

**Arab Republic of Egypt**  
**Ministry of Water Resources and Irrigation**

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**THE WEST DELTA WATER CONSERVATION  
AND  
IRRIGATION REHABILITATION PROJECT**

DRAFT

**Environmental and Social Impacts  
and a Framework Management Plan**

**Executive Summary**

April 30, 2007

# **Environmental and Social Impacts and a Framework Management Plan**

## **Executive Summary**

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## ABBREVIATIONS AND ACRONYMS

BCM	Billion Cubic Meters
CAPMAS	Central Agency for Public Mobilization and Statistics
CAWD	Central Administration for Water Distribution (MWRI)
CD-IAS	Central Directorate Irrigation Advisory Services (MWRI)
CMU	Contract Management Unit
DBO	Design-Build-Operate
DRAINFRAME	Drainage Assessment Integrated Framework
DRI	Drainage Research Institute (NWRC)
E(S)MP	Environmental (and Social) Management Plan
EEAA	Egyptian Environmental Affairs Agency
ESIA	Environmental and Social Impact Assessment
EurepGAP	Euro-Retailer Produce Good Agricultural Practices
FAO	Food and Agricultural Organization
fed.	Feddan (0.42 hectare)
GoE	Government of Egypt
GWS	Ground Water Sector (MWRI)
ha	Hectares
HE	Horizontal Expansion
HEPS	Horizontal Expansion Projects Sector
IIIMP	Integrated Irrigation Improvement Management Project
IIS	Irrigation Improvement Sector
IPM	Integrated Pest Management
IWRM	Integrated Water Resources Management
LE	Egyptian Pound
MHUNC	Ministry of Housing, Utilities, and New Communities
MoHP	Ministry of Health and Population
MWRI	Ministry of Water Resources and Irrigation
NBI	Nile Basin Initiative
NRI	Nile Research Institute
NWRP	National Water Resources Plan
OP	Operational Policy
OPN	Operational Policy Note
PMU	Project Management Unit
PPIAF	Public Private Infrastructure Advisory Facility (World Bank)
PPP	Public Private Partnership
RAMSAR	Convention on Wetlands of International Importance (after city Ramsar, Iran)
RIGW	Research Institute for Groundwater (NWRC)
RP	Resettlement Plan
RPF	Resettlement Policy Framework
SCA	Supreme Council of Antiquities
SPS	Supplementary Pumping Station
TC	Technical Committee
TS	Technical Study
WDIIP	West Delta Irrigation Improvement Project
WDR	West Delta Region
WDWCIRP	West Delta Water Conservation and Rehabilitation Project
WMRI	Water Management Research Institute
WQMU	Water Quality Management Unit
WTP	Water Treatment Plant
WUO	Water Users Organization

**1 hectare = 2,38 feddan**

**EXCHANGE RATE: 1 L.E. = US\$ 0.177**

## 1. PREAMBLE

This executive summary presents the main findings of the Environmental and Social Assessment (ESIA) conducted for the proposed West Delta Water Conservation and Irrigation Rehabilitation Project (WDWCIRP), and summarizes the key recommendations of the Environmental and Social Management Plan (ESMP). The objective of the ESIA is to examine the environmental, social, economic, physical, and biological impacts in the areas which may be affected by the project, and propose mitigation measures, monitoring plans, and institutional and budgetary requirements to undertake these as part of the environmental and social management plan ESMP, both during the construction and operational phases of the project.

This executive summary provides key information on the environmental and social aspects, potentially significant impacts, and mitigation measures which need to be addressed through the proposed project. The reader is referred to the main body of the two reports for the WDWCIRP for specific information and further details, namely: (i) the Environmental and Social Impact Assessment (ESIA), and the accompanying Environmental and Social Management Plan (ESMP) and its annexes; and (ii) the Resettlement Policy Framework (RPF). A full description of the existing social and environmental baseline data is included in these reports, including results of the public consultation processes associated with the preparation of this project.

As this proposed WDWCIRP project is partly financed by the World Bank it will have to comply with World Bank environmental and social safeguard policies, in addition to applicable laws and regulations of the Government of Arab Republic of Egypt (GOE).

The ESIA and ESMP reports were prepared by a team of Egyptian and Netherlands Experts that included Dr. Fatma Attia, Groundwater Specialist, Egypt; Dr. Hussam Fahmy, Director, Drainage Research Institute, Egypt; Manal Eid, Social Scientist; Jan Hoevenaars (ed.), Environmental Consultant; and Roel Slootweg, Environmental Consultant.

## 2. INTRODUCTION

Almost all agriculture in Egypt takes place in some 2.4 million hectares (ha) of fertile soil in the Nile Valley and the Delta region, with the Delta part alone contributing about 80% of all cultivable land in the country. However, creeping urbanization within the Nile delta has led to the rapid loss of cultivable land. Comparisons of digital mosaics of LANDSAT MSS and TM scenes, acquired over the Nile Delta suggest significant changes in land use as shown below.

Year	Change in land use from agriculture to urban (%)
1972-1984	3.6
1984-1990	5.7

As the pace of rural-urban land conversion continues unabated, by 2010 Egypt would have lost as much as 12% (about 288, 000 ha) of its best agricultural lands to urbanization in the past 38 years. One consequence of this trend in the Nile Delta is that a substantial quantity of water is no longer utilized for irrigated agriculture. Assuming the current average annual consumption of 20,500 m<sup>3</sup> per ha by the irrigated farmlands (which have among the highest yields in the world and a cropping intensity of more than 2), the reduction in the Delta water usage in this period can be estimated to be about 5.5 billion m<sup>3</sup> cubic meters, even allowing for the increased water usage by urban consumers.

In order to compensate for the loss of agricultural land in the Delta, the Government of Egypt (GOE) has supported commercial farmers in reclaiming desert lands since the late 1960s, and to provide opportunities to generate new jobs, increase production and widen the development base. In this context, an area of 100,000 hectares (equivalent to about 255,000 feddan), located approximately 60 kilometers north of Cairo to the West of the Nile Delta, has experienced noticeable agricultural growth through exploitation of groundwater resources.

Today, the West Delta area is a flourishing agricultural economy estimated between \$300 million to half billion dollars annually, serving both domestic and export markets in the European Union and elsewhere, entirely from groundwater. Moreover, the area is now home to 500,000 people and provides about 250,000 jobs in the agriculture sector alone. However, with the rapid development over the past few years, there has been an excessive depletion of the groundwater reserves. With about 47% of the total 100,000 hectares (ha) under cultivation, water extraction by the year 2000 reached 870 million m<sup>3</sup> annually, or an increase of 36.2% in just over a decade. Groundwater is quickly depleting<sup>1</sup> with a commensurate effect on overall water quality, posing a substantial threat to the farming economy that has been developed over the years.

As part of its continuing endeavor to improve water use efficiency and sustainable development, the Ministry of Water Resources and Irrigation (MWRI) is considering a plan for improving irrigation water availability to the new lands in the West of the Nile Delta. This will include areas irrigated with surface water in the Nubariya area as well as areas currently depending entirely on ground water for irrigation.

## **2.1 PROJECT DESCRIPTION**

The proposed West Delta Water Conservation and Irrigation Rehabilitation Project is the GOE's program of support to these farming communities, and one that supports the development of surface irrigation infrastructure based on full cost recovery by a private operator, while resolving the problem of excess groundwater depletion. The Project will implement a surface water conveyance system that extracts water from the Nile River with available funds to connect commercial farmers in an area in the order of magnitude of 38,000 ha that lies in the southern part of the West Delta area<sup>2</sup>, as shown in Figure 1. In achieving this objective the Government also intends to introduce important reforms in the sector, particularly to charge farmers for the full cost of service through volumetric pricing. Such reforms are part of the Government's own Integrated Water Resources Management (IWRM) Action Plan developed in 2005 to ensure correct incentives to conserve and utilize water more efficiently.<sup>3</sup>

Beyond its objective to achieve full cost recovery, the Government also wishes to involve the private sector in the design, construction and operation of the new irrigation system and to

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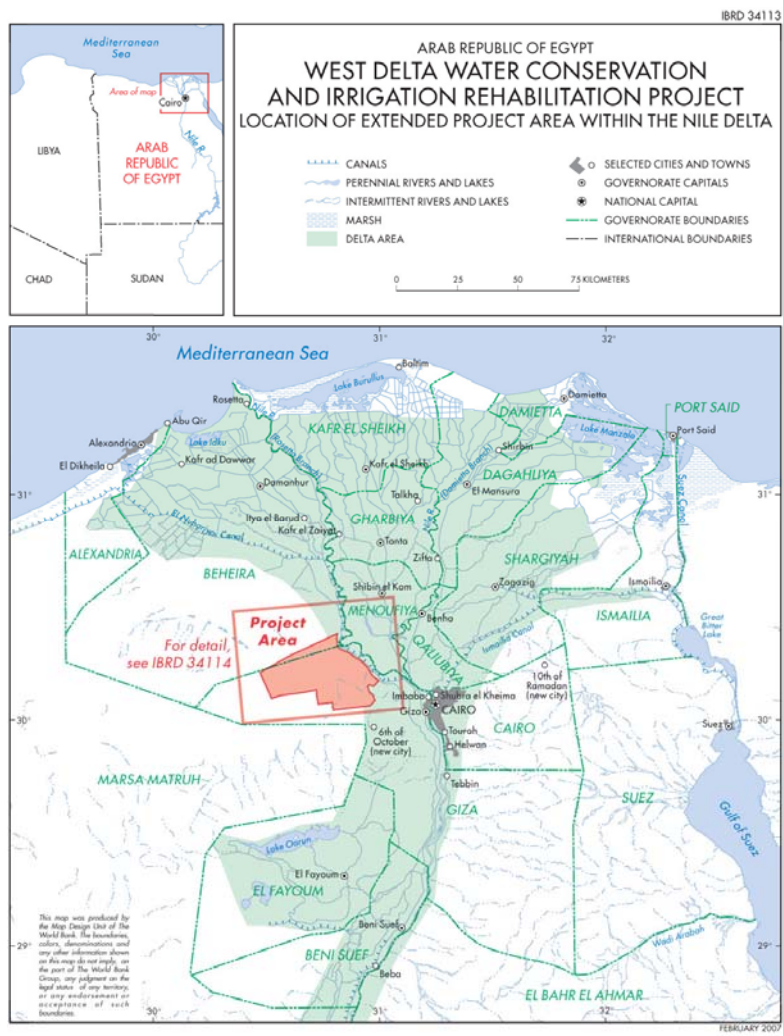
<sup>1</sup> It is estimated that the groundwater recharge rate is extremely low (around 20 million m<sup>3</sup>/year) implying an almost complete depletion of reserves in the near term at current extraction rates.

<sup>2</sup> The project area in the southern part of West Delta is estimated to include approximately 37,800 ha. Most of the area is cultivated by commercial farms utilizing modern irrigation and farming techniques. Financial sustainability of this transaction can be assessed through the participation of a relatively manageable number of farms in the proposed area.

<sup>3</sup> The Government is implementing a cost recovery policy in the old lands to recover O&M costs. In the newly reclaimed lands, it is seeking to further expand this principle to achieve higher and even full cost recovery levels in irrigation services.

share certain responsibilities for financing the investment costs, thus bearing certain risks as well as returns from this undertaking. While the Government fully endorses the Project and is willing to source a substantial amount of the related investment financing, it desires to assign responsibilities to the Private Operator for the design, construction, operations and maintenance of the activity and for it to assume the implementation and other related risks of these activities.

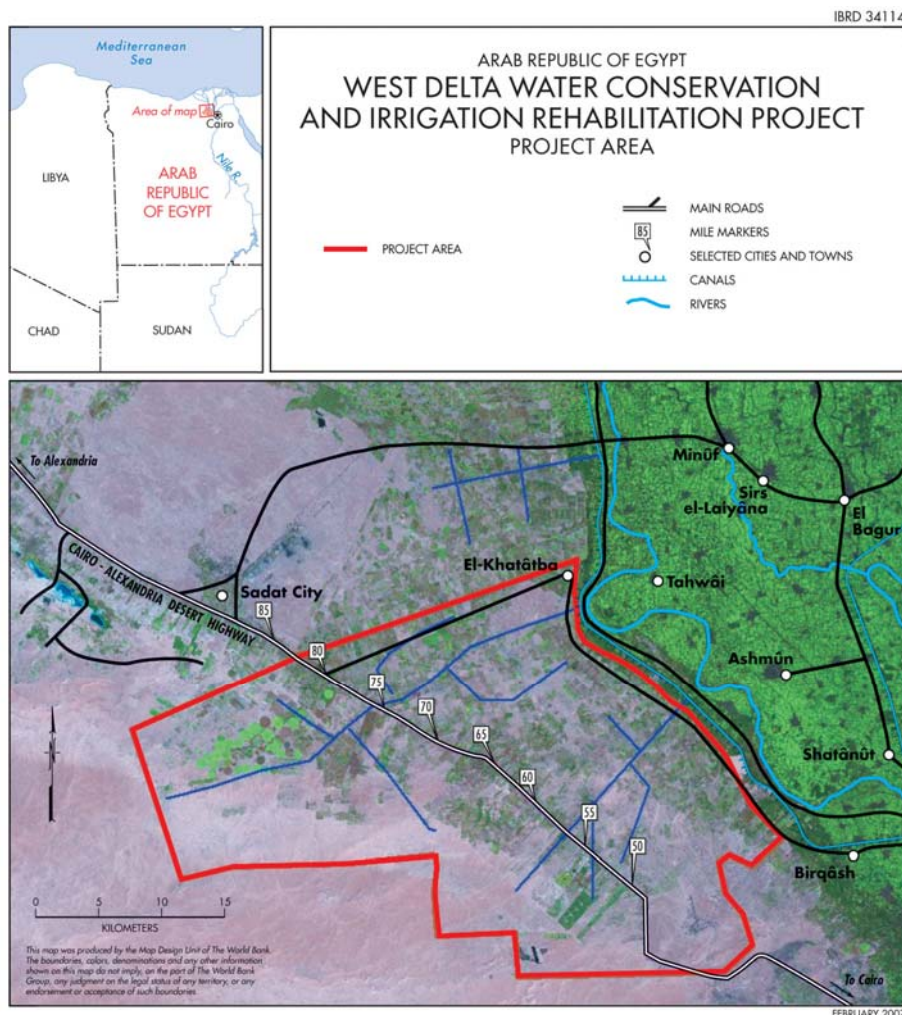
The project area is located between Cairo and Saddat City at both sides of the Desert Highway Cairo-Alexandria. The surface water will be distributed over the area by a buried pipeline network. The preliminary lay-out is derived from the Technical Study of the preparation team and may be changed by the Design Build Operate (DBO) contractor based on detailed surveys, assessments, and optimal design needs. A main pumping station with a capacity of about 22 m<sup>3</sup>/s takes the required water from the Rayah el Nasseri (main canal). The Government of Egypt will construct a new supplementary pumping station on the Rosetta Branch, to make up for the additional water requirements of the projects and refill the Rayah el Nasseri and Nubariya main canals. Figure 2 shows the layout of the project area that includes the surface water supply system covering 38,000 ha (Bank-financed) as part of a concession covering up to 80,000 ha.



**Figure 1: Location Map of Project Area West of the Nile Delta**

*Project Development Objective* – The development objective is to achieve financial sustainability of irrigation infrastructure in the West Delta and promote greater efficiency in the use of water resources established through a public-private partnership and farmers participation.

*Key Indicators* – To achieve the above development objective, the project design includes three intermediate performance benchmarks: (i) An operational surface water supply system covering an area in the range of 38,000 ha as part of a concession area covering up to 80,000 ha; (ii) farming community in the area participated in the determination of system design options based on their willingness and capacity to pay for the cost of service; (iii) institutional arrangements to ensure successful implementation of project which will guide relationships between the GOE and the private operator, the private operator vis-à-vis the farmers and relationships between farmers in the area. Institutional arrangements (i.e. contract management procedures, regulatory arrangements, and user associations) would be established and working according to design.<sup>4</sup>



**Figure 2: Preliminary Lay-out of the Project Area**

<sup>4</sup> In that context, the DBO contractor will be required to prepare comprehensive ESMPs once the design features of the surface water conveyance system are agreed.

## 2.2 PROJECT COMPONENTS

The project's total investment cost for Component No. 1 is US\$205 million, of which a World Bank loan will finance US\$145 million, with the remainder sourced from the farmers and the private operator, and donor funding. In addition, an additional US\$9 million will be made available as grants and sub-loans to farmers from bilateral donors (AFD and the Netherlands) for Component Nos. 2 and 3.

**Component No. 1: Design, Construct, and Start Up of the Surface Water System, and Connection Program for Participating Farms** (US\$205 million). - This component will finance activities leading to the final design and construction of a surface water irrigation system for the project area of an order of magnitude of 38,000 ha in the West Delta. Initial design work was carried out during the technical preparation studies which were based on a “demand-driven approach to planning” where the growers’ willingness to connect and pay guided the technical design options with commensurate tariffs. In addition, a piped system was chosen as the preferred option given its several advantages over open channel systems, particularly with regard to efficient water resource use and lower environmental and social safeguards risks. The final design will be completed by the private operator that will be contracted to construct and operate the system on a long term basis. A fixed allocation of water resource will be made available by the government to the project area, based on the estimated average annual requirement of 12,376 m<sup>3</sup> per year per ha. The preliminary design of the system has been sized to meet the peak demand in the summer months. Over the entire year, total usage converges to the annual average. Based on this, it is anticipated that the surface water system would meet most of the water resource needs of the farms that will be connecting, allowing the aquifers to recharge and to benefit farmers in adjacent areas.

**Component No. 2: Market-driven Technical Assistance to Small and Medium Scale Farmers** (US\$3 million) – This component will be initially funded through donor grants by AFD and will provide technical assistance (TA) to small and medium growers, traders, food processors, to increase West Delta products (fresh or processed) market share on national and international markets. Technical assistance to small and medium size growers, traders, exporters and food processors will be provided in the following areas:

- production, post harvest technology and farm management to small and medium size growers to improve competitiveness and quality of products,
- market intelligence (for local and export market) and logistics to small growers, traders and exporters, to look for new market opportunity and/or increase market share,
- food processing, packing and marketing to food processors, to improve competitiveness and/or create new food products,
- organizational arrangement for growers, traders and/or food processors to work in a coordinated manners within formal or informal organizations to achieve economy of scale and improve supply chain competitiveness.

Following a successful evaluation of the first donor phase activity, loan facilitation would be provided directly to participating farmers.

**Component No. 3: Support for Institutional Development and Capacity Building of Project Management Unit, Regulatory Office and Water User Organization** (US\$6 million) – This component will be funded through donor grants by the Government of the Netherlands and will support capacity building of MWRI for PPP contract management, Construction Supervision

Consultant, regulatory oversight, and to the user association along the lines of the policies for institutional reforms proposed by the MWRI and in cooperation with the Government of The Netherlands. In addition, it will support activities to disseminate on possible replication of the adopted PPP approach to other areas in Egypt and its riparian neighbours.

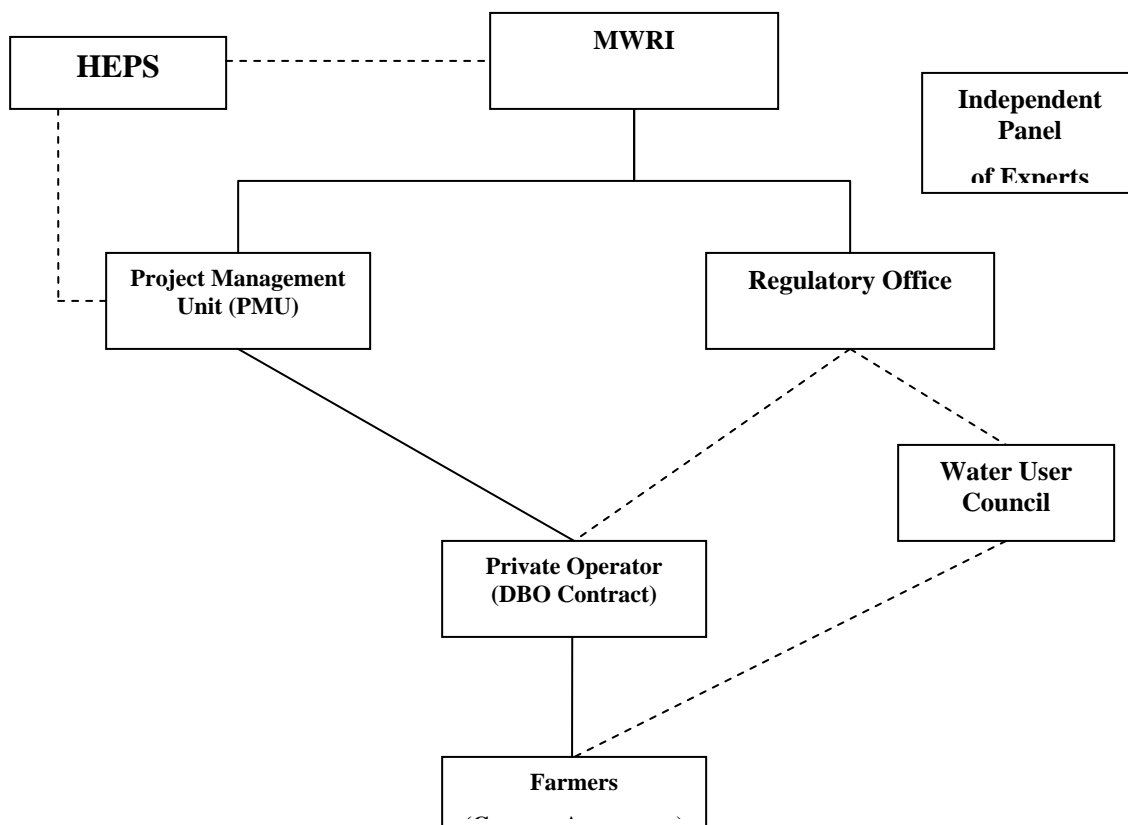
The main capacity building activities financed under this component include: (i) strengthening the PMU and the contract management activities that will oversee contractual matter between the Government and the private operators on all aspects of the implementation phases, including environmental and social safeguard compliance during the implementation of the project inclusive of groundwater monitoring; (ii) capacity building of economic regulatory office to ensure effective regulatory oversight and equitable treatment of interests between the farmers and the private operator; and (iii) capacity building of the water user association that will be formed to oversee the relationship between farmers vis-à-vis entitlements and usage of the surface and ground water resources. Given the unique nature of the PPP transaction arrangement the TA will also provide for oversight supervisory engineers and technical audits of technical milestones achieved.

### 2.3 Institutional and implementation arrangements

The project organizational structure is outlined in Figure 3. Overall direction will be provided by the Minister of MWRI and managed on a day-to-day basis by a Project Management Unit (PMU). Since the project will be implemented using a DBO contract with the private sector, the establishment of an Economic Regulatory Office will be necessary. Both the PMU and the Regulatory Office will be under the jurisdiction of MWRI. The PMU will include a Contract Management Unit, a Financial Management Office, Disbursement Office, as well as an Environmental Officer, and Social Scientist. A Water User Council has been established<sup>5</sup> as an independent farmers' organization that will monitor relationships and potential conflicts between farmers on such matters as water entitlements, usage, alternating hours of irrigation, etc. The Council will also monitor groundwater pumping. The Regulatory Office will provide traditional economic regulatory functions for rate adjustments, tariff rebasing and will be entrusted with conflict resolution that may arise between the private operator and farmers.

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<sup>5</sup> Ministerial Decree



**Figure 3: West Delta Water Conservation and Irrigation Project Organization**

The PMU will be responsible for: (i) monitoring and making sure the project activities are being implemented as designed; (ii) ensuring compliance with contract clauses vis-à-vis the Government by the private operator; (iii) ensuring adequate implementation of the TA components for strengthening the Regulatory Office, and the Water User Council as well as the initiatives directed at assisting small farmers.; and (iv) co-ordination, oversight, and monitoring of the Environmental and Social Management Plan Framework.

### **3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

#### **3.1 APPLICABLE WORLD BANK ENVIRONMENTAL AND SOCIAL SAFEGUARD POLICIES**

The Environmental and Social Impacts Assessment for the project must meet a number of policy and legal requirements. The World Bank safeguard policies and the relevant Egyptian Environmental and other related laws, and detailed requirements for conducting ESIA as defined in Law 4/1994 have been complied with during the course of project preparation and will also be complied with during project implementation.

The chapter summarizes the identification process of the World Bank’s applicable operational policies. It also summarizes relevant Egyptian Environmental and other related laws; and detailed requirements for conducting ESIA as defined in Law 4/1994 which have been complied with during the course of project preparation; and which will also be complied with during project implementation. Major national policies with bearing on the environmental component of the project, and institutional bodies with direct water quantity and quality

management responsibilities, as well as the regulatory framework within which each agency operates are also presented.

The West Delta project is rated a Category A project in accordance with the Environmental Assessment Policy (OP 4.01) of the World Bank because of the potential scale of impacts in terms of water quantity, water quality, and water access issues; and the potential corporate risk posed to the Bank by the diversion of water from the Nile. The impacts resulting from these issues have been assessed and mitigation measures proposed which should ensure that the negative impacts are mitigated effectively. In effect, the project should generate positive environmental benefits in terms of groundwater recharge, and more effective water management through the realization of effective cost savings in water use.

On the basis of the screening criteria of the World Bank safeguard policies, the following policies will be triggered: Involuntary Resettlement (OP 4.12), Physical Cultural Resources (OPN 11.03), International Waterways (OP 7.50) and Pest Management (OP 4.09). The safeguard policy applicability is summarized in Table 1, and the nature of impacts and mitigation measures are addressed in Section 4.2.

**Table 1: Safeguard Policy Applicability Table**

<b>World Bank Safeguard Policy</b>	<b>Policy Applicability</b>	<b>Reasoning/Notes</b>
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	Yes	<ul style="list-style-type: none"> <li>▪ Category A Project</li> <li>▪ Direct impacts perceived</li> <li>▪ External impacts perceived</li> </ul>
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	No	<ul style="list-style-type: none"> <li>▪ The project doesn't affect officially recognized Natural Habitats</li> <li>▪ The project will not degrade or convert any critical natural habitats.</li> </ul>
Forestry (OP 4.36, GP 4.36)	No	<ul style="list-style-type: none"> <li>▪ Command areas are not situated in forests</li> <li>▪ WDWCIIRP does not involve forestation or combating deforestation</li> <li>▪ No forests will be affected by the project</li> </ul>
Pest Management (OP 4.09)	Yes	<ul style="list-style-type: none"> <li>▪ Increase in cultivated area, hence an increase in the application of pesticides, insecticides and herbicides in absolute terms.</li> <li>▪ GoE is pursuing IPM practices and reduced considerably the reliance on chemical best pest combating.</li> <li>▪ Most farmers in project area are export oriented and producing under the EurepGAP protocol, which promotes IPM and monitors the producers. EurepGAP protocol for IPM is consistent and in compliance with IPM requirements of the Bank.</li> <li>▪ Farmers not yet producing under EurepGAP protocol will be stimulated to adopt these practices under the sustainable ground water management plan of the ESMP.</li> </ul>
Physical Cultural Resources (OP 4.11)	Yes	<ul style="list-style-type: none"> <li>▪ No significant cultural resources identified in the project area yet, triggered for precautionary reasons.</li> <li>▪ Provisions for chance-find procedures are obligatory.</li> </ul>
Indigenous Peoples (OD 4.20)	No	<ul style="list-style-type: none"> <li>▪ No distinctive indigenous ethnicity identified</li> </ul>

		in the project area with distinct cultural characteristics
Involuntary Resettlement (OP/BP 4.12)	Yes	<ul style="list-style-type: none"> <li>▪ Expropriation and rights-of-way will be required for the construction and maintenance of the buried pipeline system.</li> <li>▪ Some small-scale expropriation on the Rosetta Branch (uncertain at this stage)</li> </ul>
Safety of Dams (OP 4.37, BP 4.37)	No	<ul style="list-style-type: none"> <li>▪ No dams involved in the project</li> </ul>
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	Yes	<ul style="list-style-type: none"> <li>▪ Review of International Agreements on Nile Waters (to be done by GoE)</li> <li>▪ Notification sent to the Riparians (Feb, 21, 2007)</li> </ul>
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)	No	<ul style="list-style-type: none"> <li>▪ Project area is within the sovereign territory of Egypt.</li> </ul>

### 3.2 POLICY FRAMEWORK

The following main policies relevant to the project's environmental component have been identified:

- National Water Policy: Water for the Future.
- NEAP 2002 including Law 4: National Environmental Action Plan (MSEA).
- Agricultural Policy.
- National Policy for inhabitation of the desert (MHUNC)

Summaries of these policies are presented in the Main Report.

### 3.3 LEGAL FRAMEWORK

Table 2 is an inventory of the important laws, decrees and regulations for the project.

**Table 2:** Principal Environmental Laws, Decrees and Regulations

Environmental law	Date	Authority	Decrees Regulations	Implementing Agency
Law 12 (and its supplementary Law 213/1994)	1984	Main legislation for irrigation and drainage	has recently been revised and submitted to Parliament.	MWRI
Law No. 4 on Environment	1994	Establishment of EEAA and Environmental Protection Fund; requirement of EIA; regulation of air pollution, hazardous waste management, and marine pollution	Decree No. 338 of 1995 (Executive Regulation including Prime Ministers Decree No. 1741 of 2005)	MoEA; EEAA
Law No. 102 on Natural Protectorates	1983	Designation and management of natural protectorates	Decrees designating sites	MoEA; EEAA
Law 117	1983	Supreme Council for Antiquities	Regulates the protection of antiquities	HCA
Law No. 124 on Fisheries	1983	Management and protection of fisheries and marine animals		MALR
Law No. 48 on Protection of Nile and its Waterways	1982	Control of pollution of surface waters	Decree No. 8 of 1983 (standards for wastewater discharges to surface waters) The law has recently been modified and sent to parliament for review	MWRI
Law No. 137 on Labor	1981	Control of work place safety and environment		Ministry of Manpower and Immigration
Law No. 27 on Public Water Sources	1978	Protection of public water sources for drinking and domestic purposes	Decree No. 27 of 1966 (Supreme Committee Water) Appendix IV of 1975 (Standards for potable water)	MoHP; Supreme Committee for Water
Law No. 31 on Public Cleanliness	1976	Control of solid waste management (amends Law No. 38 of 1967)		MHUNC
Law No. 38 on Public Cleanliness	1967	Control of solid waste management (including hazardous waste)	Decree No. 134 of 1968 (waste from domestic and industrial Sources)	MHUNC
Law No. 53 on Agriculture	1966	Regulation of purchase, importation and handling of pesticides	Decree No. 50 of 1966 (registration and licensing requirements)	MALR
Law No. 93 on Wastewater and Drainage	1962	Control of wastewater discharges and drainage to public sewers	Decree No. 643 of 1962 (Standards for wastewater discharges to public sewers)	MHUNC

Law 12 is of particular interest because the amended (but not yet ratified) version regulates the legal status and powers of the Water Boards.

Water Quality is addressed separately by two laws and three decrees. The most significant are Law 48 of 1982 and Law 93 of 1962. Further, Law 4 of 1994 plays a significant role in the management and protection of water quality. These laws are discussed in some detail in Annex III.

The Supreme Council of Antiquities is responsible for the protection and conservation of Cultural Properties.

### **3.4 ADMINISTRATIVE FRAMEWORK**

**Ministry of Water Resources and Irrigation (MWRI)** - The MWRI has sole legal responsibility for the planning and management of all water resources in Egypt. It is responsible for providing water of suitable quality to all users. To accomplish this goal, the Ministry has to ensure that appropriate measures are undertaken to protect both the quantity and the quality of Egypt's water resources. In practice, very little attention has been given to water quality management, which represents a relatively small portion of the overall activities although priorities are now being reassessed. Law 48 for the protection of the Nile and its waterways assigns to MWRI legal responsibility over the following functions:

- Issue and cancellation of discharge permits into Egyptian waterways, which include the Nile, canals and drainage networks, lakes and groundwater reservoirs;
- Inspection of wastewater treatment facilities;
- Monitoring of intake sites for potable water treatment plants as well as municipal and industrial discharges;
- Delegating responsibility of proper sampling and analyses of discharges are carried out by the Ministry of Health; levying of fines for non-compliance;
- Setting of regulations and specifications for discharges into water bodies;
- Issue and oversee of licenses for new waste treatment units in floating vessels;
- Issue of licenses for the construction of any establishment that directly discharges into waterways;
- The MWRI through its Water Quality Management Unit (WQMU) has delegated most of the water quality monitoring tasks of both surface and groundwater to the NWRC. NWRC and its Institutes are monitoring the water quality status on regional and national level at strategic locations.
- While awaiting the amended Law 12 to be ratified, MWRI has the powers to establish Water User's Organizations (WUAs, WUOs, and Water Councils) by Ministerial Decree and determine their functions. This decree is in place.

**Ministry of Health and Population (MoHP)** - The MoHP has been given a central role in water quality management, especially in setting standards for the quality of the following:

- Potable water sources (River Nile, canals and groundwater wells);
- Drain water that can be mixed with other water for drinking water;
- Industrial and sewage treatment plant discharges;
- Wastes discharged from river vessels; and
- Besides developing standards, the MoHP must sample and analyze all industrial and municipal effluents and all drinking water treatment plant influents and effluents as well, which is considered a significant load of work.

**Ministry of Environmental Affairs /EEAA** - At the national level, the recently established Ministry of Environmental Affairs (MoEA) has the portfolio for environment in the Egyptian Cabinet of Ministers. Within this Ministry, the EEAA has the responsibility for setting national policy for the environment and coordinating environmental management activities within the government. The EEAA's functions, as established by law 4/1994, include:

- Conducting studies; formulating the national plan for environmental protection;
- Preparing legislation, decrees, and regulations as needed to protect the environment;
- Setting requirements for EIAs of projects;
- Monitoring compliance with standards and norms;
- Coordinating enforcement actions; managing natural protectorates;
- Promoting environmental education.

Law 4/1994, the most recent and comprehensive law gives the EEAA the authority to regulate air pollution, management of hazardous wastes, and discharges to the marine environment. Furthermore, the law gives the EEAA an array of tools for implementing and enforcing these provisions, including traditional regulatory controls (e.g., emission standards for air pollutants), economic instruments, compliance monitoring, inspection, and enforcement (e.g., penalties, closures, and imprisonment).

Thus, the EEAA has significant authority over industry under this law, including the authority to require industries to keep records of the environmental impact of their activities, to collect and analyze samples to ensure that standards are being met, and in the case of a violation to shut down a facility within 60 days if the violation has not been corrected.

The EEAA has promulgated regulations (Executive Regulations, 1995 <http://www.eeaa.gov.eg/english/main/law4.asp>) implementing the air pollution, marine discharge, and EIA provisions of the law and is in the process of completing regulations for the management of hazardous substances and wastes. Some provisions were amended by Prime Ministers Decree No. 1741 of 2005. The law granted industry a three-year grace period (until March 1998) to comply with the new standards. An additional two-year extension was available to those industries that submitted an application by August 1997 and prepared a Compliance Action Plan (CAP) by the end of 1997, demonstrating their progress in meeting the standards. However, this additional extension was rejected by the Prime Minister and the CAP activity was halted.

**Ministry of Housing, Utilities and New Communities (MHUNC)** - Within the Ministry of Housing, Utilities and Urban Communities (MHUNC), the National Organization for Potable Water and Sanitary Drainage (NOPWASD) has the responsibility for planning, design and construction of municipal drinking water purification plants, distribution systems, sewage collection systems, and municipal wastewater treatment plants. Once the facilities have been installed, NOPWASD organizes training, but the responsibilities for operation and maintenance are left to the regional or local authorities. NOPWASD has the intention to inspect each plant regularly, but in practice this very much depends on the cooperation of the various governorates. Many domestic wastewater treatment plants are currently in poor condition. The Holding Company for Water and Waste established by virtue of the Presidential Decree number 135/2004, under the Minister of MUNHC, has been entrusted the general economic authorities and public sector companies for water and wastewater in Cairo, Alexandria, Beheira, Damietta, Sharqia, Gharbia, Kafr El Sheikh, Dakahlia, Fayoum, BeniSuef, Minia and Aswan. It has its judicial personality according to the provisions of Law 203/1991 and its executive regulation. Purpose of

the company is treating, transporting, transmitting and selling drinking water; and collecting, treating and safely disposing wastewater by itself or by its subsidiary companies as well as establishing, managing and rotating a portfolio to ensure financing bonds, stocks and instruments and any other financial tools or instruments.

**Ministry of Industry and Mineral Wealth** -Within the Ministry of Industry and Mineral Wealth (MIMW), the General Organization for Industrialization (GOFI) supervises pollution control, safety and health issues in industry through its General Department for Environmental Protection. It also ensures that new plants include industrial waste treatment units. MIMW decree No. 380 of 1982 requires compliance with all applicable environmental laws, regulations, and standards as a condition for granting industrial licenses. A clause to this effect is written into all industrial licenses granted by the MIMW, committing the industry to taking the necessary preventive measures, such as installing necessary control equipment. However, GOFI does not perform any inspections at industries and, therefore, does not monitor whether industries are actually in compliance with these license requirements.

**Ministry of the Interior -The Ministry of Interior (MoI)**- Egypt's national police force, has for some time maintained the Inland Water Police, a special police force for enforcement of Law 48 and protection of the environment in general. The Inland Water Police provide guidance to citizens and take enforcement actions for violations of environmental laws. Law 4/1994 provides additional authority for this environmental police force, specifying that the MoI shall form a police force specialized in environmental protection within the ministry and in its Security Departments in the governorates (Article 65 of the executive regulations).

## **4. ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION**

### **4.1 FINAL CONSULTATION WORKSHOP**

A final consultation has been held on to discuss the ESIA, RPF and ESMP on 22 April, 2007 in Cairo. The list of invited participants included 74 persons representing the media, NGO's, water users organization in the project area, water users downstream the project area, MWRI departments responsible for the implementation of the ESMP, potential private operators, EEAA, other central level governmental agencies relevant to the project (sanitation, agriculture, antiquities, local development), and relevant local governments. The meeting was announced to whom ever be interested from the public through the project website ([www.mwri.gov.eg/wdip](http://www.mwri.gov.eg/wdip)).

Sixty nine participants attended the workshop; the vast majority of them have come through direct invitations. The invitees have either come in person or delegated colleagues in their respective organizations. Media presence has been more intense than expected and participation from all major invited categories has taken place.

The main topics that were discussed are:

- Induced development;
- Water quality improvement in the Rosetta Branch;
- Need for land drainage;
- Prevention of use of non-efficient irrigation methods;
- Groundwater monitoring;

- Water availability for areas downstream the project on Nubariya canal;
- Effect of project on water availability for other regions;
- Effect of project on small farmers.

The findings of the workshop has been incorporated in the ESIA, RPF and ESMP.

## 4.2 SUMMARY OF THE PUBLIC CONSULTATION PROCESS

The DRAINFRAME<sup>6</sup> assessment, which was conducted in an earlier stage of project preparation, conducted a series of consultations with stakeholders in 2005 and 2006 as one of the basis upon which to identify the drivers of change, including:

- February 26 and April 5, 2005: A series of consultations with stakeholders (e.g., farmers, government officials, private sector, and environmental NGOs) took place;
- 21st of September 2006: additional consultations were held with groups of villagers and farmers;
- November 16, 2006: Meeting with 3 water board members covering part of the project area;
- September and October 2006: The socio-economic survey was finalized following field study visits by the sociologist on the team to interview farmers, inhabitants of the region, and commuters about socio-economic conditions particular to the project.

Details of these workshops and various consultations are presented in the main ESIA/EMP document and its annexes.

Key findings from the above consultations and interviews were included in the ESIA and RPF. In addition, the Draft Executive Summary of the ESIA/EMP, as well as the Resettlement Policy Framework, have been disclosed on the Ministry's web-site, the InfoShop, and through the Public Information Center for diversified dissemination.

On March 22, 2007, a meeting was conducted by the Head of the Irrigation Department and attended by the Head of HEPs and the technical staff of MWRI to review the key issues raised by the Environmental & Social Impact and a Framework for Management Plan (ESMP) by the WDWCIRP; and to discuss each of the mitigation measures propose. The proposed measures were largely acceptable, and feedback was provided in finalizing this ESMP.

## 4.3 POTENTIAL IMPACTS AND MITIGATION MEASURES

### *Extended area of influence*

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<sup>6</sup> Drainframe is a water resources planning tool that ensures the integration of the multiple functions of the natural resources systems and interests of all stakeholders into the planning process and in addressing all the concerns related to a project. It provides a methodology which expands the concept of strategic environmental assessment (SEA) to the assessment of the main economic, social and environmental impacts of new structural or management interventions on the natural resource systems and its consequences for stakeholders. Central to the methodology is the integrated analysis of societies' economic an social needs while safeguarding the ecological values, from a stakeholders perspective at the regional level.

Based on the DRAINFRAME assessment of the hydrological linkages of the project with other areas in Egypt and the update made in this study, the following extended area of influence has been taken into account in the assessment:

- The **Old land** including all command areas relying on Nile water (DRAINFRAME considered only the Old Land of the Nile delta).
- **Wadi-el-Natrun** which is potentially influenced through the connected aquifer.
- The **Nubariya and Bustan command area** which will experience a change in water quality.
- **The groundwater** irrigated areas which will not be connected to the pipeline system.

### Impacts

The main issues raised and discussed through the public consultation process included: (i) the withdrawal of water from the Nile system at the expense of uses outside the project area; (ii) the continuing groundwater use in conjunction with surface water; and (iii) induced regional development as a result of the intensification of agriculture. Table 3 summarizes the main impacts which were estimated with the computational framework that was also used in the DRAINFRAME study.

**Table 3: Overview of impacts with and without project over a 13 year period.**

	change in groundwater level (m) <sup>1</sup>	change in jobs '000 man-years	change in agric. value (million US\$) Project	change in agric. value (million US\$) Old Land) <sup>2</sup>
Without project	- 14 m	- 23,0 (-13 %)	- 34,0 (-39 %)	0
With project	- 2 m	+ 102.0 (+124%)	+ 46.8 (+ 112%)	-21.3

<sup>1</sup>) Note: represents the average picture. Locally these figures may vary widely.

<sup>2</sup>) Note: these figures will improve as proper mitigating measures are implemented.

The project proposed to be financed by the World Bank covers an area in the order of 38,000 ha. By 2010 (when the project is operational) the abstraction from the Nile to serve this project area is expected to be **445 mcm/year**<sup>7</sup>. The water extracted from the Nile to serve the farms will be more than compensated by loss of water usage because of rural-urban land conversion, and water savings from irrigation improvement initiatives of the GOE.

- Assuming conservatively an annual loss of 11,000 ha. (NWRP 2005) each year an incremental amount of 225 mcm will become available, which would within 2 years compensate for the water required for WDWCIRP. If more recent urbanization figures are used, the required water for the project will be saved from land conversion within one year.<sup>8</sup>
- 280 mcm/year water saving by the year 2010 from the replication of the improved irrigation efficiency efforts presently being piloted under the World Bank and KfW-financed Irrigation Improvement Project in about a third of the Nile delta.<sup>9</sup>

<sup>7</sup> Based on a maximum entitlement of 5,200 m<sup>3</sup>/feddan/year (12,376 m<sup>3</sup>/ha/year) times the expected land area of 38,000 ha that will be connected.

<sup>8</sup> A rate of 3.2% total loss of agricultural land (out of 2.6 million ha.) is based on the estimates for the period 1972 and 1984, and a rate of 5.7% is based on the estimated land conversion for 1984 to 1990. Water savings are calculated based on an average water duty of 8,200 m<sup>3</sup>/feddan/year (equivalent to 20,500 m<sup>3</sup>/ha/year) in the Delta area where irrigation by flooding is widely practiced.

<sup>9</sup> Based on results from these Projects, water savings of 1,235 m<sup>3</sup>/fed/year were achieved while improving agricultural yields by 5%. As these pilots are replicated and extended over 75,000 feddans (or 30000 ha), it is estimated total water savings will reach 93 mcm per year and by 2010 this is expected to be 280 mcm/yr.

The existing programs of the government therefore are geared toward securing major savings in the delta area. The project includes these as an essential mitigation strategy in the implementation of the ESMP.

The following sections discuss the impacts of the project and the remedial/mitigation measures that will be undertaken under the ESMP. An overview is given in tables 5, 6 and 7. The measures are indicated (**M.x**) for easy reference across the document.

**(i) Taking water from the Nile system**

Taking water from the Nile for the project has three main effects.

- A: The **water available** for all other uses and users decreases by about 0.7% in the case of developing 38,000 ha under the project. If this water is reallocated proportionally from all existing agricultural uses, the impacts will be various but small and difficult to quantify, even in case both phases are operational. The impacts will include lower incomes from farms and fisheries, lower water quality and environmental degradation of the coastal zone. Some measures will mitigate if not avoid that such impacts may occur.

*Measures*

Implementation of the National Water Resources Plan under a new Water Policy: *Water for the Future* is being finalized<sup>10</sup>. In addition to water saving due to urbanization, if the measures of the NWRP that have been started already, are successfully completed, savings of water in the Nile system will be sufficient to make up for the water requirements of the project. Moreover, the Implementation Support Project for NWRP, which aims at sequencing and prioritizing a range of other NWRP measures, has recently been approved by both MWRI and the Government of the Netherlands and will most likely become operational within a year. Under this project the water balance of the Nile system will be monitored closely to assure that "new plans for horizontal expansion of agricultural area will be made dependent on further water saving measures or the availability of additional water resources" (ARE, 2005). The WDWCIIRP project management will, as an input in the NWRP process, identify specific water saving measures which relate to the project (**M.1**). These measures, which will seek to ensure adequate supply through the Nile, will include, among others in addition to saving due to urbanization, the following: (a) the promotion of scaling-up within the old lands, as a priority, the successful results of the Bank-financed IIIMP project which has demonstrated the viability of achieving the dual benefits of water savings and improving productivity water (**M.2A**); (b) get project area prioritized and targeted for water saving measures by GOE, by seeking a direct reference to the WDWCIIRP area within the official documentation pertaining of the Horizontal Expansion Program (**M.2B**).

To ensure adequate water supply through the Nile systems, and avoid constraints or shortfall, the DBO contractor and the attached service standards will specify that the operator has to provide the MWRI the monthly water requirements for the upcoming year (**M.3**). That will be followed with his daily requirements to be submitted 10 days before the beginning of each month. This will enable the MWRI to adjust its operational planning for water distribution in time to ensure adequate water supplies for the project and rest of the system. In any case, a fixed allocation of water will be made available by the government to the project area, based

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<sup>10</sup> This includes the GOE Horizontal Expansion Program for Agriculture – the West Delta Irrigation Improvement Project. The WDWCIIRP is a first component of this program.

on the estimated average annual requirement of 12,376 m<sup>3</sup> per year per ha. The preliminary design of the system has been sized to meet most of the peak demand in the summer months. Over the entire year, total usage converges to the annual average. Based on this, it is anticipated that the surface water system would meet most of the water needs of the farms that will be connecting, allowing the aquifers to be conserved and to benefit farmers in adjacent areas.

- B: The **hydrology of the Rosetta Branch** will change. The water taken for the project is compensated by water from the Rosetta Branch diverted to the Rayah el Nasserri downstream from the project intake. This means that the upper stretch of the river, starting from Delta Barrage, will have to convey higher average and peak discharges and consequently get higher water levels. As a consequence also the erosion and sedimentation behavior will change. Because encroachment of the river banks by agriculture and buildings took place since the regime of the river stabilized after the construction of High Aswan Dam, higher water levels may have adverse effects on these functions.

#### *Measures*

An ex-ante assessment of the potential hydrological changes in the Rosetta Branch is underway, and the conclusions of this study would inform the ESMP of this project, and the design and timing of specific mitigation measures to guard against any potential river bank flooding, erosion and sedimentation of the Rosetta Branch (M.4). This assessment has been assigned by MWRI to be undertaken by NRI. The mitigation measures will be in line with the concomitant procedure for involuntary resettlement, if there is any expropriation involved (see Section 4.2 (iv)). The situation will be monitored following the commencement of any hydrological changes in the Rosetta Branch.

- C: The **water quality** in the water system of the West Delta region will change. At present, the Nubariya canal is supplied through the Beheiri canal from the Nile at Delta Barrage, which is rather upstream. The water quality is relatively good and pollution, as the canal flows, is limited. The Rosetta branch also takes off at Delta Barrage with the same water quality. But it receives the effluent of several badly polluted drains on its way to the sea. The project takes clean water from the Nasserri-Nubariya canal. This canal further downstream is replenished with water from the polluted Rosetta branch. The result is a decrease of water quality of the Nasserri-Nubariya canal downstream of the point of re-supply. Further downstream on the Nubariya canal there are several water treatment plants for drinking water (Alexandria and local). These companies may object to the decrease of water quality. The positive side of the medal is that the discharge of the Rosetta branch will increase. More water with the same pollution load results in better water quality (but not as good as the Nubariya at present). The downstream command area of Mahmoudia, and some smaller ones as well as the Alexandria municipal water plant and the fish farming community will benefit from this effect.

#### *Measures*

Sewage treatment in the catchments of the drains polluting the Rosetta would solve the problem all together. It is clear that such measures are beyond the reach of an environmental management plan of a single project. The NWRP proposes an extensive plan to that end, and GoE allocated about LE 20 billion to improve sanitation in a national program. Planning mechanisms in the program include that the hot spots that are influencing water quality will get priority. This means that the WDWCIRP project management should, as a matter of urgency, identify and cost specific priority activities (e.g. improvement of the water quality of

the Rahawi drain) within the project which could get priority in the national sewage treatment program under the NWRP.

To get quantitative information on the future water quality in the West Delta Region, a water quality assessment study, aimed at identifying and costing specific priority programs for inclusion in the GOE, LE 20 billion sanitation plan should be undertaken urgently (M.5). This should be completed before WDWCIIRP becomes operational. This study can be seen as a follow-up to the study that was recently completed for the Umum Project. This study should also provide the framework for an intensified water quality monitoring program in the main system. The study can be done by DRI under the supervision of MWRI.

The outcomes of this assessment would provide the PMU with direct input into the NWRP, with an aim to identify and cost specific priority programs for inclusion in the GOE, LE 20 billion sanitation plan. (M.6).

### *(ii) Conjunctive use of surface- and groundwater*

By supplying surface water for irrigation, the project will respond to the groundwater depletion and groundwater quality deterioration experienced within the project area. Hence the project itself is a forceful mitigating measure for the presently unsustainable water supply system in the area. To which extent the project will succeed in this mitigation depends on several factors.

The combination of the water duty allocated for the project (12,376 m<sup>3</sup>/ha/y), the limitations posed on the design capacity of the pipeline system (22 m<sup>3</sup>/sec) and the projections of the calculated peak water requirement for the project when fully developed, make that surface water delivery will fall short to some extent during the summer months. Since the groundwater pumping infrastructure will remain intact after the project sets on, it is possible that farmers will use the groundwater to make up for the shortages of surface water supply. So there is a possibility that conjunctive use of groundwater will result in a still unsustainable ground water exploitation. In that case also deterioration of groundwater quality may not be fully stopped.

Falling ground water levels have spread to the deep depression of Wadi el Natrun, where people depend on spring water seeping in from the surrounding areas. The current status of the wetlands of Wadi el Natrun shows it has shrunk over the years.

The question is whether the project will be able to reverse the negative impacts of the present ground water extractions as indicated above.

There are some positive factors that should be monitored closely. Firstly, many farmers produce with modern irrigation techniques and under the EurepGAP protocol. Drip irrigation strongly limits percolation of water to the aquifers and hence the transfer of possible polluting substances from surface to ground water. The Integrated Pest Management requirements under the EurepGAP minimize the generation of agrochemical residuals.

Secondly, the preliminary design of the system has been sized to meet most of the demand taking into account the possibility for conjunctive use of groundwater where required in the summer months. Over the entire year, total usage converges to the annual average. Based on this, it is anticipated that the surface water system would meet most of the water resource needs of the farms that will be connecting, allowing the aquifers to recharge and to benefit farmers in adjacent areas. The possibility to use the groundwater as an emergency source of water in case the surface water delivery fails thus can be maintained.

In order to assure the GoE's objective to preserve the groundwater in the project area, additional mitigation measures are proposed to further promote improved future quality and quantity of ground water.

*Measures*

These measures will be dealt with as an Integrated and Sustainable Groundwater Management package (M.7). The first part of this package is the preparation of a plan which will explore a range of possible measures to mitigate against adverse impacts on groundwater quantity and quality. This plan will also identify a site where these measures will be piloted. Implementation of the plan is made the responsibility of the Water User Council jointly with the Groundwater Sector of the Ministry.

The range of possible measures which will be explored, in addition to the effect of the project itself, to keep the use of groundwater at a sustainable level include: i) restriction of cropping during summer, ii) modernization of irrigation technology for those farmers who are still not using such technologies, iii) storage of surface water in basins, iv) artificial recharge of the aquifer, and v) restrictive licensing of groundwater pumping. A combination of these measures will probably be the most attainable.

To control the groundwater quality, the following possible measures are identified: vi) extending the integrated pest management practices under the EurepGap protocol to those farmers which are not yet certified (which will address the Pest Management Policy of the World Bank), vii) further development of modern fertilizer application techniques (also following EurepGap protocol), and viii) treatment of agro-industrial waste water, settlement sewerage water and solid waste.

The Groundwater sector will (M.8) intensify its already existing groundwater monitoring program in and around the project area. This monitoring program will include the adjacent area of Wadi el Natrun. This may be instrumental in demonstrating the positive effect of the project on this particular area.

*(iii) Induced development*

This chapter summarizes the potential negative social impacts due to developments induced by WDWCI RP. They can be expected in three different stages of the project: planning, construction and operation. During the project planning stage an increase in land and house prices is likely due to speculation. It is extremely difficult to identify the effect of the proposed WDWCI RP as compared to other major influences, e.g. the proposed upgrading of the Cairo-Alexandria desert road might have as much impact upon land prices as improved water supply. The construction/implementation stage involves clearing land, building access roads, developing utilities camps etc. Expropriation of lands would probably occur during this phase. This is dealt with under the section on involuntary resettlement. Finally, during the operational stage labor opportunities at the commercial farms in the new lands will strongly increase.

**Table 4:** Impact of WDWCI RP I on jobs and value of agricultural production

	perm. jobs in m.year Year 1	gain of perm. jobs m.years Y1 to Y13	temp. jobs in m.years Year 1	gain of temp. jobs m.years Y1 to Y13	value of agric. prod. US\$*10 <sup>6</sup> Year 1	sum value agric. prod. US\$*10 <sup>6</sup> Y1 to Y13
Case A0 (37.800 ha, no development, 20% summer crops)	12,457	0	69,922	-11,000	41.56	-16.0
Case A1 (37.800 ha, max. surface)	12,457	14,048	69,922	87,796	41,56	+46.88

water, 20% summer crops)						
Case A1 (37.800 ha, max. surface water, 10% summer crops)	11,835	13,345	64,095	81,226	40.88	+46,1
Case A1 (37.800 ha, max. surface water, 0% summer crops)	11,213	12,644	58,274	74,661	40.20	+ 45,3

Opportunities for laborers to migrate and settle are low

According to landowners there is no opportunity to establish new villages in the area, simply because there are no “empty lands left” for that purpose.

It is also observed that most laborers prefer to commute to the farms in the area. A number of factors, particularly the lack of basic services, presently work as disincentives for permanent migration.

The multiplier effect of new settlements is low

The total job creation will be significantly more than the labor force needed for the direct agricultural activities. However figures provided by the DRAINFRAME study on the multiplier effect of agricultural development on population development are under the present conditions unrealistic, since most laborers prefer to commute. Settlement of people in the area would lead to an increase in construction activities, an increased demand for social and health services (schools, clinics, sports, etc), and an increase in service-oriented activities (such as shops). As long as settlement conditions remain unfavorable this spin-off of the project cannot be fully benefited from.

*Measures*

The present situation works at the detriment of the long term planning for regional development in Egypt. Therefore, a shared vision of the area by both government bodies and West Delta investors should be developed in order to maximally benefit of the opportunities offered in the area. An explicit social policy for settlements on new lands may well be the most important single factor in the success of the project with respect to creating a sustainable social environment. To facilitate this process it is proposed to closely monitor the socio-economic development as the project becomes operational **(M.9)**. It is extremely difficult to predict social changes resulting from a project of this nature, and it is therefore critical to establish a solid monitoring process. A first step would be the preparation of a baseline study which should focus on a limited set of key variables to be monitored at regular intervals throughout the life of the project and beyond, such as the social changes in the project areas resulting from large-scale commute/migration. This process should also pay attention to the fact that the farms in the project area vary from major agribusinesses to units having less than 10 feddans. Although none of the farmers affected by the project are poor, their interests are likely to vary considerably, and it is important to ensure that all voices are heard.

The social section of DRI has experience with such monitoring programs, as they did the baseline study during the DRAINFRAME study. The results of this program will be submitted to the Land Use Planning Authority which is responsible for the integrated socio-economic development of rural areas. Information from the monitoring process could also play a critical role in informing the future planning process with regard to regional development in the new lands.

*(iv) Triggered safeguard policies*

A Resettlement Policy Framework (RPF) for the project has been prepared which deals with the overall resettlement principles to be addressed in the resettlement plans.

- A. The scale of involuntary expropriation is expected to be limited. (i) There may be project affected people along the Rosetta Branch because of water level rise. However, their numbers, if at all, likely are small because the hydrological changes of the river due to the project are expected to be small.
- (ii) Temporary and permanent expropriation and rights-of-way will be required for the construction and maintenance of the buried pipeline system in the project area itself.

*Measures*

Potential impacts of increased water levels of the Rosetta Branch will be examined in a special study by the NRI, as indicated before (M.4).

For the temporary and permanent expropriation and rights-of-way in the project area, the corridors have not yet been designed, so the extent and location of the impact cannot be given. The DBO contractor will optimize his design to avoid (M.10) and minimize (M.11) the need for expropriation. Together with the final design the DBO contractor will present (M.12) additional information as outlined in the detailed implementation responsibilities spelt out in the Safeguards Implementation Plan. (Environmental and Social Management Plan, section IV, A)

- B. The Natural Habitats Policy (OP 4.04) is not triggered.
- C. The Physical Cultural Resources Policy (OP 4.11) is triggered for precautionary reasons. For the scale of works envisaged under the project, the Egyptian Law always requires a number of procedures to be followed before and during construction, in order to obtain and maintain clearance to proceed. The Supreme Council of Antiquities is responsible for the protection and conservation of Cultural Properties.

The matter is taken care of in the contracts prepared by the Horizontal Expansion Sector (Clause 25 of the MWRI general contract no. 3333-b), which states:

“All antiquities that can be found by the contractor during the excavations should be remitted directly to the office belonging to the High Council of Antiquities. In the case of projects occurring in or close to an antiquities area, the High Council of Antiquities is responsible to bring technical laborers to observe the location and the antiquities which cost is covered by the contractor”

*Measures*

The Supreme Council of Antiquities is the Authority which applies Law 117, which if applied correctly, would provide sufficient safeguard for the preservation of physical cultural resources. Clause 25 of the MWRI's general contract specifications is in agreement with Law 117. It will be part of the DBO contract (M.13) and will include provisions for archaeological surveys and appropriate chance find procedures.

- D. The Pest Management Policy (OP 4.09) is triggered in as far the project triggers an increase in cultivated area and hence an increase in the application of pesticides, insecticides and herbicides in absolute terms. The use of fertilizers will equally grow. It has been said before that most of the farmers in the area are export oriented and are certified and producing under the EurepGAP protocol. This organization promotes integrated pest and fertilizer

management and monitors the producers which they have certified. They apply the following definition for IPM: "The careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep plant protection products and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment. IPM emphasizes the growth of a healthy crop with the least possible disruption to agro-ecosystems and encourages natural and or non-chemical pest control mechanisms." This definition combined with the strict monitoring and certification system by the organization guarantees compliance with the World Banks requirements. Those farmers who are not yet producing under the EurepGAP protocol will be stimulated, through the Water Users Council and under the sustainable groundwater management plan, to adopt these practices.

### *Measures*

Integrated pest management under the EurepGAP protocol not only serves the quality of the produces, but also contributes to protection of the groundwater. The protocol also includes standards for sustainable application of fertilizers. IPM and fertilizer management as part of EurepGAP has therefore been included in the number of measures that protect groundwater quality and forms part of the sustainable groundwater management plan (**M.7**). The objective is to introduce the good practices of most of the farmers to those who are lagging behind in this regard.

- E. The International Waterways Policy (**OP 7.50**) is triggered in as far the West Delta project will have an annual abstraction from the Nile River, which is shared by 10 riparian countries. By 2010 (when the project is operational) the abstraction from the Nile to serve the project area is expected to range between 300 mcm/year (for 25,200 ha) and 450 mcm/year (for 37,800 ha). As explained in Section 4.2, the water extracted from the Nile to serve the farms will be more than compensated by loss of water usage because of rural-urban land conversion, and water savings from irrigation improvement initiatives of the GOE.

### *Measures*

The Nile riparian countries have formed the Nile Basin Initiative (NBI) for enhanced collaborative development and management of the Nile River for the benefit of all. While the NBI is not yet established as a permanent institution, the Nile Council of Ministers (Nile-COM) acts as the body governing the activities under the NBI. The West Delta project is one of a series of NBI projects which the Nile-COM has approved for project preparation under the umbrella of the NBI. The Government of Egypt had developed a project profile for the West Delta Project that summarizes the key components and identifies the potential water related impacts. This project profile has been shared with the riparian countries under an agreed procedure thus meeting the requirements of the Bank's policy on international waterways (**OP 7.50**).

### **(v) Construction of works**

This study gives only the issues which need to be addressed in a detailed environmental and social management plan to be produced by the proponent, the DBO contractor, and which should be part of the final design.

Possible local environmental impacts during construction include: (i) dust and particulate emissions; (ii) creation of spoil; (iii) generation of solid waste; (iv) heavy duty transport.

*Measures*

Appropriate construction management practices are required to avoid these impacts to occur. Good construction practices would mitigate most of these temporary impacts to acceptable levels. Dangerous activities in public areas will be controlled to reduce risk to the public, traffic and warning signs will be placed at construction sites, trenches will be provided by fences, or railings. The construction contract document will incorporate all requirements to minimize disturbance from construction activities. It will be monitored by the Environmental Specialist at the PMU to ensure compliance and implementation of the required provisions by the Contractor. Such measures (**M.14**) will be indicated in a Clean and Safe Construction Plan as part of the ESMP made by the proponent. The MWRI's approval of this plan is a prerequisite.

**Table 5:** Overview of remedial measures, implementing agencies and supervising roles

ESMP measures	implementing agency	supervising role	before loan	Design	construction	operation
<b>Safe Main Nile System Management Plan</b>						
<b>M.1</b> Identify specific water saving measures, and provide concrete input to the NWRP process.	CAWD, WMRI	PMU, HEPS <sup>11</sup>	x	x	x	x
Ensure adequate water throughout the Nile system, <i>inter alia</i> ,: <b>M. 2A</b> scaling-up within the old lands of water savings measures based on results of IIIMP. <b>M. 2B</b> Seek direct reference to the WDWCIRP area within the official documentation on the Horizontal Expansion Program. so as to get project area prioritized and targeted for 'water savings measures' by GOE, by seeking a direct	IIS  HEPS, MWRI	MWRI  PMU	x  x	x	x	x
<b>M.3</b> To guard against constraints and shortfalls, the Ministry will be informed ahead of the monthly water requirements for the upcoming year.	DBO contractor and CAWD	PMU		x		x
<b>M.4</b> Mitigation measures to guard against any potential erosion and sedimentation of the Rosetta Branch will be based on outcomes of ongoing assessment.	NRI, HEPS,	PMU		x	x	x
<b>Safe Water Quality for Nubariya Canal</b>						
<b>M 5.</b> A water quality assessment study relating to sewage treatment aimed at identifying and costing specific priority programs for inclusion in the GOE, LE 20 billion sanitation plan.	DRI	PMU	x	x		
<b>M.6</b> Provide NWRP with above input for prioritization of water quality (sanitation/sewerage) measures	PMU	HEPS		x	x	x
<b>Integrated sustainable groundwater management plan</b>						
<b>M.7</b> An integrated and sustainable groundwater management plan which includes several specific measures should be put in place to promote groundwater recharge and improved quality (includes provisions for IPM).	WUO & GWS	PMU			x	x
<b>M.8</b> Intensified groundwater monitoring	GWS	PMU		x	x	x

<sup>11</sup> PMU to be given a coordination/implementation role with HEPS given a supervision role.

<b>Social Development Plan</b>						
<b>M.9</b> Monitoring of socio-economic change processes : Increase in temporary/permanent labor and commuting, social impacts on labor, cost of housing/land, availability of services	DRI	PMU				x
<b>Safeguards Policy</b>						
<b>Safeguard Policy</b>						
<i>Involuntary Resettlement</i> <sup>12</sup>						
<b>M.10</b> Avoidance	DBO contractor	PMU		x		
<b>M.11</b> Mitigation	DBO contractor	PMU		x	x	
<b>M.12</b> Compensation	DBO contractor	PMU		x		
<i>Physical Cultural Property</i>						
<b>M.13</b> Avoiding through Clause 25 of general contract specifications of MWRI.	HEPS	PMU/SC A		x	x	
<i>Pest Management Policy</i>	Addressed through <b>M.7</b>					
<b>Construction activities</b>						
<b>M.14</b> Clean and Safe Constr. Plan	DBO contractor	PMU/HE PS/EEA A		x	x	
<b>General support and capacity building</b>						
<b>M.15</b> Institutional strengthening for PMU	PMU	HEPS	x	x	x	x

## 5. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Impacts Assessment and the accompanying Environmental and Social Management Plan, as per the Bank requirements, are comprehensive documents which will guide the implementation of the mitigation measures, budgetary requirement, monitoring and oversight to ensure that these issues are followed through. The ESMP is in part a framework at this juncture, for the following reasons

- (i) Some of the specific elements relating to the DBO contractor will be defined through a detailed ESMP once the final design and alignment of the pipeline has been determined.
- (ii) Some specific impacts, and their mitigation measures (e.g. water quality/sanitation; hydrology of Rosetta Branch) will be determined through detailed follow-up studies and assessments or through ongoing assessments.
- (iii) Some proposed mitigation measures are beyond the sole decision of the project, especially those relating to the NWRP (e.g. relating to prioritization of areas for water savings, sanitation programs).

It is the role of the PMU to ensure that these aspects are followed through effectively and with continued rigor.

<sup>12</sup> More fully dealt with in the Resettlement Policy Framework.

Overall, the measures of the ESMP (summarized in table 5) are grouped into six components which refer to the six main impact themes as discussed above and a general component.

- i.* Safe main Nile system management plan;
- ii.* Safe water quality for Nubariya Canal;
- iii.* Sustainable groundwater management plan;
- iv.* Social development plan;
- v.* Safeguards implementation plan;
- vi.* Clean and safe construction plan;
- vii.* General support and capacity building.

#### ***(i) Safe main Nile system management plan***

The Government has committed itself to a concession of Nile water for the WDWCIRP. Mitigation of negative impacts of the withdrawal of water from the Nile for this project is therefore the responsibility of the Government and not of the DBO contractor. The MWRI is the competent authority. In addition to water saving due to urbanization in the Delta, the proposed measures are based on the stand-still and precautionary principles as defined in the National Water Policy 2017. As a precautionary principle the Policy also states: "*New plans for horizontal expansion of agricultural area will be made dependent on further water saving measures or the availability of additional water resources*".

The actions that need to be undertaken are described in the main text. They include (*responsible party between brackets*): (i) issuing a letter that confirms that WDWCIRP is now part of the Horizontal Expansion Program (*Horizontal Expansion Projects Sector: HEPS*); (ii) Monitoring of the water balance of the Nile system to avoid (*NWRP-ISP*); (iii) an ex-ante operational plan showing in some detail that the main control structures of the Nile system will be reset timely (*DBO contractor and GDWD*); (iv) a study that will assess the changes of the hydrology of the Rosetta Branch and the consequences for the riparians (*HEPS*). All these actions will be taken or already have been taken by MWRI and as a specific task assigned to the relevant departments and sectors. An indicative timing related to the different stages of the project is included in Table 5.

The strategic National Water Resources Plan is of a different nature and beyond the reach of an Environmental Management Plan of a single project. Projects like WDWCIRP will help to set priorities in the implementation of the NWRP. The follow-up project NWRP Implementation Support Project is in the final stage of preparation and will be financially supported by the Netherlands. Developing criteria for priority setting of the various measures is one of the main outputs of this project. The PMU of the WDWCIRP will be the responsible party to provide the input to the NWRP.

#### ***(ii) Safe water quality for Nubariya Canal***

The complex hydrological system and the diffuse nature of the sources of pollution make a quantitative assessment of the water quality in the new situation impossible in the framework of this ESIA. A dedicated water quality assessment study is needed, which encompasses the Rosetta Branch, the Nasserri and Beheiri Canals, the Nubariya Canal. The assessment study will be conducted by the Drainage Research Institute and has to be completed before the start of

construction can be approved. The findings of the study should result in additional measures under the ESMP if deemed necessary. The monitoring part will be conducted during the operational phase of WDWCIIRP.

The measures mentioned above require funding, which have been provided in the budget of the ESMP, amongst others for the purchase of a 3-dimensional water quality model and assistance of an international expert.

***(iii) Sustainable groundwater management plan.***

A package composed of possible measures, as described above, has to be developed and tested to conserve the aquifers in the project area and protect their quality. To assure coherence, the plan will be developed and implemented in a partnership of the Water Users Council and the Groundwater Sector of MWRI. This partnership will be facilitated by the Central Directorate-Irrigation Advisory Services. As the design of the groundwater plan can not be blue printed, it should gradually emerge from a process of discussion and sensitization in the partnership. Pilot try-outs and field demonstrations of certain measures of the package will support this process.

The CD-IAS is the facilitating party. Since the Water Users Council in WDWCIIRP is completely different from the Water Users Associations and Water Boards which have been established so far in Egypt, the CD-IAS will need to be prepared for this task. This includes specialist training, some extra transport facilities, equipment and materials and few months of local consultancy services.

Regardless whether the groundwater management plan becomes effective or not it remains the responsibility of the GWS to monitor water quantity and quality in the project area. This is already a routine task of the GWS and will be intensified during the project.

***(iv) Social management plan***

At this stage, the social impacts of the project on the labor force and their families are uncertain. Development of an integrated plan for the West Delta region, comparable to a National Water Resources Plan, would be an opportunity to promote sustainable socio-economic development of the region. However, this is beyond the reach and responsibility of the project and belongs more to the Land Use Planning Authority.

A baseline study should be conducted as soon as practically possible, followed by regular (annual) monitoring program of the main indicators of change. It is critical to avoid an overly complex exercise. The baseline study, on which subsequent monitoring will build, should focus on a few monitorable variables. As highlighted in the SIA the interests of the farmers in the project area vary. The monitoring process should focus on how the project affects both big and small farmers, as well as the workforce and how the commuting patterns change and its impact on the communities in the new lands, number of jobs created etc. (see ESMP monitoring plan).

It is therefore considered important to monitor on a yearly basis the social and economic development after the project has become operational. A baseline study of the socio-economic status of the project area should be initiated as soon as possible.

**(v) Safeguards implementation plan**

**A. The Involuntary Resettlement Policy.**

The Resettlement Policy Framework prepared jointly with this ESMP, spells out the laws, rules and regulations applicable to the project.

Complete avoidance of involuntary resettlement may not be possible. However, before construction starts two actions will be taken to minimize it. (i) NRI will make an assessment of the potential risk of involuntary resettlement along the embankments of the Rosetta Branch. (ii) The DBO contractor explicitly evaluates alternative designs for minimal expropriation with results that are satisfactory for MWRI.

Specific responsibilities for implementation of the RPF and subsequent Resettlement Plans are as follows:

- MWRI will attach to the bidding document, (i) a copy of the RPF; (ii) available maps of the areas showing the boundaries of the properties in private and public lands; (iii) information on the standard market rate determined by a independent assessor acceptable to the Bank, for market prices of new reclaimed lands, old lands in the Delta and along the Rosetta canal. The bidding document will also require that the bidders should pay the agreed market price in case full expropriation of land is required and /or temporary or partial land acquisition.
- The bidders in their technical and financial proposal, will describe the areas to be expropriated or acquired temporarily in accordance with the RPF and will also provide the cost for such expropriation. Draft RP's will be attached to the bids.
- The Bank will provide its no objection to the successful bidder provided it fully complies with the RPF and the draft resettlement plans prepared by the successful bidder. The contract should stipulate that no civil works can start until the project affected persons (PAPs) are fully compensated at market rate.
- After contract signature and immediately after the subscription period ends, the DBO contractor will officially submit to MWRI the necessary documentation for their review and approval. This will include system layout.
- MWRI will be responsible to proceed and complete the expropriation process in accordance with the RPF and RPs.
- Once the expropriation/ land acquisition process is officially completed, MWRI will require that the DBO contractor provide PAPs the full amount of compensation before issuing the working orders for construction.
- MWRI will submit to the Bank in its semi annual progress report, the status of expropriation/land acquisition and compensations.

Compensation of remaining expropriation (temporary or permanent) and responsibility for any RPs concerning the affected areas along the Rosetta Branch is the obligation of the MWRI..

**B. The Natural Habitats Policy.**

The Natural Habitats Policy will not be triggered by the project.

C. The Physical Cultural Resources Policy.

The general contract of the MWRI regulates this issue through its clause no. 25 which make contractors responsible for any antiquities during excavation both by calling for the High Council of Antiquities in the case they find any antiquity and by employing and paying for the technicians of the Council during the period of work. The DBO contract will also include provisions for archaeological surveys and appropriate chance find procedures.

D. The Pest Management Policy.

The IPM is considered part of the Groundwater Management Plan. Roles and responsibilities as well as incurred costs are included in that component.

E. The International Waterways Policy (OP 7.50)

The West Delta project is one of a series of NBI projects which the Nile Council of Ministers (Nile-COM) has approved for project preparation under the umbrella of the NBI. The Government of Egypt has developed a project profile for the West Delta Project that summarizes the key components and identifies the potential water related impacts. This project profile will be shared with the riparian countries under an agreed procedure thus meeting the requirements of the Bank's policy on international waterways (OP 7.50). The West Delta Project Profile for discussion is presented in Annex 1 of the Main Report.

(vi) *Clean and safe construction plan*

A detailed ESMP, as far as it will be the responsibility of the DBO contractor, will be submitted for agreement to MWRI by the DBO contractor jointly with the final design. Part of this is the Clean and Safe Construction Plan which indicates how he will avoid or mitigate negative impacts during the construction and caused by the construction. The measures that are proposed will be in accordance with all pertinent Egyptian rules and regulations.

The costs which may stem from this part of the ESMP are to be covered by the DBO contractor. The obligations of the DBO contractor will be spelled out clearly in the tender documents.

(vii) *General support and capacity building*

Apart from the measure-specific components of the ESMP, a general component is included which provides for the required support and capacity within the PMU. The PMU has to monitor the implementation of the ESMP components which are assigned to Governmental Agencies, and will also follow-up the DBO contractor's obligations for the ESMP. This component comprises unspecified consultant services and capacity building for both units if and when required, and a relatively large fund for unforeseen expenses which may appear in the other components of the ESMP. This is to allow flexibility of operations during the preparation and implementation of the ESMP.

## 6. CONSIDERATION OF ALTERNATIVES

The main part of the DRAINFRAME assessment was geared to the evaluation of alternative solutions for the project as regards the conjunctive use of groundwater. The result was a quantitative assessment of economic benefits, job opportunities and ground water depletion for the range of alternatives. The DRAINFRAME study also compared the environmental pro's and con's of closed conduits and open canals for the conveyance of water throughout the project area. The assessment has resulted in an adaptation of the design capacity of the pipeline system, a

decrease in the size of the project area from 100,000 ha to 38,000 ha., and a principle choice for closed conduits.

Although the measures discussed above don't identify or select best alternatives directly, several create the conditions that these best alternatives will be found in a later stage. M.1 and M.6 intend to create interaction with the NWRP process, exactly to generate the best alternative interventions within that framework. M.7, dealing with sustainable groundwater management aims to create a participatory ground water management environment in which several technical and institutional measures in a coherent package will be developed, tested and introduced. M.9 aims to provide a scientific basis from the beginning of a development process so that in a later stage, the best alternative plan for regional socio-economic development can be searched for.

Under the measures M.10 and M.11, the DBO contractor has to develop best alternatives for avoidance and mitigation of resettlement issues, and under M.14 he has to develop best alternative practices for environmentally safe construction.

## **7. MONITORING**

Four monitoring activities, for which GoE/MWRI is responsible, will be carried out under the ESMP: a) the hydrological behavior of the Rosetta Branch during project operational stage; b) the water quality of Rayah el Nasser, Rayah el Beheiri, Nubariya and Nasser Canals, and Rosetta Branch; c) intensified monitoring of groundwater quality and quantity during operation of the project; d) monitoring of the social development of the region. The PMU supervises these monitoring components of the ESMP.

The implementation of the Safe and Clean Construction Plan, the Resettlement Plan, and the procedures for antiquities chance-find cases will be internally monitored by the DBO contractor and reported to the PMU. The PMU, in co-operation with the competent governmental authorities, will be responsible for the external monitoring.

## **8. CAPACITY BUILDING**

The following capacity building activities will be undertaken in the ESMP:

- (i) External support and software for water quality assessment study West Delta Region.
- (ii) External support to Central Directorate-Irrigation Advisory Services for Water Users Organization strengthening.
- (iii) Observation wells for intensified monitoring of ground water
- (iv) General and yet to be specified support to the Project Management Unit for their supervising roles in the ESMP.

## **9. INSTITUTIONAL PLAN**

The final responsibility for implementation of the ESMP lies with the MWRI. The preliminary project set-up indicates that those parts of the ESMP that are to be implemented by the DBO contractor should be supervised by the PMU. This unit deals with all contractual matters of the project. The Project Management Unit monitors the other plan components and takes the proper measures in case of non compliance. They are all implemented by agencies belonging to the MWRI. The PMU will report progress made to the Egyptian Environmental Affairs Agency, the Supreme Council of Antiquities and to the World Bank.

The ESMP framework sets out remedial, monitoring and institutional measures, responsibilities for implementation and related costs. The elements of the ESMP framework for

which the borrower will be responsible to implement, and other than those related to the DBO contract, will be funded through the TA of Component 3 of the Project at a level of US\$ 1.248 million. To ensure effective compliance, implementation and supervision of the proposed mitigation measures as outlined in the framework ESMP, the following will be undertaken:

- (i) DBO contracts: The ESMP (Executive Summary and Main Report) and the RPF will be appended to the bid documents. Prior to the launch of the bid documents, the DBO contractors will undertake detailed ESMPs of the final design and alignment of the surface water system and connection, which will be submitted to the MWRI and EEAA, in accordance with the national Environmental Protection Law # 4 of 1994;
- (ii) MWRI will coordinate and cause to implement those elements of the ESMP framework for which it has responsibility (e.g. safe main Nile system Management Plan) and these will be monitored for progress by the PMU;
- (iii) The PMU will have the dual role of implementation and supervision of specific elements of the ESMPs. A full-time Environmental Specialist will be part of the PMU, as reflected in the institutional measures of the framework ESMP. For those mitigation and monitoring measures that the PMU is charged with implementation (e.g. safe water quality) detailed plans will be developed within the first year of implementation. For those that PMU is charged with supervision (e.g. sustainable groundwater management plan, social development) they will develop detailed monitoring plans.

## **10. FINANCIAL PLAN**

Table 6 shows the cost components for each mitigating measure. In table 7 these costs have been rearranged following the themes (i) monitoring, (ii) institutional strengthening and capacity building, and (iii) construction. The costs which come with the safeguards policy and the clean and safe construction practices will form part of the DBO contract. They will be specified in the final design and RP prepared by the proponent of the final EIA.

**Table 6:** Remedial measures, responsibilities for implementation and related costs

Potential Impacts	Measures		Responsibility		Cost (US\$)
			Implementation	monitor	
<b>Component I: Safe Main Nile System Management Plan</b>					
Over exploitation of Nile water.	M.1	Identify specific water saving measures, and provide concrete input to the NWRP process.	CAWD, WMRI	PMU , HEPS <sup>13</sup>	150,000
	M.2	A. Scaling-up within the old lands of water savings measures based on results of IIIMP.  B. Seek direct reference to the WDWCIIRP area within the official documentation on the Horizontal Expansion Program. so as to get project area prioritized and targeted for 'water savings measures' by GOE, by seeking a direct	IIS  HEPS, MWRI	MWRI  PMU	n.a.
	M.3	To guard against constraints and shortfalls, the Ministry will be informed ahead of the monthly water requirements for the upcoming year.	DBO contractor and CAWD	PMU	n.a.
	M.4	Mitigation measures to guard against any potential erosion and sedimentation of the Rosetta Branch will be based on outcomes of ongoing assessment.	NRI, HEPS	PMU	n.a.
<b>Component II: Safe water quality for Nubariya Canal</b>					
Deteriorating water quality in Nubariya and Nasser Command areas	M.5	Water quality assessment study	DRI	PMU	83,000
	M.6	Prioritize water quality measures under NWRP	PMU	HEPS	n.a.
<b>Component III: Sustainable groundwater management plan</b>					
Remaining risk of groundwater deterioration	M.7	Integrated and sustainable groundwater management plan	WUO and GWS	PMU	200,000
	M.8	Intensification of groundwater monitoring: maintenance and sampling	GWS	PMU	360,000
<b>Component IV: Social development plan</b>					
Opportunity for sustainable development	M.9	Monitoring of socio-economic change processes	DRI	PMU	55,000
<b>Component V: Safeguards Policy</b>					
Involuntary Resettlement	M.10	Avoidance by optimization of design	DBO contractor	PMU	DBO contract
	M.11	Mitigation	DBO contractor	PMU	DBO contract
	M.12	Implementation of Resettlement	HEPS/MWRI	PMU	DBO

<sup>13</sup> PMU to be given a coordination/implementation role with HEPS given a supervision role.

		Plan			contract
Loss of Cultural Property	M.13	Avoiding through Clause 25 of general contract specifications of MWRI.	HEPS	PMU/SCA	DBO contract
Protection of Groundwater	p.m.	Integrated Pest Management is part of sustainable groundwater management plan M.8	WUO and GWS	PMU	n.a. (part of M.8)
<b>Component VI: Construction activities</b>					
	M.14	Clean and safe construction plan	DBO contractor	PMU, HEPS, EEAA	DBO contract
<b>Component VII: General support and capacity building</b>					
	M.15	Support & Capacity for PMU	PMU	HEPS	400,000
<b>total cost (minus DBO contractor costs)</b>					<b>1,248,000</b>

**Table 7: Rearranged Budget Lines**

#	Item	amount (US\$)
<b>Monitoring activities</b>		
M.1	Identify specific water saving measures, and provide concrete input to the NWRP process.	150,000
M.5	Water quality assessment study : monitoring	13,000
M.8	Intensified GW monitoring in project area: 5 years monitoring	330,000
M.9	Monitoring social and economic changes	55,000
	<b>subtotal monitoring</b>	<b>548,000</b>
<b>Capacity building and institutional strengthening</b>		
M.5	Water quality assessment study : modeling, software, training	70,000
M.7	Capacity building and support to WUOs and GWS	200,000
M.8	Intensified GW monitoring in project area: maintenance of wells	30,000
M.15	Support and capacity building PMU	200,000
	<b>subtotal monitoring</b>	<b>500,000</b>
<b>Safeguards Policy and Construction</b>		
M.15	Support and capacity building PMU (including salary of full-time Environmental Specialist	<b>200,000</b>
M.10-M.13	Implementation of safeguards policy will be included in the DBO contract	To be determined <sup>14</sup>
	<b>Total</b>	<b>1,248,000</b>

<sup>14</sup> The cost of implementation of these measures will be determined after final surveys, designs, and bids are complete. The cost will be covered by the loan.

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