plan includes 39 specific actions designed to address the difficulties identified in the National Water Resources Plan prepared in 2004. The improvement of the water supply and sanitation situation in the country is addressed in some of these plans with the aim of increasing access to improved water sources from 98% in 2004 to 100% by 2017 and access to safe sanitation facilities from 30% to 60%[9] by the same date.

1.2.5 Egypt shares the Nile Basin with nine other riparian countries and efforts have been made to promote trans-boundary water resources management and regional cooperation. The present framework for cooperation between the ten riparian countries of the Nile Basin is provided by the Nile Basin Initiative (NBI), which was established in 2000. At its ratification, the Cooperative Framework Agreement (CFA) currently under negotiation between the riparian countries of the Nile will enable the establishment of the Nile River Basin Commission and thereby the replacement of the NBI.

1.3 Problem Definition

1.3.1 The large number of major hydraulic structures in the Nile valley and the Nile Delta, which play the important role of controlling water distribution and allocation, are at different stages of degradation. The main problems with the structures include hydraulic inefficiency resulting from leaks and dysfunctional gate operating mechanisms which allow the flow of water at times when the water is not required downstream. The structures also suffer from structural instability resulting from the erosion of their foundations, differential settlement caused by high traffic loads, deterioration of their construction materials due to age and changes in soil bearing capacities over time.

1.3.2 The inefficiency of these hydraulic control structures exacerbates the water scarcity and the food security situation of the country. Furthermore, the population of several million farmers who rely on irrigation water for their livelihoods also stands the risk of losing their lives and or property in the event of the failure of any of the major structures due to flooding. The old and fragile structures are particularly prone to failure in the event of a major earthquake. Egypt has a relatively high level of earthquake activity with six destructive earthquakes in the last fifty years including the Alexandria earthquake of 1955, the Aswan earthquake of 1981 and the Dahshour earthquake of 1992.

1.3.3 Another challenge facing the Egyptian Ministry of Water Resource and Irrigation (MWRI), which is responsible for the rehabilitation, and the replacement of the hydraulic control structures on the Nile is the capacity of its personnel to effectively undertake the planning of interventions and the supervision of operations on this vast network of structures. The timely and efficient implementation of the proposed Master Plan for the rehabilitation and or replacement of these structures up to the year 2050 require the availability of adequate capacity for the updating of the plan and for the monitoring and evaluation of the attainment of the different objectives set in the plan. The MWRI has developed a strategy to undertake the necessary development of the capacity of its personnel as well as to retain them to ensure the sustainability of the management systems to be developed under the proposed study.

1.3.4 Given the constraints imposed by limited resources required for capital investments, it is necessary to have in place a system that enables the prioritization of appropriate and timely

[9] Egypt: 2005 IWRM Plan §3.6.2

interventions on the different hydraulic structures. Such a system will equally address the issues of effective planning and timely resources mobilization. This prioritization process involves elaborate socio-economic cost-benefit analyses, which take into account the probability and the impacts of failure of the structures as well as the risks of climate change and variability on their performance and resilience.

1.4 Objective of the Study

1.4.1 The objective of the study is to assess and design improvements of major hydraulic facilities and thus contribute to the implementation of Egypt's Integrated Water Resources Management (IWRM) plan. The IWRM plan aims at improving water distribution and allocation efficiency and reducing the risks of flooding and damage to life and property in the case of the failure of hydraulic control structures in the country.

1.4.2 This objective is to be attained through: i) the preparation of a Master Plan for the rehabilitation/ replacement of major hydraulic control structures on the Nile and ii) the preparation of a capital investment project for the rehabilitation or replacement of one priority major structure identified under the study in order to facilitate the mobilisation of funds for implementation

1.5 Beneficiaries and Stakeholders

1.5.1 The GoE is the main beneficiary of this study, as it will use its outcomes for the efficient planning of capital investment projects for the rehabilitation or the replacement of hydraulic control structures as well as for the mobilisation of resources required for these investments. Other direct beneficiaries of the study include the Ministry of Water Resources and Irrigation (MWRI) and its major sectors, Consultants, and other stakeholders of the Water, Agriculture and Transportation sectors in Egypt.

1.5.2 The ultimate beneficiaries of the outcomes of the study include the millions of farmers who depend on Nile irrigation water for their livelihoods and who stand to benefit from implementation of the recommendations of the study as regards the efficient allocation and distribution of water and the protection of farmlands and lives from floods.

1.5.3 The main donor stakeholders of the Water and Agriculture sector in Egypt include the European Union, which is currently supporting the preparation of a Master Plan for Water and Sanitation; the Japanese International Cooperation Agency (JICA), which is presently supporting the preparation of a specific Master Plan for the Bahr Yousef Delivery System and the African Development Bank (AfBD) Group, which is funding the feasibility study for the rehabilitation or reconstruction of the Zefta Barrage with MIC funds and the study for the improvement of the Nubaria and Ismailia canals, with AWF funds.

1.6 Justification for AWF support

1.6.1 The proposed study falls within the priority area of intervention of the AWF entitled "Investments to meet water needs – Project Preparation". The Master Plan to be prepared under the study will assist the GoE in the efficient planning of investments in the sector up to the year 2050. The capital investment project to be prepared, under the study, will facilitate the mobilization of funds for immediate investment, thereby fulfilling one of the major objectives of the AWF. The replacement of a major barrage as envisaged under this study will require the mobilization of about €250 millions, given current estimates.

1.6.2 The study is designed to promote effective north – south knowledge transfer by requiring the

training of MWRI staff by the Consultant while carrying out the safety evaluation of one-quarter of the hydraulic structures and the undertaking of the safety evaluation of the rest of the structures by the MWRI staff under the supervision of the Consultant. This aspect is in line with the AWF strategy to promote the dissemination of information and the application of best practices in the preparation and implementation of projects.

1.6.3 Furthermore, knowledge sharing and regional cooperation are encouraged under the study, given the context of water scarcity in the region and the potential for conflicts, which might result from the aggravation of the situation by climate change and variability risks. Experts and representatives of Nile river basin countries and international organizations active in the water and agriculture sectors will be invited to participate in the workshops to be organized under the study.

2. THE STUDY

2.1 Impacts

2.1.1 The relevant sector goal, as expressed in the Egypt 2004 National Water Resources Plan (NWRP), is to improve water resources management in Egypt by introducing sector reforms and through the implementation of improved water use and conservation programmes. The expected impact of this strategy is to contribute to food and water security for all the various uses of water in the country including domestic, agriculture, industry and transportation.

2.2 Outcomes

2.2.1 The main outcome of the study will be the funds mobilized for the rehabilitation /replacement of major hydraulic control structures in Egypt. In the medium term, it is expected that at least €250 million will be mobilized for the rehabilitation or replacement of one major hydraulic structure on the Nile, following the capital investment project to be prepared under this study.

2.2.2 The achievement of these outcomes will be measured against a set of indicators identified in the Logical Framework Matrix.

2.3 Outputs

2.3.1 The major outputs of the study, arranged under 4 components, are the following:

Component 1: Site Investigations and Development of a Geographic Information System (GIS) database

- *Output1*: GIS database developed and data entered for 200 structures inspected in 75 locations.
- *Output2:* Priority list of structures for detailed investigations prepared.
- *Output 3*: Reports of workshop organized for the validation of Component 1 reports.

Component 2: Safety Evaluations and Development of a Decision Support System

- *Output 4*: Decision Support System prioritizing interventions on the structures studied developed.
- *Output 5*: Reports of workshop organized for the validation of Component 2 reports.

Component 3: Development of a Master Plan and Preparation of detailed designs for one priority major structure

- *Output 6*: dynamic Master Plan for the rehabilitation/ replacement of major hydraulic control structures on the Nile prepared;
- *Output 7:* Capital investment project for a major priority structure prepared.

- *Output 8:* Strategic Environmental Assessment (SEA) of the Master Plan and socio-economic cost-benefit analysis carried out.
- *Output 9:* Reports of workshop organized for the validation of Component 3 reports.

Component 4: Project Management Activities

- *Output 10*: Project Management Results (Consultant Services procured, organized technical and study validation work-shops and approved study reports, information systems and Master Plan; quarterly reports and Project Completion Report prepared on time).

2.4 Activities

2.4.1 These outputs will be attained through the performance of the activities organised into 4 components and described briefly below. The specific activities that will collectively contribute to the achievement of the outputs of the Study are summarised in the following paragraphs:

2.4.2 Component 1: : Site Investigations and Development of a Geographic Information (GIS) System database

Activity 1.1: Undertake inspection of structures and collect data.

This activity comprises the undertaking of site inspections for 200 hydraulic control structures clustered in about 75 locations in the Nile Valley and the Nile Delta in Egypt. The structures to be considered consist of 11 Main barrages on the Nile River, 21 Head regulators at the off-takes of canals from the Nile, 44 Intermediate regulators within Major canals and 124 smaller structures located within irrigation canals. The tasks to be carried out under this activity include:

- The visual inspection of the hydraulic control structures and the collection of physical data related to the geometry, the structural state and the hydraulic performance of each structure.
- The carrying of bathymetric and topographic surveys for each of the 75 sites in order to collect data that will permit the modeling of the hydraulic performance and the impacts of floods of varying intensities in the case of structural failures.
- The undertaking of detailed site investigations for up to 100 structures prioritized according to the economic importance attached to their efficient hydraulic performance or the potential socio-economic and environmental impacts of their failure.
- The underwater inspection of up to 50 suspected structures in order to carry out a detailed investigation of the structural integrity of their submerged portions. This task will equally involve the dewatering of one vent for each of an estimate of 20 structures that will require this operation. The task will include drilling boreholes to enable the inspection of the substructure and foundations of the structures and to obtain soil samples for soil strength and structural stability analysis.

Activity 1.2: Develop a Geographic Information System (GIS) database and prioritize the structures for detailed investigations.

Under this activity, the Consulting firm will determine the data needs and the appropriate structure of data and design and develop a Geographic Information System (GIS) database to handle all the data related to the 200 structures studied. This data will include geographic, physical, structural and geometric data, environmental and socio-economic data as well as aerial photographs and videos of the sites.

Under the study, the GIS will be developed for the Reservoirs and Grand Barrages Sector (RGBS) of the MWRI which is responsible for the rehabilitation and or the replacement of all the major hydraulic

control structures in Egypt. The Consulting firm will design an appropriate user interface and link the developed GIS database to the existing GIS operating system server of the Planning Sector of the MWRI. This approach will avoid the significant financial and human resources requirements of acquiring, running and maintaining a new GIS server and GIS operating system by the RGBS.

The Consulting firm will also draw-up a priority list for the undertaking of detailed site, geotechnical and structural investigations on the hydraulic control structures.

Activity 1.3: Organize report validation and technical workshops

The main reports prepared under this component will be presented by the Consulting firm in a workshop to be organized at the end of the activities of the component. The workshop will examine the validity of the reports on the site inspections and detailed investigations as well as the operation and the performance of the GIS database developed under the study.

The Consulting firm is equally required to organize a knowledge transfer technical workshop within Component 1 of the study to enable exchanges on the conduct and the participation and performance of the staff of the MWRI in carrying out some of the tasks in the component as well as to impart specific technical knowledge related to the activities of Component 1 or of subsequent components of the study. This technical workshop is designed to supplement, in a more formal setting, the training received by the MRWI staff on-the-job in the course of the implementation of the activities under Component 1 of the study.

2.4.3 Component 2: Safety Evaluations and Development of a Decision Support System

Activity 2.1: Carry out safety evaluations on the hydraulic structures.

Under this activity, the Consulting firm will undertake stability analysis and overall safety evaluations on 50 hydraulic structures selected jointly by the MWRI and the Consultant's experts. The Consulting firm shall carry out on-the-job training of the MWRI staff on these 50 structures and for this reason the selection will include structures of a variety of sizes and ages and located at varied geographic sites. The procedure is to ensure that the staff get exposure to all the types of challenges to be expected in carrying out work of this nature.

After effective training on the evaluation of a number of representative hydraulic structures, the staff will in turn carry out the safety evaluation of the remaining 150 hydraulic structures under the overall supervision of the Consultant's experts. As part of its deliverables, the Consulting firm will evaluate the performance of the staff with regard to the undertaking of stability analysis and safety evaluations on hydraulic structures and submit a Performance Evaluation Report covering work done by the MWRI staff on the 150 structures.

Activity 2.2:Develop a Decision Support System (DSS) for prioritizing interventions on the structures.

The Consulting firm is required under this activity to develop a GIS-based Decision Support System (DSS) that will enable the prioritization of the different structures identified as requiring specific capital investment interventions. The DSS will essentially consist of the GIS-database developed under Component 1; a model developed from analytical tools that enable spatial-temporal simulations and designed to handle the decision context and the user criteria; and the user interface designed for the optimal operation of the system and for meeting the output requirements of the MWRI. The decision context and user criteria will be provided by the results of the safety evaluations, the SEA and the summary socio-economic analysis as well as the GIS datasets.

The model will use the rules and criteria set by the user to analyse all the information included and to generate a priority list of structures requiring rehabilitation or replacement. The DSS will serve the MWRI up to the year 2050 as a dynamic tool for planning since it will permit spatial-temporal simulations and modeling and it will be designed such that the MWRI staff can update it as and when required. After completing the development of the system, the Consulting firm will test and revise it as appropriate and train the staff of the MWRI on its operation, maintenance and updating.

Activity 2.3: Organize report validation and technical workshops

Similarly to Activity 4 under Component 1, the Consulting firm will organize workshops under Component 2 to validate the main reports prepared under this component as well as to provide additional training to the MWRI staff in specific areas determined during the implementation of the component.

2.4.4 Component 3: Development of a Master Plan and Preparation of detailed designs for one priority major structure.

Activity 3.1: Develop a Master Plan

Under this activity, the Consulting firm will use the priority list generated by the DSS model for the 200 structures studied to further develop the DSS model into a dynamic Master Plan. The dynamic Master Plan will describe the type of intervention to be carried out for each structure (further studies, rehabilitation or replacement), provide the scheduled time recommended for the proposed intervention to be undertaken for each structure and the estimated capital investment costs for each intervention recommended. This tool should permit the MWRI to efficiently plan capital investment projects and the GoE to mobilize the required resources in a timely manner.

The Consulting firm will develop the Master Plan model such that it enables as well the simulation of the effect of the performance of the different hydraulic structures and the impacts of given interventions on the overall efficiency of the entire system of hydraulic control structures and at any point in time. This temporal modeling will take into account the impacts of particular events such as socio-economic shifts as well as earthquake and climate change risks over the next 40 years. The structural design and cost estimate to be prepared by the Consulting firm will take into consideration the earthquake and climate resilience of the structures to be reconstructed or rehabilitated as well as the potential socio-economic costs and benefits of each intervention.

Activity 3.2 Carry out Strategic Environmental Assessment (SEA) of the Master Plan and socio-economic cost-benefit analysis.

All the tasks under this activity will be undertaken with the participation of the MWRI staff, expected to benefit from knowledge-transfer in the process. The Consulting firm will:

- undertake a Strategic Environmental Assessment of the Master Plan taking into account all of the 200 structures, in accordance with the Bank's guidelines, with emphasis on those requiring some capital investments in the short-term.
- Prepare a summary socio-economic cost-benefit analysis for those hydraulic structures requiring immediate capital investments, to justify the proposed interventions.

Activity 3.3: Undertake detailed feasibility studies, ESIA and prepare detailed designs and tender documents for one priority major structure

Once the Consulting firm prepares the prioritized list of structures requiring capital investments at the end of Component 2, the top priority major structure will be selected by the MWRI for the preparation

of a capital investment project in order to facilitate the mobilization of resources for immediate implementation. For this selected structure, which will be limited to one due to budgetary constraints, the Consulting firm will undertake detailed feasibility studies including socio-economic, environmental, institutional, technical and financial analysis in order to justify the viability and the sustainability of the proposed project.

The Consulting firm will equally prepare detailed designs including technical specifications and construction drawings for the selected hydraulic control structure as well as prepare detailed cost estimates for the works to be implemented. Finally, the Consulting firm will prepare complementary tender documents for the procurement of the services of contractors for the execution of the works as well as the services of consultants for the supervision of the works.

Activity 3.4: Organize donors' conference and workshop

The final workshop to be organized under Component 3 will double as a resource mobilization and a knowledge-sharing workshop in addition to the validation of the major reports, models and plans developed under the study as a whole. The capital investment project documents prepared under this study will be used in this forum to obtain commitment of funds from donors for immediate implementation. As in the order components of the Study, the Consulting firm will equally organize a technical workshop under this component to strengthen the skills of the MWRI staff in the operation and the updating of the Master Plan model.

2.4.5 In order to ensure valuable knowledge exchanges, foster regional cooperation and facilitate resource mobilisation, experts from international organizations active in the water sector and from Nile River Basin and neighbouring countries as well as all potential donors will be invited to participate in all the three workshops to be organized under the study.

2.4.6 Component 4: Project Management

Activity 10: Project Management Tasks

Under this activity, the following major tasks will be carried out by the Study Coordination Team (SCT): i) the procurement of the services of a Consulting firm for the Study; ii) the acquisition of office supplies; iii) organisation of report validation, technical and donors' workshops; iv) preparation of quarterly progress reports; and v) the review and approval of all study reports prepared by the Consulting firm.

2.5 Risks

2.5.1 A number of explicit and implicit assumptions and risks, stated in the logical framework matrix, linking the lower to the higher objectives of the study will determine the level of attainment of its objectives. It is necessary that these risks be reassessed during the undertaking of the study and the envisaged mitigation measures adapted at each stage to improve the chances of attaining the set objectives.

2.5.2 At the output level, there is a risk of the MWRI staff failing to acquire sufficient skills and knowledge to enable them to effectively undertake the safety evaluation of 150 hydraulic control structures in accordance with the design of the study. To mitigate this risk, the study has been designed to include the effective training of staff by the Consultant as a verifiable deliverable. The effectiveness of staff training will be encouraged by requiring that the Consulting firm prepare a staff performance evaluation report, which will hold both staff and the Consulting firm responsible for performance.

2.6 Costs and Financing

2.6.1 The total cost of the project is estimated at € 2,520,086 and this amount is to be financed by an

AWF grant of €1,364,782 (54.2%), a Middle Income Countries (MIC) Technical Assistance Funds (TAF) grant of €658 847 (26.1%) and a GoE contribution of € 496 457 (19.7%). The detailed cost estimates, summarized in Table 2.1 by study components, are shown in Annex 3. The costs are based on estimates made from similar studies in Egypt, including the study on the rehabilitation/ replacement of the Zefta Barrage in the Nile Delta, approved by the Bank in June 2009, with a 5% allowance for physical and price escalation contingencies.

Table 2.1 – Estimated Costs by study components (Amounts in € - excluding taxes and duties)

Study Components	AWF	MIC-TAF	GoE	Total
Component 1 : Site Investigations and Development of a Geographic Information (GIS) System database	557 330	598 868	36 160	1 192 358
Component 2: Safety Evaluations and Development of a Decision Support System	468 470	9 585	23 502	501 558
Component 3: Development of a Master Plan and Preparation of detailed designs for a priority major structure	270 743	17 452	292 587	580 782
Component 4: Project Management Costs	-	-	119 384,88	119 385
Sub-total	1 296 543	625 905	471 634	2 394 082
Contingencies, 5% (physical 3%; financial 2%)	68 239	32 942	24 823	126 004
Total	**1 364 782**	**658 847**	**496 457**	**2 520 086**
Total (Rounded up)				
Percentages (%)	54,16	26,14	19,70	100,00

Table 2.2 – Estimated Costs by Expenditure Categories (Amounts in € - excluding taxes and duties)

Categories of Expenditure	AWF	MIC	GoE	Total
Goods	7 125	23 750		30 875
Services	1 289 418	602 155	352 249	2 243 822
Miscellaneous			107 403	107 403
Sub-total	1 296 543	625 905	471 634	2 394 082
Contingency (5%)	68 239	32 942	24 823	126 004
Total	**1 364 782**	**658 847**	**496 457**	**2 520 086**

2.6.2 The financing of this study will be in accordance with the above table. The GoE funds are composed of € 370 789 (14.7%) in cash and an equivalent of €125 668 (5%) in-kind for the operating costs of the Study Coordination Team (SCT). The costs related to the SCT include the salaries of the members of the team, the value of an existing vehicle to be placed at the disposal of the team, the operating and maintenance cost of the vehicle, office space and supplies and telecommunication costs. In addition, the Government of Egypt (GoE) will pay all taxes and duties incurred on the implementation of the study. The appraisal of the study has been carried out jointly by the OSAN.1 Division of the Bank and the AWF. In accordance with the Bank's procedures, the corresponding document prepared for the approval of the MIC grant funds is a Board Memorandum.

3. PROJECT IMPLEMENTATION

3.1 Recipient

3.1.1 The Recipient of the project is the Ministry of International Cooperation of Egypt and the Executing Agency is the Ministry of Water Resources and Irrigation (MWRI). The MWRI will implement the study through its Reservoirs and Grand Barrages Sector (RGBS) shown on the

Ministry's organization chart in Annex 2. The organization chart of the RGBS is also shown in Annex 2.

3.2 Implementation arrangements and capacity

3.2.1 The RGBS will setup a Study Coordination Team (SCT) consisting of a Study Coordinator (Project Manager), a hydraulic engineer, a procurement officer and auxiliary staff. The SCT will be responsible for the day-to-day supervision of the implementation of the study and will report to the Head of the RGBS. The RGBS has implemented a number of related studies and capital investment project in the last twenty years, including the feasibility studies and the construction of the Damietta Dam, the new Esna Barrage, the Al-Menofi Head Regulator and the new Shubra Bas Intermediate Regulator. The RGBS is thus assessed to have sufficient experience, technical, financial and managerial capacity to enable it implement this study efficiently. Under the overall oversight of the MWRI, the SCT will receive funding from the AWF, manage the funds, recruit a Consulting firm and administer the consultancy contract. Stakeholder workshops will also be organised to validate the reports prepared under each of the 3 components of the study. The Egypt Field Office of the Bank (EGFO) will assist with the supervision of the implementation of the activities of the study.

3.2.2 For technical and financial efficiency in the implementation of the study, both the development of the Master Plan and the preparation of the capital investment project envisaged under the study will be carried out by one Consulting firm whose services will be procured by the Executing Agency. The provisional terms of reference for the study are included in Annex 5. The physical investigations of the hydraulic control structures considered under the study will be carried out by sub-contractors to be recruited and supervised by the Consulting firm, under the study. The subcontractors will equally undertake the bathymetric and topographic surveys as well as the dewatering of vents for the inspections of submerged parts of the hydraulic control structures.

3.2.3 The validation of the main reports prepared under each of the components of the study will take place at workshops to be organised by the Consulting firm and the Executing Agency at the end of each component. The different database developments, structural and geotechnical investigations, analyses and modeling as well as the environmental and social studies will be carried out by experts with the qualifications specified in the terms of reference.

3.3 Performance Plan

3.3.1 The performance indicators shown in Table 3.1 will be used in monitoring the attainment of the outputs and outcomes of the study.

Table 3.1: Performance Plan

Outputs	Indicators	Targets and Timeframe
Component 1 1. GIS database developed and data entered for 200 structures inspected in 75 locations. 2. Priority list of structures for detailed investigations prepared. 3. Reports of workshop organized for the validation of Component 1 reports. *Component 2* 4. Decision Support System prioritizing interventions on the structures studied developed, 5. Reports of workshop organized for the validation of Component 2 reports	1. The use of a GIS database by the RGBS staff for the management of hydraulic control structures. 2. Existence of a prioritized list of structures 3. Existence of validated workshop reports 4. The use of a DSS by the MWRI for deciding interventions on hydraulic control structures 5. Existence of validated workshop reports	1. 200 structures inspected, data collected and entered into an operational GIS database, 150 structures by the RGBS staff, 26 months from study commencement date; 2. Prioritized list of structures prepared 16 months from study commencement date; 3. One technical workshop organized, 8 months from study commencement and one Report validation workshop organized, 12 months from study commencement date. 4. Safety evaluation of 50 structures by the Consultant, 24 months from study commencement date and for 150 structures by the RGBS staff, 26 months from study commencement date; and the DSS is developed and in use in the MWRI, 27 months from study commencement date, 5. Two technical workshops organized, 19 months from study commencement and 2 Report validation workshops organized, 27 months from study commencement date.

Component 3 6. Master Plan for the rehabilitation/ replacement of major hydraulic control structures on the Nile prepared; 7. Strategic Environmental Assessment (SEA) of the Master Plan and socio-economic cost-benefit analysis carried out. 8. Output 6: Capital investment project for a major priority structure prepared. 9. Reports of workshop organized for the validation of Component 3 reports	6. The use of a Master Plan by the MWRI for the mobilization of resources and the planning of interventions on hydraulic structures. 7. Existence of a validated SEA report. 8. Existence of ESIA report, detailed designs and tender documents for the top priority major structure identified under the study. 9. Existence of validated workshop reports	6. Master Plan developed and is ready for validation, 33 months from study commencement date. 7. SEA report completed and validated 35 months from study commencement date. 8. Feasibility study reports, ESIA reports, detailed designs and tender documents prepared, 35 months from study commencement date. 9. Three technical workshops organized, 30 months from study commencement, 2 Report validation workshops organized, 27 months from study commencement and 1 donors' conference organized 36 months from study commencement date.
Component 4 10. Consultancy Services procured, Report validation workshops and donors' conference organized and study reports reviewed and approved.	10. Signed contract with a Consultant, number of Report validation workshops and donors' conference organized and number of reports reviewed and approved.	10. Contract with a Consultant signed, 6 months from Grant Signature; 3 workshops, including 1 donors' conference organized, 36 months from study commencement date. All reports from Consultant reviewed and validated 36 months from study commencement date. Quarterly reports and Project Completion Report prepared on time.

NB: a period of 6 months from Grant Signature to study commencement date is assumed, making a total duration of 42 months for the entire study.

The percentage attainment of these performance targets will be evaluated during implementation and details provided in the quarterly project progress reports to be prepared by the SCT and submitted to the main stakeholders, including the AWF.

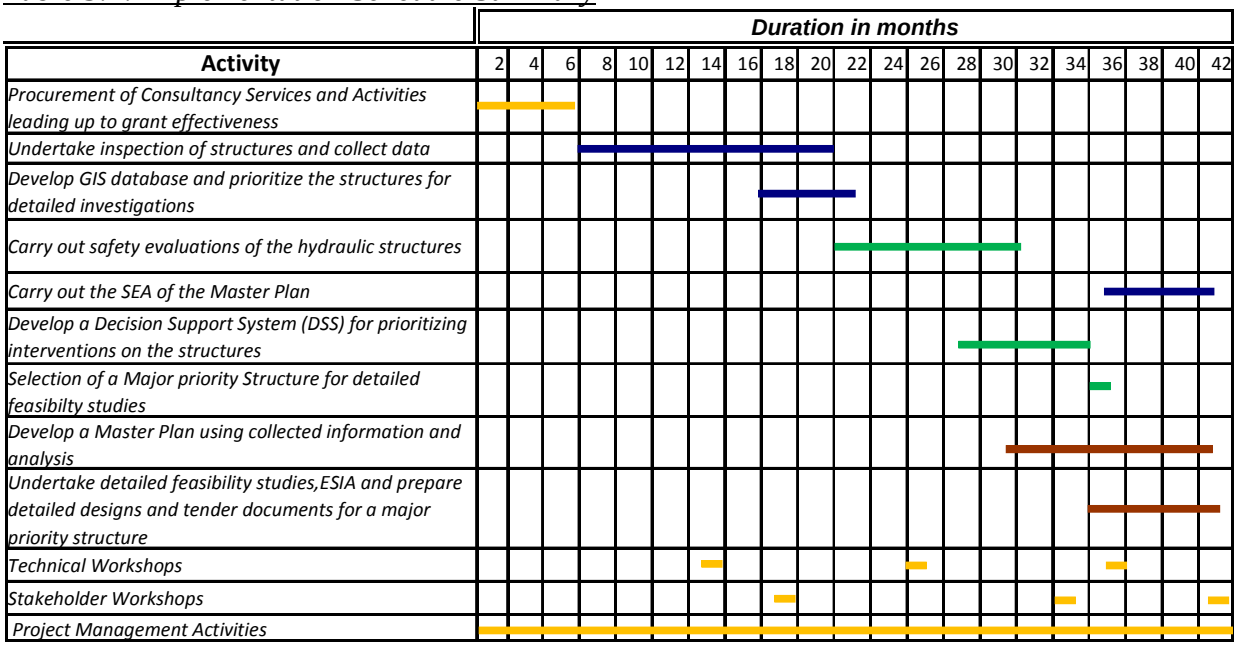
3.4 Implementation Schedule

3.4.1 The study will be undertaken in a period of 36 months, after an estimated period of 6 months required for the activities leading up to grant effectiveness and for the procurement of the services of a consulting firm, making a total duration of 42 months from Grant signature. The period of 36 months for the undertaking of the study is justified by the wide scope of the study, both in terms of the geographic coverage (all of Egypt) and the volume of activities involved (a Master Plan study and a Project Preparation study, up to tender documents). A further constraint necessitating this duration is the requirement in the design of the study that the Consulting firm should first of all train the MWRI staff on stability analysis and safety evaluation of 50 structures. Thereafter, under the supervision of the firm, the MWRI staff are to carry out these activities on a further 150 structures all over Egypt, after acquiring the necessary skills.

3.4.2 *Procurement Activities*: Upon approval of the Grant, the Executing Agency will: i) prepare and advertise for expressions of interest; ii) prepare shortlists of consultants to undertake the entire study; iii) prepare Requests for Proposals and obtain approvals from the African Water Facility (AWF). The consulting firms will be allowed 42 days from the date of issue of the Request for Proposals to submit their proposals. A period of two weeks will be allowed for the review of the proposals and approval by the Tender Board of the MWRI and the same amount of time for approval by the AWF; and a further two weeks for the letter of acceptance to be issued. The consulting firm will be expected to begin work within two weeks of this acceptance.

3.4.3 *Implementation*: The Consulting firm will submit an inception report and work plans to the Executing Agency for approval within a month of commencement of the study activities. After the approval of the Consulting firm's plan of work, methods and tools, the timing for the starting and the completion of the different activities will be in accordance with the summary implementation schedule (Table 3.2.) The detailed Implementation Schedule is presented in Annex 4.

Table 3.2: Implementation Schedule Summary



3.5 Procurement Arrangements

3.5.1 All acquisition of goods and consultancy services financed by AWF and MIC funds shall be in accordance with the AWF's Operational Procedures and the Bank's Rules and Procedures for the Use of Consultants and the procurement of goods, using the relevant Bank Bidding Documents. Procurement arrangements are divided into categories and summarized in Table 3.3, based on the cost estimate details given in Annex 3.

Table 3.3: Procurement Arrangements (Amounts in € - Excluding taxes and duties)

Procurement Categories	**Shopping**	**Shortlist**	**Other****	**Total**
1. Goods				
1.1 GIS and DSS Software	25 000			25 000
1.2 Barrage Safety Analyses Software	(7 500)			(7 500)
2. Services				
2.1 Consultancy Services for Development of Master Plan and Preparation of Capital Investment Project. (Part financed by the AWF in brackets)		2 353 638		2 353 638
		(1 357 282)		(1 357 282)
2.2 Auditing of MIC funds		8 281		8 281
3. Miscellaneous				
3.1 Vehicle running cost			4 540	4 540
3.2 Office Supplies			4 540	4 540
3.3 Telecommunications			1 816	1 816
3.4 Subsistence Allowances (Per diems)			90 808	90 808
3.4 Study Coordination Team Salaries			11 351	11 351
Total Cost of Study	**32 500**	**2 361 918**	**113 056**	**2 507 474***
Total AWF Grant	***(7 500)***	***(1 357 282)***		***(1 364 782)***

*The figures in brackets represent the amounts financed by the AWF; ** GoE procedures*
**An existing vehicle valued at €12 612 will be placed at the disposal of the SCT by the GoE.*

3.5.2 **Goods**. Goods comprising a GIS/DSS software amounting to € 25 000 and a Barrage Safety Analyses Software amounting to € 7,500 will be procured utilizing the Shopping procedures, given that the amount involved is small and the software can be procured locally.

3.5.3 **Services**. Acquisition of consulting services from a firm shall be processed and a contract awarded, through competition, following Short-Listing (SL) procedures. One such contract comprising technical investigations, data collection and the development of a Master Plan as well as the detailed feasibility studies, detailed designs and tender document preparation amounting to € 2 353 638 shall be procured utilizing the quality and cost-based selection (QCBS) process.

3.5.4 The services of an auditor for the auditing of MIC funds will be procured through short-list procedures. One such contract amounting to €8 281 shall be procured utilizing the quality and cost-based selection (QCBS) process.

3.5.5 For all consultancy contracts whose value are above UA 200,000 (*€219,612*), the Specific Procurement Notice (SPN) shall be advertised in the *United Nations Development Business* (UNDB) *Online* and on the Bank's Website in addition to one newspaper of national circulation in the Recipient's country, the official gazette or an electronic portal with free access.

3.5.6 **Miscellaneous**: Miscellaneous expenditures falling under vehicle running cost amounting to €4,540; office supplies amounting to € 4,540; telecommunications costs amounting to €1,816; subsistence allowances for international consultants and local staff and consultants amounting to €90 808 ; and Study Coordination Team salaries amounting to € 11 351, all funded by the GoE, will be procured using GoE administrative procedures.

3.6 Procurement Review Procedures

3.6.1 ***Prior Review:*** The contract for consultancy services envisaged for this study will be subject to prior review by the AWF. The following documents are subject to review and approval by the AWF before promulgation, under prior review: The Specific Procurement Notice (SPN); the Request for Proposals document; the reports on evaluation of consulting firms' proposals, including recommendations for contract award, as well as the draft contract, if this has been amended from the drafts included in the Request for Proposals document.

3.6.2 ***Post Review:*** The procurement of goods estimated at less than €10,000 may be approved on the basis of post-review as allowed for in the Operational Procedures of the African Water Facility. The procurement of the GIS/DSS software will be done in line with MIC-TAF procurement review procedures.

3.6.3 ***Executing Agency:*** The Executing Agency, the Ministry of Water Resource and Irrigation through its Reservoirs and Grand Barrages Sector (RGBS), will be responsible for the procurement of goods and consulting services. The resources, capacity, expertise and experience of the RGBS are adequate to carry out the procurement. This is based on its performance in the implementation of a number of related projects as indicated in section 3. 2.

3.6.4 ***Procurement Plan:*** The Recipient shall prepare and submit a Procurement Plan acceptable to the AWF before Grant Signature, and setting forth: (a) the particular contract for the consulting services and goods during the life of the project; (b) the proposed mode of procurement; and (c) the related AWF review procedures (prior or post review). The Recipient shall update the Procurement

Plan annually or as needed throughout the duration of the project. Any revisions proposed to the Procurement Plan shall be furnished to the AWF for its prior approval. The Recipient shall implement the Procurement Plan in the manner in which it has been approved by the AWF.

3.7 Accounting and Auditing

3.7.1 Specific accounting arrangements and requirements for the Recipient to open a Special Account with a local Bank acceptable to AWF from which all eligible payments will be made, will be included in the Grant Agreement that will be prepared by the legal services of the Bank and signed with the Recipient. The account will allow installments in Euro and will be administered by the Executing Agency, the RGBS.

3.7.2 The AWF will recruit and retain an auditor to perform ex-post evaluation or supporting documents review and audit the project in the interest of fast tracking the implementation of the Project activities. The independent auditor will review and certify at predetermined intervals, statements of expenditure and supporting documents, to ensure that funds have been utilized in accordance with the Grant Agreement. The AWF will incur the costs of such audits and these will not be included in the Grant. The utilization of MIC funds will be audited by an independent auditor whose service will be procured in line with MIC procedures.

3.8 Disbursement Arrangements and Expenditure Schedule

3.8.1 There will be two disbursement arrangements according to the efficiency preferences of OSAN and the AWF. On the one hand, disbursement of about one-third of the consultant's fees will be effected through the Direct Payment Method (MIC Grant Funds). On the other hand, proceeds from the AWF grant shall be deposited into a Special Foreign Currency Account (FCA) to be opened in an acceptable bank in Egypt and managed by the SCT. The opening of the Special Account will be a condition precedent to the first disbursement of the AWF grant. The Special Account will be replenished on the condition that the preceding advance has been utilized and justified up to at least 50 percent and that all previous advances have been fully justified.

3.8.2 The SCT will pay the invoices of the consulting firm recruited for the implementation of the studies, in accordance with the terms of the contract signed with the firm.

3.8.3 The expected Expenditure Schedule for the total AWF grant amount of € 1 364 782 is shown in Table 3.4. The grant is to be disbursed in 3 tranches. For the 2nd and 3rd tranches, the Special Account will be replenished on the condition that the preceding tranche has been utilized and justified up to at least 50 percent and that all previous tranches have been fully justified.

.Table3.4 Expenditure schedule (€ – excluding taxes)

Study Components	1st Tranche	2nd Tranche	3rd Tranche	Total
Component 1 : Site Investigations and Development of a GIS database	234 665	175 999	175 999	586 663
Component 2: Safety Evaluations and Development of a DSS	197 251	147 938	147 938	493 127
Component 3: Development of a Master Plan and Preparation of a capital investment project.	113 997	85 498	85 498	284 993
Component 4: Project Management.	-	-	-	-

Total	**545 913**	**409 435**	**409 435**	**1 364 782**
Percentages (%)	40	30	30	100

3.9 Progress Monitoring and Reporting

3.9.1 The Consulting firm shall issue monthly progress reports to the SCT in a format to be agreed with the MWRI, taking into consideration the information needs of all stakeholders. The reports shall cover progress made in comparison to planned actions and show proposed corrective action to address deviations. The Consultant shall further report on the key indicators stated in the Performance Plan.

3.9.2 The Recipient shall, based on the monthly reports and on other relevant data sources, submit quarterly progress reports to the African Water Facility in a form to be agreed with the Facility. The reports shall cover progress in the implementation of procurements and all other activities of the study including financial aspects. Progress of implementation shall underscore the level of outputs attained, using the indicators in the performance plan, as well as the planned levels to be attained for the subsequent quarter. Any problems encountered, including delays, shall be presented and planned measures to address them explained.

3.9.3 The financial progress shall be presented in the form of a comparison between the budget and both cumulative and current expenditures. Variance should be explained and proposed corrective action taken to address them should be provided. The form of statement of expenditure in quarterly reports will of necessity be more simplified than for the end of year and/or the final statement and should be agreed prior to the commencement of the implementation of the study.

3.9.4 The Reports shall clearly indicate the level of attainment of the results as shown in the Logical Framework Analysis matrix for the reporting period concerned.

4 PROJECT BENEFITS

4.1 Effectiveness and Efficiency

4.1.1 The effective attainment of the objectives of the study will be ensured by the performance of the Study Coordination Team (SCT) and respect of procedures ensuring the selection of a Consulting firm with adequate experience and capacity to undertake the study.

4.1.2 Financial efficiency is built into the design of the study by the following aspects: i) the Consulting firm is to undertake detailed investigations and safety analyses on only 50 of the 200 hydraulic control structures and at the same time train the MWRI staff on these techniques to a level that will permit them to carry out the detailed analyses of the remaining 150 hydraulic structures themselves under the study; ii) Lead foreign experts spend less than 40% of the man-months required for the study, with their local counterparts working full-time at much reduced costs[10]; iii) the carrying out of a capital investment project preparation within this Master Plan development study results in much reduced costs because the same Consulting Firm undertaking the preliminary studies on all the structures will use the results obtained to undertake detailed studies on the identified top priority major structure while the firm is still in the field.

4.2 Viability

[10] See detailed cost estimates – Annex 3.

4.2.1 The study is expected to bring net benefits to the water and agriculture sector in Egypt, including: i) providing the MWRI with tools that will enable it to efficiently plan interventions and mobilize resources for capital investments aimed at improving the efficiency of irrigation water use in the country as well as protecting farming communities from the dangers of flooding in the event of the failure of the control structures; ii) the strengthening of the capacity of the staff of the MWRI particularly in the complex areas of hydraulic structure stability and safety analysis through extensive on-the-job training activities; and iii) promoting regional cooperation and knowledge transfer through the workshops to be organized under the study.

4.3 Sustainability

4.3.1 The GIS database and the DSS developed from it for the use of the RGBS will be linked to an existing server and operating system belonging to the Planning Sector of the MWRI which will be responsible for the operation, maintenance and the updating of system. The Planning Sector already has trained human resources and this aspect will improve the sustainability of the system to be developed under the study.

4.3.2 The water and agriculture sectors in Egypt as a whole are faced with sustainability challenges which are closely related to the water scarcity context of the country. The less efficient flood irrigation is the dominant type of irrigation in the country and irrigation water is currently available for free to farmers. The country has embarked on measures aimed at improving the efficiency of irrigation water use such as controlling the illegal growing of rice[11] which is a crop with high irrigation water requirements. The GoE is equally considering full irrigation system cost recovery and the introduction of volumetric tariffs[12] to ensure correct incentives to conserve and utilize water more efficiently. The efficiency of irrigation water use is also being addressed through the reuse of irrigation drainage water with the GoE aiming at a 14% reuse rate by 2017[13]

4.3.3 Environmental sustainability concerns are addressed in the study by requiring the Consulting firm to carry out a full environmental and social impact assessment (ESIA) for the capital investment project envisaged under the study as well as a Strategic Environmental Assessment (SEA) for all the structures considered in the Master Plan, in line with the Bank's guidelines. The concerns of end-users will be addressed and recommendations made for improving their contributions to improved water management in the country by the Consulting firm. A cross-section of the 2100 water users associations (WUAs) in the country will be consulted by the Consulting under the "Stakeholder Analysis" component of the SEA and the ESIA.

4.3.4 It is widely envisaged in Egypt that in the decades to come climate change risks will aggravate the water scarcity situation of the country. In response to this threat, the Egyptian Ministry of Agriculture and Land Reclamation (MALR) in currently implementing a three year Climate Change Risk Manage Programme in collaboration with the International Fund for Agricultural Development (IFAD) and the Food and Agriculture Organisation (FAO) aimed at developing stress tolerant crops and disseminating information in response to climate change risks. Under this study, the Consulting firm is required to consider climate change and variability risks in the design and costing of new hydraulic structures to be built in order to ensure their climate resilience.

4.3.5 Though the 2005 Millennium Development Goals (MDG) Country Report notes that Egypt is

[11] Egypt: NWRP 2004, §4.2.3

[12] Egypt: IWRMP 2005, Pg. 74.

[13] Egypt: IWRMP 2005, Pg. 50

on course to attain most of the MDG by 2015, progress is slower in women empowerment. Egyptian women occupy only 2% of the seats in the People's Assembly[14]. Nevertheless, the situation in the MWRI is more encouraging with women occupying 22% of professional engineer posts in the Ministry. Under this study, the envisaged on-the-job training will be provided equally to male and female engineers of the MWRI.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 The Government of Egypt (GoE) has been addressing the challenge of efficient water use in irrigation in the last two decades through the improvement of the efficiency of the major hydraulic control structures on the Nile. The efforts of the GoE include the construction of 7 major barrages on the Nile in replacement of old and dysfunctional ones between 1989 and 2008.

5.1.2 Availability of a Master Plan as envisaged under the proposed study will assist the GoE in efficiently planning future capital investment interventions and the mobilization of the resources required for the improvement of the over 200 old but vital hydraulic structures on the Nile.

5.2 Recommendations

5.2.1 Based upon a critical assessment of the relevance, effectiveness, and sustainability of the project, as well as the capacity and the credibility of the Recipient, it is recommended that the AWF approves a grant not exceeding € 1 364 782 to finance the activities detailed in Section 2.4 of this report.

5.2.2 The first disbursement will be made subject to the following conditions: i) the opening of a Special Account with a local bank acceptable to the AWF, to receive the proceeds of the Grant and make eligible payments under the project (§ 3.7.1) and ii) the setting up of a functional Study Coordination Team and the appointment of a Study Coordinator (Project Manager) acceptable to the AWF.

[14] Egypt: CSP 2007 – 2011 §2.5.8

Annex 1: Map of Egypt

Annex1a: showing the Nile valley and the Nile Delta in Egypt

Disclaimer

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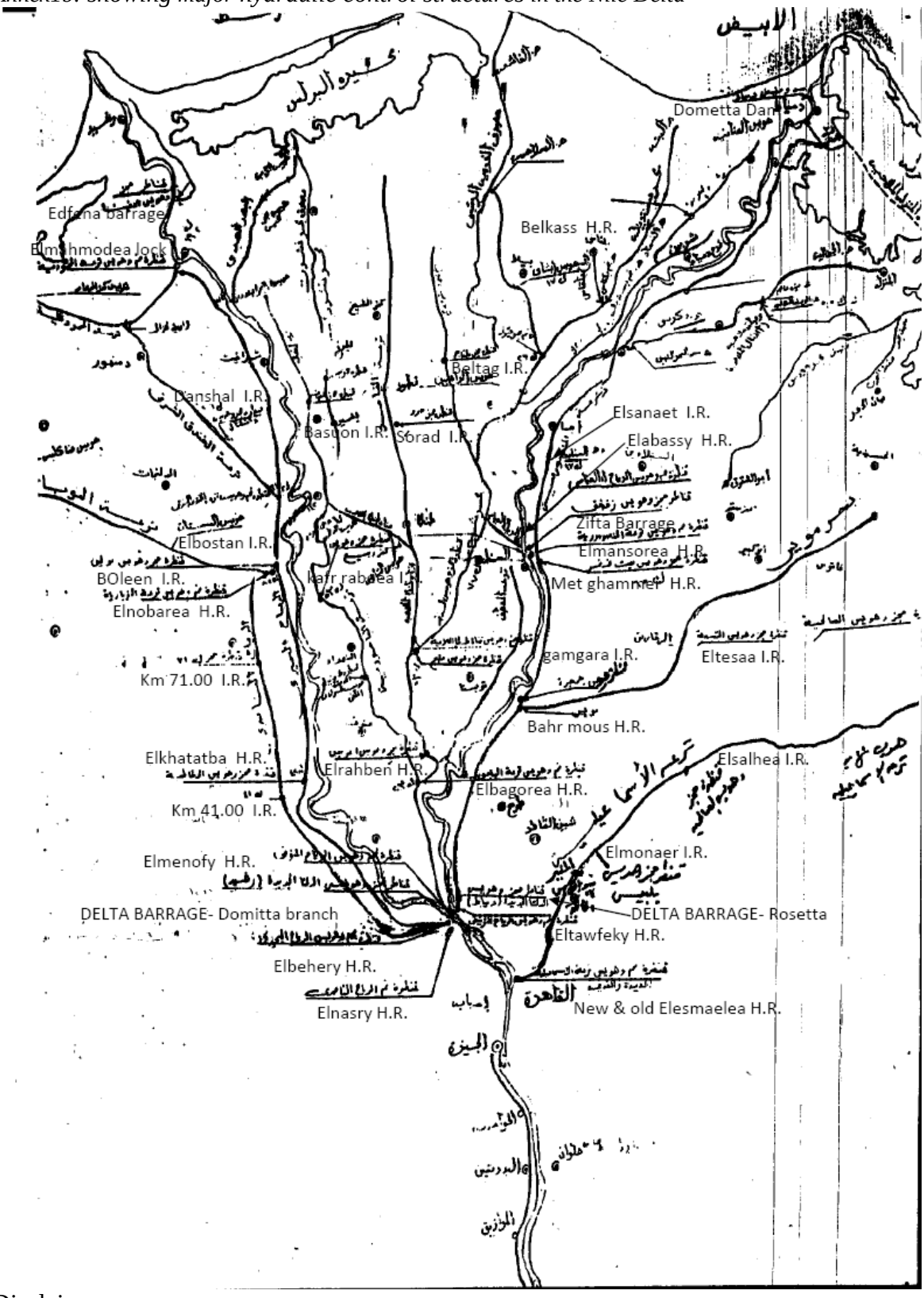
Annex1b: showing major hydraulic control structures in the Nile Delta



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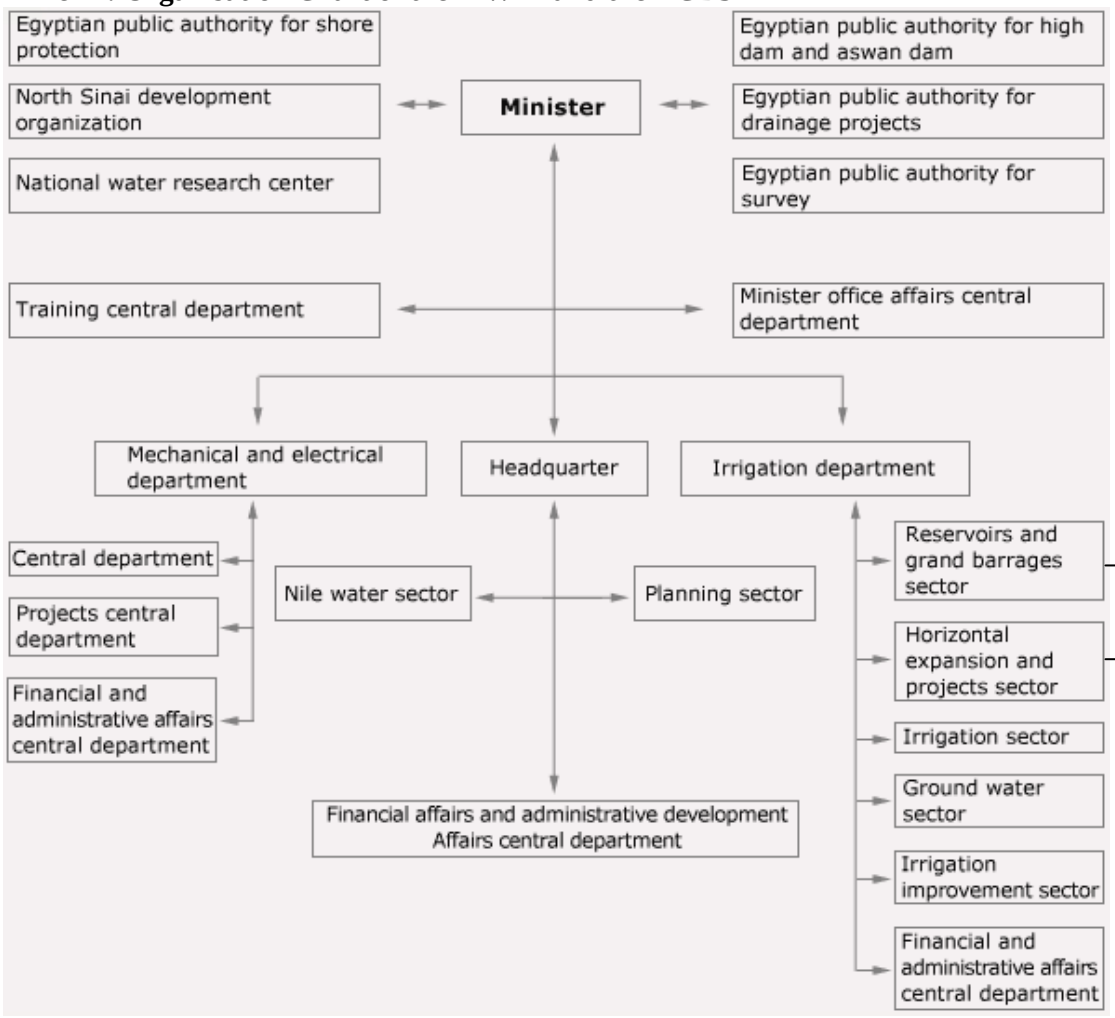
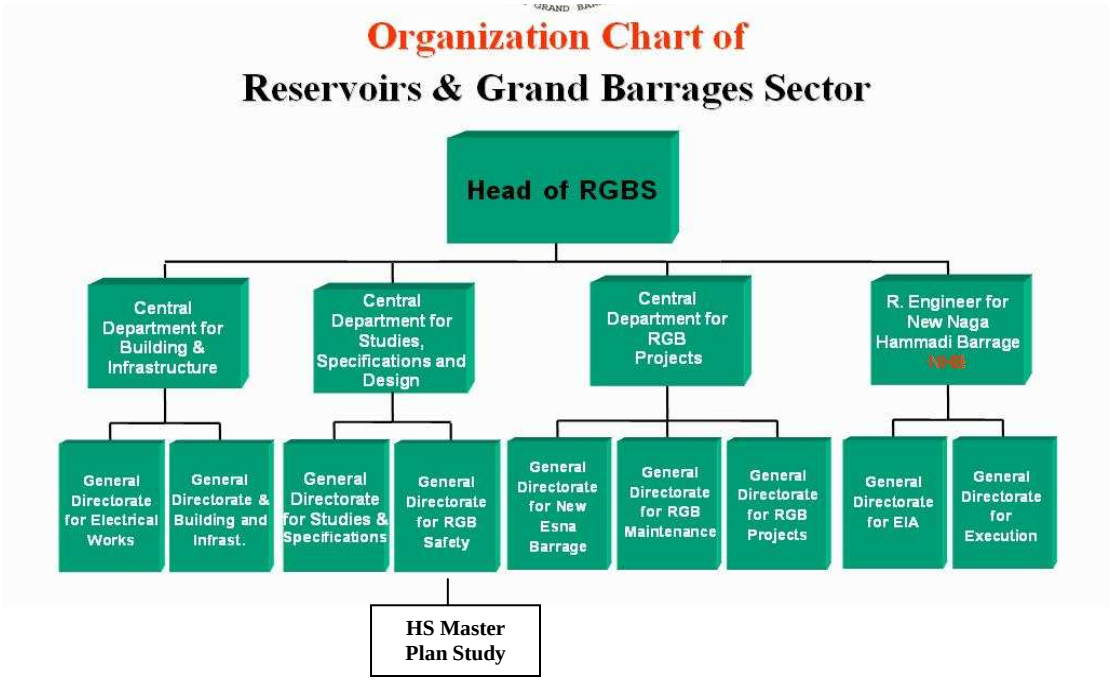
Annex 2: Organisation Chart of the MWRI and the RGBS





Annex 3: Cost Estimates

Egypt Hydraulic Structures Master Plan - Detailed Costs Estimates (Excluding taxes)

	mm = Man-Months; LS=Lumpsum							
Item N°	**Description**	**Units**	**Q'ty**	**Unit Cost (€)**	**Total Cost (€)**	**Contributions (€)**		
	Component 1: *Site Investigations and GIS development*					AWF	MIC	GoE
1	Team Leader (Project Manager - Foreign)	mm	2	15 200	30 400	30 400		
2	Deputy Team Leader (Local)	mm	16	2 396	38 341	38 341		
3	Data Entry Assistant	mm	12	959	11 502	11 502		
4	Lead Specialist Foreign (Civil Engineer)	mm	4	12 350	49 400	49 400		
5	Lead Specialist Foreign (System Analyst GIS)	mm	2	12 350	24 700	24 700		
6	Lead Specialist Foreign (Electro-Mechanics)	mm	3	12 350	37 050	37 050		
7	Lead Specialist Foreign (Hydraulics Engineer)	mm	3	12 350	37 050	37 050		
8	Lead Specialist Foreign (Enviromentalist)	mm	4	12 350	49 400	49 400		
9	Lead Specialist Foreign (Geotechnical Engineer)	mm	2	12 350	24 700	24 700		
10	Lead Specialist Foreign (Sociologist/Gender)	mm	4	12 350	49 400	49 400		
11	Lead Specialist Foreign (Institutional)	mm	1	12 350	12 350	12 350		
12	Senior Engineer Local (Civil Engineer)	mm	16	1 917	30 673	30 673		
13	Senior Engineer Local (Electro-Mechanics)	mm	6	1 917	11 502	11 502		
14	Senior Professional Local (Economist)	mm	3	1 917	5 751	5 751		
15	Senior Professional Local (Environmentalist)	mm	6	1 917	11 502	11 502		
16	Senior Engineer Local (Geo-technical)	mm	10	1 917	19 171	19 171		
17	Senior Engineer Local (GIS developer)	mm	4	1 917	7 668	7 668		
18	Senior Professional Local (Sociologist)	mm	6	1 917	11 502	11 502		
19	Senior Professional Local (Institutional)	mm	3	1 917	5 751	5 751		
20	Accountant (Local)	mm	16	240	3 834	3 834		
21	Procurement officer (Local)	mm	8	144	1 150	1 150		
22	4 Drivers (Local)	mm	66	96	6 326	6 326		
23	Draftman (Local)	mm	16	240	3 834	3 834		
24	Secretary (Local)	mm	33	120	3 954	3 954		
25	GIS, DSS and Master Plan Software	U	1	23 750	23 750	-	23 750	
26	Site Investigations for 100 Structures (Sub-contract)	LS	1	191 706	191 706	-	191 706	
27	Topographic & bathymetric surveys for 75 locations (Sub-contract)	LS	1	251 614	251 614	-	251 614	

28	Under-water Inspections for 50 structures and dewatering of 20 vents (Sub-contract)	LS	1	131 798	131 798	-	131 798	-
29	Technical workshop	U	1	1 997	1 997	-		1 997
30	Classic workshop	U	1	9 585	9 585	-	-	9 585
31	Reporting	LS	1	4 916	4 916	4 916		
32	Office rental & Communications	LS	1	9 831	9 831	9 831		
33	Car rentals & local flights	LS	1	24 578	24 578	-		24 578
34	Accommodation (Local - during site visits)	LS	1	14 747	14 747	14 747		
35	Accommodation (Foreign Lead Specialists)	LS	1	29 231	29 231	29 231		
36	International trips (Foreign Lead Specialist)	LS	1	11 692	11 692	11 692		
	Contingency 5% (2% price; 3% physical)				62 756	29 333	31 519	1 903
	Sub-Total Component 1				***1 255 113***	***586 663***	***630 387***	***38 063***
	Sub-Total Component 1 - EXCL CONTN				*1 192 358*	*557 330*	*598 868*	*36 160*
	Component 2: *Safety Evaluations and Development of DSS*							
37	Team Leader (Project Manager - Foreign)	mm	2	15 200	30 400	30 400		
38	Deputy Team Leader (Local)	mm	11	2 396	26 360	26 360		
39	Lead Specialist Foreign (Civil Engineer)	mm	4	12 350	49 400	49 400		
40	Lead Specialist Foreign (Electro-Mechanics)	mm	1	12 350	12 350	12 350		
41	Senior Professional Local (Economist)	mm	1	12 350	12 350	12 350		
42	Lead Specialist Foreign (Enviromentalist)	mm	1	12 350	12 350	12 350		
43	Lead Specialist Foreign (Geotechnical Engineer)	mm	2	12 350	24 700	24 700		
44	Lead Specialist Foreign (Hydraulics.)	mm	3	12 350	37 050	37 050		
45	Lead Specialist Foreign (Sociologist)	mm	1,5	12 350	18 525	18 525		
46	Lead Specialist Foreign (Structures/ Seismiology)	mm	4	12 350	49 400	49 400		
47	Senior Engineer Local (Civil)	mm	6	1 917	11 502	11 502		
48	Senior Engineer Local (Electro-Mechanics)	mm	2	1 917	3 834	3 834		
49	Senior Professional Local (Economist)	mm	1	1 917	1 917	1 917		
50	Senior Professional Local (Environment)	mm	6	1 917	11 502	11 502		
51	Senior Engineer Local (Geotechnical)	mm	8	1 917	15 336	15 336		
52	Senior Engineer Local (Hydraulics)	mm	8	1 917	15 336	15 336		
53	Senior Professional Local (Sociologist)	mm	6	1 917	11 502	11 502		
54	Senior Engineer Local(Struct/ Seismic)	mm	8	1 917	15 336	15 336		
55	Senior Developer Foreign (DSS)	mm	1	12 350	12 350	12 350		
56	Senior Developer Local (DSS)	mm	4	1 917	7 668	7 668		
57	Barrage Stability Analysis and Safety Evaluation Software	U	1	7 125	7 125	7 125		

58	Accountant (Local)	mm	11	240	2 636	2 636		
59	Procurement officer (Local)	mm	8	144	1 150	1 150		
60	4 Drivers (Local)	mm	66	96	6 326	6 326		
61	Draftman (Local)	mm	11	144	1 582	1 582		
62	Secretary (Local)	mm	33	240	7 908	7 908		
63	Data Entry Assistant	mm	1	959	959	959		
64	Technical workshop	U	1	1 997	1 997	-		1 997
65	Classic workshop	U	1	9 585	9 585	-	9 585	-
66	Reporting	LS	1	4 301	4 301	4 301		
67	Office rental & Communications	LS	1	8 602	8 602	8 602		
68	Car rentals & local flights	LS	1	21 505	21 505	-		21 505
69	Accommodation (Local - during site visits)	LS	1	12 903	12 903	12 903		
70	Accommodation (Foreign Lead Specialists)	LS	1	25 577	25 577	25 577		
71	International trips (Foreign Lead Specialists)	LS	1	10 231	10 231	10 231		
	Contingency 5% (2% price; 3% physical)				26 398	24 656	504	1 237
	Sub-Total Component 2				***527 956***	***493 127***	***10 090***	***24 739***
	Sub-Total Component 2 - EXCL CONTN				*501 558*	*468 470*	*9 585*	*23 502*
	Component 3: A) *Development of the Master Plan Model*							
72	Team Leader (Project Manager - Foreign)	mm	2	15 200	30 400	30 400		
73	Deputy Team Leader (Local)	mm	9	2 396	21 567	21 567		
74	Lead Specialist Foreign (Civil Engineer)	mm	4,00	12 350	49 400	49 400		
75	Lead Specialist Foreign (Electro-Mechanics)	mm	1,50	12 350	18 525	18 525		
76	Senior Professional Local (Economist)	mm	2,00	12 350	24 700	24 700		
77	Lead Specialist Foreign (Enviromentalist)	mm	1,50	12 350	18 525	18 525		
78	Lead Specialist Foreign (Sociologist)	mm	1,50	12 350	18 525	18 525		
79	Senior Engineer Local (Civil)	mm	6,0	1 917	11 502	11 502		
80	Senior Engineer Local (Electro-Mechanics)	mm	3,5	1 917	6 710	6 710		
81	Senior Professional Local (Economist)	mm	3,5	1 917	6 710	6 710		
82	Senior Professional Local (Environment)	mm	3,0	1 917	5 751	5 751		
83	Senior Professional Local (Sociologist)	mm	3,0	1 917	5 751	5 751		
84	Accountant (Local)	mm	9	240	2 157	2 157		
85	4 Drivers (Local)	mm	38	96	3 642	3 642		
86	Draftman (Local)	mm	5	144	719	719		
87	Secretary (Local)	mm	19	240	4 553	4 553		
88	Technical workshop	U	1	1 997	1 997	1 997		-
89	Classic workshop	U	1	9 585	9 585	-	9 585	-
90	Reporting	LS	1	2 765	2 765	2 765		
91	Office rental & Communications	LS	1	5 530	5 530	5 530		

92	Car rentals & local flights	LS	1	13 825	13 825	-		13 825
93	Auditing (MIC Funds)	LS	1	7 867	7 867		7 867	
94	Accommodation (Local - during site visits)	LS	1	8 295	8 295	8 295		
95	Accommodation (Foreign Lead Specialists)	LS	1	16 442	16 442	16 442		
96	International trips (Foreign Lead Specialist)	LS	1	6 577	6 577	6 577		
	Contingency 5% (2% price; 3% physical)				15 896	14 250	919	728
	Sub-Total Component 3A				**317 916**	**284 993**	**18 370**	**14 553**
	Sub-Total Component 3a - EXCL CONTN				302 020	270 743	17 452	13 825
	Component 3: B) *Preparation of a Capital Investment Project (Feasibility studies to tender documents)*							
97	Lead Specialist Foreign (Civil/Structural Engineer)	mm	4,5	12 350	55 575			55 575
98	Lead Specialist Foreign (Electro-Mechanics)	mm	2,5	12 350	30 875			30 875
99	Lead Specialist Foreign (Enviromentalist)	mm	3	12 350	37 050			37 050
100	Lead Specialist Foreign (Geotechnical/Seismology Engineer)	mm	2,5	12 350	30 875			30 875
101	Lead Specialist Foreign (Sociologist/Gender)	mm	2	12 350	24 700			24 700
102	Lead Specialist Foreign (Hydraulic Engineer)	mm	4	12 350	49 400			49 400
103	2 Drivers (Local)	mm	18	96	1 725			1 725
104	Draftman (Local)	mm	6	240	1 438			1 438
105	Secretary (Local)	mm	6	120	719			719
106	Reporting and reproduction of tender documents	LS	1	9 585	9 585			9 585
107	Car rentals & local flights	LS	1	9 000	9 000			9 000
108	Accommodation (Local - during site visits)	LS	1	3 594	3 594			3 594
109	Accommodation (Foreign Lead Specialists)	LS	1	14 250	14 250			14 250
110	International trips (Foreign Lead Specialists)	LS	1	9 975	9 975			9 975
	Contingency 5% (2% price; 3% physical)				14 672	-	-	14 672
	Sub-Total Component 3B				***293 434***	***-***	***-***	***293 434***
	Sub-Total Component 3B - EXCL CONTN				*278 762*	*-*	*-*	*278 762*
	Contingency 5% (2% price; 3% physical) ***Component 3***				*30 567*	*14 250*	*919*	*15 399*
	Sub-Total Component 3				**611 349**	**284 993**	**18 370**	**307 986**

	Sub-Total Component 3 - EXCL CONTN				580 782	270 743	17 452	292 587
	Component 4: Project Management							
111	Study Coordinator (Project Manager)	mm	7,2	300	2 157			2 157
112	Study Engineer	mm	18	204	3 666			3 666
113	Accountant (procurement)	mm	9	72	647			647
114	Driver	mm	36	60	2 157			2 157
115	Secretary	mm	36	60	2 157			2 157
116	Vehicle	U	1	11 982	11 982			11 982
117	Monthly operation cost of vehicle	LS/m	36	120	4 313			4 313
118	Office supplies	LS/m	36	120	4 313			4 313
119	Telecommunication costs	LS/m	36	48	1 725			1 725
120	Per diem*	LS/m	36	2 396	86 268			86 268
	Contingency 5% (2% price; 3% physical)				6 283			6 283
	Sub-Total Component 4				**125 668**			**125 668**
	Sub-Total Component 4 - EXCL CONTN				119 385	-	-	119 385
	Total Cost Excluding Contingencies				2 394 082	1 296 543	625 905	471 634
	Contingencies 5% (2% price; 3% physical)				126 004	68 239	32 942	24 823
	Total Cost Including Contingencies				**2 520 086**	**1 364 782**	**658 847**	**496 457**
	Percentages (%)					54,2	26,1	19,7

Annex 4: Activity Schedule

Detailed Activity Schedule: Egypt Hydraulic Structures Master Plan Study (1/2)

Component 1		Dur (m)	Duration (in months)																																														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Activ 0	Procurement of Consulting firm and activities to Grant Effec.	6																																														
Activ 1.01	Office setup and staff induction	1																																														
Activ 1.02	Determine data needs and initial design of a GIS	1																																													
Activ 1.03	Conceptual design of the GIS	3																																														
Activ 1.04	Procurement of GIS software	1																																														
Activ 1.05	Development of the GIS	4																																														
Activ 1.06	Data compilation, check and review the available data	4																																														
Activ 1.07	Entry of all available and acquired data	6																																														
Activ 1.08	Complete and test the Geographic Information System,	2																																														
Activ 1.09	Site visits, visual inspection, collect missing data	6																																														
Activ 1.10	Undertake topographic and bathymetric surveys(75 locations)	4																																														
Activ 1.11	Set priorities of all studied structures and get approval	1																																														
Activ 1.12	Plan the site investigation program for the structures.	1																																														
Activ 1.13	Undertake the site investigation program (100 structures)	9																																														
Activ 1.14	Above and underwater inspection of submerged parts (50 structures)	9																																														
Activ 1.15	Re-prioritize the studied structures and get approval from RGBS.	1																																														

Detailed Activity Schedule: Egypt Hydraulic Structures Master Plan Study (2/2)

Component 2			Duration (in months)																																									
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
Activ 2.01	Determine and review the available DSS software	1																■																										
Activ 2.02	Develop, test and verify the safety analyses modules	2																	■	■																								
Activ 2.03	Undertake safety evaluations for 200 structures : 50 by Consultant; 150 by MWRI staff.	12																			■	■	■	■	■	■	■	■	■	■	■	■												
Activ 2.04	Set rules and criteria for prioritizing rehabilitation / replacement	2																															■											
Activ 2.05	Design and develop the Decision Support System (DSS)	2																																■										
Activ 2.06	Test, verify the DSS and make the necessary modifications	1																																	■									
Activ 2.07	Re-prioritize the studied structures	1																																	■									
Activ 2.08	Select the top priority major barrage for the undertaking of feasibility studies & tender docs	1																																		■								
Component 3																																												
Activ 3.01	Feasibility Studies & Tender docs.	7																																			■	■	■	■	■	■	■	
Activ 3.02	Prepare itemized cost estimate for all required capital interventions	3																																			■	■	■					
Activ 3.03	Produce the Draft Master Plan based on all relevant activities	2																																						■	■			
Activ 3.04	Review the Draft Master Plan by stakeholders	1																																								■		
Activ 3.05	Update and issue the final Master Plan	1																																										■
Activ 3.07	Undertake the Strategic Environmental Assessment (SEA)	6																																				■	■	■	■	■	■	
Activ 0	Project Management Activities	42	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Arab Republic of Egypt
Ministry of Water Resources and Irrigation
Reservoirs and Grand Barrages Sector (RGBS)
Central Department for Studies, Specs and Design (CDSSD)
General Directorate for Design and Barrage Safety (GDDBS)

DRAFT TERMS OF REFERENCE (TOR)

For

The Consultancy Services of the

Preparation of a Master Plan on Rehabilitation/Replacement of Major Hydraulic Structures in Egypt

Tunis
August 2009

STUDY NAME:
PREPARATION OF MASTER PLAN ON REHABILITATION AND REPLACEMENT OF MAJOR HYDRAULIC STRUCTURES

FINANCING:
African Development Bank (Middle-Income countries' Fund) and the African Water Facility

EXECUTING AGENCY:
Ministry of Water Resources and Irrigation (MWRI) through the Reservoirs and Grand Barrages Sector (RGBS)

1.1

1. INTRODUCTION

1.1 BACKGROUND

1.1 Egypt is an arid country having a total land area of approximately one million square kilometers (1.0 M.km^2), of which only 4% is occupied by its population which has grown from 60 million in 1996 to 72 million in 2007 (National Water Resources Plan (NWRP), 2005). This rapid population growth has greatly affected the food security at all levels of the nation as well as availability of water resources in the country.

1.2 Agriculture sector in Egypt strongly depends on Nile River water that is limited to 55.5 BCM per year as determined in the Nile Water Treaty with Sudan in 1959. Nile River water constitutes more than 95% of the water resources in Egypt. In addition to that, Egypt faces water allocations and quality issues; therefore, the NWRP concluded that it is also important to enhance water allocation, conservation and protection through an effective legal framework.

1.3 Due to water scarcity, the role of the control structures on the Nile and the irrigation network became of high importance to save each drop of water and release the required flow discharge in the right time. This implies that the control structures (dams, barrages, regulators, weirs, and navigation locks) should be in a good operational condition to achieve the desired efficiency. A challenge arises since most of the operational control structures in Egypt are quite old as they were built in the late 19th or early 20th century. Along this extended lifetime, these structures have been affected by weathering, changes in loading conditions, creep, fatigue, etc. in a way that has deteriorated their functionality, safety and stability.

1.4 To face this challenge, the Ministry of Water Resources and Irrigation (MWRI) is implementing a programme of rehabilitation and replacement of the old main barrages and regulators. This programme includes:

- The construction of Damietta Dam replacing Faraskour Dam on Damietta branch of the Nile in 1989,
- The construction of new Esna Barrage replacing old Esna on the Nile in 1994,
- The construction of new Shubra Bas intermediate regulator replacing the old one on Al-Baguria canal at middle delta region in 1997.
- Construction of Al-Menofi Head Regulator, replacing the old in 2008,
- Construction of Al-Tawfiki Head Regulator, replacing the old one in 2008,
- Construction of the New Naga Hammadi Barrage, replacing the old one on the Nile in 2008,
- Construction of the New Abassi Head Regulator, replacing the old in 2008, and
- Construction of the New Assiut Barrage on the Nile, replacing the old one due to be completed in 2015.

1.5 For other major hydraulic structures (such as barrages on the Nile and its branches, regulators on main canals, navigational locks, submerged weirs, and dykes), the MWRI plans to develop a Master Plan for all of the major structures to assess their current conditions and recommend future remedial actions if needed.

1.6 It should be noted at this stage that the construction, rehabilitation and maintenance of major structures lie under the authority of the Reservoirs and Grand Barrages Sector (RGBS) within MWRI, whilst the operation of, almost, all structures and maintenance of small ones are under the authority of the Irrigation Sector.

1.7 Different degrees of studies and investigations have been carried out on the considered structures through their lifetime. Up-to-date documentation of these studies and investigations is

available for reading and reviewing at the MWRI.

2. PURPOSE OF THE STUDY

2.1 Egypt is an arid country extending over a million square kilometers with sole and limited water resource coming from the Nile River that is being shared among other Nile basin riparian countries. As a result, its agriculture sector depends mainly on the Nile water for irrigation. The operational control structures (dams, barrages, regulators and weirs) should ideally function efficiently to save water and optimize flow discharge. Most of these infrastructures are very old; most of which have been built in the late 19^{th} and early 20^{th} century. Throughout their extended lifetime, these control structures have been affected by weathering, changes in loading conditions, creep, and other wear and tear effects that deteriorated their functionality, safety and stability.

2.2 The proposed study will contribute to the implementation of the National Water Resources Plan (2004) and the Integrated Water Resources Management Strategy of Egypt (2004-2017). It will provide an integrated plan until 2050, for the rehabilitation/replacement of control structures to improve the efficiency and safety of the irrigation network along the Nile by improving water distribution and allocation and reducing the risk of flooding in case of structures' failure. Specifically, the study will result in (i) building a database of hydraulic structures in the Nile Valley and Delta in Egypt; (ii) developing a comprehensive prioritized list of all major hydraulic structures describing detailed remedial actions required for each structure, and (iii) the preparation of an investment plan for the rehabilitation and replacement of major hydraulic structures in Egypt up to the year 2050.

2.3 The Study will produce plans for efficient management of capital investment projects for the rehabilitation or the replacement of hydraulic control structures as well as for the mobilization of resources required for these investments. In this regard, the GoE is the main beneficiary of this study with other direct beneficiaries represented by the Ministry of Water Resources and Irrigation, Agriculture and Transports sectors. The ultimate beneficiaries of the outcomes of the study include millions of farmers who depend on Nile River water for irrigation for their livelihood and who stand to benefit from the implementation of the recommendations of the study as regards the efficient allocation and distribution of water and the protection of farmlands and lives from floods.

3. RATIONALE FOR A MASTER PLAN STUDY

3.1 The Ministry of Water Resources and Irrigation has decided to undertake a Master Plan study for the rehabilitation and or replacement of Egypt's major hydraulic structures in the Nile Valley and Delta because most of the major hydraulic structures have deteriorated over time (100 – 150 years old for some).The study is also motivated by the need to respond to the constraints of water scarcity as well as the necessity of the proper management of Nile Water to ensure the reduction of water losses and improve efficiency in water allocation and distribution. The study will respond to Pillar 2 of the Integrated Strategy of the Water Resources management as indicated in the National Water Resources Plan (2004 – 2017).

3.2 The purpose of the Master Plan (MP) is to contribute to the overall River Nile water resources management by producing a decision support model for the improvement of structures' operation and efficiency of water allocation and distribution. The MP will produce a detailed description of the necessary measures and remedial actions to be undertaken for the selected 200 major existing structures, estimate costs and time schedules for interventions on these structures up to the year 2050, taking into account current and any anticipated future socio-economic and environmental changes. The MP study will also prepare a detailed feasibility study including detailed designs and tender documents for one large structure requiring an immediate rehabilitation or/and replacement intervention. The number of structures to be studied in detail is limited to one, due to budgetary constraints.

3.3 The study will provide a plan that aims at raising the efficiency of the major control structures along the Nile. The concerned stakeholders and beneficiaries that benefit from the Master Plan comprise a large pool of Government institutions e.g. concerned Ministries and departments (MWRI, RGBS, etc…), Agricultural sector, Industrial sector, Domestic locales, and the Transportation sector as well as an estimated 35% of the population of the country which directly benefit from Nile River water.

4. OBJECTIVES OF THE STUDY

The study equally aims at assisting the Government in its integrated approach to Nile Water Resources Management through efficient distribution and allocation of water. The Study will deliver the following outputs that will lead to the preparation to a dynamic Master Plan:

- Develop a database of the 200 selected hydraulic structures in the Nile valley and Delta in Egypt and classify the major structures based on certain criteria to be considered under the Master Plan study,
- Develop a comprehensive prioritized list of the selected hydraulic structures including a schedule for undertaking required remedial actions for each structure.
- Prepare a Master Plan for rehabilitation or replacement of major hydraulic structures in Egypt up to the year 2050, and develop a feasibility study for the rehabilitation/replacement for a large and an intermediate structure.

Study also includes the preparation of a capital investment project for the top priority large structure through the undertaking of feasibility studies, detailed designs and the preparation of tender documents.

4.2 The development of the Master plan will comprise many activities. The study will require specialists in different disciplines such as Information Technology, Engineering, Economics and physical and \ or numerical Modeling. It is anticipated that all of these activities will be conducted by a single multi-disciplinary consulting firm, for operational efficiency.

5. DESCRIPTION OF THE STUDY

5.1 Study Design and Formulation

The proposed study will include the investigation of the 200 hydraulic structures considered for the Master Plan. These structures are under the jurisdiction of the MWRI located on the Nile Valley and Nile Delta of Egypt. The study area covers the location of the following structures:

- 11 Main barrages on the Nile River
- 21 Head regulators at the off-takes of canals from the Nile
- 44 Intermediate regulators within Major canals
- 124 smaller structures located within irrigation canals

Appendix 3 shows an indicative list of the Main structures under consideration in this study.

5.2 The study is designed in three interrelated phases namely; (i) Site Investigations and Development of a Geographic Information System (GIS) database, (ii) Safety Evaluations and Development of a Decision Support System and (iii) Development of a Master Plan and Preparation of detailed designs for one priority major structure. A single Engineering Consulting firm will recruited to carry out the study, utilizing the expertise of foreign and local experts as well as the services of sub-

contractors for specialized investigation of structures (dewatering, drilling…).

5.3 The executing agency for the project is the Ministry of Water Resources and Irrigation (MWRI) represented by the Reservoirs and Grand Barrages Sector (RGBS). The RGBS shall be the focal point between the executing agency MWRI and the Consultant and will monitor the Consultant's activities and performance. The Consultant shall also interact and co-ordinate with other institutions such as the AfDB, MWRI's Institutions, etc.

6. DESCRIPTION OF THE MASTER PLAN STUDY PHASES

6.1 Introductory Remark:

While every attempt has been made to outline the project tasks and activities in detail, the Consultant should note that the list of tasks and activities is by no means exhaustive. The Consultant will be given certain latitude to critically verify the proposed scope of services and to use best professional judgment to propose revisions and improvements when deemed necessary in the course of proposal preparation. It is understood that the Consultant shall perform all work as necessary to fulfill the objectives of the Study. All the activities shall be carried out as per the latest applicable and relevant codes approved in Egypt and established best practices, guidelines and criteria.

6.2 Scope of the Assignment: In order to achieve its objectives and deliver the required outputs, the Master Plan Study shall proceed in three phases. The list of activities in each phase describes the investigations, analyses, design considerations and calculations to be carried out in order to achieve the objectives of the study. Hereafter is a detailed description of activities to be performed by the consultant under each phase.

6.3 Description of Services

6.3.1 Phase I: Data Collection, Site Inspections, investigations and surveys (Duration 16.5 months)

6.3.1.1 The main task in this phase of the study will be collecting relevant data of the considered structures such as their history, drawings, design criteria etc... This phase also involves the assessment of data and information needs and full design of a geographic information system (GIS) database to handle the data. An estimate of professional and supporting person-months required for this phase is presented in Appendix 2. Below is a list of activities that will be undertaken by the consultant in this phase:

- Activity 1.01 Office setup, staff induction, desk review of all existing project related documentation and preparation of the Project Inception Report including a full proposed study methodology. The inception report will also indicate if additional data is needed and suggest an approach to acquire this data. The inception report will be submitted one month after the start of this phase
- Activity 1.02 Carry out user analysis and determine data requirements for the Geographic Information System database that will be used for storing and utilization of the project data.
- Activity 1.03 Undertake an initial conceptual design of the Geographic Information System (GIS) database.
- Activity 1.04 Procurement of items needed for the conceptualized Geographic

Information System database.

- Activity 1.05 Development of the structure of the Geographic Information System database, ready for the entry of structured datasets. The Consultant will link this GIS database, located at the RGBS, to the existing GIS server and GIS operating system located in the Planning Sector of the MWRI. The Consultant will work with the Planning sector and take measures to ensure the compatibility of the system to be developed with the existing GIS operating system and GIS server.

- Activity 1.06 Data compilation, check and review the available data (structural drawings, tech. reports, previous rehabilitations…) and collect available data.
- Activity 1.07 Entry of all available and all acquired data under the study such as inspection results, technical reports, social and environmental study results, drawings, photos, video, etc… in the Geographic Information System database.

- Activity 1.08 Complete and test the Geographic Information System database, create access levels for the different users and provide a concise technical documentation explaining the developed system together with user and programmer manuals.

- Activity 1.09 Site visits, visual inspection, collect missing data (structural, social, economical, environmental, etc …) as much as possible, and report existing apparent conditions of each structure. It should be noted that more than one structure could exist in one location. It's anticipated that the consultant will visit up to 75 locations, in which the 200 structures are found.

- Activity 1.10 Undertake topographic and bathymetric survey for up to 75 locations in which the 200 structures are found.

- Activity 1.11 Set priorities for intervention on all studied structures based upon, for example, structure performance assessment, importance … etc. and get approval from RGBS.

- Activity 1.12 Prepare a program for the site investigation for the structures to be inspected in detail.

- Activity 1.13 Undertake the site investigation program to fulfill data requirements for up to 100 structures, following the priority list.

- Activity 1.14 Undertake above and underwater inspections of submerged parts of the structures to inspect their integrity, for up to 50 structures and to complete any missing data where needed, including dewatering of one vent per structure for up to 20 suspected structures.
- Activity 1.15 Re-prioritize the studied structures based upon output of activities 1.13 & 1.14 and get approval from RGBS.

- Activity 1.16 Organise stakeholders/donors' workshop/conference to validate the results of this phase of the study.

6.3.1.2 **Main Deliverables of Phase I**: The Consultant will submit the following main deliverables

under this phase:

i. The Project Inception Report;
ii. A functional GIS database with all available and acquired data entered and linked to the GIS server of the Planning Sector of the Ministry;
iii. A report on the site visit of the 200 structures, including topographic and bathymetric surveys;
iv. A report on the detailed investigation of up to 100 structures;
v. An SEA and Climate Change risk assessment report
vi. The Consultant will equally submit the stakeholder workshop/conference report for the validation of the results of this phase of the study.

6.3.2 Phase II: Performing of Safety Evaluations on 200 structures, on the job training of RGBS staff on Safety Evaluations, and the development of a DSS (Duration 16.5 months)

6.3.2.1 The scope of work of this Phase involves development of the Decision Support System (DSS) by the consultant through the elaboration and integration of appropriate analytical tools in the GIS database developed in Phase I. Under this phase, the Consultant will equally perform safety evaluations on the existing structures with the assistance of the RGBS staff. The consultant will be responsible for evaluation of fifty (50) structures included in the priority list of structures and the safety evaluation of the rest of the studied structures shall be undertaken by the RGBS staff under the consultant's supervision. This phase will also be devoted to the identification of the input, output, and the methodology to be applied in the safety analyses modules to be developed to check the design and safety of the existing structures as well as to assess the risks associated with the operation of these structures.

Below is a list of activities that will be undertaken by the consultant under this phase**:**

- Activity 2.01 The development of safety analyses modules for hydraulic structures based on appropriate software. Purchase of the most suitable software package for the project.
- Activity 2.02 Develop, test and verify the safety analyses modules and make necessary modifications / adaptation. In addition to, providing user and programming manuals.
- Activity 2.03 Select the fifty (50) structures to be analyzed by the Consultant and get approval from RGBS. Afterwards, undertake stability and safety evaluation of the 50 selected structures, taking into consideration the previous and existing safety and stability analysis and maintenance, work as well as the existing operating conditions. The Consultant will effectively train the MWRI staff on the undertaking of stability and safety evaluations on the 50 structures assigned to the Consultant. The consultant will equally verify and validate the results of the safety evaluation work to be carried out by the trained MWRI staff on the remaining 150 selected structures.
- Activity 2.04 Set rules and criteria for prioritizing rehabilitation / replacement projects.
- Activity 2.05 Design and develop the Decision Support System (DSS) based upon the rules and criteria developed in activity 2.04.
- Activity 2.06 Test, verify the DSS and make the necessary modifications / adaptations that enable this system to be used as a dynamic tool for planning.
- Activity 2.07 Re-prioritize the studied structures according to the developed rules and criteria, as in activity 2.05.
- Activity 2.08 Select the top priority major barrage for the undertaking of feasibility studies, detailed

designs and the preparation of tender documents.

- Activity 2.09 Organise stakeholders/donors' workshop/conference to validate the results of this phase of the study.

6.3.2.2 **Main Deliverables of Phase II**: At the end of this phase the Consultant will submit a report incorporating the results of the safety and stability analysis, risk assessment of the evaluated structures and the design and delivery of a tested and functional GIS based DSS. The Consultant will equally submit a report on his evaluation of the on-the-job training and performance of the MWRI staff in carrying out safety evaluations. The Consultant will also submit the stakeholder workshop/conference report for the validation of the results of this phase of the study.

6.3.3 Phase III: Preparation of the Master Plan and the Capital Investment Project (Duration 9.5 months)

6.3.3.1 The scope of work of this phase involves the development of a master plan model to manage the maintenance of the hydraulic control structures for an optimum use of Egypt's water resources. The efficiency of water use and actual water requirements in the command area of each hydraulic structure should be taken into account in the design of new structures and measures taken to improve the overall efficiency of the irrigation control system in the interventions proposed under the Master Plan. The feasibility studies, the detailed designs and preparation of tender documents will equally be undertaken under this phase for the top priority large structure selected at the end of Phase II. The feasibility studies, the detailed designs and preparation of tender documents will be undertaken in accordance with the following Terms of Reference included in Appendix 1:
Appendix 1B: Terms of Reference for the Environmental and Social Impact Assessment (ESIA) of the Capital Investment Project to be prepared;
Appendix 1C: Terms of Reference for the Technical Feasibility Studies of the Capital Investment Project to be prepared; and
Appendix 1D: Terms of Reference for the Economic and Financial Analysis (EFA) of the Capital Investment Project to be prepared.

Below is a list of activities that will be undertaken by the Consultant under this phase**:**

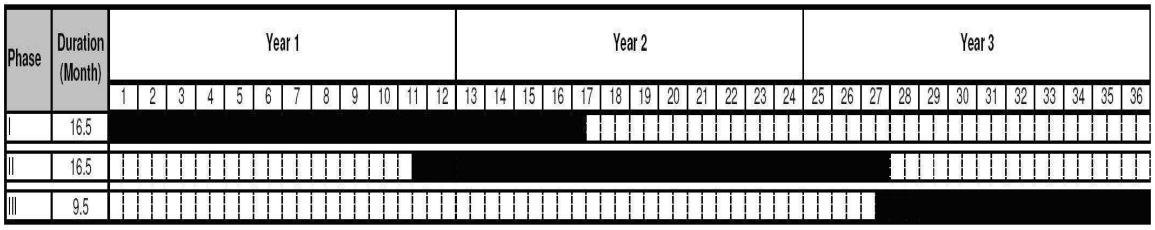
Activity 3.01	Determine the appropriate measures (e.g. replacement, rehabilitation, maintenance, further studies, etc …) to be implemented for each structure within the study and the approximate date for the proposed intervention to be carried out. Integrate this information for each structure into the GIS-based DSS to develop the Master Plan model.
Activity 3.02	Prepare itemized cost estimates for the measures required for each structure within the study. The itemized cost estimate should be in a format that allows RGBS staff to easily update them as required. Equally integrate this information for each structure into the GIS-based DSS to develop the Master Plan model further.
Activity 3.03	Produce the Draft Master Plan model based on all relevant activities and data in the project phases.
Activity 3.04	Review of the Draft Master Plan model by stakeholders

Activity 3.05	Revise and issue the final Master Plan model taking into consideration stakeholders' feedback.
Activity 3.06	Undertake the feasibility studies, the detailed designs and preparation of tender documents for the top priority large structure selected at the end of Phase II. These detailed studies will be undertaken in accordance with the Terms of Reference included in Appendix 1B, 1C and 1D.
Activity 3.07	Undertake the Strategic Environmental Assessment (SEA) and climate change risk assessment for the implementation of the Master Plan. The SEA study will be carried out in accordance with the Terms of Reference included in Appendix 1A. Over the planning horizon of the project, 2050, the SEA information integrated it the Master Plan should permit decision makers to be aware of the cumulative impacts of the different intervention programmes envisaged under the Master Plan as well as draw their early attention to potential environmental and social problems that might result from the implementation or the non-implementation of any particular envisaged programme. This activity could be commenced at the beginning of this phase of the study.
Activity 3.08	Organise stakeholders/donors' workshop/conference to validate the results of the entire study and mobilize resources for the implementation of capital investments

6.3.3.2 **Main Deliverables of Phase III:** At the end of phase 3, the Consultant will submit a functional Master Plan model and the related documentation, reports and models as well as the feasibility study report, detailed designs and tender documents for the prepared capital investment project. The Consultant will equally submit the final stakeholder workshop/conference report.

7. IMPLEMENTATION SCHEDULE

The estimated total time for carrying out the study is 36 months as shown below in the following chart.



The Consultant shall also propose a complete work plan and implementation schedule specifying activities, duration and professionals to be deployed for each activity. Provisions for local administrative and field support staff have to be included and reflected in the work plan and implementation Schedule. The Consultant shall also provide a detailed personnel assignment schedule for the execution of the project, including any support deemed necessary from the Consultant's Head Office.

8. DELIVERABLES' SCHEDULE

The following reports should be prepared and submitted by the Consultant – in both hard and soft

forms to RGBS in the associated time, belonging to the implementation schedule of the relevant activity.

No.	Deliverables	Submittal date	No. of draft copies	No. of final copies
1	Project Inception Report	One month from Study commencement.	5	5
2	Monthly Progress Report	End of each month	5	5
3	Report on data requirements and the initial conceptual design of the GIS database.	End of Activity 1.03	5	5
4	Report on data and information entered into the GIS database and hand over of the GIS to RGBS.	End of Activity 1.17	5	5
5	**Issue of Phase I Report *** *(components of the report include reports on the deliverables listed in section 6.3.1.2 ii) to vi)*	End of Activity 1.17	15	15
6	Report on safety and stability analysis of the studied structures.	End of Activity 2.03	10	10
7	Report on risk assessment of the evaluated control structures and on the performance assessment of the MWRI staff on the undertaking of stability analysis and safety evaluations on hydraulic structures.	End of Activity 2.03	5	5
8	Report on criteria rules for prioritizing required remedial actions.	End of Activity 2.04	10	10
9	Report on the conceptual design of the DSS, user, programmer manuals and the final output of the DSS for the current situation and hand over DSS system to RGBS.	End of Activity 2.05	10	10
10	Report on the prioritized list of the hydraulic control structures and the selected major hydraulic structure for the preparation of a capital investment project.	End of Activity 2.08	5	5
10	**Issue of Phase II Report *** *(components of the report include reports on the deliverables listed in section 6.3.2.2 and items 6 to 10 on this table.)*	End of Activity 2.09	15	15
11	Report on existing conditions of the studied structures, future operational requirements and remedial actions required for these structures.	End of Activity 3.01	10	10
12	Report on available resources and prediction of future resources	End of Activity 3.02	5	5
13	Draft report of the Master Plan model based on the DSS	End of Activity 3.03	15	15
14	**Final Master Plan model Report(s) *** *(components of the report include reports on the deliverables listed in section 6.3.3.2 and items 11, 12 and 15 on this table.)*	End of Activity 3.05	20	20
15	**Feasibility Study Report, Detailed Designs and Tender Documents.**	End of Activity 3.06	5	5

* Proposed table of contents of these reports is in Appendix 4.

9. CONSULTANT'S OBLIGATIONS DURING THE STUDY

9.1 General Remark:

The Consultant shall in all professional matters provide the services to the Employer to the best of his knowledge and belief. The Consultant shall exercise all his skills, reasonable care and diligence in the discharge of his duties under this Contract. He shall carry out the services in conformity with common professional practices and in accordance with current scientific and generally accepted engineering standards. The Consultant shall perform his services under the Employer's supervision and control. The Consultant shall also be responsible for the following:

9.2 Training

The Consultant shall be responsible for providing the following training activities:

1. On-the-job training
   This will be carried out during the day to day work activities throughout project duration. Based upon the performance of RGBS staff, the consultant will evaluate and assess their additional training needs and submit a report explaining the strengths and weaknesses of RGBS noticed during the work. It's anticipated that up to 50 % of the trainees will be females.

2. Knowledge Transfer Technical Workshops
   The consultant will be responsible for organizing and holding three technical workshops within the project duration to transfer knowledge between the project team and RGBS staff to train staff on noticed weaknesses during the undertaking of the stability and safety analyses and evaluations on the 50 hydraulic structures assigned to the Consultant.
   The expected training modules include:
   - Geographic Information System operation and maintenance;
   - Structural and stability analysis of hydraulic structures;
   - Assessment of proposed remedial actions (rehabilitation/ maintenance/replacement etc.) for the hydraulic structures;
   - Selection of appropriate construction materials;
   - Risk assessment of the hydraulic structures;
   - Socio-economic and environmental impact assessment for envisaged interventions on the hydraulic structures;
   - Decision Support System operation and maintenance.

   It is anticipated that the number of trainees will be about of 20 and will come mainly from the central and external services of the MWRI.

9.3 Workshops

Based on the stakeholder analysis to be carried out by the Consultant under the SEA and EIA studies, the Consultant shall advise the MWRI on the most relevant stakeholders to be invited to the workshops and shall organize and hold:

- A workshop for up to 60 attendees involving stakeholders to receive feedback on data collection and initial prioritization of the studied structures. This workshop shall be held after finalizing activity 1.16 (near the end of Phase I).
- A workshop for up to 60 attendees involving stakeholders to obtain feedback on stability, structural analysis and prioritization of the studied structures. This workshop will be held 0.5 month prior to the end of phase II.
- A workshop for up to 60 attendees involving stakeholders and donors to discuss the draft Master Plan and the prepared feasibility study in order to make any required modifications/amendments. This workshop shall be held after finalizing activity 3.03.

In order to foster Regional Cooperation and Knowledge Sharing, Experts from Nile Basin countries and from various international institutions, active in the water sector, will be invited to attend these workshops.

9.4 Consultant's Office & Site Accommodation

The Consultant shall be responsible for:

- renting suitable office in Cairo for the whole period of the study;
- office operation including cleaning, electricity, water, heating, air conditioning and all office consumables;

- provision of accommodation and subsistence to his staff during the site visits and investigations that will be undertaken at the different locations of the project.

9.5 Local Transport

Local Transport is determined by the Consultant's logistical approach to the project as presented in his *Technical Proposal* and to be included in the Consultant's Financial Proposal as:

- Renting of vehicles, as a lump sum item
- Local flights

10. EMPLOYER'S OBLIGATIONS

The Employer will provide free of charge all existing information, data, reports and maps as far as available from the MWRI and its organizations to the Consultant. The Employer will assist the Consultant in obtaining other relevant information and materials from governmental institutions and state authorities as far as possible. The Consultant has to review the accuracy and completeness of the information provided.

11. INSTRUCTIONS FOR BID PREPARATION AND SUBMISSION

11.1 Levels of Effort and Participation of Domestic Professionals

The level of participation of domestic professionals in the Consulting Firm's proposed team for the study will be an important criterion in the evaluation of the technical offer of the firm. The profiles required for the expatriate and the domestic professionals in given in Appendix 2. The estimated levels of effort for the domestic and the expatriate professionals in the Consultant's team are shown in the table below:

Professional	*N° of Staff-Months*	
	Expatriate	*Domestic*
Team Leader & Deputy Team Leader	6	36
Civil Engineer	16,5	28
GIS System Analyst and Developer	2	4
Electromechanical Engineer	8	11,5
Hydraulics Engineer	10	8
Environmentalist	9,5	15
Geotechnical Engineer	6,5	18
Sociologist/Gender Expert	9	15
Institutional Expert	1	3
Seimologist	4	8
DSS Analyst and Developer	1	4
Economist	3	7,5
Total	*76.5*	*158*

The total level of effort of the domestic professionals will be about 158 staff-months and this is estimated to represent about 25% of the total cost of the Consulting firm's staff time input into the study.

11.2 Scope and Content of Technical Proposal

The technical proposal shall contain:

- A detailed critical analysis and the Consultant's interpretation of the Terms of Reference (TOR). The Consultant is encouraged to present critical comments and suggestions on the TOR, if any, especially if they relate to project outcomes.

- Conceptual approach and methodology proposed to carry out the required services.

- Organizational and logistical aspects of the project, including an organization chart, time and staffing schedules indicating staff-month input, duration and deployment details (field and home office assignment) of Consultant's expatriate and local staff.

- Details on the composition, selection, administration and experience of the proposed team (including the envisaged personnel for home office support), together with description of tasks to be assigned to each professional.

- A detailed description of tasks to be performed by the Consultant and those assumed to be contributed by others (i.e. RGBS). It is presumed that the Consultant is familiar with all local physical, technical and logistical conditions which might influence the performance of work.

11.3 Modality of Payment of Fees

- The Consultant shall make his quotations in EURO (€) and where applicable in local currency (LE). The validity of the Consultant's offer should be 6 (six) months from the closing date.

- The Consultant shall assume for the preparation of his Financial Proposal that payments will be made in the following sequence:

Payment	**Percentage (%)**	**Deliverable**
Advance Payment	10	Contract signature and letter of Guarantee
First Interim Payment	10	Inception Report
Second Interim Payment	10	GIS system and manuals
Third Interim Payment	20	Phase I Reports
Fourth Interim Payment	10	DDS system and manuals
Fifth Interim Payment	20	Phase 2 Reports
Sixth Interim Payment	10	The Draft Final Master Plan
Final Payment	10	The Final Master Plan

APPENDIX 1A: Terms of Reference for the Strategic Environmental Assessment (SEA) of the Master Plan.

1. Introduction

The framework for the management of water resources in Egypt is defined in two policy documents, namely the National Water Management Plan (NWRMP) and the Integrated Water Resources Management Plan. These policy documents identify efficiency in allocation, distribution and use of water as well as the protection of the environment and the Nile River from pollution as the major challenges in the management water resources in Egypt. Inefficiencies in water use, distribution and allocation are aggravated by the poor hydraulic performance of a large number of hydraulic structures in the country. With the increased likelihood of structural failures that could result due to the aging and the deterioration of the structures as well as from earthquake risks, the populations which live and carry out agricultural activities within the respective command areas of the structures are at risk of flooding. The main source of pollution is domestic water use which results in an annual discharge of about 3.8 billion m³ of waste water into the Nile, of which only 35% is treated[15]. Industrial effluents contribute about 1.3 billion m³ per year of untreated waste water discharged into surface waters. The GoE is responding to the challenges identified in these policy documents by preparing a Master Plan to the horizon of the year 2050 for the rehabilitation or replacement of the priority hydraulic control structures in the country. The GoE is equally facing these challenges by elaborating a legal framework for the protection of the environment and the Nile River and adopting strategies such as the National Program for Water Quality Management and Water Reuse which aims at introducing modern pollution management techniques into the water sector. In order to incorporate environmental and social considerations in the planning process, and to assess any significant cumulative environmental and social consequences that the interventions to be proposed under the Master Plan might have and to formulate appropriate mitigation measures, a Strategic Environmental Assessment (SEA) for the Master Plan will be carried out under this study.

2. Objective

The objective of the Strategic Environmental Assessment is to incorporate environmental considerations and assess the likely significant environmental and social effects (risks and opportunities) of the implementation of the Master Plan. The SEA will also propose improved arrangements for the evaluation of the ESIA reports to be prepared for specific programmes and projects to be implemented under the Master Plan. Similarly, the procedures should enable the ESIAs to be increasingly designed to prevent negative impacts by anticipatory and pro-active sector analysis, instead of only reacting to project proposals that are considered in isolation from the broader sector.

3. Approach

Up-streaming environmental considerations: The SEA aims to upstream environmental considerations in the planning practice, thus providing inputs for consideration at appropriate times during the implementation of the Master Plan. The SEA process will be conducted in a participatory manner and will involve consultations with the main stakeholders in the water and agriculture sectors.

4. Scope of Work

Scenarios and alternatives: the SEA should generate the decision alternatives for analysis in close deliberation with the decision-makers and all the relevant stakeholders, through applying a scenario analysis for instance. A risk and impact analysis ensuring a proper identification and analysis of environmental and social pressures and impacts of the various alternatives should be undertaken. The following tasks will be carried out under the SEA of this Master Plan:

[15] Egypt: 2005 IWRM Plan §2.3

Task 1: Situation Analysis and Assessment of Environmental and Social Priorities

The consultant will undertake screening and scoping exercises and formulate sustainability indicators for the SEA. The consultant will further identify the SEA's priorities by an analysis of environmental and social issues in the Nile Valley and Nile Delta and priority environmental and social concerns of stakeholders. Key environmental and social issues will be selected out of a literature review and expert judgment on existing studies and knowledge on natural hazards, climate change risks, water and land pollution originating from different activities, to address the population's needs such as potable water supply, waste water management and agricultural production. Using environmental and social valuation techniques and distributional analysis tools and public participation methods the consultant will identify environmental, distributional and other social priorities in the water and agriculture sectors and how these will be influenced by the implementation of the Master Plan. The analysis will include the assessment of the current state of the institutions relevant for this SEA and ESIA regulations, gaps and problem areas pertaining to their implementation, the likely evolution thereof without implementation of the Master Plan, and the relationship between the Master Plan and other relevant plans and programs under implementation or envisioned for implementation. Stakeholders' priority concerns will be identified through consultations and workshops. The "social" assessment will cover notably resettlement and land acquisition, particularly in the case of the reconstruction of major barrages, and the impacts of the implementation of the Master Plan on vulnerable groups, such as the poor and women. A health and safety evaluation of irrigation activities in the areas covered by the Master Plan will also be carried out by the consultant under this task. The consultant will formulate recommendations for the mitigation of expected negative impacts of the implementation of the Master Plan.

Task 2: Stakeholder Analysis

The consultant will identify the key public and private stakeholders, analyse their interests and incentives for water resources and agricultural development and management and review the role, mandate and linkages of the various institutional stakeholders of the water and agriculture sectors. A cross-section of the 2100 Water Users Associations (WUAs) in the country will be consulted by the Consultant. The stakeholder analysis will inform the whole SEA process and focus on two different moments:
(i) when the SEA report is being prepared prior to the definition of the specific programmes or projects under the Master Plan, and (ii) during the implementation of the SEA recommendations. In the latter, the analysis will focus on those stakeholders that can capture the planning process for their benefit. Actions needed to avoid the materialization of this situation will be identified.

Task 3: Assessment of Transmission Mechanisms from Master Plan to Environmental Priorities

The analysis will be carried out in a two-pronged approach. On the one hand, it focuses on the potential effects of the Master plan implementation on environmental and social priorities, including biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the linkages between them. This will also include analysis of gaps in addressing environmental priorities such as the protection of surface water from pollution. On the other hand, the assessment will analyze the effects on environmental and social priorities resulting from the ability of some stakeholders to influence and sometimes distort the effective implementation of plans to protect vested interests. It is recommended that the Consultant employs methodologies such as multiple criteria analysis that will enable him carry out the assessments in a holistic manner. The assessment will focus on likely significant effects exclusively, prioritizing those effects that are significant in all or most of the scenarios considered in the Master Plan. These effects will be selected in collaboration with the MWRI.

Task 4: Assessment of Institutional and Governance Weakness

The SEA will assess the institutional and governance capacity to manage priority environmental and social risks. Issues to be considered in the assessment will comprise (i) intra and inter-institutional planning coordinating mechanisms; (ii) institutional capacity to identify priorities, in general, and environmental and social priorities, particularly; (iii) ability to adapt planning processes to changing priorities; and (iv) monitoring and enforcement capacity. Key issues to be considered will be the transparency of planning processes, accountability of decision makers and existing mechanisms to resolve controversies i.e., access

to the judiciary for environmental damages. The SEA will propose institutional measures and procedures to further strengthen the Environmental Impact Assessment (EIA) process applied to water and agriculture sector interventions.

Task 5: Institutional, Financial, Governance and Monitoring Plan
The SEA will formulate concrete proposals for the short, medium and long term to be incorporated in the formulation and implementation of the Master Plan. This will include a quantification of the resources needed to implement these recommendations and the formulation of a monitoring and evaluation plan involving the participation of multiple stakeholders. The monitoring plan will ensure that mitigation measures are implemented if unforeseen effects occur and also that agreed upon mitigation measures are actually carried out.

Task 6: Dissemination
The SEA draft report and recommendations will be validated in a workshop that will convene sectoral and nation wide stakeholders. A final dissemination meeting will be carried out to present to the stakeholders the SEA final report, recommendations, monitoring and evaluation plan.

5. Public Participation Process

A participatory plan and timeframe for the SEA process will be established to consult with and involve, as needed, various organizations, stakeholders and the public. In addition to determining their concerns and priorities on the environmental and social issues related to the implementation of the Master Plan, the participatory process should contribute to institutional strengthening and improved governance. This process will provide SEA stakeholders, especially weak and vulnerable ones, with a dialogue platform to discuss water and agriculture management issues and will also provide direction to the SEA.

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6. Proposed staffing and area of expertise

It is proposed that the team will consist of a:

- Team leader with broad expertise in Environmental Assessments and Water Resources Management
- Supported by a team of consultants with expertise in the following areas:
- International expertise in Strategic Environmental Assessments;
- Expertise in Social Impact Assessment;
- Water Resources Management/Irrigation systems development expertise;
- The consultant will implement the assignment preferably in cooperation with experienced national NGOs.

7. SEA and ESIA Guidelines

The consultant will use guidelines provided in the following documents obtainable from the internet:

- http://www.adb.org/Documents/Guidelines/Environmental_Assessment/Strategic_Environmental_Assessment.pdf
- http://www.afdb.org/en/topics-sectors/sectors/environment/ http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Climate Risk Management and Adaptation Strategy_CRMA.pdf.
- Strategic Environmental Assessment for Policies (The World Bank)
- The African Development Bank (AfDB) IESIA Guidelines (2003); the AfDB ESA Procedure (2001); the AfDB Gender Policy (2001); the AFDB Involuntary Resettlement Policy (2003).
- **Other Requirements**: The consultant will equally ensure that the SEA and ESIA are carried out to standards acceptable to all the other potential donors who will be supporting the implementation of investment programmes and projects to be identified under the Master Plan Studies. These will be indicated by the MWRI.

- **Other resources**: the MWRI will put at the disposal of the Consultant, reports of the different environmental studies that have already been carried out in the Nile Basin of Egypt in recent years.

APPENDIX 1B: Terms of Reference for the Environmental and Social Impact Assessment (ESIA) of the Capital Investment Project to be prepared under the study.

Preparation of Viable Project

1. Context:

Under this study, the preparation of the activities of a capital investment project will be undertaken for the rehabilitation or the reconstruction of the top priority large barrage to be determined during the development of the Master Plan. Given the nature and the importance of the hydraulic control structure envisaged, it is likely that the project will be a Category 1 Project; in any case, the categorization of the project will be determined by the Consultant upon identification of the structure and the type of intervention to be implemented, in accordance with agreed guidelines. The present ESIA is required in accordance with AfDB rules and procedures to assess the environmental and social sustainability of the proposed project. In order to present a more accurate costing of the project, the ESIA will equally assess the cost of implementing a Comprehensive Mitigation Plan (CMP) aimed at mitigating the negative impacts of the project as identified under the ESIA study.

2. Objective

The Environmental and Social Impact Assessment will provide decision-makers in the Ministry of Water Resources and Irrigation (MWRI) and potential funding agencies with sufficient information to justify, on environmental and social grounds, the acceptance, modification or rejection of the proposed project for financing and implementation. It will also provide the basis for ensuring that environmental issues are taken into account in project costing and implementation.

3. Scope and undertaking of the ESIA Study

This ESIA study involves the investigation of environmental and social issues within the project area and the preparation of an ESIA report, an Environmental and Social Management Plan (ESMP) and a Comprehensive Mitigation Plan (CMP).
The Technical Appendices to be prepared under this ESIA study will present detailed investigations and analysis of the following components:

A. Institutional Arrangements and Consultations with Interested and Affected Parties (IAPs);
B. Analysis of Engineering Impacts of the project;
C. Socio-Economic Analysis, including gender aspects;
D. Investigation of the Vegetation of the project Area;
E. Investigation of the Fauna of the project Area;
F. Health Assessment of the Project Area;
G. Waste Analysis and Management;
H. Environmental Economic Analysis including Costing of the CMP and the Environmental Monitoring System.

Climate Risk Management and Adaptation
The Consultant will investigate climate change risks and propose management and adaptation strategies. The firm will review data related to climate change and analyse related risks as well as propose mitigation measures to be built into the design of the infrastructure of the proposed project for climate-resilience. All available climate related data in the project area shall be obtained and appropriate extrapolations made. This information will be used to determine the trend and the expected climate related risks that the proposed infrastructure will be exposed to. The possible impacts of these risks on the operating efficiency of the barrage to be developed will also be analysed and mitigation measures proposed.

The data to analyse includes:

- Changes in rainfall patterns (durations, frequency, intensity) and lengths of dry periods (droughts);
- Temperature variability, noting the extremes;
- Frequency and magnitude of floods (surface runoffs, flow rates and velocities);
- Changes in vegetation cover and the rate of erosion (sediment loads, silting…);
- Changes in the physical, chemical and bacteriological quality of the river water;
- Changes in the flow rates of rivers and other water courses;
- Changes in the rate of outbreaks of water vector borne diseases and other health indices;
- Climate related changes in ecosystems and biodiversity.

In addition to proposing measures to climate-proof the infrastructure to be developed in LUSIP II, the Consultant will also propose a coping strategy for the populations in order to enable them adapt to the impacts of climate change and climate variability and extremes.

4. Results

The ESIA Study will deliver the following results, organized in accordance with the ESIA report structure included in the Guidelines for conducting ESIA studies (Appendix 1A):

- Overview of the project, its geographical area and the applicable legislative and institutional framework;
- Description of the proposed project, updating the description of the project relevant components, plans, maps, figures and tables;
- Identifying the policy, legal and administrative framework relevant to the project;
- Indication of the project alternatives: Presenting and analysing alternatives to the proposed project, including the "without project" option, by identifying and comparing the alternatives on the basis of technical, economic, environmental and social criteria;
- The assessment of the potential significant environmental and social impacts of the project alternatives;
- For the selected alternative (Technical and Financial Feasibility Studies components of the study), identifying and assessing the potential importance of beneficial and adverse environmental and social impacts, including gender aspects, direct and indirect, short and long-term, temporary and permanent impacts, on the basis of a rigorous method;
- Update the mitigation/enhancement measures to prevent, minimise, mitigate, or compensate for adverse impacts or to enhance the project environmental and social benefits, including responsibilities and associated costs;
- Addressing potential cumulative effects taking into account other initiatives planned in the study area;
- Developing an environmental and social monitoring program, including indicators, institutional responsibilities and associated costs;
- A Resettlement plan as appropriate (according to the AfDB rules or equivalent);
- Consultations carried out with primary and secondary stakeholders in order to obtain their views on and preoccupations about the project. .
- .
- Organisation of Study Validation Workshops and preparation of Workshop Reports.
- Limitations of the study: The consultants should underline all the major limitations, weaknesses and uncertainties of the study.
- Conclusions: summarise the key results of the ESIA, the recommendations and the assessment of the residual impacts.

Main Deliverables: The ESIA study will have the results above organized into the following main deliverables:

The ESIA Report,
The Environmental and Social Management Plan (ESMP) and
The Comprehensive Mitigation Plan (CMP) based on the ESMP and the climate change risk management and adaptation strategy developed.

a. Staffing and Guidelines

See Articles 6 and 7 of Appendix 1A for proposed Staffing and Guidelines.

APPENDIX 1C: Terms of Reference for the Technical Feasibility Studies of the Capital Investment Project to be prepared under the Master Plan Study.

1. Context:

Under this study, the preparation of the activities of a capital investment project will be undertaken for the rehabilitation or the reconstruction of the top priority large barrage, to be determined during the development of the Master Plan. The technical evaluation required hereunder aims at preparing the optimal technical alternative scheme for implementation, as informed by the Master Plan Study.

2. Approach and Inputs

The consultant will use the data obtained from the geotechnical analyses and investigations carried out under the Master Plan Study for all the hydraulic structures covered by the study. Use can equally be made of the relevant findings and conclusions recorded in the available project documentation of the Esna, Naga Hammadi and Assiut Barrages. The available topographic information and maps seem to be of sufficient detail for these studies. The design features of hydraulic structures such as sluices, weir, approach channels, and other components will be verified by means of mathematical hydraulic model tests.

3. Design Criteria and Parameters:

Based largely on the findings and data established and agreed upon under the preparation of the Master Plan:

- Review and confirmation of the essential criteria and parameters regarding construction materials, geotechnics and foundations, required flow diversion during construction, and any necessities;

- Review and identification of other essential criteria applicable, for the preliminary designs and related calculations, cost estimates, and others, considering the conditions at the sites of the three barrages.

- Care should be taken in the specification of construction materials to ensure that materials harmful to health are not used in the project.

4. Technical Design Alternatives

- Consideration and design supported by relevant calculations and drawings, of the civil works alternatives for the project components;
- Applicable and reasonable design supported by relevant calculations and drawings, of the mechanical/electrical works alternatives, such as control gates, and others;
- Consideration and design supported by relevant calculations and drawings, of alternatives of hydropower equipment, applicable for optimized design flows, and of the corresponding adaptations of the civil works designs;
- Comparative estimation of the equipment / construction costs associated with the technical alternatives of the various project components;
- Review and assessment of costs and benefits associated with the technical alternatives studied, proposed implementation schedules, construction stages, operation of the works, particular environmental impacts, resettlement and significant costs;
- Based on the cost estimates and the other aspects, which prove to be essential, identification of the optimum technical layout and design for the selected project concept.

5. Further Survey Requirements and Arrangements for Project Implementation

The Consultant is required to prepare an outline program of any further field surveys and other investigations, which in his judgment need to be arranged and executed in advance or during the

implementation of the project. The outline program shall consider the requirements, the extent and scope, and the estimated periods and costs for the execution of geological/geotechnical investigations, topographical surveys and mapping, hydraulic model tests, and others that may be identified as significant sources of information to facilitate project implementation. The outline program shall also forward proposals regarding appropriate administrative arrangements for such detailed investigations and field surveys, including allocation of responsibilities and control, so that agreements and preparations can be made adequately and in good time. Finally the consultant shall annex to the outline program, draft terms of reference for the consultancy services required during project execution; namely evaluation of tenders and supervision of works, as well as technical support in the implementation of the environmental management plan and land acquisition. The outline program will be part of the Final Study Report.

6. Preparation of Tender Documents

The consultant will undertake the preparation of the tender documents, bill of quantities and bid packages for the selected alternative of the barrage selected for this capital investment project.

7. Reporting

In general, all relevant findings and results shall include baseline study details, analysis, procedures, calculations and descriptions for each option as well as for the detailed designs, bill of quantities, cost estimates and tender documents are to be attached as annexes to the main reports. All reports will be prepared in A4 format. Separate volume(s) in A3 and/or A0 format will be prepared containing all plans, drawings and photographs, etc

APPENDIX 1D: Terms of Reference for the Economic and Financial Analysis (EFA) of the Capital Investment Project to be prepared under the study.

1. Objectives

The objectives of this component of the study include the preparation of a Proposal for Funding document based on the financial and economic viability of the project, taking into account the costs and benefits of the infrastructure to be developed under the project. The EFA Report and the Proposals for Funding will form the base documents required for the mobilization of funds for the infrastructure investment costs of the project through Donors' Conferences and other approaches envisaged by the Government of Egypt (GoE).

2. Scope of the Study

Under this study an analysis and assessment of the economic and financial costs and benefits of the hydraulic structure to be developed will be undertaken. The analysis will be carried out in conjunction and iteratively with the technical and environmental studies components of this study in order to determine the financial and economic costs associated with the construction, operation and maintenance of the structures. The EFA study will be carried out in accordance with the relevant rules and procedures for the financial and economic analysis of development projects.

3. Results and Deliverables

Under this study the consultant will:

- Prepare a Financial and Economic Analysis technical report detailing all the analysis and assumptions made as well as specifying the financial and economic net present values, internal rates of return for selected scenarios and the results of sensitivity analysis carried out using key variables;
- Prepare a Proposal for Funding Report which presents detailed cost estimates of the alternative adopted after all the consultations as well as a summary of the social, economic, financial, institutional, technical and environmental sustainability arguments advanced in order to obtain donors' support for the implementation of the proposed project.
- Organize a stakeholder workshop and make a debriefing presentation to project management and stakeholders;
- An Input Report

The input report is a brief listing of the items set out below, to be submitted before departure at the end of an input.

1. Dates of Assignment;
2. Dates of travel (international and local) and locations visited;
3. Meetings attended and the names and designations of those involved, main topics discussed and main points of agreement or disagreement;
4. Any training sessions or seminars attended;
5. The items of the Expert's Terms of Reference which have been completed and proposals for the completion of any outstanding items;
6. Papers, reports, maps, drawings, computer disks and other technical output, together with the details of their distribution;
7. A directory of paper and computer files, indicating their contents and previous location.

4. Required expertise

The consultant should have in his team an expert with an advanced degree in Agricultural Economics and at least 10 years relevant working experience in developing countries.

APPENDIX 2: DESCRIPTION OF THE PROFILE OF THE STUDY TEAM.

A- Expatriate experts

1. Project Manager

The Project Manager will be responsible for the overall project planning and implementation as well as coordination and management of the experts proposed for the project. The Project Manager will promote the exchange of knowledge and experience between the team members, provide liaison with the relevant Government Departments and assure timely and accurate reporting. This position requires a minimum of a PhD degree in structural engineering or related field with a minimum with 20 years of experience, related to design and rehabilitation of large irrigation control structures with good knowledge in project management and planning.

2. Lead Specialist Foreign/GIS: The GIS Expert should have at least 15 years experience in GIS development and modeling. He will be required to design the Information System work. Also he is required to create the link between the developed Information System and the GIS maps. The GIS Expert should have at least 10 years of experience in GIS-based works.

3. Lead Specialist Foreign/System Analyst: The System analyst should have at least 15 years of experience in system analysis for the creation of Information systems.

He will be required to determine the different inputs, outputs and functionality of the system as well as the required queries and reports. He will help the Database Management Developer in creating, implementing, testing and finalizing the system.

4. Lead Specialist Foreign/ Civil: This Foreign Lead Specialist will have a minimum qualification Masters' degree in Civil Engineering with at least 15 years experience in projects involving design of irrigation infrastructure and water control structures). A PhD degree will be an add-on to the profile.

The Civil Engineer will be responsible for setting the priorities of structures to be evaluated by the consultant and design the Decision Support System (DSS) As well as the civil engineering will be responsible for supervising field investigations for soil survey; investigation and analysis of control structures conditions, and assessment of the risks related to the current and potential condition of the different control structures.

5. Lead Specialist Foreign/ Database Management System Developer: This expert should have at least 15 years of experience in developing information systems using the most up-to-date database management systems (Oracle). He should develop, implement and test the system. He will be also required to create the user and programmers manuals for the system.

6. Lead Specialist Foreign/ Electromechanical: This expert will have a minimum qualification a Masters' degree in electro-mechanics with at least 15 years experience in projects involving planning and feasibility studies (A PhD degree will be an add-on degree). The Electromechanical Engineer will be responsible for supervising field investigations.

7. Lead Specialist Foreign/ Hydraulic: with a minimum qualification Masters' degree in hydraulics with at least 15 years experience in projects involving planning and feasibility studies (a PhD degree will be add-on degree). The Hydraulic Modeling Engineer will be responsible for assessing the risk associated with the failure or partly failure of the control structure using mathematical models.

8. Lead Specialist Foreign/ Structural/ Seismic Modeling: This foreign Lead Specialist will have a minimum qualification Masters' degree in civil engineering/ structural design and analysis with at least 15 years experience in structural design and analysis of the safety and stability of control structures on water courses, barrages, regulators, etc. A PhD degree will be an add-on degree. He will be able to use the most

up-to-date structural analysis software packages and should be well-acquainted with the Egyptian and, British, and American Specifications. He will be to work with the team in conducting a thorough and comprehensive assessment of the risk associated with the safety and stability of the structures. He is also required to create a comprehensive report on the condition of the structure and the recommended actions to overcome the problems or potential problems that might face the structure. He is also required to accompany and supervise the work performed by the different subcontractors, review the study reports.

9. Lead Specialist Foreign/ Geotechnical: minimum qualification Masters' degree in Civil Engineering with at least 15 years experience in projects involving design of irrigation infrastructure and water control structures with a good background in geotechnical engineering (a PhD will be an add-on degree). Working closely with the Hydraulics Engineer, the Geotechnical Engineer will be responsible for assessing the physical and structural conditions of the irrigation control structures.

10. Lead Specialist Foreign/Sociologist: minimum qualification Master's degree in rural sociology, socio-economics or a related field with at least 10 years field experience in carrying out social impact assessments with a sound background in addressing gender-related issues. The Sociologist will work closely with the Environmentalist on preparing an Environmental and Social Impact Assessment for the proposed project as well as an Environmental and Social Management Plan to include any long-term monitoring requirements. The social assessments will highlight gender-related issues and propose appropriate interventions required to address those issues.

11. Lead Specialist Foreign/Environmental: minimum qualification Master's degree in Environmental Sciences or a related field with at least 15 years of relevant experience in water resources and irrigated agriculture projects. The Environmental Specialist will be responsible for assessing the current environmental problems in the study areas, especially those related to infrastructure failures and inefficient irrigation water management. Working closely with the Sociologist, the Environmental Specialist will carry out an Environmental and Social Impact Assessment for the risk associated with the failure or partly failure of the structure as well as the impact of the different proposed solutions of each control structure following the relevant Egyptian guidelines on conducting such assessments. He will also prepare Socio-environmental analysis to address the measures to be taken within project implementation of a rehabilitation/ replacement.

12. Lead Specialist Foreign/Economist: with a minimum qualification Masters' degree in economics with at least 10 years field experience in project planning and evaluation with emphasis on irrigation. The Economist will be responsible for carrying out assessment of the expected development impact of the recommended rehabilitation solutions for both canals. In that capacity, he/she will mount the expected financial setup of the proposed solutions and undertake financial and economic analyses of the project that will be proposed as an outcome of the study. The analysis will be based on the financial and economic activities models, including crops and livestock models.

13. Lead Specialist Foreign/ Electrical: with a minimum qualification Masters' degree in Electric with at least 15 years experience in projects involving planning, feasibility study. The Electric Engineer will be responsible for collecting the available data (structural drawings, tech. reports, previous rehabilitations, etc)

B- Domestic Experts

The Senior Engineer Local professionals will be experts normally living and working in Egypt and will be constituted of professionals in the fields of (GIS, structural engineering, Database Management, Geotechnical engineering, hydraulics, electromechanical …) will work in collaboration with the expatriate experts and RGBS staff members each in his specialization under the leadership of the Lead Specialist Foreign. The expert should have at least 10 years of experience in his field of the study.

APPENDIX 3: MAIN STRUCTURES UNDER CONSIDERATION WITHIN STUDY

No.	Structure	Canal	Chainage (km)	City / Country side	Area Served (feddan)	No. of vents	Vent width (m)	Head (m)
1	New Esna Barrage	Nile River	167.85	Qena	487600	11	12	9.63
2	Old Esna Barrage	Nile River	166.65	Qena	435638	119	5	5
3	Old Naga Hammadi Barrage	Nile River	354	Sohag	557990	100	5	5.9
4	Assiut Barrage	Nile River	359	Assiut	75823	110	5	6.4
5	New Delta Barrage - Rosetta Branch	Nile River	967	Rosetta	393754	46	8	3.8
6	Edfina Barrage	Nile River	211	Edfina		46	8	3.7
7	New Delta Barrage - Damietta Branch	Nile River	967	Damietta	3561833	64	287	3.8
8	New Seriakous Regulator	Ismailia Canal	13	Kafr Ghannamia, Bagour	159355	10	5	**0.9**
9	El-Beheiry Head Regulator	Nile River	965	Al-Qalubia	119010	6	8	3.5
10	El-Khatatba Head Regulator	El-Behery Rayah	42.6	Al-Khatatba	173100	8	5	2.75
11	Meleeg Intermediate Regulator	El-Menoufi Rayah	52.51	Al-Qalubia	736165	10	5	**2.6**
12	Old Abbasi Head Regulator I	Nile River	1053.8	Zefta	783393	4	5	3
13	Old Abbasi Head Regulator II	Nile River	1053.8	Zefta	783393	4	5	3
14	New Abbasi Head Regulator	Nile River	1053.8	Zefta	783393	3	5	3
15	Zefta Barrage	Nile River	1045	Zefta	750000	50	5	5.6
16	Old Tawfiki Head Regulator	Nile River	965	Al-Kanater Al-Khairia	673131	6	5	4.65
17	Damietta Barrage	Nile River	225.5	Damietta		5	5.25	2.2
18	Bahr Youssef Head Regulator	El-Ibrahimia Canal	60.6	Dairout	770134	5	3	3.7
19	El-Abeed Intermediate Regulator	Bahr Youssef Canal	77.6	Al-Minia		20	3	**2.6**
20	New Sakoula Intermediate Regulator	Bahr Youssef Canal	177.73	Assiut		4	8	3
21	El-Ibrahimia Head Regulator	Nile River	538.5	Assiut	1535152	9	5	4
22	New Ismailia Head Regulatort	Nile River	949	Cairo	1100000	4	8	3.6
23	Old Ismailia Head Regulatort	Nile River	949	Cairo		3	5	3.6
24	El-Ibrahimia Intermediate Regulator	El-Ibrahimia Canal	60.6	Dairout		7	3	3.65
25	El-Noubaria Head Regulator	El-Behery Rayah	81.65	Boleen	100000	5	5	5.47
26	El-Mansouria Head Regulator	El-Tawfiki Rayah	86.6	Zefta		4	5	2.5
27	Bahr Mowees Head Regulator	El-Tawfiki Rayah	35	Al-Sharkia	487600	7	3	2
28	Western Naga Hammadi Head Regulator	Nile River		Naga Hammadi	435638	6	6	5
29	Boleen Intermediate Regulator	El-Behery Rayah	82	Boleen		5	5	4.5
30	El-Nasr Head Regulator	Nile River	965	Al-Kanater Al-Khairia	75823	10	5	2.15
31	Intermediate Head Regulator (km 71 on Rayah Al-Nasr)	Al-Noubaria Canal	71	Badr Center	9475	4	5	3.5
32	Meghagha Intermediate Regulator	El-Ibrahimia Canal	196.79	Maghagha		34	287	3.8
33	El-Bagouria Head Regulator	Al-Bagouria Canal	23	Bagour	159355	3	3	3
34	Gamgra Intermediate Regulator	El-Tawfiki Rayah	37	Al-Qalubia	673131	6	8	3
35	El-Khatatba Head Regulator	El-Behery Rayah	42.6	Al-Khatatba	173100	8	5	2.75
36	Meleeg Intermediate Regulator	El-Menoufi Rayah	52.51	Al-Qalubia	736165	10	5	**2.6**
37	Akhmeem Intermediate Regulator	Eastern Naga Hammadi Canal	66	Akhmeem	130176	3	3	3
38	Eastern Naga Hammadi Head Regulator	Nile River	353.7	Naga Hammadi	103175	3	6	**5.5**
39	Hassan Wasef Head Regulator	Bahr Youssef Canal	288	Al-Lahoun		3	4	1.1
40	El-Sharkawia Head Regulator	Nile River	951.64	Al-Kanater Al-Khairia	163743	7	2.25	1.6
41	Tema Intermediate Regulator	Western Naga Hammadi Canal	123.7	Sohag		3	5	2.6
42	Asfoon Head Regulator	Nile River	168.67	Esna	69390	5	5	3.2
43	El-Giza Head Regulator	Bahr Youssef Canal	288	Al-Minia		4	4	0.6
44	El-Saff Head Regulator	Eastern Naga Hammadi Canal	15.7	Beni Sweef		4	8	4
45	Meet Ghamr Intermediate Regulator	El-Tawfiki Rayah	65	Meet Ghamr		7	3	2.5
46	Badrman & Dairoutia Head Regulators	El-Ibrahimia Canal	60.6	Dairout	1100000	3	3	3.65

47	El-Bassosia Head Regulator	Nile River	963.5	Al-Qalubia		3	3	1.5
48	El-Monaiar Intermediate Regulator	Ismailia Canal	28.15	Al-Sharkia		6	8	4.5
49	Old Delta Barrage _ Rosetta Branch	Nile River	967	Rosetta		61	5	3.8
50	Old Delta Barrage _ Damietta Branch	Nile River	967	Damietta		51	5	3.8
51	Old Mazoura Intermediate Regulator	El-Ibrahimia Canal	230.26	Al-Menia		25	3	**3**
52	Beltag Intermediate Regulator	Meet Yazeed Canal	24.668	Beltag	7500	7	3	3
53	Tanta Head Regulator	Bahr Shebin Canal	53.5	Shebin Al-Koom	148627	6	3	3
54	El-Salhia Intermediate Regulator	Ismailia Canal	75	Al-Kareen	190000	3	5	3
55	El-Safia Intermediate Regulator	Al-Kadhaba Canal	14.85	Al-Gharbia		5	3	2.65
56	El-Kareneen Intermediate Regulator	El-Menoufi Rayah	29.6	Al-Menoufia		5	5	2.25
57	El-Rahebeen Intermediate Regulator	Bahr Shebin Canal	113.76	Al-Rahebeen	900	9	3	2
58	Serd Intermediate Regulator	Al-Kased Canal	22.8	Al-Gharbia		4	3	2
59	Basioun Intermediate Regulator	Bahr Nashrat	6.35	Al-Gharbia		3	3	1.7
60	Al-Lahoun Intermediate Regulator	Bahr Youssef Canal	288	**Al-Lahoun**		2	5.5	1.6
61	Abo Al-Shokook Intermediate Regulator	Al-Giza Canal	22	**Bani Sweef**		4	3.55	1.5
62	Kafr Rabea Intermediate Regulator	Al-Bagouria Canal	53.55	Al-Gharbia		5	3	1.35
63	Al-Rasheedia Head Regulator	Nile River				2	3	1
64	El-Santa Intermediate Regulator	El-Menoufi Rayah	77.4		736163	2	4	0.55
65	Al-Boustan Intermediate Regulator (km 28)	Al-Noubaria Canal	28	Al-Delngat	831073	6	5	
66	Danshal Intermediate Regulator	Eastern Khandak Canal	34.5	Al-Behera		5	5	
67	Intermediate Regulator, km 82	Al-Nasry Rayah	82	Badr Center	9535	5	5	
68	Bahr Teera Head Regulator	Bahr Shebin Canal	49.95	Samanoud	162810	8	3	
69	Intermediate Regulator, km 24	Bahr Mowees Canal	24	Bandaf	285000	8	3	
70	Rayah Dairout Gates, Masrf Dairout			Dairout		4	5	
71	Meet Yazeed Head Regulator	El-Menoufi Rayah	96.6	Al-Gharbia		5	3	
72	Shobrabas Intermediate Regulator	Al-Bagouria Canal	29.8	Al-Menoufia	18000	5	3	
73	Rayah Al-Shokook Gates, Giza Canal	Al-Giza Canal	22.5	Abweet		4	3.5	
74	Kafr Rabea Intermediate Regulator			Al-Menoufia		2	2.5	
75	Intermediate Regulator, km 41	Al-Nasry Rayah		Al-Behera				

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