Egypt, Arab Republic of

Giza North Additional Financing Project

Executive Summary

Environmental and Social Impact Assessment

Of

Nubaria-Metnama Gas Pipeline

And

Giza North Power Plant
Introduction

The proposed project is an integral part of Egypt’s strategy which aims to expand the uses of natural gas as a clean source of energy. This project aims to provide natural gas to the North Giza power station and to strengthen the national network of gas. The Egyptian Company for Natural Gas (GASCO) is taking the responsibility of the implementation of this project, with funding and assistance from the World Bank.

EcoConServ has been asked to prepare an Environmental and Social Impact Assessment including a Resettlement Policy Framework, in compliance with the requirements and regulations of the Egyptian Government and the World Bank.

Approach to Study

- Assessment of the potential environmental and social impacts of the project.
- Comparison of impacts with regard to the requirements and national and international guidelines.
- Assessment of the environmental and safety guidelines which is practiced on an ideal basis through gas delivery activities in Egypt.
- Inclusion of stakeholder concerns at multiple stages through early scoping session and final public consultation
- Monitoring of the Egyptian laws and the World Bank standards, which might affect the project during implementation.
- Preparation of the environmental management plan and the environmental monitoring plan to mitigate the potential negative impacts and monitor the compliance process of the relevant environmental laws.
- Provision of an integrated plan for monitoring, evaluating and determining compensation strategies for groups likely to be affected as a result of the implementation of the project.
- Evaluation of the institutional capacity of GASCO to implement the project and proposed mitigation measures, and suggestion of institutional capacity raising means if necessary.

Project Description

Pipeline Route

(El Nubariya – Metnama 32” pipe line and length of 105 km)

The pipeline route starts from the end of Abu Homos-Nubaria 42” pipeline route chamber (next to Nubaria power station), and extends to the south along El Rayah El Nasry, until cutting east to reach the intake of North Giza power station. The pipeline then crosses much agricultural land in the heart of the delta region, before linking with the existing El Teena-Metnama 32” pipeline at Nawa (Ezbet Swelem).
The planned path of the pipeline runs through agricultural lands and near to inhabited areas, crosses several major transportation routes and waterways (including the Nile). Major roads and waterways are crossed using a special tunneling method to avoid major disruptions and impacts.

The project includes construction of a Pressure Reduction Station inside the North Giza power station, as well as 11 valve rooms along the route of the pipeline, which aid in isolating leaks and performing maintenance.

**Construction Phase**

The project will be carried out under the supervision and control of GASCO. It is anticipated that the construction phase will continue for 15 months, and include the following activities:

- Leveling and preparing of the temporary roads leading to the work sites
- Storing of pipes
- Trenching
- Welding and checking the seams
- Tweaking the welding joints
- Visual checking of the welding joints
- Inspection
- Air tests
- Laying pipes in the trenches
- Valves installation
- Connection works with valves
- Backfill works
- Cleaning works
- Preparation for tests
- Hydrostatic test
- Additional air test
- Water discharging
- Magnetic cleaning
- Drying and delivery

**Operation Phase**

Normal operation will include routine audits on pressures and condition of the pipeline. Normal maintenance and monitoring works will also be performed, including a leakage survey and patrolling for encroachment. In case of leak detection, or damage of part of the pipeline, the damaged pipe is replaced. Standard procedures are in place for such incidents.

**Routing Alternatives**

Choosing the pipeline route involves selecting paths that, when possible, follow a logical course along existing transportation ways, cross these transportation ways at opportune locations, and
avoid populated areas and other sensitive receptors. These efforts must be balanced with efficient use of resources and the desire to minimize the overall length of the pipeline.

The first section of the pipeline, before it reaches the North Giza Power Station, runs along the El Rayh El Nasry drain. Though this route still intersects some agricultural lands, unutilized desert land is too distant for a viable alternative to be considered in which this does not occur.

After the pipeline reaches the North Giza station, it must cut across part of the delta to join the existing Metnana pipeline. One serious alternative was considered for this portion of the pipeline. Under this scenario, the line would have continued south along Al Rayah Al Nasry until the area of Birqash, crossed the Mansouriya Canal and the Maryoutiya Canal, passed near the population centers of Burtus and Oseem, and terminated at the Sharqawiya Complex in an area called Meet Halfa in Qalyub. The total distance of this proposed route is 97 km.

Although this shorter distance would have required less crop damage and temporary land acquisition, and thus less compensation, there were several prohibitive factors which made this option unacceptable. The presence of significant numbers of buildings near Burtus and Oseem, in addition to a high density of high voltage electricity towers near the area of Al Waraq, would greatly complicate matters. Furthermore, the large number of buildings on both sides of the Cairo-Alexandria Agricultural Road (in the area just before the termination of this route), are essentially unavoidable. These factors increase the likelihood that some structures would have been affected and resettlements necessary. The proximity of population centers and electricity lines which could induce a current in the line would negatively affecting the safe operation of the pipeline, due to an increased risk of interference, and greater potential damage in the case of an accident.

The path selected by GASCO and proposed in this report is sufficiently short and well chosen for its navigation of the critical crossing points and populated areas. GASCO has an unwritten strategy that thoroughly avoids any construction buildings including: houses, graveyards, religious buildings and historical areas.

**Positive Environmental and Social Impacts**

Achievement of the previously mentioned project objectives represents many of the social and economic benefits, and will support the achievement of Egypt's strategy for the energy sector. The most significant positive impacts to be achieved are:

- Providing work opportunities for local untrained labor or limited trained labor in construction works, as well as opportunities for engineers, welding and coating workers, marine employment (assistance), and supervisors.
- To achieve increased commercial activities (such as restaurants and cafes) at construction sites, which exist in the rural areas of Qalubia, El Beheira and Menoufiya.
To stimulate the sale and rental of building materials and construction equipment at the targeted areas, where such projects provide a good marketing opportunity, particularly as a result of distance from the production plants that are buying from them in bulk.

Increased opportunities for workers in the various means of transportation in the different locations, and in particular light transportation means, such as motorcycle and Tuk Tuk which spread in the governorates of Qalubia, El Beheira and Menoufiya, and also ferry owners in these areas.

Contribute to improving the opportunities for targeted communities to benefit from the natural gas service.

Utilization of housing units for the project management at site, as well as to accommodate the workers.

Achievement of sustainability and continuity of the energy source, which is environmentally safer and comes with less economic cost. The life span of the facilities used to generate electricity at power stations that will be supplied by gas will be extended. This will lead to improved continuity of electricity in the targeted governorates of Egypt.

The ability to make subsidiary gas connections for the various governorates, which could result in delivery of natural gas to houses around the clock.

Economic benefits as a result of using sustainable local source of energy at the power stations, which will work on the stability of the fuel cost price, unlike other unstable sources such as fuel oil and diesel fuel. This will also reduce the subsidiary cost of petroleum materials which overburden Egypt.

**Environmental Impact Rating Summary**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Impact Category</th>
<th>Impact Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Hazardous waste generation</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Risk to infrastructure</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Construction/excavation waste generation</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Water use/wastewater generation</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Air emissions</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Noise production</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Soil quality degradation</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Biodiversity and habitat destruction</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Stability of existing structures</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Traffic disruption</td>
<td>X</td>
</tr>
<tr>
<td>Operation</td>
<td>Accidents and emergencies</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Repairs and maintenance</td>
<td>X</td>
</tr>
</tbody>
</table>
Main Construction Impacts

Hazardous Waste Generation

The primary sources of hazardous waste are:

- Demolished asphalt
- Containers of chemicals and lubricant oils used for construction machinery

Asphalt waste will come from the 9 open-cut road crossings described in Section 4.1.3, while the chemicals and lubricants will result from the use of machinery described in Section 4.4. It is estimated that on average, 12 kg of such waste will be produced daily. Articles 26 through 28 of the Executive Regulations of Law 4 lay down certain steps that must be followed for the granting of handling licenses for these materials.

Improper disposal of these items can potentially directly affect the health of anyone who comes in contact with them. Potential soil contamination may result from improper hazardous waste storage, handling, and disposal practices, as well as potential spillage and/or leaks during the course of the construction activities. There is a slight risk of a spilled or leaked substance spreading beyond the project site as a result of nearby ground or surface water contamination, thus becoming a more significant environmental risk, but in general the potential of this impact is local in nature.

Damage to Existing Infrastructure

Most of the underground infrastructure pipelines (such as water, sewerage and telecommunication) have been established a long time ago, without accurate documentation for its routes and depths. Therefore, the risk of breaking infrastructure lines is relatively high. Normally the contractor takes caution by applying manual excavation to avoid such situations where he is obliged to pay for the damage.

The most important environmental impact will arise in case a sewerage pipe is broken, and wastewaters accumulate in the trench and, possibly, over flood to the streets causing significant nuisance to the surrounding environment.

Breaking a water supply pipe may result in cutting the supply to a number of residential units, which may, if it takes place for a long period, direct residents to use other sources of water which may be either expensive or unsafe.

The effects of cutting telecommunication cables during excavation are mainly socioeconomic, due to cutting possible personal and business communications.
Main Operational Impacts

Accidents and Emergencies (Quantitative Risk Assessment)

A Quantitative Risk Assessment was performed to determine the threat of injury or fatality to the public in the case of an accident or emergency. The study found that a portion of the inhabitants of several nearby villages are within a zone of potential risk of injury or fatality during the operation of the pipeline. However, due to the low population density and easy access to shelter, which reduces the possibility of harm, the risk to individuals and the public was determined to be As Low As Reasonably Practicable in all these villages, and the design is deemed acceptable.

Social Impacts

Social Impacts during Construction

- Temporary negative impact on the local livelihoods of farmers due to the temporary acquisition of land and the subsequent impact of damaging crops. Farming, in most of the cases, is the sole source of income for the affected farmers. The project construction phase will necessitate temporary expropriation of about 400-500 feddans of agriculture land during the construction. It was very difficult to estimate the numbers of potentially affected people during this phase of the project. This will only be possible before the actual construction of the project and upon determining the exact route. During this stage a Resettlement Action Plan (RAP) should be prepared guided by the prepared RPF. The RAP will involve a full inventory survey for the PAPs and a valuation for the compensation that should be paid.
- Permanent acquisition of land for the establishment of the valve rooms. In such cases, the common rule of GASCO is to provide full replacement cost for purchasing the land as per the market price under satisfactory, agreeable and appropriate agreement. It might be roughly suggested that each of the land plots (25m x 45 m) for each of the valve rooms is owned by one farmer. Based on this assumption, 11 farmers are expected to sell their land to Gasco for establishing the valve rooms.
- Potential traffic congestion due to the accumulation of construction materials and dust that will result from digging. From a social prospective, this impact might affect the income of microbuses, small vehicles and taxi drivers.
- Potential temporary inconvenience as result of the construction activities. This could be in the form of accumulation of wastes (both construction and domestic waste in the construction areas, associated odor, air emissions, especially dust as a result of excavation. These impacts are of temporary nature and will be of very limited level of severity, particularly since the construction activities will be in farms and not populated areas
- Risks of damaging existing community infrastructure, especially water pipes that are not mapped, can have detrimental social repercussions. Disruption of other utility services such as electricity and communications can also be a nuisance to those affected.
Social Impacts during Operation

The possibility of a gas leakage or the occurrence of fires, which could affect the residents in the area, is a concern. The other element is the possibility of extending the residential mass to the pipeline routes, which could lead to encroachment on the line. Additional crop damage as a result of maintenance or surveillance activities is also a possibility.
## Environmental Management Plan

### Environmental mitigation matrix during construction

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measures</th>
<th>Responsibility of mitigation</th>
<th>Responsibility of direct supervision</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous waste generation</td>
<td>Separation of asphalt waste, arrange for asphalt recycling</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Vehicle repairs and fuelling off site, on appropriate surfaces</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Approved storage and disposal of chemical and lubricant containers</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Risk of damaging infrastructure</td>
<td>Consult maps before excavation work</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Use of trial pits</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Analysis of accident log</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Construction/Excavation waste generation</td>
<td>Identification and use of approved nearby disposal sites through local authority</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Designation and use of appropriate stockpiling locations on site</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Daily hauling of waste to disposal site in covered trucks</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Water use/wastewater generation</td>
<td>Acquire discharge permits from sewage/irrigation authority</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Collection of potentially contaminated streams in separate</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Impact Area</td>
<td>Mitigation Measures</td>
<td>Responsible Party</td>
<td>Cost Source</td>
<td></td>
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<tr>
<td>------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Air emissions</td>
<td>Water spraying before excavation, filling, loading and unloading</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spraying of stockpiles, storage in covered areas</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Implementation of regular maintenance schedule for machinery</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td>Noise Production</td>
<td>Limit exposure time of workers to elevated noise levels</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of earmuffs</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td>Effect on structures by dewatering/tunneling</td>
<td>Survey of buildings with damage potential</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td>activities</td>
<td>Soil investigations</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td>Traffic congestion</td>
<td>Signage and markings to instruct drivers</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of alternative routes when roads are obstructed</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employment of trained drivers</td>
<td>Contractor</td>
<td>GASCO HSE Site supervisor</td>
<td></td>
</tr>
<tr>
<td>Loss of farmer livelihood due to temporary land</td>
<td>Applying the requirements presented on the prepared RPF</td>
<td>GASCO Compensation Committee</td>
<td>GASCO Social Development Officer</td>
<td></td>
</tr>
<tr>
<td>acquisition and crop damage</td>
<td>Preparation of RAP</td>
<td>External Consultant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Providing fair compensation to</td>
<td></td>
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</tbody>
</table>

Estimated amount for crop compensation: USD 339,000
Loss of farmer livelihood due to permanent land acquisition for valve rooms | Providing fair compensation to the land owners for purchasing the land for the valve rooms | GASCO Compensation Committee | GASCO Social Development Officer | GASCO has already purchased the land
Environmental monitoring matrix during construction

<table>
<thead>
<tr>
<th>Impact</th>
<th>Monitoring indicators</th>
<th>Responsibility</th>
<th>Frequency/Duration</th>
<th>Location</th>
<th>Methods</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction/excavation and hazardous waste generation</td>
<td>Use of designated stockpile locations</td>
<td>Contractor</td>
<td>Weekly</td>
<td>Construction site</td>
<td>Site observation</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Separation of hazardous waste components</td>
<td>Contractor</td>
<td>Weekly</td>
<td>Construction site</td>
<td>Site observation</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Quantity and type of waste generated</td>
<td>Contractor</td>
<td>Daily</td>
<td>Construction site</td>
<td>Recording of daily hauling statistics</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Risk of damaging infrastructure</td>
<td>Frequency and location of damage incidents</td>
<td>Contractor</td>
<td>Monthly</td>
<td>Documentation offices</td>
<td>Documentation in HSE monthly reports</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Water use/wastewater generation</td>
<td>Quantity of wastewater/sewage discharge from administrative camp</td>
<td>Contractor</td>
<td>Daily</td>
<td>Construction site</td>
<td>Recording of daily discharge amounts</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Quantity of water diverted for testing</td>
<td>Contractor</td>
<td>Continuous during testing</td>
<td>Construction site</td>
<td>Flow rate measurements</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Oily appearance or smell of wastewater stream</td>
<td>Contractor</td>
<td>Continuous during testing</td>
<td>Construction site</td>
<td>Site observation</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Contaminant concentrations in wastewater streams</td>
<td>Contractor</td>
<td>Upon detection of oily appearance or smell</td>
<td>Approved water treatment lab</td>
<td>Chemical analysis</td>
<td>USD 840</td>
</tr>
</tbody>
</table>
## Monitoring Indicators

<table>
<thead>
<tr>
<th>Impact</th>
<th>Monitoring Indicators</th>
<th>Responsibility</th>
<th>Frequency/Duration</th>
<th>Location</th>
<th>Methods</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air emissions</td>
<td>Inspection of vehicle and machinery maintenance schedule</td>
<td>Contractor</td>
<td>Quarterly</td>
<td>Documentati on offices</td>
<td>Review of schedule</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>HC, CO% and opacity</td>
<td>Contractor</td>
<td>Once before construction, once quarterly for each vehicle</td>
<td>Vehicle maintenance site</td>
<td>Emissions testing</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Noise Production</td>
<td>Noise intensity, exposure durations and noise impacts</td>
<td>Contractor</td>
<td>Quarterly, at least one measurement per contractor per sector</td>
<td>Construction site</td>
<td>Noise recording, reporting in monthly reports</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Complaints from residents</td>
<td>Contractor</td>
<td>Quarterly</td>
<td>Construction site</td>
<td>Inspection of filed complaints</td>
<td>Contractor cost</td>
</tr>
<tr>
<td></td>
<td>Use of earmuffs by construction workers</td>
<td>Contractor</td>
<td>Weekly</td>
<td>Construction site</td>
<td>Site observation</td>
<td>Contractor cost</td>
</tr>
<tr>
<td>Effect on structures by dewatering/tunneling activities</td>
<td>Amount of soil present in wastewater stream</td>
<td>Contractor</td>
<td>As necessary during dewatering/tunneling</td>
<td>Construction site</td>
<td>Inspection of water from dewatering or tunneling</td>
<td>Contractor cost</td>
</tr>
</tbody>
</table>
### Nubaria-Metnama Gas Pipeline, Egypt
Environmental and Social Impact Assessment
Executive Summary

<table>
<thead>
<tr>
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<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of farmer livelihood due to temporary land acquisition and crop damage</td>
<td>Complaints and grievances from PAPs about fair compensation and procedures</td>
<td>GASCO Social Development Officer</td>
<td>Weekly</td>
<td>Project Site Documentati on offices</td>
<td>Review list of PAPs, receipts, grievances, and follow up forms</td>
<td>No additional cost required</td>
</tr>
<tr>
<td></td>
<td>Complaints and grievances from PAPs about fair compensation and procedures</td>
<td>Compensation Committee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss of farmer livelihood due to permanent land acquisition for valve rooms</td>
<td>Complaints and grievances from PAPs about fair compensation and procedures</td>
<td>GASCO Social Development Officer</td>
<td>Weekly during the phase of project preparation until the purchase of land is done</td>
<td>Project Site Documentati on offices</td>
<td>Review list of PAPs, receipts, grievances, and follow up forms</td>
<td>GASCO regular management cost</td>
</tr>
<tr>
<td></td>
<td>Complaints and grievances from PAPs about fair compensation and procedures</td>
<td>Compensation Committee</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
## Environmental mitigation matrix during operation

<table>
<thead>
<tr>
<th>Impact</th>
<th>Mitigation measures</th>
<th>Responsibility of mitigation</th>
<th>Responsibility of direct supervision</th>
<th>Estimated Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accidents and Emergencies</strong></td>
<td>Design to recognized standards, effective inspection, testing, and maintenance plans</td>
<td>GASCO HSE Department</td>
<td>GASCO Headquarters</td>
<td>GASCO regular management cost</td>
</tr>
<tr>
<td></td>
<td>Rapid isolation of leaks to minimize potential hazards</td>
<td>GASCO HSE Department</td>
<td>GASCO Headquarters</td>
<td>GASCO regular management cost</td>
</tr>
<tr>
<td></td>
<td>Pipeline patrolling for encroachment and damage risks</td>
<td>GASCO HSE Department</td>
<td>GASCO Headquarters</td>
<td>GASCO regular management cost</td>
</tr>
<tr>
<td></td>
<td>Pipeline leakage surveys</td>
<td>GASCO HSE Department</td>
<td>GASCO Headquarters</td>
<td>GASCO regular management cost</td>
</tr>
<tr>
<td><strong>Permanent expropriation of land entering urban zoning</strong></td>
<td>Providing compensation to the land owners</td>
<td>GASCO Compensation Committee</td>
<td>Review list of PAPs, receipts, grievances, and follow up forms</td>
<td>Difficult to determine at this stage</td>
</tr>
<tr>
<td><strong>Temporary loss of crops during maintenance</strong></td>
<td>Compensation for the loss of crops</td>
<td>GASCO Compensation Committee</td>
<td>Review list of PAPs, receipts, grievances, and follow up forms</td>
<td>Estimated compensations USD 850 annually</td>
</tr>
</tbody>
</table>
## Environmental monitoring matrix during operation

<table>
<thead>
<tr>
<th>Impact</th>
<th>Monitoring indicators</th>
<th>Responsibility</th>
<th>Frequency/Duration</th>
<th>Location</th>
<th>Methods</th>
<th>Estimated Cost</th>
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<td>Site observation, inspection of permits</td>
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<td><strong>Temporary loss of crops during maintenance</strong></td>
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<td>Project Site Documentation offices</td>
<td>Affected land plots Compensation offered Documentation that prove receiving compensation</td>
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Social Management Plan

Implementation of the social management plan for the project activities is carried out through a committee of GASCO including a lawyer, an accountant, and the committee director. Members of the agricultural associations and the Local Governorate Units in the various governorates will need to cooperate with the committee. In the case of a dispute regarding the provided compensation amount and the failure of the proposed proactive and reactive grievance mechanisms proposed on the RPF in handling these disputes, it should be submitted to the Supreme Commission for Compensation, which is chaired by a consultant from the state council, and the commission is competent to hear appeals for compensation. Also there should be a field Social Development Officer who is responsible for compensation record keeping and monitoring of complaints, among other social responsibilities.

Detailed guidelines for dealing with expropriated land, displacement of people, and compensation matters are provided in the Resettlement Policy Framework.

Public Consultation

Due to the project needs for a temporary expropriation of the agricultural land, the need for supportive community participation for the various activities of the project must be greatly considered. The ESIA and RPF team carried out several consultation activities and community interviews along the planned route. The field surveys involved comprehensive investigations to evaluate the environmental and social assessment of the proposed project. Interviews were carried out with different groups, in order to include their inputs about the proper scope of the study, and what they consider the most important environmental and social impacts.

After drafting the results of the ESIA, public consultation was organized to review the draft results with various stakeholders. This activity comes in line with the World Bank disclosure policy and the requirements of the EEAA as part of the EIA guidelines. Questions and comments session was arranged and the comments and suggestions of the stakeholders were incorporated into the findings of the ESIA report. Resettlement and the compensation for various types of land acquisition were key issue that the participants raised during the consultation. Key recommendation to ensure full community participation included:

- Provide the names of individuals who need to be compensated for land and crops and disclose transparently.
- To discuss prices with agricultural associations to determine the acceptable actual value of the different crops, without prejudice to the right of the affected groups.
- To inform the local community about the project and provide the necessary information through NGOs and seminars, and placing guidelines and definitions signs.
- Monitoring of complaints related to the project, performance, infringement on the property and report to the project follow-up unit. This should be achieved through adapting both the proactive and the reactive approaches as explained in details in the RPF.
The ESIA recommended strongly the need for the involvement of various stakeholders and community groups, including

- Local Governorate; executive authorities
- NGOs
- Agricultural Associations.
- Mayors and natural leaders
- Project affected groups

Conclusion

The study concluded, after analyzing the various project activities through the phases of construction and operation, and the consequent various environmental impacts, that the basic designs were based on the latest technologies and cleaner production technologies. The study also concluded that the project has many positive impacts on the socio-economic level, in terms of providing several employment opportunities, especially during construction phase, which support the national economy.

As for the negative environmental impacts during construction phase, they are considered to be limited and short-term, and can be reduced to the minimum that could be made these impacts negligible, by applying the proposed environmental monitoring and management plan during the construction phase. With regard to the negative environmental impacts during operational phase, the study concluded that they are insignificant and very limited.

Similarly, the social impacts of the project are mostly of temporary nature. The negative social impacts could be tackled through adopting a transparent and fair strategy to address resettlement and compensation for the project affected persons.

From the foregoing, the study concluded that the project is acceptable in terms of environmental and social aspects, with the following of the proposed social and environmental monitoring and management plan.
Arab Republic of Egypt
Ministry of Electricity and Energy
Egyptian Electricity Holding Company
Cairo Electricity Production Company

GIZA NORTH 3 x 750 MWe GAS-FIRED
COMBINED CYCLE POWER PROJECT

Environmental and Social
Impact Assessment

EXECUTIVE SUMMARY

FINAL REPORT
Volume – II(A)

May 2011
Project No. 1583

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GIZA NORTH 3 x 750 MWe GAS-FIRED
COMBINED CYCLE POWER PROJECT

Environmental and Social
Impact Assessment

EXECUTIVE SUMMARY

1. INTRODUCTION
   1.1 Background
   1.2 Project Overview

2. THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
   2.1 Contributors to the EIA Report
   2.2 Scope of the EIA Report
       Legal and Administrative Framework

3. GENERAL SETTING OF THE SITE:
   DESCRIPTION OF THE ENVIRONMENT

4. PROJECT DESCRIPTION
   4.1 Overview of the Power Plant
   4.2 Process Description
   4.3 Operational Releases from the Power Plant

5. ANALYSIS OF ALTERNATIVES
   5.1 Current Situation ("No Action" Option)
   5.2 Alternative Technologies and Fuels
   5.3 Power Plant Design
   5.4 Alternative Sites

6. KEY FINDINGS OF THE ENVIRONMENTAL AND
   SOCIAL IMPACT ASSESSMENT
   6.1 Introduction
   6.2 Air Quality
   6.3 Aquatic Environment
   6.4 Noise Impacts
   6.5 Flora and Fauna
   6.6 Land Use, Landscape and Visual Impacts
6.7 Soils, Geology and Hydrology
6.8 Traffic
6.9 Socio-economics and Socio-cultural effects
6.10 Archaeology, Historic and Cultural Heritage
6.11 Natural Disaster Risks
6.12 Major Accident Hazards
6.13 Solid and Hazardous Waste Management
6.14 Occupational Health and Safety
6.15 Associated Infrastructure

7. ENVIRONMENTAL MITIGATION AND MONITORING: THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1 Enhancement and Mitigation Plan
7.2 Monitoring Program

8. PUBLIC CONSULTATION AND DISCLOSURE

9. RESPONSIBILITIES AND INSTITUTIONAL

9.1 Environmental Management Organization
9.2 Environmental Training
9.3 Occupational Health and Safety
9.4 Emergency Procedure and Accident Response

10. IMPLEMENTATION SCHEDULE AND REPORTING

11. CONCLUSIONS

12. REFERENCES AND CONTACTS
# ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
</tr>
<tr>
<td>BPIP</td>
<td>Building Profile Input Program</td>
</tr>
<tr>
<td>CAA</td>
<td>Competent Administrative Authority</td>
</tr>
<tr>
<td>CAPMAS</td>
<td>Central Agency for Public Mobilization and Statistics</td>
</tr>
<tr>
<td>CEPC</td>
<td>Cairo Electricity Production Company</td>
</tr>
<tr>
<td>COD</td>
<td>Chemical Oxygen Demand</td>
</tr>
<tr>
<td>CWDS</td>
<td>Circulating Water Discharge Structure</td>
</tr>
<tr>
<td>DCS</td>
<td>Distributed Control System</td>
</tr>
<tr>
<td>DO</td>
<td>Dissolved Oxygen</td>
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<td>DS</td>
<td>Dissolved Solids</td>
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<td>Egyptian Ambient Air Quality Limits</td>
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<td>EGAS</td>
<td>Egyptian Natural Gas Holding Company</td>
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<td>EGSMA</td>
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<td>Environmental Management Staff</td>
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<td>ENIT</td>
<td>Egyptian National Institute of Transport</td>
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<td>EUPS</td>
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<td>Description</td>
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<tr>
<td>RIGW</td>
<td>Research Institute for Ground Water</td>
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<td>SFD</td>
<td>Social Fund for Development</td>
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<td>SS</td>
<td>Suspended Solids</td>
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<td>STG</td>
<td>Steam Turbine Generator</td>
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<td>Total Suspended Solids</td>
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</table>
List of Tables

Table 1: Potential World Bank Environmental Safeguard Policies and Giza North Power Project Triggerability
Table 2: Key Findings of the Consideration of Alternative Sites
Table 3: Environmental, Health and Safety Issues Relating to Construction and Operation of Giza North Power Project
Table 4: Environmental Impacts and Environmental Guidelines
Table 5: Institutional Arrangements for Giza North Power Project
Table 6: Construction Impact Mitigation, Monitoring and Management Measures
Table 7: Operational Impact Mitigation, Monitoring and Management
Table 8: Transmission System Impact Mitigation, Monitoring and Management
Table 9: Summary of Implementation Cost of the ESMP
Table 10: Monitoring Program for Ambient Air Quality, Noise and Vibration
Table 11: Monitoring of the Aquatic Environment During Operation
Table 12: Key Environmental Issues Associated with the Development of the Proposed Power Plant Identified During Local ESIA and RPF Consultation
Table 13: Recommended Training Required for the PMU/EMS

List of Figures

Figure 1: Location Map of the Proposed Site within the Egyptian Context
Figure 2: Location Map of the Proposed Site within the Giza Governorate Context (before separation of the 6th of October ex-Governorate)
Figure 3: Landsat Image of the Wider Delta Area Showing the Proposed Site of the Giza North Power Plant
Figure 4: Landsat Image of the Wider El-Kata Area Showing the Proposed Site of the Giza North Power Plant
Figure 5: Localized Map of the Proposed Site
Figure 6: Markaz Imbaba Region Master Scheme, 2009
Figure 7: General Layout of the Giza North Power Plant and its Easments
Figure 8: Giza North Air Quality Monitoring Locations
Figure 9: Environmental Department (ED) within the Organizational Structure of Giza North Power Plant
Figure 10: Environmental Management Staff (EMS) within the Project Management Unit (PMU)
GIZA NORTH 3 x 750 MWe GAS-FIRED
COMBINED CYCLE POWER PROJECT

Environmental and Social
Impact Assessment

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 Background

1. Engineering Consultants Group (ECG), a private consulting firm (Egypt) was commissioned by the Egyptian Electricity Holding Company (EEHC) / Cairo Electricity Production Company (CEPC) to prepare the technical documents and procedures required by the World Bank Group (WB) and other Development Banks concerning the Environmental and Social Assessment of the Giza North Power Project.

2. EEHC is seeking financial assistance from the WB for the construction and operation of this 3x750 MWe, dual fuel Combined Cycle power plant. The proposed plant is designated as a Category A project under WB rules and a Category C project under the Egyptian environmental regulations and therefore requires a full Environmental Impact Assessment. Financing from WB and other Development Banks is conditional upon obtaining the environmental clearance from both the Egyptian regulatory authorities and the International & Regional Banks, i.e. the WB & other Development Banks.

1.2 Project Overview

3. Cairo Electricity Production Company (CEPC), a company incorporated in Egypt and affiliated to the Egyptian Electricity Holding Company (EEHC) proposes to construct and operate a new combined cycle power plant at Giza North, which is along the El-Rayyah El-Beheiry and about 30km north west of the Cairo city on the eastern coast of the El-Rayyah El-Beheiry. The site is within an existing piece of land purchased on 7th June 2009 by CEPC from the land owner Mr. Mohamed Galal Mohamed Kandil, who was offering the land for sale. The overall proposed site area is approximately 295,000 m².

4. The proposed power plant is a 2,250 MWe Combined Cycle Gas Turbines (CCGT) comprising three 750 MWe modules, each module will include three gas turbines, each with a nominal electricity generating capacity of 250 megawatts (MWe) and three heat recovery steam generators (HRSG) feeding one steam generator with a nominal electricity generating capacity of 250MWe, which will be known as Giza North Power Plant. The overall generating capacity of the power plant will be 2,250 MWe. The power plant is
intended to be operational by the year 2012/2013. The power output from the proposed plant will be sold to the Egyptian Electricity Transmission Company (EETC).

5. The power plant will utilize natural gas as its primary fuel, and also have the capability to operate using sollar (light fuel oil). The ability to "dual-fuel" the power plant (with natural gas or sollar) will provide security of electricity supply in the event that gas supplies are unavailable for any reason. In addition, a small emergency generator, for the plant safe shut down, operating on sollar oil (light fuel oil) will also be provided on-site to drive key items of equipment within the power plant in the event of a power supply failure.

6. The power plant will incorporate a direct (once through) cooling system using water abstracted from the El-Rayyah El-Beheiry. The abstracted water will also be used, following pre-treatment demineralization and desalination, to provide process water make-up in the boiler system. Potable water supplies will be drawn from the potable water network feeding near villages around the power plant site.

7. The main demand for water is due to the direct cooling system. The use of a direct cooling system maximizes the electrical efficiency of the power plant and, after use, virtually all of the water will be returned to the El-Rayyah El-Beheiry at a slightly elevated temperature compared to the abstraction. No evaporative cooling towers are required, hence there is no opportunity for water drift or the formation of visible plumes of water vapor or ground fogging.

8. Canal water will be used as non-contact cooling water and for process water following desalination. Canal water will be pumped through a piping system running underground for water intake whilst heated cooling water will be returned to the canal via a discharge piping system running underground, too and released approximately on the verge of the canal bank.

9. A wastewater treatment facility on the site will treat liquid wastes and produce an effluent suitable for discharge into the canal. All oil waste effluents will be collected into a separate network and sent to an oil separator, then disposed of by petroleum company.

10. The Giza North site is located on the eastern bank of the El-Rayyah El-Beheiry (El-Beheiry Canal), which is a part of the sub-branch of the Rosetta Branch of the Nile River. The site is located approximately 30 kilometers northwest of Cairo City and just along the Manshyyet El-Qanater / Etay El-Baroud Regional Road, which runs parallel to the El-Rayyah El-Beheiry. The site is bordered to the North by a fodder factory within a cultivated land and consists of flat agricultural land approximately 295,000 squared meters, out of which approximately 125,000m² are allocated for the facilities of the project. The remaining 170,000m² has been set aside for future uses as a lay down area during construction and plant landscaping during operation.

11. The site is bordered to the south by agricultural areas. Construction laydown, as mentioned, is planned to be accommodated within the Giza North
project land on, therefore, the proposed site. The site of the proposed power plant is shown on Figure 1. Also, Figure 2 depicts this location within the context of the 6 of October and Giza Governorates. Figure 3 illustrates a landsat image (general view) of the proposed site land.

12. *Table 1* of this E.S. Report presents environmental, health and safety issues relating to construction and operation of Giza North power project.

13. The key Environmental Issues associated with the development of the proposed power plant, identified during local ESIA and RPF scoping and consultation, are summarized in *Table 12*, page 84 of this E.S. Report, under “Public Consultation and Disclosure”, and these issues were subsequently taken into account in the preparation of ESIA documentation both for local permitting requirements and this ESIA report.
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<td>Global warming potential.</td>
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<td>Aquatic Environment</td>
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<td>Wastewater discharge.</td>
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<td>Sewage disposal and foul drainage.</td>
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<td>Operation of drainage systems on site.</td>
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<td>Discharge of storm water, sewage and drainage.</td>
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<td>Accident risks.</td>
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<td>Safety at work.</td>
<td>Safety at work.</td>
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Figure 1

Location Map of the Proposed Site within the Egyptian Context
Figure 2

Location Map of the Proposed Site within the Giza Governorate Context
Figure 3

Landsat Image of the Wider Delta Area
Showing the Proposed Site of the Giza North Power Plant
2. THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

2.1 Contributors to the EIA Report

14. The Environmental and Social Impact Assessment (ESIA) report is prepared by ECG, a private consulting firm (Egypt), based on many baseline studies undertaken by independent national and international consultants and on information provided by EEHC, CEPC and their sub-contractors. Public consultation activities are undertaken by ECG and EEHC in conjunction with CEPC. The ESIA report draws heavily on the environmental and social assessment documentation prepared by group of local and international multidisciplinary consultants and submitted to ECG, for preparing the ESIA report for local permitting purposes and financing requirements. All such documentations were reviewed by ECG and cleared for inclusion in this report. Most of the relevant local permits for the construction of the power plant have now been received (Further details of the relevant local permits are available in Section 2.3.1 of the main ESIA report).

2.2 Scope of the ESIA Report: Legal and Administrative Framework

2.2.1 Government of Egypt Requirements

15. Beginning in the 1950s, the Government of Egypt has promulgated several laws and regulations concerning protection of the environment.

16. The Egyptian standards have been drawn from the range of provisions in the following documents:

- Law No. 93 for 1962 regarding the drainage of liquid wastes, particularly sanitary drainage.

17. Law 4/1994 and Law 9/2009 require that, for establishments requiring licenses, an environmental impact assessment must be prepared and submitted to the Egyptian Environmental Affairs Agency (EEAA) for review. The environmental impact assessment must be submitted to the EEAA by “the Competent Administrative Authority (CAA) or the licensing authority” for the project in question. For the Power Plant Project, the Competent Administrative Authority is the 6 of October ex-Governorate.

18. The 6 of October ex-Governorate will send the EIA to EEAA for review and provide its opinion within 60 days. Once EEAA has approved the project,
a license to proceed can be issued. No additional environmental or social clearances are required other than the EIA approval to proceed with the project activities. The law requires that any new project should comply with all the relevant articles pertinent to environmental attributes, which could be impacted from project activities.

19. Egyptian EEAA regulations specify the technical scope or contents of an environmental impact assessment. As a matter of practice, environmental impact assessments for power plant projects typically have a scope and organization similar to World Bank environmental assessments.

20. In addition to environmental impact assessment requirements, the Government of Egypt has established air pollution and water pollution limits applicable to the Power Plant project. These limits are discussed in Chapter 6, along with the actual air and water pollution levels expected from the Power Plant.

2.2.2 World Bank Guidelines and Safeguard Policies

21. The World Bank includes environmental impact assessment as an integral part of the evaluations it performs before financing a proposed project. The World Bank’s Operational Policy 4.01 (October 3, 1991 and its updates, 1999) provides guidance on the types of assessments that should be performed for different types of projects, and on the scope and content of those assessments. According to Operational Directive 4.01, thermal power plant projects require a full Environmental Assessment (EA).

22. World Bank Environmental Safeguard Policies provide 10 potential issues that may need to be considered in an EA, depending on the specific characteristics of each project. Table 2 summarizes the expected triggerability of the potential Safeguard Policies for the Giza North Power Plant Project. The Safeguard Policies identified as “triggerable” are those which may be triggered and thus considered “Requiring Management”. When the detailed design of the Giza North Power Plant has been determined, the CEPC should prepare project-specific plans to manage these potential impacts.

23. No safeguard policies were triggered except for the Environmental Impact Assessment and the Involuntary Resettlement. Table 2 shows potential World Bank environmental Safeguard Policies and Giza North project triggerability. The table justifies the triggerability or lack thereof for WB Safeguard Policies.

24. Annex B to Operational Directive 4.01 provides an outline of the information that should be included in a full EA. This Environmental and Social Impact Assessment follows the scope of Annex B.
Table 2
Potential World Bank Environmental Safeguard Policies and Giza North Power Project Triggerability

<table>
<thead>
<tr>
<th>No.</th>
<th>Safeguard Policy</th>
<th>Policy Triggered?</th>
<th>Justification</th>
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</table>
| 1.  | Environmental Assessment          | Yes               | • This policy applies to all projects requiring a Category A Environmental Assessment Under OP 4.01.  
• All environmental and Social aspects included in Giza North project are adequately examined.  
• Giza North project is not likely to have significant potential (reverse) environmental risks & impacts in its area of influence (impacts on the natural environment: air, water & land; human health & safety; physical cultural resources; and transboundary and global environment concerns). |
| 2.  | Forest                            | No                | • No forest areas exist.                                                                                                                                                                                                             |
| 3.  | Involuntary Resettlement          | Yes               | • This policy applies to all projects triggering OP 4.12.  
• The final location of all sections of the transmission lines, which will evacuate power generated by the Giza North power plant is not yet fully firm. These transmission lines will include the following:  
A. **Connection to the 220 kV grid:**  
   • Construct four circuits 220 kV underground cables Abo-Ghaleb / Giza North with length 5 km.  
   • Construct 220 kV double circuit O.H.T.L–Ashmoun/ Giza North 220 kV with length about 10 Km.  
B. **Connection to the 500 kV grid:**  
   • Construct Giza North substation 500 /220 kV with 2x500 MVA transformers.  
   • Release 500 kV (O.H.T.L) Samallout 500 / Cairo 500 from Cairo 500 S/S side and extending it with a length of 1x35 km to Giza North 500 S/S to become Giza North 500 / Samallout 500 with a length about 244 km.  
   • Construct 500 kV single circuit (O.H.T.L) Cairo 500 / Giza North 500 with length about 35 km.  
   Also, the final location of the gas connection is not determined yet. Land take or resettlement may be associated to the power interconnecting lines as well as gas pipeline connection. The ESMP will be revised after exact routes for both the transmission lines and gas connection are available. |
Table 2 (Contd.)

**Potential World Bank Environmental Safeguard Policies and Giza North Power Project Triggerability**

<table>
<thead>
<tr>
<th>No.</th>
<th>Safeguard Policy</th>
<th>Policy Triggered?</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Indigenous Peoples</td>
<td>No</td>
<td>● The project does not affect the indigenous peoples in the project area.</td>
</tr>
<tr>
<td>5.</td>
<td>Safety of Dams</td>
<td>No</td>
<td>● The project does not involve construction of a large dam. ● The project is not dependent upon an existing dam.</td>
</tr>
<tr>
<td>6.</td>
<td>Pest management</td>
<td>No</td>
<td>● Procurement of pesticides or pesticide application equipment is not envisaged. ● The project will not affect pest management in any way.</td>
</tr>
<tr>
<td>7.</td>
<td>Physical Cultural Resources</td>
<td>No</td>
<td>● Physical cultural resources are adequately examined. ● The Giza North project is not likely to have any significant impact on physical cultural resources.</td>
</tr>
<tr>
<td>8.</td>
<td>Natural Habitats</td>
<td>No</td>
<td>● Natural Habitats are adequately addressed and examined. ● The Giza North project is not likely to have any significant impacts on natural habitats.</td>
</tr>
<tr>
<td>9.</td>
<td>Projects in Disputed Areas</td>
<td>No</td>
<td>● The CEPC/EEHC is not involved in any disputes over an area with any of its neighbors. ● The project is not situated in a disputed area. ● Any component likely to be financed as part of the project is not situated in a disputed area.</td>
</tr>
<tr>
<td>10.</td>
<td>Projects on International Waterways</td>
<td>Yes</td>
<td>The impact of the project on the Canal Water, which is a branch of an international waterway, the Nile River as per the Bank’s policy on projects on international waterways (Operational Policy 7.50) is addressed in the following topics:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Type of cooling system. ● Source of water abstraction (surface water and ground water). ● Pre-treatment of abstracted water before use inside the plant. ● Water requirement per day for - (i) industrial cooling; (ii) processing or cleaning; and (iii) for domestic consumption by facility staff. ● Water discharge per day from - (i) cooling/heating system, blow downs; (ii) storm water; and (iii) from use in toilets; floor cleaning, colony etc. ● Point of discharge of water from power plant - directly into the water body. ● Amount of discharged water from power plant - (i) untreated directly into water body and (ii) treated directly into the Nile River. ● Average seasonal flow of water in the river water cum/hr (seasonal variation - minimum and maximum). ● Average characteristics of water in the river (pH, total dissolved solids; suspended solids; chloride; sulfate and metals). ● Average anticipated characteristics of discharge from (i) cooling system and (ii) from colony and non-industrial/process facility.</td>
</tr>
</tbody>
</table>
Table 2 (Contd.)

Potential World Bank Environmental Safeguard Policies and Giza North Power Project Triggerability

<table>
<thead>
<tr>
<th>No.</th>
<th>Safeguard Policy</th>
<th>Policy Triggered?</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Information on mixing zones at the point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Information about presence of fishes and other aquatic species in the Canal including fish catch etc.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Distinguishment between the consumptive use of water (abstracted water that is not returned back to the source of abstraction) and non-consumptive use (abstracted water that is returned back to the source of abstraction).</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Main answers of the above topics are given in the ESIA Report per One Module as follows:</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Drinking water: 8.33 m³/hr (totally consumed)¹</td>
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<td></td>
<td></td>
<td></td>
<td>Service water²: 31.25 m³/hr (10.7% consumed = 3.34 m³/hr and 89.3% recycled³ = 27.91 m³/hr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HRSG make – up water: 18.75 m³/hr (totally recycled)</td>
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<td></td>
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<td></td>
<td>Cooling water: 46,800 m³/hr (0.34% consumed = 159.12 m³/hr and 99.66% recycled = 46,640.88 m³/hr)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fire fighting water: 26.04 m³/hr (totally consumed)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Total water usage: 46,884.38 m³/hr (consumed = 196.84 m³/hr, recycled = 46,687.54 m³/hr)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Cooling water abstracted from the Canal (13 m³/sec. per module, i.e., 46,800 m³/hr) is returned totally back to it. Actual water consumption is less than 0.35% of the abstracted water.</td>
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<tr>
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<td></td>
<td>No disturbance to the Canal flow is expected either upstream or downstream.</td>
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<td></td>
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<td></td>
<td>Hydrological/hydraulic study is carried out and the study revealed that no impact is expected and the mixing zone is limited to 50-70m distance with 5°C above ambient, which is diluted to 3°C at a distance between 100 and 150 m with full compliance with Egyptian Law 48/1982 and WB regulations.</td>
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<tr>
<td></td>
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<td></td>
<td>All waste water is treated. Water treated directly into waterbody: 120-220 m³/hr.</td>
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<td></td>
<td>MWRI is in full agreement with EEHC regarding its plan for water abstraction. Average seasonal flow of water in the Canal is as follows:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minimum flow (Winter time): 113.5 m³/sec. at a MSL of 12.8m (11.25% of the Nile total).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dominant flow (Average time): 231.5 m³/sec. at a MSL of 14.0m (5.63% of the Nile total).</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Maximum flow (Summer time): 312.5 m³/sec. at a MSL of 14.8m (4.17% of the Nile total).</td>
</tr>
</tbody>
</table>
25. In addition to environmental impact assessment guidelines, the World Bank has established guidelines concerning air pollution and water pollution form thermal power plants (*Pollution Prevention and Abatement Handbook-Part III* (July 1998)). The guidelines were officially published in 1988; since then, several sets of revisions have been proposed, most recently on March 22, 1996. The 1988 and proposed 1996 guidelines are discussed in Chapter 6, along with the actual air and water pollution levels expected from the Power Plant. Also, the most recent updates of the World Bank Guidelines, issued in 2007 and in December 2008 have been considered.


27. Public Consultation Process has been designed in accordance with World Bank Guidance for the Preparation of a Public Consultation and Disclosure Plan (January 1996);

28. The ESIA has assessed the impacts of the construction and operation of the New Giza North Power Plant and has also considered the cumulative air quality impacts of the plant and other existing sources in the project area, including the small and medium sized local manufactures. Consideration has also been given to the operation of the transmission line and other outside facilities, including natural gas pipeline, which will feed the power project with gas fuel. The ESMP will be revised after exact route of both transmission lines and gas connection are available. Permits will be required from the relevant Competent Administrative Authorities.

29. The ESIA report presents the full assessment of the environmental, social, health and safety impacts of the Giza North power plant. This Executive Summary presents a short resume of the findings of the ESIA report. For further details, reference should be made to the full ESIA report.

3. GENERAL SETTING OF THE SITE:
DESCRIPTION OF THE ENVIRONMENT

30. The proposed power plant site is located on the eastern bank of the El-Rayyah (Canal) El-Beheiry, a main branch of the Rosetta Branch of the River Nile, approximately 40 km northwest of Cairo City, and at the kilometer 20 southeast El-Khatatba along the immediate side northeast the Mansheyyet El-Qanater/Itay El-Baroud Road, which runs parallel to the El-Rayyah El-Beheiry. The site is within the administrative boundary of the 6th of October ex-Governorate and its Markaz of Imbaba & Menshat El-Qanater. The site, also, is within the El-Kata agricultural complex, an area being developed for agricultural use. The area surrounding the site is locally known as the El-Kata area. The general site location is given in *Figure 4*. 
31. For the purpose of defining the study area for this ESIA, the assessment has focused on an area stretching 15km to the north, west and south of the site and across the El-Rayyah El-Beheiry, whilst also taking into consideration wider regional issues where relevant.

32. The site is situated in the heart of the cultivated lands. It forms the flat area which is a part from the Nile Delta plain. Many small villages (Ezzab / Kafr) are littered around the area.

33. The site is located a small distance to the immediate north of the existing poultry farm at km 22 El-Khatatba and 5 km north west Ezbet Sayyed Ibrahim, the nearest residential community to the site. The project site is owned by the Cairo Electricity Production Company (CPEC), an affiliate company to the Egyptian Electricity Holding Company (EEHC), and consists of flat land measuring approximately 337m by 876m with a total allocated area of 275,000m$^2$. This includes land required for building the power plant. A large land area (about 60 Feddans) on the site is covered with fruit trees (mangoes, tangerine), palm trees and cultivation of wheat and vegetables. The site is flanked on three sides (west, north and east) by agriculture lands with similar land use. The main road runs parallel to the west southern side of the site connecting to the city, Sixth of October, which is 25km west with a reported population of over a million people. The site has a small office building currently being used as a rest house. The site is surrounded by a barbed wire fence along the boundary and display boards announcing that the site is being proposed for construction of a power project. The site has a large ground water well, 50m deep, connected to a 75 HP pump, which reportedly runs 6 hrs every day to supplement water supply from the adjoining canal.

34. The entire land area reportedly belongs to one owner (Mr. Mohamed Galal Mohamed Kandil) from whom the CEPC purchased this land in February 2009 at a commercially negotiated value 37 Million Egyptian Pounds. To the north of the site, the nearest settlement is 5-6 km northwards at village El-Kata with a population of over 7000 people. The process of selecting the current site was based on consideration of 2 other alternative site options. The other site options were rejected for a variety of factors, including parcel size, price and proximity to road, water, transmission lines and gas. Figure 5 shows localized map of the proposed site area.

35. The proposed site and the land to the surroundings is flat. The topography of the site is described in more detail in Sections 5.2 and 5.8.

36. Across the main regional road from the site there is the El-Beheiry Canal which will serve as a source for the power plant’s condenser cooling water intake via a once-through cooling system and final discharge.

37. Potable water to the plant will be provided through the water supply network of the nearest village area reaching to the site, supplemented by new groundwater wells. Existing land uses surrounding the site are described in more detail in Section 5.8.
38. The area is dissected by a system of irrigation and drainage. The main irrigation canal is the El-Rayyah El-Beheiry Canal. The width of this canal is about 50 m and its depth ranges from 4.5 m to 5 m. The canal contains aquatic habitat as same as the river Nile in this regions.

39. The surface water system comprises the River Nile Rosetta Branch. The irrigation network generally starts from the Rosetta Branch, and El-Rayyah El-Beheiry Canal.

40. The Rosetta Branch provides fresh water to El-Rayyah El-Beheiry Canal for domestic and irrigation demands. It also provides fresh water for various agricultural applications and discharges the rest of fresh water in the Mediterranean Sea for balancing pressures of erosion and salt water intrusion in the coastal region.

41. The water quality in Rosetta Branch is generally fair. It was estimated (by Awad and Yousef, 2002) that the Rosetta Branch receives more than 0.5 million m$^3$/day of untreated or partially treated domestic and industrial wastes and huge amounts of agricultural drainage water.

42. The groundwater aquifer is highly productive. The aquifer is recharged by the infiltration from the irrigation systems and the excess irrigation water.

43. Land cover on the site consists primarily of green cultivation, with dense low and mid-rise growing vegetation. Scattered low-rise type housing residences, agricultural activities and other small-manufacturing and irrigation land uses are located on wider area around the site and in its immediate vicinity and the cultivable nature of the area provides great opportunity for agricultural production.

44. Agriculture activity found at and around the project site showed that only three types of land uses for agriculture purposes are present. The first type includeds areas designated for some trees (orange and mango) cultivation which concentrated at the eastern side of the bank of El-Rayyah El-Beheiry canal. This areas are mainly dependent on the intensive mango and orange plantation trees without introducing any other type of plant in the off season period.

45. Field survey indicated that there are no significant terrestrial ecosystems on, or near, the proposed site. The ecosystems present are typical of those throughout the western part of the Delta, west of the Rosetta Branch. Moreover, no Beduin settlements or any indigenous groups were observed in, or near to, the project location. A small number of scattered houses were observed in the lands of individual farmers or investors, approximately 3 km south east the project site, these homes are resided by few farmers.

46. Inside the cultivated lands around the site area some farm animals are present as donkey, cattle, sheep and cow. In the wider area around the site, there are some villages inhabited by several aggregations of fishermen and farmers. Most of the villages are concentrated on the eastern side of the El-Rayyah El-Beheiry canal.
47. The annual average surface water temperature in the El-Rayyah El-Beheiry site area is 20.7°C, with a range of 12.5°C (recorded in February) to 29°C (recorded in August). The highest monthly average surface water temperatures are 27.5°C in July and 29°C in August.

48. The climate in the study region is one of the mildest climates in the Mediterranean Sea region. Winter temperatures are higher than in any other part of the Mediterranean coast. Generally, this climate, however, gradually changes as one moves south and at about 40 to 50 km inland, merges into Mediterranean Saharian climate. As far the area occupies a portion of the Mediterranean zone, it has a special climate which differs from the inland areas. It is characterized by a comparatively high humidity, frequent dew formation and small diurnal temperature variations.

49. The temperature data collected at Giza North for a 35 year period indicates a maximum monthly-average temperature of 35.3°C in July and a minimum monthly-average temperature of 6.9°C in January. Summertime high temperatures average 35.1°C while winter lows reach 8.1°C. The annual-average temperatures is 21.52°C with record highest and low temperatures of 48 and -1.1°C, respectively.

50. The average amounts of rainfall observed in Giza North site range between 0.0 mm and 4.9 mm. The annual rainfall precipitation is about 22.2 mm. The rainy season begins during the second half of October. December and January are the rainiest months with an average of 4.9 mm/month. Some showers are still observed in March, 2.9 mm/month.

51. Relative humidity does not vary greatly through the year, staying between 50% and 60% at noon and between 60% and 70% in the morning and in the evening.

52. Wind speeds are generally light to moderate with an annual-average speed of approximately 2.66 meters per second and rarely exceed 5.65 m/sec.

53. The Northwest winds prevail with a frequency of 30 – 40%. Winds in the Winter can be strong and stormy. A dry hot south west loaded with sands and dust (Khamasin wind) blows on occasions for three to four days during the Spring. During the Summer, the wind decreases steadily and in September there are many calm days.

54. No archaeological resources are known in this site. Local archaeological authorities have been consulted, where they confirmed that the near area around the site proved that no historic resources exist.

55. The main transport infrastructure linking the Giza North area to the country main ports facilities is principally based on road network. The site is accessible through a major Regional Road from Cairo to El-Khataba via Delta Barrage. The Qanater / Khataba regional Road and the Cairo / Qanater Road are the main three roads linking the site with the national road network.
56. The main national roads connecting sea ports to the Giza North site are: Cairo/Alexandria Desert Highway and Cairo Alexandria Agricultural Highway from Alexandria port and both of Cairo/Suez desert Highway and Port Said/Suez highway from Suez, Port Said and Damietta ports.

57. The site, also, is accessible via railways network through El-Manashy railway, in the immediate west of the El-Rayyah El-Beheiry canal, parallel to it.

58. The 6th of October Region Master Scheme, 2009 is shown in Figure 6. The proposed land uses around the project site include new urbanized and residential development areas, which discussed in more detail in Section 5.8.
Figure 4

Landsat Image of the Wider El-Kata Area
Showing the Proposed Site of the Giza North Power Plant
Figure 5

Localized Map of the Proposed Site
Figure 6

Markaz Imbaba Region Master Scheme, 2009
[The 6th of October ex-Governorate is planned for developments, which enhance the need for electricity]
4. PROJECT DESCRIPTION

4.1 Overview of the Power Plant

59. The power plant site will occupy an area of approximately 125,000 m², within a total allocated area of 275,000 m² trapizoide-shaped piece of land and will include the following main elements for each 750 MWe module:

- Three indoor combustion turbine generator (CTG) units.
- Three outdoor heat recovery steam generators (HRSGs) without supplementary firing.
- One indoor condensing steam turbine generator (STG) unit.
- The project is rated for 750 MWe (nominal) net power generation at ISO conditions of 15 °C ambient air temperature, and 60 percent relative humidity.
- Each CTG will feed exhaust gases to its respective HRSG. The steam produced from the three HRSGs will feed the STG.
- The primary fuel for the combustion turbines will be natural gas supplied by Owner at 26.0 barg guaranteed at the interface. The secondary fuel for the combustion turbines will be sollar oil (Fuel oil No. 2).
- Power will be generated at the manufacturer’s standard voltage and stepped up through main transformers to be connected to a 220 kV gas insulated switchgear (GIS).
- The power plant is designed to operate as a base load unit with the STG operating in sliding pressure mode.
- Cooling water supply will be provided by an extraction from, and discharge to, the Gulf of Aqaba.

60. The power plant will include the following main components for each 750 MWe module:

- Gas Turbine 1A.
- Gas Turbine 1B.
- HRSG Unit 2 A.
- HRSG Unit 2 B.
- Steam Turbine Unit 1 A.
- Elec. Bldg. Unit 1 A.
- Elec. Control Bldg. Unit 1 B.
- Main Transformers Unit 1 A.
- Main Transformers Unit 1 B.
- Aux. Transformers Unit 1 A.
- Aux. Transformers Unit 1 B.
- Switchyard Area.
• Diesel Generator.
• Switchgear Control Room.
• Stacks Module 1.
• Fuel Gas Receiving/Reducing Station.
• Solar Oil Unloading Pumps.
• Solar Oil Storage Tanks.
• Water Treatment Area.
• Circulating Water fi re Water Pump House.
• Circulating Water Electrical Equipment Bldg.
• Chlorine Tank/Pump.
• Condensate Water Tank.
• Condensate Water Discharge Structure.
• Condensate Water Seal Well.
• Demineralized Water Storage Tank.
• Waste Water Treatment Plant.
• Administration Building.
• Warehouse/Work Shops.
• Security office.
• Fire Station.
• Hydrogen Generation Building.
• Bottled Gas Storage/Gen. Area.
• Foam Equipment.
• Black Start Facility.

61. The layout and main components for the power plant is presented in Figure 7.

4.2 Process Description

62. The key steps of the generating process of the proposed combined cycle power plant are as follows:

• The main inputs to the generating process consist of natural gas or solar oil, which will be transported to the station via pipeline (gas) or by trucks (solar oil).

• Natural gas (or solar oil as a backup) will be mixed with air at the gas turbine unit compressor outlet and combusted to produce hot high-pressure flue gas, which drives the gas turbine electrical generator. Gas turbine exhaust will be used to generate steam from demineralized water to drive one steam turbine generator.
• The steam is cycled from the Heat Recovery Steam Generators through the turbine to a condenser. A direct, once through cooling system, extracting water from, and discharging to the El-Rayyah El-Beheiry, cool the condenser. The condensate is then returned for recirculation within the Heat Recovery Steam Generators.

• The final exhaust gases will be discharged to the atmosphere in accordance with emission standards set by the EEAA. The main by-products from combustion of natural gas are carbon dioxide (CO\textsubscript{2}), water vapour (H\textsubscript{2}O), carbon monoxide (CO) and nitrogen oxides (NO\textsubscript{x}). Sulfur dioxide (SO\textsubscript{2}) and particulates, which are typically associated with coal and oil combustion, will not be produced other than in trace quantities during natural gas firing. When solar oil is used instead of natural gas, SO\textsubscript{2} and particulates will also be key emissions from the power plant.
Figure 7

General Layout of the Giza North Power Plant and its Easments
4.3 Operational Releases from the Power Plant

63. During operation, the key releases into the environment from the power plant will comprise the following:

- Exhaust gases, will be emitted into the atmosphere, normally from the Boilers' stack as a result of fuel combustion. Emissions from the combustion of natural gas are carbon dioxide (CO\(_2\)), water vapor, carbon monoxide (CO) and nitrogen oxides (NO\(_x\)). Sulfur dioxide (SO\(_2\)) and particulates, which are typically associated with coal and oil combustion, will only be produced in trace quantities during natural gas firing. In emergencies when light fuel oil (sollar) is used instead of gas, SO\(_2\) and particulates will however be key emissions from the power plant.

- Heated cooling water will be discharged into the El-Rayyah El-Beheiry via the cooling water discharge structure at a temperature of no more than 8 °C at the point of discharge. Process waste water will be treated and discharged into the discharge system, which includes three pathways: one to the circulating water discharge system (CWDS) and the other to the plantation irrigation network. Any oil and residual solids will be removed before discharge and the pH of discharged water maintained at between 6 and 9.

- Chlorine will be added to the cooling water system to control bacterial and algal growth on various surfaces and in the cooling water intake. The cooling water discharge will contain residual quantities of chlorine at concentrations below the World Bank standard for free chlorine of 0.2 mg/l.

- Small volumes of solid wastes will be segregated, collected and disposed of by licensed waste disposal contractors.

64. The power plant incorporates a range of measures to eliminate or reduce operational releases within its design and layout, such as low NO\(_x\) combustors in the gas turbines, oil interceptors fitted to the site drainage system and effluent treatment facilities to treat wastewater prior to discharge. As a result, the power plant is designed to meet high environmental standards and comply with the emission limits of the Arab Republic of Egypt and the international / World Bank.

5. ANALYSIS OF ALTERNATIVES

5.1 Current Situation (“No Action” Option)

65. The no action alternative will result in the demand for electricity exceeding supply, with an increasing deficit as demand increases in future years. A lack of a secure and reliable electricity generation and supply system has significant social and economic implications, since it will:

- constrain existing and future economic development and investment through lack of energy resources to meet industrial and social demand;
- restrict socio-economic development through lack of electricity supply, or poor reliability and shortages in electricity supply for domestic users, community and other public facilities and public services;
- inhibit provision of social services, including public health and poverty eradication.

66. As a result, the "no action" option is not a viable or acceptable alternative to the proposed project.

5.2 Alternative Technologies and Fuels

5.2.1 Selection of the Proposed Technology

67. The EEHC has an objective to provide a secure, reliable electricity generation and distribution system for Egypt. A key element in meeting this objective is to establish a diverse range of technologies to avoid over-reliance on any particular fuel or technology, which may adversely affect the ability to provide electricity or meet the fluctuations in demand which occur on a day-to-day or seasonal basis.

68. The EEHC generation expansion plan includes provision of the following:

- gas/oil-fired steam units;
- gas/oil-fired combined cycle units;
- gas/oil-fired simple cycle combustion turbine units;
- pumped storage;
- wind farms; and
- integrated solar-combined cycle generating units.

69. Other possible options include “importing electricity”, “rehabilitation of existing power plants”, “transmission and distribution investment” and “IPPs”.

These technological alternatives constrained by the following:

- **Importing electricity**: Egypt is interconnected to Libya and Jordan and is exporting electricity to both countries. Interconnection to Libya has a capacity of 300 MWe, and that of Jordan has a capacity of 350 MWe, which was increased to 450 MWe in 2006. Libya and Jordan are currently paying 4 US$c/kWh for the Egyptian power supply. As they are net importers, there is currently not much scope for electricity imports to Egypt from the interconnected networks. In addition, the cost of electricity in both countries is much higher than that of Egypt, making it an uncompetitive alternative. There is currently no south border connection to Sudan, although there is an ongoing activities in the context of the Nile Basin Initiative (NBI), whereby Egypt could potentially import hydroelectric power starting approximately in 2012, if the price is competitive. However, considering the abundance of natural gas and thus the low cost electricity provision in Egypt, it will be difficult for imported electricity to be
competitive. The same situation stands as for completion of the Syrian interconnection, which entered into operation since Jordanian-Syrian interconnection on 8 March 2000.

- **Renewable energy:** Current world market cost of wind based electricity is 5.9-7.38 USc/kWh, whilst is 3.75 USc/kWh with current grant financing for wind projects, which is higher than the cost from natural gas combined cycle plants (as estimated for the Giza North power project for only 2.249 USc/kWh). Therefore, renewable energy is not competitive unless further subsidies are provided.

- **Rehabilitation of existing power plants:** EEHC has concluded that the rehabilitation option is cost effective in seven of its existing power plants, and these sites have already been or will be rehabilitated. However, these efforts are not enough to cope with the growing demand for electricity.

- **Transmission and distribution investments:** EEHC has developed a transmission and distribution (T&D) development plan and the T&D system is optimized for the current load requirements and generation capacity. To meet the demand growth for the fast track period and medium term expansion, a T&D investment plan has been developed. New electricity generation capacity is required in the network; therefore, strengthening of T&D capacity alone will not replace the need for the generation capacity. Furthermore, T&D losses are at a relatively low level, around 10% on average, and reducing the losses further would not free up the amount of electricity supply required.

- **BOOTs/IPPs:** Three BOOT projects (650 MWe each) have been built in Egypt in late 1990's and early 2000's. The government is encouraging private sector participation in order to attract private investment. However, given the worldwide reduction in investor’s interest in the power sector, private financing for power generation in the near term is still unlikely.

70. **Consistent with the generation expansion plan, the EEHC has stipulated that the Giza North should be gas/oil-fired combined cycle units of a net 3x750 MWe generating capacity. The reasons for the selection of this technology are as follows:**

71. The steam cycle (SC) technology, which fires natural gas as a main fuel and mazout as a back-up fuel, has been used for decades in Egypt. The plant efficiency is around 42% with 600 MWe size. The investment cost of Steam Cycle Plant, based on recent worldwide market experience, is around $1100-1300/kWe (EPC basis with multiple packages). The application of large scale (750MWe) gas turbine combined cycle (CC) technology, which fires natural gas as a main fuel and diesel fuel as a back-up fuel, has been operational since 2004. Plant efficiency exceeds 55% and the investment cost, based on recent worldwide market experience, is around $760-810/kWe (EPC basis with multiple packages). Given that CC plants show lower investment cost and higher plant efficiency, this is considered a distinguished rationale to justify why the CC technology has been selected for the proposed project.
72. Given this rationale, existing and planned generating capacity using gas/oil-fired steam cycle units is already considered sufficient by the EEHC and further reliance on this particular technology is not preferred – for the time being – for reasons of security of supply, response to demand and economics. As shown in Table 3-1, almost 26% of installed capacity in 2007/2008 was provided by combined cycle technology and considered able to accommodate more CC capacities. Also, declared combined cycle additions of Nuweiba on the Gulf of Aqaba has been delayed for unforeseen period of time, which means that the power generation system actually needs to increase the combined cycle capacity by another 750 MWe within the same period.

73. Hence, with the current policy to increase CC to 30-35% in the generation mix (as identified by EGEAS), and with urgent need of supply capacity with load following capability, CC technology has been identified as the most viable option for the Giza North project. This will ensure operational flexibility, network stability, fuel flexibility and local job creation.

5.2.2 Alternative Fuels

74. Natural gas has been selected as the main fuel for the power plant. Compared to other fossil fuel generating technologies, gas-fired combustion turbine generators have a relatively low emissions of carbon dioxide (CO₂), moderate emission levels of nitrogen oxides (NOx) and the lowest emission levels (almost traces) of sulfur dioxide (SO₂) and particulates.

5.3 Power Plant Design

75. There are a wide variety of potential designs for the proposed power plant. On the basis of the key design features selected for the power plant, together with the adoption of general good practices within its overall design and layout, fuel and chemical storage facilities and pollution monitoring equipment, the power plant minimizes its potential impacts on the environment whilst ensuring safe, secure and efficient operation. Key aspects of the design, which have been compared with alternatives, are as follows:

- the stack has been designed to maximize buoyancy and dispersion of emissions and its height (82 m) exceeds good engineering practice;
- the Gas Turbines will be equipped with low NOx combustors, minimizing emissions of NOx which is the key pollutant associated with combustion of natural gas;
- direct cooling water will be used to maximize generating efficiency, minimizing visual impact, noise emissions and the potential for visible vapor plumes or ground fogging. Alternatives such as cooling towers and air cooled condensers (open, whilst using less water, result in lower generating efficiencies and also result in impacts such as vapor plumes, visual and noise impacts). The availability of water is not considered an issue for this project given the use of water from the El-Rayyah El-Beheiry;
cooling water will be supplied from a sustainable water supply, namely the El-Rayyah El-Beheiry, and the intake and outfall structures can be constructed and operated without significant impacts.

5.4 Alternative Sites

5.4.1 Identification of Candidate Sites

76. Three sites were considered for the proposed project, namely Nubaryyah, Kom Hamada and Giza North. Relatively, the Giza North was preferred to Nubaryyah and Kom Hamada sites mainly because of the higher cost for connection to cooling water, make-up water and the gas network, in addition to difficulty of connecting the power plant to the electricity grid due to the distance densely covered with green cultivations to the load centers.

77. The key criteria used in the evaluation of the alternative sites by the EEHC/CEPC were as follows:

- **Economic factors:**
  - capital costs;
  - operation and maintenance costs;
  - requirement for natural gas;
  - requirement for cooling water;
  - demand loads for electricity; and
  - requirement for electricity transmission lines/sub-stations.

- **Non-economic factors:**
  - potential environmental impacts; and
  - site development.

78. Potential environmental impacts have been examined for all sites. Screening level assessment during feasibility study indicated that the level of environmental impacts will be relatively constant for all the three sites.

79. According to the Land-use Map of 6 of October ex-Governorate, the site area of the El-Kata has been designated in early 2009 for some urbanizational developments. Part of the land around has already been assigned to the developed of El-Kata village. As a result, the Giza North on the El-Kata area has been identified eligible as an appropriate location for current and future electricity production facility.

80. Compared to other alternative sites, the Giza North on the El-Rayyah El-Beheiry site was found to be the most effective site for the following reasons:

- Minimal additional infrastructure requirements are needed.
• A workers colony is not required during construction as the power plant will use the local workforce from 6 of October and Giza Governorates and the surrounding towns and villages.
• Desirable benefits for development of the site area.

81. In addition, the power plant will be constructed and operated on a land originally intended to be sold for an activity other than agriculture activity, thus it will not include any land take. Also, the power plant site will bring socio-economic benefits to the wider 6 of October and Giza Region, through employment opportunities, supply contracts and the effects of project expenditure within the local economy.

82. The key findings of the consideration of alternative sites are summarized in Table 3. The consideration of alternative sites by the EEHC/CEPC indicated that Giza North has no significant disadvantages and has several beneficial aspects for other developments in the 6 of October, Giza and Greater Cairo area, and desirable site development characteristics. Therefore, Giza North was selected as the preferred site for the power plant.
Table 3

Key Findings of the Consideration of Alternative Sites

<table>
<thead>
<tr>
<th>Site</th>
<th>Key Findings</th>
</tr>
</thead>
</table>
| Nubaryyah      | "Greenfield" site, hence a new colony for workers would be required with potential socio-economic conflicts.  
Extensive infrastructure requirements needed, resulting in higher costs and potential environmental impacts.  
High Difficulty for interconnection to the national electrical grid due to dense cultivated land all along the proposed routings.  
High difficulty with connection to the gas network.  
High purchase cost for the land to be bought for the project site area. |
| Kom Hamada     | Relative to Giza North site, significant infrastructure requirements needed, resulting in higher costs and potential environmental impacts.  
Relative to the other three sites, the area available is considerably small and the price is considerably high.  
High difficulty with connection to the gas network. |
| Giza North     | Minimal additional infrastructure would be required.  
Cost-effective site for development (first lowest of the three alternative sites).  
A workers colony is NOT required as the project will use the local workforce from wider Suez area.  
No problem at all with gas connection and electrical interconnection. |

6. KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

6.1 Introduction

83. A thorough assessment of the impacts of the proposed plant has been carried out based on information provided by EEHC, CEPC and their sub-consultants. A combination of quantitative and qualitative assessment techniques, ranging from computer and/or physical modeling for air, water, noise and traffic impacts to ecological and aquatic surveys and visual evaluation, have been undertaken. The results of the assessment work have been compared with the environmental standards set by the Government of the Arab Republic of Egypt and the World Bank, whichever is the more stringent.

84. The following items are examined in the corresponding sub-sections of the ESIA Study Report:
- Air Quality;
- Aquatic Environment;
- Noise and Vibration;
- Flora and Fauna;
- Land use, Landscape and Visual Impacts;
- Soils, Geology and Hydrology;
- Traffic;
- Socio-economics and Socio-cultural Effects;
- Archaeology, Historical and Cultural Heritage;
- Natural Disaster Risks;
- Major Accident Hazards;
- Solid Waste Management;
- Public Health Effects;
- Occupational Health and Safety; and
- Associated Infrastructure.

85. For each of these items, a concise description and evaluation of the significance of potential impacts of the project is presented in the ESIA study report. Where modeling has been undertaken, a description of the model as well as corresponding maps summarizing the results of the assessment are provided.

86. Where potentially significant adverse impacts are identified, possible mitigation measures are suggested wherever possible, to ameliorate the impact to an acceptable level. Where identified, beneficial or positive impacts/effects of the project are also highlighted.

87. The conclusions of the assessment (see Table 4) are that (with suitable mitigation measures described in Tables 5, 6, 7, 8 and 9) the project is in compliance with the environmental requirements of both the Government of Egypt and the World Bank with respect to stack emissions of the new power plant, ambient air quality, discharge quality and noise. Table 1 provides with a summary of anticipated impacts in relation to the Egyptian and World Bank environmental guidelines for stack emissions, ambient air quality, liquid effluent and noise. The following discussion highlights some of the key considerations and results of the assessment.
6.2 Air Quality

Construction Dust

88. Construction activities will result in locally high levels of dust. This may affect nearest receptors or sensitive environments which lie in the immediate boundaries of the power plant. Existing concentrations of airborne dust are already high in this rural area. Potential impacts from dust emissions on site will be significantly reduced by careful management and the implementation of mitigation measures to reduce dust generation.

Stack Emissions and Background Air Quality

89. The power plant will burn natural gas as its primary fuel. As a result, the principle pollutant during normal operation will be NOx. During emergency operation (and for not more than 2% of operating time), the burning of light fuel oil will result in emissions of particulate matter and SO2 along with trace amounts of other pollutants. Emissions from the plant will meet Egyptian and World Bank Guidelines.

90. In order to analyze the potential impacts of the plant’s emissions during normal operation (firing gas) on ambient air quality in the project area, dispersion modeling has been undertaken.

91. The assessment indicates that the highest concentrations for each of the averaging periods under consideration (hourly, daily, annual) are found to the north-north-east, north-north-east, and south-south-east of the site, respectively. This is because the winds are exposed to the atmospheric prevailing conditions, although they are overwhelmingly from the north and northwest for most of the time. The maximum hourly average value is 327.3 μg/m³ at 377.0 meters (101.9 m, 363 m), the maximum 24-Hours average is 125.6 μg/m³ at 464.3 meters (101.9 m, 453 m) and the maximum annual average is 37.4 μg/m³ at 370.3 meters (101.9 m, 377.1 m). The ambient existing levels of pollutants are dominating the wider area of the Giza North site. Combined effects from the proposed Giza North power project and the surrounding sources for nitrogen oxides (NOx) have been obtained using the background NOx measurements recorded for the Giza North area via the NRC. The maximum total combined 24-hour impact level (136.58 μg/m³, including the background level) is under the Egyptian 24-hour limit of 150 μg/m³. The maximum 24-hour impact level of the Giza North power project is 125.6 μg/m³ (excluding the background level). The maximum combined 1-hour impact level, including the highest value during 2006, is 354.75 μg/m³. The Giza North plant contributed 327.3 μg/m³ at this location. (see Figure 8).

It is recommended that an air quality monitoring system composed of 2 or 3 monitoring stations will be utilized. The monitoring station equipped with meteorological monitoring system will be located near to, or within, the power plant site, the other one or three stations will be located one down wind within the designated area of maximum predicted pollutant concentration and the other (if any) upwind.
Figure 8

Giza North Air Quality Monitoring Locations
### Table 4
Environmental Impacts and Environmental Guidelines

<table>
<thead>
<tr>
<th>Impact Area</th>
<th>Predicted Max. Concentration from Giza North Power Plant</th>
<th>Existing Ambient Air Quality (Effect of All Surrounding Facilities)</th>
<th>Cumulative Air Quality Impact of both the Giza North Power Plant and Surrounding Facilities</th>
<th>Egyptian Standard</th>
<th>World Bank Guideline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOx</strong></td>
<td>&lt; 50 mg m⁻³</td>
<td></td>
<td>300 mg m⁻³</td>
<td>51 mg m⁻³</td>
<td></td>
</tr>
<tr>
<td><strong>SOx</strong></td>
<td>neglegible</td>
<td></td>
<td>not specified</td>
<td>not specified</td>
<td></td>
</tr>
<tr>
<td><strong>TSP</strong></td>
<td>&lt; 5 mg m⁻³</td>
<td></td>
<td>200 mg m⁻³</td>
<td>50 mg m⁻³</td>
<td></td>
</tr>
</tbody>
</table>

**Stack emissions (70% load when firing Light Fuel Oil (<2% of total annual operating time))**

| NOx – oil firing | > 70 mg m⁻³                                          |                                                                   | 300 mg m⁻³                                                                               | 150 mg m⁻³       |                      |
| TSP – general (all sizes) | < 5 mg m⁻³                                           |                                                                   | 200 mg m⁻³                                                                               | 50 mg m⁻³        |                      |

**Liquid Effluent**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Predicted Max. Concentration</th>
<th>Existing Ambient Air Quality (Effect of All Surrounding Facilities)</th>
<th>Cumulative Air Quality Impact of both the Giza North Power Plant and Surrounding Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.9</td>
<td></td>
<td>6.9</td>
</tr>
<tr>
<td>BOD</td>
<td>&lt;30 mg/l</td>
<td></td>
<td>30 mg/l</td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td></td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Copper</td>
<td>&lt;0.5 mg/l</td>
<td></td>
<td>1 mg/l</td>
</tr>
<tr>
<td>Zinc</td>
<td>&lt;1 mg/l</td>
<td></td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td>Oil and Grease</td>
<td>&lt;5 mg/l</td>
<td></td>
<td>10 mg/l</td>
</tr>
<tr>
<td>Residual Chlorine (total)</td>
<td>&lt;0.2 mg/l</td>
<td></td>
<td>0.2 mg/l</td>
</tr>
<tr>
<td>Temperature Increase (°C)</td>
<td>≤ 8°C at the point of discharge and ≤ 3°C within 100 m.</td>
<td>(max. absolute temp 35°C at the point of discharge. Mixing zone up to 5°C above ambient.</td>
<td>≤ 3°C at edge/pt mixing zone</td>
</tr>
</tbody>
</table>

**Noise**

<table>
<thead>
<tr>
<th>Daytime (max.)</th>
<th>Max. ≤54.6 dB(A)</th>
<th>65 dB(A)</th>
<th>55 dB(A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nighttime (max.)</td>
<td>Max. ≤54.6 dB(A)</td>
<td>55 dB(A)</td>
<td>45 dB(A)</td>
</tr>
</tbody>
</table>

(1) Egyptian standards for NOx are expressed in terms of NO₂.
(2) Ambient air quality monitoring results measured by the NRC air quality monitoring equipment in Giza North area during September 2009.
(3) The PM₉₀ concentrations resulting from the power plant itself only is traces.
(4) "Chlorine shocking" may be preferable in certain circumstances, which involves using high chlorine levels for a few seconds rather than a continuous low level release. The maximum value is 2 mg/l for up to 2 hours, which must not be more frequent than once in 24 hours (and the 24 hour average should be 0.2 mg/l).
(5) The effluent should result in a temperature increase of no more than 5°C at a distance less than 100m from the point of discharge where initial mixing and dilution take place. Where this zone is not defined 3°C at a distance, 100 m from the point of discharge is used when there are no sensitive aquatic ecosystems within this distance.
(6) There are no sensitive receptors for noise within 150m of the power plant. The area has been categorised as “Residential-Commercial area” with respect to Egyptian ambient noise standards and “commercial” with respect to World Bank guidelines.
6.3 Aquatic Environment

92. Cooling water and process water for power plant operation will be drawn from the El-Rayyah El-Beheiry via an intake structure. The quantity of the cooling water that will be returned back to the El-Rayyah El-Beheiry is about 46,800 m³/sec. per One Module. Process water that will be abstracted from the El-Rayyah El-Beheiry is about 0.34% of this quantity. Potable water will be supplied to the power plant via the El-Kata local potable water system. Cooling water will be returned to the El-Rayyah El-Beheiry via a discharge structure whilst waste process water will be disposed of the El-Kata local sewer system or after treatment via discharge system, which includes three pathways: plantation irrigation network and Circulating Water Discharge System (CWDS). Sanitary waste water will be disposed of through the El-Kata local sewer system or-after treatment- via plantation irrigation network. No ground water or other surface water will be used during power plant construction and operation. The Contractors will be responsible for relevant water/toilet facilities during construction and the need to provide appropriate services will be specified in their contracts. The key potential impacts of the power plant on the aquatic environment will therefore be impacts to the aquatic flora and fauna during power plant construction and operation.

93. The aquatic environment surrounding the project site is characterized by generally fair water quality. The aquatic flora is characterized by poor biodiversity and no sensitive ecosystems. No commercial fishing occurs in the vicinity of the project, but very limited fishing activity.

94. During construction of the power plant dredging and construction of the intake and discharge structures could lead to potential impacts on physical aquagraphy, water quality and removal of, or disturbance to, aquatic habitats, flora and fauna. Given that the area of impact is very localised, losses are in many cases temporary and field survey data available do not indicate significant or sensitive habitats, the impacts of power plant construction on the aquatic environment are not considered to be significant. In addition, good site management and engineering practices during construction will ensure that any residual impacts are reduced to a minimum.

95. Power plant operation will result in a heated plume of waste cooling water being discharged into the El-Rayyah El-Beheiry. Process water will be disposed of to the discharge system (identified above). All discharges of process water will be treated prior to discharge to ensure that the Egyptian and World Bank waste water quality guidelines are met. Treatment includes neutralization, oil separation, flocculation and filtration.

96. The returned cooling water will be released at a temperature of no more than 8°C at the point of discharge. Thermal modeling of the discharge plume shows that, at max. operational conditions, the point at which the plume has decreased in temperature to 3°C above ambient, lies at approximately within 100 m from the point of discharge. The mixing zone has been defined by the HRI/MWRI to be 150 m from the point of discharge.
97. The temperature of the returned cooling water at the point of discharge conforms to the Egyptian Standard, and the discharge as modeled satisfies the World Bank standard of a maximum increase of 3°C above ambient at the edge of the mixing zone (100 m from the point of discharge). In addition, the area affected by the highest temperature increases and therefore where aquatic ecology is likely to be most affected, is localized and the aquatic habitats in this area have been found to already be relatively impoverished. Outside this area, more marginal increases in the El-Rayyah El-Beheiry water temperature are likely to create new or improved habitats for flora and fauna.

98. Physical aquagraphy, Giza North El-Rayyah El-Beheiry bankline access, fishing and navigation are not predicted to be significantly affected by the presence of the intake and discharge structures.

6.4 Noise Impacts

99. The construction of the Giza North power plant is expected to generate a maximum noise level of 59 dB(A) during the day at the fence of the power plant and 57 dB(A) at night. These worst-case construction noise levels are both within Egyptian and World Bank\(^1\) guidelines, and for most of the construction periods, the noise levels will be lower than these values. There are no residential receptors within 1000 m of the plant.

100. Construction traffic on local roads will also generate additional noise, however noise levels on local roads predicted for peak construction activity (during 2011-2013) is expected to be only 0.3dB(A) above ambient levels. This magnitude of increase is generally not perceptible to the human ear, consequently no construction traffic impacts are predicted.

101. The potential noise emissions from the Giza North plant during operation have been modeled to provide noise contours in the area around the site. The predicted operational noise levels at the site boundary and at all receptors are below the Egyptian and World Bank guidelines during daytime and night-time.

\(^1\) There are no World Bank Guidelines for demolition and construction noise, therefore Operational noise guidelines are applied here.
6.5 Flora and Fauna

102. No areas protected for their conservation value are located on, or in the vicinity of, the project area. The proposed site itself and the surrounding land is agricultural vegetated with much of the area having been dominated by common cultivars. Given that the potential impacts of construction and operation on power plant area likely to be localized and good site management practices will be implemented, no significant effects are predicted.

6.6 Land Use, Landscape and Visual Impacts

103. The land use at the project site is agricultural land. There is no loss of this land to the power plant development, as this land is offered for sale by its owner, either, for other purposes or for a power generation activity, therefore there is not significant land use impacts due to the Giza North power project.

104. The surrounding land use is generally agricultural. As the land is dominantly cultivated, all existing views will be insignificantly influenced by the power plant and given the surrounding context, the visual intrusion of the power plant could be accommodated.

105. Visual impacts of the power plant from the residential areas to the northwest and southeast are also not expected to be significant given the long distance of their locations from the site and orientation of the facilities. The potential landscape and visual impacts of the project are therefore expected to be properly accommodated.

6.7 Soils, Geology and Hydrology

106. Due to the characteristics of the soils and geology of the site, in particular the lack of any sensitive features, and the mitigation measures proposed as part of the construction and operation of the power plant, no significant impacts are predicted to occur. In addition, preliminary land surface investigations confirmed the site as being uncontaminated.

6.8 Traffic

107. The assessment of traffic and transport covers the changes in traffic conditions in terms of delay and congestion during construction and operation.

108. The greatest potential for traffic impacts to occur arises during a short period at peak construction. There is some potential for increased congestion on the main roads to the power plant, however the impacts will only occur during the peak construction phase and during peak hours. The overall impact is therefore predicted to be insignificant. Mitigation measures will be put in place to reduce the potential for impacts to arise.

109. During operation, a small number of workers and HGVs are associated with operating the power plant and no impacts are predicted to occur.
6.9 Socio-economics and Socio-cultural effects

110. It is anticipated that the power plant will provide a net positive socio-economic impact through the provision of employment opportunities and attraction of economic investment into the area. In addition, the use of local labor (95% during construction), will maximize these positive impacts through the development of the local skill base and will also generate increased demand for local services, materials and products.

111. In addition to the area specifically designated for the plant, there are large empty spaces next to the power plant site. All activities related to the construction of the new plant will therefore take place within the area belonging to the CEPC, i.e. there will be no off-site activities or associated land acquisition during construction.

112. As indicated in the main document, scientific research has shown that certain species of the fish grow considerably faster in warmer water.

113. The effects on the fisheries of warmer water returned to the El-Rayyah El-Beheiry from similar power plants along the Nile banks are well known. Experience from more than 10 other power plants located on the banklines of both the River Nile and its branches that have operated in Egypt for a number of years indicates that the overall impacts on fisheries of slightly warmer water actually are positive, and consultations with the fishermen indicate that the catches in these areas have increased rather than decreased. Since this is part-time, small-scale fisheries no statistics are available, but after many years the warmer water around the various points of discharge, is clearly perceived by the fishermen to have positive effects (More details are presented in "consultation with the fishermen” given in Volume III, Annex C).

114. In line with this recognition, discussions have already been initiated between the EEHC and the General Authority for Fishery Development with a view to jointly take advantage of this, e.g. establishing a fry collection station near the edge of the mixing zone.

115. Land expropriation is not likely for the sub-projects, including interconnecting transmission lines and gas pipeline. However, in order to handle any potential future changes, a Resettlement Policy Framework (RPF) is prepared by ECG separately in a stand alone document to be attached with this ESIA report. Fair compensation, if any, will be paid for the right of way according to the Law 63 of the Year 1974 and the recommendations set out in the RPF. The ESMP will be revised after exact routes for both of the gas connection an transmission lines are available.

6.10 Archaeology, Historic and Cultural Heritage

116. No available information was found which identified any archaeological, historic or cultural remains on the site or in the surrounding area. Consequently, no impact is predicted to occur on any known archaeological, historic or cultural resources.
117. CEPC have incorporated mitigation measures into the construction program to ensure that any potential finds of significance are recorded and are accorded the required protection in consultation with Supreme Council for Antiquities.

6.11 Natural Disaster Risks

118. An assessment of the risks to the power plant from seismic activity has concluded that given the engineering measures incorporated into the design of the power plant, the potential environmental impacts of a seismic event during power plant operation are not anticipated to be significant.

119. Furthermore the power plant will be designed to conform to the Uniform Building Code Zone 2 seismic criteria, according to US regulations for earthquake. These design criteria are therefore considered sufficient to withstand the level of seismic activity experienced in the area.

120. The risks of flooding during power plant construction and operation were also examined. However, site drainage will be constructed to minimize any risks of contaminated water reaching the surroundings and to properly drain the site, no significant flood risk impacts are anticipated.

6.12 Major Accident Hazards

121. Given the wider land surrounding the Giza North power plant and the measures incorporated into the design of the plant to minimize the risk from fire and explosion, the plant is not anticipated to pose a potential risk of any significance to any third party facilities.

6.13 Solid and Hazardous Waste Management

122. The management of wastes during construction and operation of the power plant will include mitigation measures to collect and store waste on-site, record all consignments of solid or contaminated waste for disposal and periodically audit waste contractors and disposal sites to ensure that disposal is undertaken in a safe and environmentally acceptable manner according to the rules set by Law 4/1994 and the Governorate of the 6 of October.

123. Private sector contractor will be assigned via general bidding process and the contract will include detailed environmental procedures, according to Law 4/1994 and Governorate of the 6 of October regulations, for disposing debris materials. The contract covers all fees required.

124. During construction and operation, all wastes including debris waste, general waste, packaging waste, commercial wastes, raw-water pre-treatment sludge, tank sludge and interceptor sludge will be disposed of by licensed waste contractors according to the rules set by Law 4/1994 and the Governorate of the 6 of October.
125. Solid and hazardous waste management is not predicted to cause any significant impacts.

6.14 Occupational Health and Safety

126. With the provision of a high standard of health and safety management on site, construction and operation of the power plant in accordance with good industry practice, the occupational health and safety risks associated with construction and operation of the power plant will be minimized and are not significant.

6.15 Associated Infrastructure

127. All construction related activities will take place within the area belonging to the East Delta Electricity Production Company. The total area is 297,250 square meters have, already, designated for the new plant. In addition to the area specifically designated for the plant, there is large empty space inside the purchased land next to the power plant designated area. All activities related to the construction of the new plant will therefore take place within the area belonging to the Cairo Electricity Production Company, i.e. there will be no off-site activities or associated land acquisition during construction.

128. Transmission lines which will evacuate power generated by the Giza North power plant will add connecting transmission lines to the Egyptian network. Some limited distance (on 220kV and on 500 kV, too) transmission lines will connect the power plant to existing substations following new routes. Very small pieces of land will be taken against compensation.

129. The power plant will be connected through the following:

- **Connection to the 220 kV grid:**
  - Construct four circuits 220 kV underground cables Abo-Ghaleb/ Giza North with length 5 km.
  - Construct 220 kV double circuit O. H. T. L – Ashmoun / Giza North 220 kV with length about 10 Km.

- **Connection to the 500 kV grid:**
  - Construct Giza North substation 500 /220 kV with 2x500 MVA transformers.
- Release 500 kV (O.H.T.L) Samallout 500 / Cairo 500 from Cairo 500 S/S side and extending it with a length of 1x35 km to Giza North 500 S/S to become Giza North 500 / Samallout 500 with a length about 244 km.

- Construct 500 kV single circuit (O.H.T.L) Cairo 500 / Giza North 500 with length about 35 km.

A shorter connection had also been discussed, but has not been found acceptable as it will likely go through a number of orchards as well as cultivated lands. The proposed option seems to be less intrusive, both in terms of adverse socio-economic impacts and land acquisition challenges.

130. A considerable portion of the proposed transmission routes of both groups of 220 kV and 500 kV TLs with their transmission towers would be footed on dry, unproductive land. The majority of affected land owners seem to have fairly large farms, with average land holdings estimated at 8-10 Feddans. The land required for each tower footing is expected to be maximum 20x20 meters. (this requirement will be almost half for angle towers compared to suspension towers).
The final information related to the location of the associated infrastructure (i.e., transmission lines and substations) is to be determined by EEHC/EETC/CEPC.

131. Also, a new gas pipeline route will have to be identified from the nearest point of supply within the gas network in consultation with EGAS.

Gas connection will be implemented, where gas pipelines will be buried underground along the identified route.

132. However, since the transmission lines and gas pipelines are likely to require some land acquisition (and possibly resettlement), a Resettlement Policy Framework (RPF) is prepared separately, as part of this ESIA work.

The ESMP will be revised after exact routes for both of the gas connection and transmission lines are available.

133. EETC and CEPC will submit Screening Form B to the EEAA concerning the electrical interconnection. No significant impacts are anticipated.

6.16 Global Impacts

134. Natural gas has been selected as the main fuel for the power plant. Compared to other fossil fuel generating technologies, gas fired steam generators have a relatively low emissions of carbon dioxide (CO\textsubscript{2}), moderate emission levels of nitrogen oxides (NO\textsubscript{x}) and the lowest emission levels (almost traces) of sulfur dioxide (SO\textsubscript{2}) and particulates.

135. The greenhouse effect is caused by the build-up of carbon dioxide (CO\textsubscript{2}), methane (CH\textsubscript{4}), nitrous oxide (N\textsubscript{2}O) and chlorofluorocarbons (CFCs) in the atmosphere. Water vapor and ozone (O\textsubscript{3}) can also act as greenhouse gases. For power generation processes, CO\textsubscript{2} is the key emission of concern, as methane and CFCs are not emitted by power plants and none of the other greenhouse gases are emitted in sufficient quantities from power generation to be considered important in terms of the greenhouse effect.

136. The efficiency of the proposed combined cycle power plant is 55-58\% with natural gas, with associated CO\textsubscript{2} emissions of about 360-420 g/kWh. This compares with the efficiency of a typical steam cycle power plant of 36-45\% and CO\textsubscript{2} emissions of about 500-520 g/kWh.

137. Emissions of carbon dioxide are estimated to be up to 6,200 kilotonnes per year (expressed as CO\textsubscript{2}). This assumes that the plant operates for the whole year and consumes around 9 millions m\textsuperscript{3} of gas per day. The emissions of CO\textsubscript{2} from fuel burning in Egypt amounted to around 160,000 kilotonnes in 2008 (Ref: EEAA: Egypt's Second National Communication). Fuel combustion will account for most of Egypt's CO\textsubscript{2} emissions from all sources. Hence, the
power plant as proposed will emit up to around 3.7% of the total Egyptian CO₂ emissions in 2000. This is an upper estimate as the plant will not operate 100% of the year or at full load 100% of the time.

138. Natural gas, which is the main fuel to be used in the Giza North plant, contains very low concentrations of sulfur or particulate matter, therefore the potential for emissions of SO₂ and particulates from the electricity generating process are also very low. Fuel oil however, leads to greater emissions of SO₂ and particulates, due to the relatively high sulfur content of these fuels and the generation of ash during their combustion.

139. Natural gas fuel also has the significant benefit over fuel oil of being able to be delivered by an existing pipeline, whereas oil requires delivery to the power plant by road, rail and/or Nile river. The use of a pipeline avoids the potentially significant environmental impacts of road, rail or waterborne traffic and fuel unloading operations at a power plant. The very limited use of fuel oil at the proposed plant does not justify use of a pipeline for this fuel.

7. ENVIRONMENTAL MITIGATION AND MONITORING: THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

7.1 Enhancement and Mitigation Plan

140. The Environmental and Social Management Plan (ESMP) includes mitigation measures, design of monitoring programs where appropriate, and specification of management measures (including institutional responsibility and training requirements).

141. The mitigation measures represent a synthesis of those measures which are part of the basic power plant design and those that have been recommended in Section 6 of the ESIA report for both the construction and operational phases of the power plant. The mitigation measures discussed in this section are summarized in the following Five Tables, together with respective environmental monitoring and management arrangements. It should be noted that many of the mitigation measures presented below for the construction phase, will be carried forward into plant Operation.

142. All the mitigation, monitoring and management measures proposed below and in Section 8 of the ESIA report (the Environmental and Social Management Plan (ESMP)), will be adopted by the Project Company and imposed as conditions of contract on the contractor and any sub-contractors employed to build or operate any part of the power plant. Since many of the mitigation measures presented are considered an essential, integrated component of the construction and operation works, it is not possible to separate the specific costs of their implementation from the overall construction and operation costs.

143. Mitigation measures introduced into the design and construction phase of the power plant will be carried forward into the operational
phase by the CEPC Company. Many of the mitigation measures, as described in Sections 4 and 6 of the ESIA report, have already been integrated into the design of the power plant in order to minimize any operational impacts on the environment. Mitigation measures such as low NOx burners, noise silencers and water discharge controls are for example integral to the design of the power plant.

144. The key features of the ESMP relate to air quality, aquatic discharge and implementation of good site management practice. The ESMP is summarized in Tables 5, 6, 7 and 8 which relate to construction and operational phases respectively. Table 9 summarizes the cost of ESMP which will require to be included in the project financial plan.
### Table 5
**Institutional Arrangements for Giza North Power Project**

<table>
<thead>
<tr>
<th>Issue/Impact</th>
<th>Mitigation Measures</th>
<th>Implementation Schedule</th>
<th>Type and Frequency of Reporting / Monitoring</th>
<th>Responsibility</th>
<th>Monitoring Indicators</th>
<th>Budget in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Phase</td>
<td>Establishment of the Project Management Unit (PMU), including the Environmental Management Staff (EMS) (will include 3-4 staff members, B.Sc. and/or 5 years high technical education), construction phase. Basic training of persons employed to operate the monitoring activities. Basic induction training for all employees on good construction and site management practice.</td>
<td>Prior to starting construction. Ongoing training</td>
<td>Quarterly to EEHC Environmental Management (EEM) and EEHC Chairman</td>
<td>PMU / EMS</td>
<td>CEPC Project Manager in collaboration with the Consultant Site Manager</td>
<td>Training programs Compliance with ESMP</td>
</tr>
</tbody>
</table>

| Institution | Project Management Unit (PMU), including the Environmental Management Staff (EMS) (will include 3-4 staff members, B.Sc. and/or 5 years high technical education), construction phase. Basic training of persons employed to operate the monitoring activities. Basic induction training for all employees on good construction and site management practice. Training methods, facilities & manuals | Prior to starting construction. Ongoing training | Quarterly to EEHC & EEHC Environmental Management (EEM) | PMU / EMS | CEPC Project Manager in collaboration with the Consultant Site Manager | Training programs Compliance with ESMP | Included in air quality monitoring package Training time and cost (included in construction cost) (around US$ 20 k) CEPC responsibility |

### Operation Phase

| Institution | Project Management Unit (PMU), including the Environmental Management Staff (EMS) (will include 3-4 staff members, B.Sc. and/or 5 years high technical education), operation phase. Basic training of persons employed to operate the monitoring activities. Induction, specific and refresher training for all employees on good operation management practice. Training methods, facilities & manuals | Prior to starting operation. Ongoing training | Quarterly to EEHC & EEHC Environmental Management (EEM) | PMU / EMS | CEPC Project Manager in collaboration with the Consultant Site Manager | Training programs Compliance with ESMP | Training time and cost (included in operation cost) (around US$ 20 k) CEPC responsibility |

### Notes:
- (*) CEPC responsibility: means that training and capacity building activities are included in the company organizational structure and budget.
<table>
<thead>
<tr>
<th>Issue/Impact</th>
<th>Mitigation Measures</th>
<th>Implementati on Schedule</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Mitigation Measures, Management time and costs (included in construction costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Dust emissions caused by construction activities, construction vehicle movements, and transport of friable construction materials.</td>
<td>Before construction and during construction</td>
<td>Before Construction and during Construction until 6 Months ahead of Commissioning:</td>
<td>Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU / EMS and the Assistant Plant Manager.</td>
<td>CEPC Project Manager in collaboration with the Consultant Site Manager.</td>
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<tr>
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<td></td>
<td>CEPC/PMU responsible for management of the air quality monitoring system. Submission of annual summary reports to EEHC and any other concerned authority.</td>
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<tr>
<td></td>
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<td></td>
<td>Basic training of persons employed to operate and maintain the monitoring system.</td>
<td>CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practice.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Mitigation Measures, Management time and costs (included in construction costs)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Baseline Air Quality Monitoring:</td>
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<td></td>
<td>First construction period; third party monitoring (e.g. National Research Center), four times a year until using continuous monitoring; US$70K</td>
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<tr>
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<td>Second construction period; 6 months ahead of commissioning: Permanent Continuous Monitoring System-approx. US$1000-1500K plus management time &amp; reporting.</td>
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</tr>
</tbody>
</table>
### Table 6 (Contd.)

**Construction Impact Mitigation, Monitoring and Management Measures**

<table>
<thead>
<tr>
<th>Issue/Impact</th>
<th>Mitigation Measures</th>
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<th>Indicative Cost Estimate (US$)</th>
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</table>
| Aquatic Environment Dredging and construction of the intake structure and water discharge structure. Increased suspended sediment and pollutant loads, permanent loss and disturbance to aquatic flora and fauna. | The following measures will be taken:  
- Construction Method Statement to be produced by the Contractor;  
- dredged areas limited to minimum area required;  
- disposal of dredged sediments to an agreed site;  
- all works will be made clearly visible using flags, beacons and/or signals;  
- bank area will be reinstated following construction.  

During construction of intake and discharge structures  
- Off bankline survey undertaken September 2009 along 5 profiles fronting the site.  
- Report to be maintained for later monitoring and evaluation during operation.  
- Continuous visual inspection  

During dredging sediment and surface water will be monitored at four locations (three downstream of the intake and three upstream of the discharge) twice a month.  

During construction sampling will be conducted at three sites, unless preliminary monitoring campaign shows strong variations in water quality.  

Water samples will be tested for temp., pH, COD, BOD, TOC, DO, TSS, oil & grease, residual chlorine and light metals.  

Sediment will be tested for oil & grease and light metals.  

- Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU / EMS and the Assistant Plant Manager.  
- CEPC Project Manager in collaboration with the Consultant Site Manager.  
- Actual parameters to be measured.  
- Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority. (e.g. EEAA, WB, etc.).  
- CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practice.  
- Mitigation Measures: Management time and costs (included in construction cost).  
- Water quality measurement costs (between US$ 30-45K) | | CEPC Project Manager in collaboration with the Consultant Site Manager. | Actual parameters to be measured. | Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority. (e.g. EEAA, WB, etc.). | CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practice.  
- These mitigation measures must be a condition of any construction contracts commissioned. |

(*) Environmental regulations are to be included in all construction contracts.
### Table 6 (Contd.)

**Construction Impact Mitigation, Monitoring and Management Measures**

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| Contamination of the aquatic environment as a result of construction activities on land e.g. spillages, disposal of liquid wastes; surface run-off, exposure of contaminated soils (see also under “Soils and Hydrology”). | Mitigation activities will include the following:  
- no discharge of effluents into the El-Rayyah El-Beheiry - all effluents shall be collected and removed off site for treatment by approved firms;  
- development of a site drainage plan which reduces flow velocity and sediment load;  
- protection of temporary stockpiles of soil from erosion by using a reduced slope angle where practical, sheeting and by incorporating sediment traps in drainage ditches;  
- maintenance of well kept construction site. | During construction | Continuous visual inspection will be conducted. | Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU/EMS and the Assistant Plant Manager. | CEPC Project Manager in collaboration with the Consultant Site Manager. | Fluid effluents within the site.  
- Soil erosion.  
- Surface water run-off.  
- Sewage effluents.  
- Earth, mud and debris depositions on roads. | Quarterly reporting of summary results (or more if requested) and submitted to the EEEC and any other concerned authority (e.g. EEAA, WB, etc.), if required. | CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices. | Management time and costs (included in construction cost). |

(*) Environmental regulations are to be included in all construction contracts.
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<th>Management and Training</th>
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</table>
| **Noise**                     | Increased noise in the project area as a result of the use of noisy machinery and increased vehicle movements.                                                                                                   |Implementation of good site practices including:  
- enforcement of vehicle speed limits;  
- strict controls of vehicle routing;  
- diesel engine construction plant equipment to be fitted with silencers;  
- limited noisy construction activities at night;  
- prohibition of light vehicle movements at night;  
- use of protective hearing equipment for workers. | During construction   | Monthly monitoring and supervision by CEPC is required to ensure the implementation of good site management practices by all contractors during construction. Third party audit, conducted every 4 month. | Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU/EMS and the Assistant Plant Manager. CEPC Project Manager in collaboration with the Consultant Site Manager. | CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices. | Management time and costs (included in construction cost). Third party noise measurement costs (about US$ 23K) |                            |
| **Flora and Fauna**           | Site Clearance- Vegetation removal and habitat disturbance.  
- Good site management practices will be observed to ensure that disturbance of habitats off-site are minimized.  
- Specific mitigation measures include restricting personnel and vehicles to within construction site boundaries, lay down areas and access roads. | During construction | Periodic inspection and supervision by CEPC is required to ensure the implementation of good site management practices by all contractors during construction. | Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU/EMS and the Assistant Plant Manager. CEPC Project Manager in collaboration with the Consultant Site Manager. | Good conservation of floral wealth. Quarterly reporting No. of floral species conserved or planted, if any. | CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices. | Management time and costs (included in construction cost). |

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<tr>
<td>Soils and Hydrology</td>
<td>Site clearance, excavation and disposal of material, exposure of potentially contaminated soils, spillage or leakage of substances on land, movement of equipment and vehicles on site.</td>
<td>During construction.</td>
<td>Daily visual inspection is required to ensure the implementation of good management practices during construction.</td>
<td>Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU/EMS and the Assistant Plant Manager.</td>
<td>Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB etc.), if required.</td>
<td>CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices.</td>
<td>Costs for mitigation measures and management time included in construction costs. Any additional features (e.g. bunding, interceptors etc.) may incur additional costs of between US$ 30-50K dependent on the measure.</td>
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| Traffic and Transport Disruption, noise and increased air pollution due to increased traffic, light loads and abnormal loads. | Standard good practice measures will be implemented as follows:  
- adherence of abnormal load movements to prescribed routes, outside peak hours and advance publication of movements if required;  
- construction shifts will be staggered;  
- scheduling of traffic to avoid peak hours on local roads;  
- transportation of construction workers by contract bus. | During construction. | Monitoring traffic entering the site during morning & evening peaks to ensure the implementation of good site management practices by all contractors during construction. | Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU / EMS and the Assistant Plant Manager. | Increased congestion  
Travel time (compared to reasonable daily commute) | Three times per month  
Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB etc.), if required. | CEPC/PMU to ensure all contractors and subcontractors working on site are aware of ESMP and all employees are given basic induction training on good construction and site management practices. | Management time |

(*) Environmental regulations are to be included in all construction contracts.
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**Construction Impact Mitigation, Monitoring and Management Measures**

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<tbody>
<tr>
<td><strong>Socio-</strong>&lt;br&gt;Economic&lt;br&gt;Environment&lt;br&gt;Positive impacts identified.</td>
<td>All activities related to the construction of the new plant will take place within the area belonging to CEPC, i.e. there will be no off-site activities or associated land acquisition during construction. <strong>Transmission lines will connect the power plant to existing substations following new routes. Also, a new gas pipeline route will have to be identified from the nearest point of supply within the gas network. However, since the transmission lines and gas pipeline are likely to require some land acquisition (and possibly resettlement), a Resettlement Policy Framework (RPF) is prepared separately, as part of this ESIA work. Separate ESIA and RPF for Gas Pipeline project is already prepared by local independent Consultant</strong>&lt;br&gt;The entire labor force will be daily commuters, thus no worker housing or associated facilities will be erected on site during construction. The contractors will be responsible for relevant temporary water / toilet facilities during construction and the need to provide appropriate services will be specified in their contracts. Public and Industry Relations will be maximized through open dialogue between CEPC (through the Assistant Plant Manager who has direct responsibility for EHS Liaison) and local authority, public and industry representatives.</td>
<td>During construction.</td>
<td>Record local employment provided by the project.</td>
<td>PMU/EMS and the Assistant Plant Manager</td>
<td>CEPC Project Manager in collaboration with the Consultant Site Manager.</td>
<td>Editing a special report</td>
<td>Responsibility of CEPC/PMU.</td>
</tr>
</tbody>
</table>

(*) Environmental regulations are to be included in all construction contracts.
### Table 6 (Contd.)

**Construction Impact Mitigation, Monitoring and Management Measures**

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<th>Management and Training</th>
<th>Indicative Cost Estimate (US$)</th>
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</thead>
</table>
| **Archaeology** | Potential chance finds of archaeological remains during construction. | The project site does not lie on, or in the immediate vicinity of any known archaeological areas of interest. If remains are found CEPC is committed to:  
- cease activities and consult Antiquities authority;  
- protection in situ if possible;  
- excavation of areas where protection not feasible;  
PMU/EMS and the Assistant Plant Manager will allocate responsibilities in accordance with the Chance Finds Procedure. | CEPC Project Manager in collaboration with the Consultant Site Manager. | Chance finds (see annex II) | Daily inspection  
Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB etc.), if required. | CEPC/PMU to ensure that all workers on site are aware of the importance of archaeological remains and must report any potential finds immediately.  
Immediate liaison with Competent Administrative Authority should a potential find be uncovered. | Mitigation measures require management time.  
Should chance finds occur, protection & excavation could add significantly to the cost. |
| **Natural Disasters** | Flash flooding. | Good engineering design will incorporate the following mitigation measures:  
- drainage system designed to direct flood water from main plant areas into the sea and direct potentially contaminated waters through the oil interceptor. | During construction. | No monitoring measures are envisaged. | PMU/EMS and the Assistant Plant Manager | CEPC Project Manager in collaboration with the Consultant Site Manager. | Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB etc.), if required. | CEPC/PMU to ensure that all workers on site receive training in emergency preparedness and response procedures. | Relevant costs are included within the construction costs. |

(*) Environmental regulations are to be included in all construction contracts.
<table>
<thead>
<tr>
<th>Issue/Impact</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Waste Management</td>
<td>Good practice measures such as the following: (1) all waste taken off-site will be undertaken by a licensed contractor and CEPC will audit disposal procedure; (2) collection and segregation of wastes and safe storage; (3) recording of consignments for disposal; (4) prior agreement of standards for storage, management and disposal with relevant authorities. It is of highest importance that final disposal of wastes shall be strictly adhered to environment friendly disposal Contract.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation Schedule</th>
<th>Monitoring Implementation</th>
<th>Responsibility</th>
<th>Monitoring Indicators</th>
<th>Type and Frequency of Reporting/monitoring</th>
<th>Management and Training</th>
<th>Indicative Cost Estimate (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>During construction.</td>
<td>Periodic inspection is required to ensure the implementation of good management practices during construction.</td>
<td>Implementation of Good Site Management practices shall be the responsibility of all contractors on site under supervision of the PMU/EMS and the Assistant Plant Manager.</td>
<td>CEPC Project Manager in collaboration with the Consultant Site Manager.</td>
<td>Management contract in place</td>
<td>Functional transfer station.</td>
<td>Quarterly reports from management contractor to CEPC and then to EEHC. These reports are to be submitted to any other concerned authority (e.g. EEAA, WB, etc.), if required.</td>
</tr>
</tbody>
</table>

Management time plus costs (< US$ 20K)

(*) Environmental regulations are to be included in all construction contracts.
### Table 6 (Contd.)

**Construction Impact Mitigation, Monitoring and Management Measures**

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</thead>
<tbody>
<tr>
<td><strong>Occupational Health &amp; Safety</strong></td>
<td>Good local and international construction practice in Environment, Health and Safety (EHS) will be applied at all times and account will be taken of local customs, practices and attitudes. Measures include: • implementation of EHS procedures as a condition of contract all contractors and sub-contractors; • clear definition of the EHS roles and responsibilities of all construction companies and staff; • management, supervision, monitoring and record-keeping as set out in plant's operational manual; • pre-construction and operation assessment of the EHS risks and hazards; • completion and implementation of Fire Safety Plan prior to commissioning any part of the plant; • provision of appropriate training on EHS issues for all workers; • provision of health and safety information; • regular inspection, review and recording of EHS performance; and • maintenance of a high standard of housekeeping at all times.</td>
<td>During construction.</td>
<td>Daily inspection is required to ensure the implementation of EHS Policies, plans and practices during construction.</td>
<td>Implementation of Good Site Management practices and the EHS policies shall be the responsibility of all contractors on site under supervision of the PMU/EMS and the Assistant Plant Manager.</td>
<td>Management procedures in place. Workers health and safety as measured by no. of incidents.</td>
<td>Daily inspection Quarterly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required.</td>
<td>CEPC/PMU to ensure all contractors and sub-contractors for workers on site include reference to the requirements of the ESMP and are aware of the EHS policies and plants. All employees will be given basic induction training on EHS policies and practices. Contractors are responsible for ensuring that a Fire Safety Plan, which conforms to NFPA 850, is prepared and implemented prior to commissioning of any part of the plant under supervision of PMU/EMS and the Assistant Plant Manager.</td>
<td>Mitigation measures will require management time plus costs of up to US$ 50K for implementation of EHS Plans.</td>
</tr>
</tbody>
</table>

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<td>Air Quality</td>
<td>Emissions from stack are not expected to exceed standards.</td>
<td>Mitigation measures have already been included in the design of the plant and, given CEPC/GNPP’s strict commitment to use solar fuel oil for 2% of operating time, no further mitigation measures are proposed.</td>
<td>Automatic monitoring of stack emissions for NOx, SO2, particulate matter and carbon monoxide (CO) via test ports installed in the main stacks.</td>
<td>CEPC Top Management</td>
<td>Automatic stack monitors: included in the project cost.</td>
</tr>
<tr>
<td>Ambient air quality affected by emissions from the power plant.</td>
<td>CEPC/GNPP will however demonstrate the validity of the conclusions drawn in the ESIA report.</td>
<td>Install three continuous NOx, SO2, CO, PM10 &amp; TSP monitoring stations to monitor short-term concentrations in the area predicted to have the highest impacts on humans (as there are no other sensitive environments). The analyzer station near or within the site boundaries will include a continuous monitor of meteorological conditions (temperature, wind speed, wind direction and mixing heights).</td>
<td>The analyzer stations will be owned and operated by CEPC/GNPP/EMS, Assistant Plant Manager</td>
<td>EEHC Environmental Management &amp; Studies Sector. Report introduced to EEAA as requested. Third party inspection.</td>
<td>Management time for compilation of reports and performance monitoring: included in operation cost.</td>
</tr>
<tr>
<td></td>
<td>CEPC/GNPP will demonstrate the validity of the conclusions drawn in the ESIA report. If ground level concentrations are found to be above local and World Bank standards options for further mitigation will be discussed.</td>
<td>Automatic stack monitors: included in the project cost.</td>
<td>Ambient air pollutants concentrations (at least TSP, PM10, NOx, SOx and CO).</td>
<td>Continuous Hourly data acquisition. Quarterly reporting to EEHC. Reports are to be available to any of the concerning authorities (EEAA, WB, etc.).</td>
<td>Annual reporting by CEPC/GNPP/EMS to Government and WB etc. (or more frequently if required) highlighting key features and comparing results with air quality standards and prediction in ESIA report.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Annual servicing, calibration &amp; running costs: included in operation cost.</td>
</tr>
</tbody>
</table>
### Table 7 (Contd.)

**Operational Impact Mitigation, Monitoring and Management**

<table>
<thead>
<tr>
<th>Issue/Impact</th>
<th>Mitigation Measures</th>
<th>Implementation Schedule</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Monitoring Indicators</th>
<th>Type and Frequency of Reporting/ monitoring</th>
<th>Management and Training</th>
<th>Indicative Cost Estimate (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Environment: Discharge of process and cooling water.</td>
<td>The design of the intake and cooling water structures have already incorporated measures to reduce impacts. In addition, good site management practices including the following will be implemented: 1) neutralization, oil separation, flocculation and filtration of any contaminated water before discharge to either plantation irrigation network or the El-Kata sewer network (if close to the site); 2) no disposal of solid wastes or waste water into the discharge structure; 3) regular maintenance of site drainage system to ensure efficient operation; 4) all discharges will comply with local Egyptian and World Bank guidelines. In addition, CEPC/GNPP will demonstrate the validity of the conclusions drawn in the ESIA report. If pollutant concentrations in the discharge or impacts to the surrounding aquatic environment are found to be above local and World Bank standards or unacceptable, options for further mitigation will be discussed.</td>
<td>Lifetime of the plant</td>
<td>Prepare regular water quality monitoring program including: 1) quality of all water prior to discharge (continuous monitoring of all discharged water for temperature and pH, daily monitoring of process water for COD, TSS, oil &amp; grease and residual chlorine and monthly monitoring of light metals and other pollutants) 2) ambient water quality in the area affected by the discharge plume (3- monthly monitoring of temperature, pH, COD, BOD, TOC, DO, TSS, oil &amp; grease, residual chlorine, light metals and other pollutants) 3) monitoring of benthic environment (over a 3 year period). 4) weekly monitoring of fish catches on intake screens including species, numbers and size (over a 1 year period).</td>
<td>CEPC/GNPP/EMS Assistant Plant Manager.</td>
<td>CEPC Top Management EEHC Environmental Management &amp; Studies Sector.</td>
<td>Basic parameters as per the Law 48/1982 and Law 93/1982  Monthly monitoring of light metals and other pollutants  3-monthly monitoring of the plume.  Annual monitoring of benthic environment (over a 3 year period).  Weekly monitoring of Fish Catches on intake screens (over a 1 year period).  Reports are available to any of the concerning authorities (EEAA, WB, etc.).</td>
<td>CEPC/GNPP/EMS to EEHC  Continuous monitoring of water quality etc.  Summary reports (with any exceptions identified) will be submitted to the Government and WB etc. on annual review basis (or more frequently if required).  CEPC/GNPP/EMS to ensure that all employees are given basic induction training on the requirements of the ESMP, good site management practices and H&amp;S procedures. The Assistant Plant Manager will ensure implementation of procedures.</td>
<td>Management time for implementation of site management practices. Included in operation cost.  All costs are included in operation cost.</td>
</tr>
</tbody>
</table>
### Table 7 (Contd.)

#### Operational Impact Mitigation, Monitoring and Management

<table>
<thead>
<tr>
<th>Issue/Impact</th>
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</tr>
</thead>
</table>
| Noise        | Specific design mitigation measures to minimize noise impacts include:  
  - gas turbines, steam turbine generators; air compressors, pumps and emergency diesel engines are enclosed in buildings;  
  - air compressors are equipped with silencers;  
  - noisy outdoor equipment are designed to a noise limit of 90 dB (A) at 1 m.  
  In addition, plant workers will be provided with protective wear in plant areas with high noise levels.  
  The plant will operate in accordance with internationally accepted health and safety measures. | During first year of operation. | When the plant is fully operational, noise audit measurements are to be carried out at noise sources and at the fence of the power plant as well as at noise receptors around the plant. | CEPC/GNPP/EMS  
Third party audit supervised by Assistant Plant Manager | CEPC Top Management  
EEHC Environmental Management & Studies Sector. | Power plant compliance with ESMP. | Quarterly to CEPC and EEHC.  
Monthly reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required. | Should any complaints be received regarding noise, these will be logged and the Assistant Plant Manager will investigate problem.  
CEPC/GNPP/EMS to ensure that all employees are given basic induction training on the requirements of the ESMP, good site management practices and H&S procedures. The Assistant Plant Manager will ensure implementation of procedures. | Minimal costs (up to US$ 10K per annum) required for provision of protective wear (included in operation cost).  
No further mitigation or monitoring costs envisaged with the exception of management time.  
Noise audit US$ 10-20K (included in operation cost). |
### Table 7 (Contd.)

**Operational Impact Mitigation, Monitoring and Management**

<table>
<thead>
<tr>
<th>Issue/Impact</th>
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</tr>
</thead>
</table>
| Flora and Fauna contestant to habitats as a result of noise, vehicle and personnel movements. | The following mitigation measures will be implemented:  
- restrict personnel and vehicle movements to access roads and within boundaries of site only; and  
- control of noise during operation. | Lifetime of the plant. | No monitoring is envisaged. | CEPC/GNPP/EMS  
Assistant Plant Manager  
EEHC Environmental Management & Studies Sector. | Good plantation | CEPC/GNPP/EMS  
EEHC Environmental Management & Studies Sector. | CEPC/GNPP/EMS  
EEHC Environmental Management & Studies Sector. | Approx. US$ 20-35K for landscaping measures (included in operation cost) |
| Visual Impact Visual image of power plant from surrounding areas. | The visual effect of the power plant will be improved through:  
- creation of landscaped boundary along the fence of the power plant.  
- Ficus elastica var decora and Ficus nitida will be propagated and the resulting plants will be used for decorating and landscaping the site when completing the new power plant. One may obtain 200-300 individual plants from a single tree. | Lifetime of the plant. | No monitoring is envisaged. | CEPC/GNPP/EMS  
Assistant Plant Manager  
EEHC Environmental Management & Studies Sector. | Improved visual image | CEPC/GNPP/EMS  
EEHC Environmental Management & Studies Sector. | Management time |

Flora and Fauna Disturbance to habitats as a result of noise, vehicle and personnel movements.

Flora and Fauna Disturbance to habitats as a result of noise, vehicle and personnel movements.

Visual Impact Visual image of power plant from surrounding areas.
### Table 7 (Contd.)

**Operational Impact Mitigation, Monitoring and Management**

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<th>Indicative Cost Estimate (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soil and Hydrology</strong></td>
<td><strong>Spillage of oils, chemicals or fuels on site.</strong></td>
<td></td>
<td></td>
<td>CEPC/GNPP, through the Assistant Plant Manager, will implement a Spills Response Plan and all employees will receive corresponding training.</td>
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<td>CEPC/GNPP, through the Assistant Plant Manager, will implement a Spills Response Plan and all employees will receive corresponding training.</td>
<td>Management time</td>
</tr>
<tr>
<td></td>
<td>Good site management measures as described under Aquatic Environment will minimize any potential risks. As part of this, regular checks of bunds and drainage systems will be undertaken to ensure containment and efficient operation.</td>
<td></td>
<td></td>
<td>CEPC/GNPP, through the Assistant Plant Manager, will implement a Spills Response Plan and all employees will receive corresponding training.</td>
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<td>Management time</td>
</tr>
<tr>
<td><strong>Solid Waste</strong></td>
<td><strong>Good practice measures undertaken during the construction phase will be continued into the operation phase (see Table 6). It is of highest importance that final disposal of wastes shall be strictly adhered to environment friendly disposal Contract.</strong></td>
<td></td>
<td></td>
<td>CEPC/GNPP, through the Assistant Plant Manager, will implement a Spills Response Plan and all employees will receive corresponding training.</td>
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<td>Good practice measures undertaken during the construction phase will be continued into the operation phase (see Table 6). It is of highest importance that final disposal of wastes shall be strictly adhered to environment friendly disposal Contract.</td>
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<td>Management time</td>
</tr>
</tbody>
</table>

Notes:
- CEPC/GNPP: Corporate Environmental Protection Cell/General Neward Plant
- EEHC: Environmental Engineering and Hydrology Cell
- EEAA: Environmental and Engineering Authority
- WB: World Bank
- ESMP: Environmental Site Management Plan
- EEHC: Environmental Management & Studies Sector
- Functional transfer station: Infrastructure for collection, transfer and storage of solid waste to a centralized disposal facility.
### Table 7 (Contd.)

**Operational Impact Mitigation, Monitoring and Management**

|-------------------------------------|-------------------------------------------------------------------------------------|-------------------------|------------|----------------|--------|-------------|------------|------------------------------------------|-------------------------|-------------------------------|
| Occupational Health and Safety, Risks and Hazards | Standard international practice on EHS issues shall be employed on site. The mitigation measures summarized in construction management Table apply. In addition, the following measures will be undertaken:  
(1) Provision of training in use of protection equipment and chemical handling.  
(2) Use of protective equipment.  
(3) Clear marking of work site hazards and training in recognition of hazard symbols.  
(4) Installation of vapour detection equipment and control systems.  
(5) Development of site emergency response plans. | Lifetime of the plant | Regular on-site training. Regular staff checks, system checks and field tests of emergency procedures by on-site management. | CEPC/GNPP/EMS Assistant Plant Manager | CEPC Top Management EEHC Environmental Management & Studies Sector. | Management procedures in place. Workers health and safety measured by incidents, injuries and illnesses. | Monthly reports from management to EEHC Annual reporting of summary results (or more if requested) and submitted to the EEHC and any other concerned authority (e.g. EEAA, WB, etc.), if required. | CEPC/GNPP/EMS to ensure that all employees are given basic induction training on H&S policies and procedures, Emergency Preparedness and Response Plan and a Spills Response Plan. The Assistant Plant Manager is to ensure implementation of procedures. CEPC/GNPP/EMS is responsible for ensuring that the site emergency response plan is complete and implemented prior to commissioning any part of the power plant. | Management time and costs (< US$ 15K per annum) (included in operation cost) |

ESIA for Giza North Combined Cycle Power Project

May 2011 - Project No. 1583

E.S.- Page 69 of 98
### Table 7 (Contd.)

**Operational Impact Mitigation, Monitoring and Management**

<table>
<thead>
<tr>
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<th>Type and Frequency of Reporting/monitoring</th>
<th>Management and Training</th>
<th>Indicative Cost Estimate (US$)</th>
</tr>
</thead>
</table>
| Socio-Economic Environment Positive impacts identified | **Fish Catch:** based upon experience with similar plants elsewhere along the Nile River and its branches and the opinions of the fishermen, impacts are very likely to be positive. **Corporate Responsibility:** Public Consultation with local community, NGOs and local administration representatives have resulted in the following:  
- CEPC is committed to hire all available skilled and unskilled labor force from within the local community.  
- CEPC will establish, within the power plant residential colony, a nursery garden, a school, a health care unit, and a social club, which will be open and available, too, for the local people of the surrounding communities.  
- CEPC will think about reclaiming around 160 Feddans as a compensation for the land taken for the power plant. | First year of operation, (possibly 2 other years) | In collaboration with the Fishery Authorities, monitor any changes to the fish catch | CEPC/GNPP/EMS Assistant Plant Manager | CEPC Top Management EEHC Environmental Management & Studies Sector. | Fish catch no. & quality | Monthly reports from management to EEHC | Included in operation costs. |
| Modern Environment Positive impacts identified | **Fish Catch:** based upon experience with similar plants elsewhere along the Nile River and its branches and the opinions of the fishermen, impacts are very likely to be positive. **Corporate Responsibility:** Public Consultation with local community, NGOs and local administration representatives have resulted in the following:  
- CEPC is committed to hire all available skilled and unskilled labor force from within the local community.  
- CEPC will establish, within the power plant residential colony, a nursery garden, a school, a health care unit, and a social club, which will be open and available, too, for the local people of the surrounding communities.  
- CEPC will think about reclaiming around 160 Feddans as a compensation for the land taken for the power plant. | First year of operation, (possibly 2 other years) | In collaboration with the Fishery Authorities, monitor any changes to the fish catch | CEPC/GNPP/EMS Assistant Plant Manager | CEPC Top Management EEHC Environmental Management & Studies Sector. | Fish catch no. & quality | Monthly reports from management to EEHC | Included in operation costs. |
### Table 8
Transmission System Impact Mitigation, Monitoring and Management

<table>
<thead>
<tr>
<th>Issue/Impact</th>
<th>Mitigation Measures</th>
<th>Implementation Schedule</th>
<th>Monitoring</th>
<th>Responsibility</th>
<th>Monitoring Indicators</th>
<th>Type and Frequency of Reporting/monitoring</th>
<th>Management and Training</th>
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</tr>
</thead>
</table>
| Direct       | • Utilize appropriate clearing techniques. (e.g., hand clearing versus mechanized clearing).  
              • Maintain native ground cover beneath lines.  
              • Replant disturbed sites.  
              • Manage ROWs to maximize wildlife benefits.  
              • Select ROW to avoid important natural areas such as sensitive habitats.  
              • Maintain habitat (i.e., native vegetation) beneath lines.  
              • Make provisions to avoid interfering with natural fire regimes.  
              • Select ROW to avoid sensitive lands.  
              • Develop protection and management plans for these areas.  
              • Use discontinuous maintenance roads.  
|              | During Construction and Operation | Visual inspections of the materials being used, the construction practices and mitigation measures.  
              | | | Egyptian Electricity Transmission Company (EETC)  
              | | | CEPC / PMU / EMS  
|              | | | | Egypt Energy Holding Company (EEHC) management  
|              | | | | CEPC Project Manager in collaboration with the Consultant Site Manager.  
|              | | | | Effects on environmental and human resources involved (negative land uses, ecological damage)  
|              | | | | Degree to which they are affected.  
|              | | | | Weekly (during construction).  
|              | | | | Maintenance time (during operation)  
|              | | | | Environmental training and management will be warranted for ROW maintenance techniques, including the proper use of chemical and mechanical clearing methods.  
|              | | | | Training will be conducted by EETC and CEPC/PMU with assistance from environmental consultant.  
|              | | | | Staff workers should have an understanding of the rational for the recommended mitigation and monitoring that they may be implementing.  
|              | | | | Included in construction and operation cost.  

### ESIA for Giza North Combined Cycle Power Project
May 2011 : Project No. 1583

Page 71 of 98
<table>
<thead>
<tr>
<th>Issue/Impact</th>
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</tr>
</thead>
</table>
| Runoff and sedimentation from grading for access roads, tower pads, and substation facilities, and alteration of hydrological patterns due to maintenance roads. | • Select ROW to avoid impacts to water bodies, floodplains, and wetlands.  
  • Install sediment traps or screens to control runoff and sedimentation.  
  • Minimize use of fill dirt.  
  • Use ample culverts.  
  • Design drainage ditches to avoid affecting nearby lands.  
  • Select ROW to avoid important social, agricultural, and cultural resources.  
  • Utilize alternative tower designs to reduce ROW width requirements and minimize land use impacts.  
  • Adjust the length of the span to avoid site-specific tower pad impacts.  
  • Manage resettlement in accordance with World Bank & AfDB procedures.  
  • Utilize mechanical clearing techniques, grazing and/or selective chemical applications.  
  • Select herbicides with minimal undesired effects.  
  • Do not apply herbicides with broadcast aerial spraying.  
  • Maintain naturally low-growing vegetation along ROW. | During Construction and Operation | Visual inspections of the materials being used, the construction practices and mitigation measures.  
  • Short-term monitoring to assure that negative land use and/or ecological impacts are avoided and proper mitigation measures are employed.  
  • Occurs along the line as it is constructed.  
  • Monitoring of ROW maintenance activities to assure proper control methods. | Egyptian Electricity Transmission Company (EETC)  
CEPC / PMU / EMS  
CEPC Project Manager in collaboration with the Consultant Site Manager. | Effects on environmental and human resources involved (negative land uses, ecological damage)  
Degree to which they are affected. | Weekly (during construction).  
Maintenance time (during operation) | Environmental training and management will be warranted for ROW maintenance techniques, including the proper use of chemical and mechanical clearing methods.  
Training will be conducted by EETC and CEPC/PMU with assistance from environmental consultant.  
Staff workers should have an understanding of the rational for the recommended mitigation and monitoring that they may be implementing. | Included in construction and operation cost. |
| Loss of land use and population relocation due to placement of towers and substations. | | | | | | | |
| Chemical contamination from chemical maintenance techniques. | | | | | | | |
Table 8 (Contd.)

Transmission System Impact Mitigation, Monitoring and Management

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Avian hazards from transmission lines and towers.</td>
<td>• Select ROW to avoid important bird habitats and flight routes.</td>
<td>During Construction and Operation</td>
<td>Visual inspections of the materials being used, the construction practices and mitigation measures.</td>
<td>Egyptian Electricity Transmission Company (EETC) / CEPC / PMU / EMS</td>
<td>Effects on environmental and human resources involved (negative land uses, ecological damage)</td>
<td>Weekly (during construction). Maintenance time (during operation)</td>
<td>Environmental training and management will be warranted for ROW maintenance techniques, including the proper use of chemical and mechanical clearing methods. Training will be conducted by EETC and CEPC/PMU with assistance from environmental consultant. Staff workers should have an understanding of the rational for the recommended mitigation and monitoring that they may be implementing.</td>
<td>Included in construction and operation cost.</td>
</tr>
<tr>
<td>Aircraft hazards from transmission lines and towers.</td>
<td>• Install towers and lines to minimize risk for avian hazards.</td>
<td></td>
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<tr>
<td>Induced effects from electromagnetic fields.</td>
<td>• Install deflectors on lines in areas with potential for bird collisions.</td>
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<tr>
<td>Impaired cultural or aesthetic resources because of visual impacts.</td>
<td>• Select ROW to avoid areas of human activity.</td>
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<tr>
<td></td>
<td>• Select ROW to avoid sensitive areas, including tourist sites and vistas.</td>
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<tr>
<td></td>
<td>• Construct visual buffers.</td>
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<tr>
<td></td>
<td>• Select appropriate support structure design, materials, and finishes.</td>
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</tr>
<tr>
<td></td>
<td>• Use lower voltage, DC system, or underground cable to reduce or eliminate visual impacts of lines, structures, and ROWs.</td>
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</tr>
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<tr>
<td>Indirect</td>
<td>• Provide comprehensive plans for handling induced development. • Construct facilities to reduce demand. • Provide technical assistance in land use planning and control to local governments. • Route ROW away from sensitive lands. • Provide access control.</td>
<td>During Construction and Operation</td>
<td>Visual inspections of the materials being used, the construction practices and mitigation measures. Short-term monitoring to assure that negative land use and/or ecological impacts are avoided and proper mitigation measures are employed. Occurs along the line as it is constructed. Monitoring of ROW maintenance activities to assure proper control methods.</td>
<td>Egyptian Electricity Transmission Company (EETC) CEPC / PMU / EMS</td>
<td>EEHC management EETC management CEPC Project Manager in collaboration with the Consultant Site Manager.</td>
<td>Effects on environmental and human resources involved (negative land uses, ecological damage) Degree to which they are affected.</td>
<td>Weekly (during construction). Maintenance time (during operation)</td>
<td>Environmental training and management will be warranted for ROW maintenance techniques, including the proper use of chemical and mechanical clearing methods. Training will be conducted by EETC and CEPC/PMU with assistance from environmental consultant. Staff workers should have an understanding of the rational for the recommended mitigation and monitoring that they may be implementing.</td>
</tr>
</tbody>
</table>

Table 8 (Contd.)
Transmission System Impact Mitigation, Monitoring and Management
### Table 9

**Summary of Implementation Cost of the ESMP**

<table>
<thead>
<tr>
<th>No.</th>
<th>Phase of Implementation</th>
<th>Cost in US$ Measures</th>
<th>Source of Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Construction Phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Pre-commissioning Monitoring (ambient air quality monitoring equipment)</td>
<td>120 K</td>
<td>CEPC</td>
</tr>
<tr>
<td></td>
<td>• All others</td>
<td>138 K</td>
<td>CEPC</td>
</tr>
<tr>
<td></td>
<td>• Training</td>
<td>153 K</td>
<td>CEPC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1325 K</td>
<td>CEPC (with possible support from the Arab Funds)</td>
</tr>
<tr>
<td>2</td>
<td>Operation Phase</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Training</td>
<td>70 K</td>
<td>CEPC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 K</td>
<td>CEPC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 K</td>
<td>CEPC</td>
</tr>
<tr>
<td></td>
<td>Sub. Total</td>
<td>190 K</td>
<td>1658 K</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>1848 K</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

(*) Excluding gas pipeline system cost.

145.  *Table 9* shows that the total implementation cost of the environmental and Social Management Plan is about US$ 1.848 million, which amounts to about 0.15% of the total project cost.

### 7.2 Monitoring Program

#### Stack Emissions

146. Stack emissions will be monitored continuously during plant operation at a representative point in the stack. Operational monitoring of stack emissions shall comprise monitoring the levels of: Oxides of Nitrogen; Sulfur Dioxide; Carbon Monoxide; and Total Suspended Particles and PM$_{10}$.

147. The automatic monitoring system used will be linked in the controlling room to an alarm system to warn when emission limits (as stated in Section 2) for each pollutant are being approached.

148. Concentrations will be recorded as hourly rolling averages and reports on stack emissions monitoring will compare recorded emissions against predicted levels and Egyptian and WB guidelines (as given in Section 2). Reports will be submitted to the EEAA, the WB and any other concerned authority on an annual basis (or as required).

#### Ambient Air Quality - Validation of Modeling Predictions Using Continuous NOx, SO$_2$ and TSP Analyzer

149. The use of a continuous NOx, SO$_2$, CO and TSP analyzer allows for baseline air quality monitoring on a continuous basis. The provision of three continuous monitors (or three: one at the site, one upwind and the third
downwind) will provide the basis for “validating” the predictions made in the ESIA. The monitors will also include a weather station providing data on air temperature, wind speed, wind direction and mixing heights on a continuous basis. These monitors shall, also, be connected electronically, if possible, to the EEAA ambient monitoring system.

150. The construction and operational monitoring of air quality around the Giza North power project will include the parameters summarized in Table 10. Also, Figure 8 (see page 41 of this E.S-Report) depicts the maximum impact locations derived in Section 6.2 presented by the conventional x-y coordinates.

**Aquatic Environment**

151. Monitoring of impacts of the power plant on the aquatic environment will include monitoring of the quality of the discharge water, El-Rayyah El-Beheiry bankline and benthic sediments, ambient water quality and the impact on aquatic flora and fauna. The survey techniques and areas will be comparable to the survey undertaken by both of the Hydraulics Research Institute and the National Research Center during September-October 2009. The survey will include the area affected by the thermal plume (i.e. 75-150 m from the discharge point).
### Table 10

**Monitoring Program for Ambient Air Quality, Noise and Vibration**

<table>
<thead>
<tr>
<th>Item</th>
<th>Monitoring Parameters</th>
<th>Sampling Frequency</th>
<th>Monitoring Locations</th>
<th>Indicative Cost Estimate (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust emissions caused by</td>
<td>NO₂, SO₂, CO, TSP and</td>
<td>Quarterly during most of the</td>
<td>On site of the project and its surroundings.</td>
<td>Measurement cost: US$70K</td>
</tr>
<tr>
<td>construction activities,</td>
<td>PM₁₀</td>
<td>construction period.</td>
<td></td>
<td>Approx. US$ 1000-1500K</td>
</tr>
<tr>
<td>construction vehicle</td>
<td></td>
<td>Continuous monitoring during</td>
<td>2 locations minimum: at maximum predicted pollution</td>
<td></td>
</tr>
<tr>
<td>movements, and transport</td>
<td></td>
<td>6 months ahead of commission.</td>
<td>concentration of 24-hours &amp; annual averages. Third</td>
<td></td>
</tr>
<tr>
<td>of friable construction</td>
<td></td>
<td></td>
<td>location, if any, will be 1 km upwind.</td>
<td></td>
</tr>
<tr>
<td>materials.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>Decibels (dB) A</td>
<td>Quarterly</td>
<td>6 locations minimum: at nearest residences</td>
<td>Third party noise measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>costs (≈ US $23k)</td>
</tr>
<tr>
<td><strong>Operation Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emissions from stack are</td>
<td>Automatic monitoring</td>
<td>Continuous and/or 24 hour</td>
<td>2 locations minimum: at maximum predicted pollution</td>
<td>Included in the plant</td>
</tr>
<tr>
<td>not expected to exceed</td>
<td>of stack emissions for</td>
<td>average Continuous and/or</td>
<td>concentration of 24-hours &amp; annual averages. Third</td>
<td>operation</td>
</tr>
<tr>
<td>standards.</td>
<td>NOₓ, SO₂, CO, PM₁₀ &amp; TSP</td>
<td>passive samples every 2/4 weeks</td>
<td>location, if any, will be 1 km upwind.</td>
<td></td>
</tr>
<tr>
<td>Ambient air quality</td>
<td>Install (at least)</td>
<td>The analyzer stations will be</td>
<td></td>
<td></td>
</tr>
<tr>
<td>affected by emissions from</td>
<td>three continuous</td>
<td>electronically connected to the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>the power plant.</td>
<td>NOₓ, SO₂, CO, PM₁₀ &amp; TSP</td>
<td>plant controlling room and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>monitoring stations</td>
<td>CEPC Chairman's office.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>to monitor short-</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>term concentrations in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the area predicted to</td>
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<tr>
<td></td>
<td>have the highest</td>
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<td></td>
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<tr>
<td></td>
<td>impacts on humans (as</td>
<td></td>
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<td></td>
<td>there are sensitive</td>
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<tr>
<td></td>
<td>environments). The</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>analyzer station</td>
<td></td>
<td></td>
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<td></td>
<td>near or within the</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>site boundaries will</td>
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<tr>
<td></td>
<td>include a continuous</td>
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<td></td>
<td>monitor of</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>meteorological</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>conditions (temperature, wind speed, wind</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>direction and mixing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>heights).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td></td>
<td>Bi-annually</td>
<td>6-10 sites at nearest receptors and fence around the</td>
<td>Noise audit US$ 10-20K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>plant</td>
<td>(included in operation cost)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Third party (e.g. NRC) Measuring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>instruments and equipment.</td>
</tr>
</tbody>
</table>

152. The operational monitoring of cooling water and effluent discharge will include the parameters summarized in Table 11 below.
Table 11

Monitoring of the Aquatic Environment During Operation

<table>
<thead>
<tr>
<th>Issue</th>
<th>Parameter</th>
<th>Method</th>
<th>Frequency of measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>Temperature &amp; pH of all discharged water</td>
<td>Continuous automatic monitor in discharge structure</td>
<td>Continuous</td>
</tr>
<tr>
<td></td>
<td>COD, TSS, Oil &amp; Grease, residual chlorine of effluent</td>
<td>Sample taken from water in discharge structure and submitted for lab. Analysis</td>
<td>Daily</td>
</tr>
<tr>
<td></td>
<td>Heavy metals &amp; other pollutants of effluent</td>
<td>As above</td>
<td>Monthly</td>
</tr>
<tr>
<td>Ambient Water Quality</td>
<td>Temperature, pH, COD, BOD, TOC, DO, TSS, oil &amp; grease, residual chlorine, heavy metals &amp; other pollutants</td>
<td>Grab sampling and analysis within the area predicted to be affected by the discharge plume</td>
<td>3-monthly</td>
</tr>
<tr>
<td>Flora &amp; Fauna (1)</td>
<td>Benthic flora &amp; fauna</td>
<td>Transect sampling (following same method as in baseline monitoring) within a 2 km radius of the discharge point</td>
<td>Annual</td>
</tr>
<tr>
<td>Entrainment (2)</td>
<td>Fish entrainment on screens</td>
<td>Removal and analysis of any debris caught in intake screens</td>
<td>Weekly</td>
</tr>
</tbody>
</table>

Notes:
(5) To be undertaken for the first 3 years of plant operation.
(6) To be undertaken for the first year of plant operation.

Abbreviations:
COD: Chemical Oxygen Demand
BOD: Biological Oxygen Demand
TOC: Total Organic Carbon
DO: Dissolved Oxygen
TSS: Total Suspended Solids

153. Monitoring data will be analyzed and reviewed at regular intervals and compared with Egyptian and World Bank guidelines (as given in Section 2). Records of monitoring results will be kept in a suitable format and will be reported (in summary format with any exceptions identified) to the responsible government authorities, the WB or any other concerned authority as required. As a result, the project company, in discussion with the EEAA, EEHC, the WB or any other concerned authority, will review the need to implement any additional mitigation features, such as provision of further water treatment facilities on site and also on the need to continue monitoring.

Waste Monitoring

154. Wastes generated on site and collected for disposal by skilled firms will be referenced, weighed and recorded. Environmental audits will be undertaken which will assess the quality and suitability of on- and off-site waste management procedures.
8. PUBLIC CONSULTATION AND DISCLOSURE

155. In order to ensure that the views and interests of all project stakeholders are taken into accounts, public consultation has been carried out according to the EEAA guidelines which require coordination with other government agencies involved in the EIA, obtaining views of local people and affected groups. This consultation has been undertaken as part of the Environmental Impact Assessment process.

156. The objectives of consultation and disclosure are to ensure that all stakeholders and interested parties, are fully informed of the proposed project, have the opportunity to voice their concerns and that any issues resulting from this process are addressed in the EIA and incorporated into the design and implementation of the project.

157. The adopted methodology for the public consultation comprises three phases, including four elements, namely:

**Phase I**
- discussions with local stakeholders and interested parties during preparation of the environmental documents for local permitting requirements;
- discussions with local stakeholders during scoping and preparation of this ESIA-Report, including the organization of a Public Scoping Meeting on 21 October 2009, in the 6th of October ex-Governorate;

158. As far as public disclosure is concerned, major activities to inform the public and interested parties about the Giza North project include the following:
- press advertisement in Al-Ahram Newspaper (on 7 October 2009) describing the project and inviting interested parties to attend the scoping meeting.
- distribution of an invitation and a copy of summary leaflet about the main concerns of ESIA study (in Arabic).

**Phase II**
- the organization of a Public Consultation Meeting on 11 January 2010 for the first project configuration of two units, in the 6th of October ex-Governorate and on 19th April 2011 (for the second project configuration of three units), too, and
- on-going consultation through an “open-door” policy during construction and operation of the power plant.

159. Again, as far as public disclosure is concerned, major initiatives to inform the public and interested parties about the Giza North Power project include the following:
- press advertisement in Al-Ahram Newspaper (on 30 December 2009), and for the second meeting in the same newspaper on 30 March 2011,
describing the project and inviting interested parties to attend the public meeting and review the Draft Final ESIA Report;

- distribution of an invitation and copy of the Non Technical Summary (in Arabic) describing the context of the power plant, the technology employed, the impact on the environment, the mitigation measures and the ESMP; and

- disclosure of the Draft Final ESIA Report, including the Executive Summary, locally and via the World Bank Infoshop.

160. A Public Consultation and Disclosure Activities (PCDA) are designed and implemented in accordance with World Bank guidelines. The purpose of the Activities is to establish the process by which CEPC/GNPP will consult and involve stakeholders in the planning, development, construction and operation of the power plant.

8.1 PHASE 1 CONSULTATION

Consultation Undertaken by ECG, EEHC and CEPC

161. During the preparation of an ESIA-Report for local permitting requirements, ECG, EEHC and CEPC undertook consultations with a variety of organizations to assist them in the identification of environmental and social concerns and the overall development of the project. These stakeholders included the Egyptian Electricity Holding Company (EEHC), Cairo Electricity Production Company (CEPC), Egyptian Environmental Affairs Agency (EEAA), the 6th of October ex-Governorate and the District Council of the 6th of October, including Imbaba & Menshat El-Qanater zone, Egyptian General Authority for Shore Protection, Hydraulics Research Institute and local population leaders.

162. The purpose of these consultations was primarily to provide information regarding the project, identify published and non-published sources of relevant data and information relating to the site and surrounding area, obtain views on the scope of the project, and open channels for ongoing discussions.

163. The key environmental and social issues raised during this consultation process are summarized in Table 13 and these issues were subsequently taken into account in the preparation of ESIA documentation both for local permitting requirements and this ESIA report.

Consultation during the ESIA Process

164. A scoping session for this ESIA undertaken by ECG in collaboration with the EEHC and CEPC, took place on Wednesday, 21 October 2009 during which a wide selection of personnel from different orientations contributed actively to its activities.
165. The key objectives of this consultation were to identify primary and secondary stakeholders, ensure that they had received sufficient information about the project during earlier consultation activities and to identify their immediate concerns.

166. The session was organized to include the following activities:

- Presentation of the ESIA scope as per the TOR, including the RPF;
- Breakdown of the activities to highlight the issues that the attendees might comment on;
- Explain the environmental issues and invite the participants to raise their concerns about possible negative impacts; and
- Conduct the discussions and invite the owner, local authorities and agencies to participate in the discussions.

The full documentation for the scoping meeting is presented in Annex B. The issues raised during the scoping session are summarized in Table 13 below.

**Mini-meetings with Affected Stakeholders**

167. In addition to the scoping meeting, several mini-meetings were held with some particular affected stakeholders for taking their viewpoints into consideration.

168. The purpose of taking these viewpoints into account was to improve project viability. The World Bank (1991) has found that where such views are seriously considered and incorporated in the EA process, projects are likely to be more successful. The Bank provides some useful guidance regarding the extent and level of stakeholder involvement in the EA process in its Sourcebooks (World Bank, 1991-Chapter 7).

169. Mini-meetings were held with fishermen along the El-Rayyah El-Beheiry at about 5 km to the north west of the proposed site, the El-Kata area representatives, Imbaba and Menshat El-Qanater District Administration, General Authority for Fishery Development and three active NGOs in the 6th of October zone, “October for Environment & Development”, 6 of October City, and “Youth and Environment Friends”, Siqil, Ossim.

170. These mini-meetings were seen important for:

- informing interested groups and individuals about the proposed development, its potential impacts, and measures which will lessen impacts and protect the environment;
- providing opportunities for timely feedback;
- identifying problems, needs and values;
minimizing misunderstandings about the scope and impacts of the project and increase public confidence in the proposed development; and

• contributing to an increased awareness and understanding of project plans and activities.

Memorandums of Mini-meetings that were held with some affected groups are given in Annex C.

Conclusions from Phase 1 Consultations

171. The main results of Phase I consultation was to successfully raise the level of local awareness about the plant, to identify the immediate local concerns and to seek stakeholder involvement in the implementation of the project.

172. The three issues of key concern to the stakeholders consulted were the impact of the plant on pollutant loads in the El-Kata zone air shed, compliance with environmental standards, particularly with regard to air and wastewater discharge quality and the potential economic impacts on the local community. These concerns have been addressed within the ESIA process and measures to ensure compliance are incorporated into the Environmental and Social Management Plan (ESMP). The ESMP will be implemented by CEPC/GNPP as a condition of compliance with the EEAA regulations and of financing from the World Bank.

8.2 PHASE II CONSULTATION AND DISCLOSURE

173. Phase II of the public consultation and disclosure process included the disclosure of information about the project (advertisement, invitation including a copy of the Non-Technical Summary (in Arabic) and public access to the Draft Final ESIA Report) and organization of a public meeting.

174. The Draft Final ESIA report, together with the Non-Technical Summary in Arabic, have been disclosed locally for 30 days at the offices of the CEPC at the Giza North power plant, EEHC offices and at the offices of the local environmental consultant in Cairo.

175. In order to make people aware of the disclosure of the Draft Final ESIA Report, an advertisement was placed in the national newspaper Al Ahram in Arabic on the Wednesday, 30 December 2009. The advertisement also drew readers attention to the date and venue of the proposed public meeting.

176. Finally, a public meeting was held in the 6th of October ex-Governorate on Monday, 11 January 2010. The aim of the meeting was to present and explain the results of the Draft Final ESIA Report to local stakeholders, to provide them with the opportunity to raise any further or additional concerns that will be and to ensure that all issues are taken into account in the Final ESIA Report and corresponding ESMP. Again, the same process was
repeated for another public consultation meeting, where an advertisement was placed in the national newspaper Al-Ahram in Arabic on Wednesday, 30 March 2011, and a public meeting was held in the Giza Governorate (the area of the project, as part of 6th of October ex-Governorate was back to Giza as part and parcel of it) on Tuesday, 19th April 2011). Further concerns that were raised during Public Consultation Meeting are summarized in Table 12 below.

Phase II Consultation and Disclosure activities and Public Consultation Meeting Report are reported in Annex D.

**Ongoing Consultation and Disclosure**

177. Giza North Power Plant's (GNPP's) Assistant Plant Manager, who is responsible for the Environment, Safety and Quality Assurance program for the plant, will have full responsibility for implementing and supervising the ESMP. This role includes ongoing communication with local industrial and commercial interests, local authorities and other interested parties. An “open door” policy will be adopted to allow stakeholders to voice ongoing concerns.

178. The process and results of the public consultation activities held to date are documented in the EISA, Chapter 9 and Annexes A, B, C and D.

179. All issues have been taken into account and addressed in the ESIA and RPF through assessment and the inclusion of mitigation, management and monitoring requirements which are detailed within the ESMP.

9. **RESPONSIBILITIES AND INSTITUTIONAL ARRANGEMENTS**

9.1 **Environmental Management Organization**

**During Design and Construction**

180. Suitably qualified and experienced contractors will be responsible for the detailed design and construction of the power plant. Construction workers will be required to demonstrate appropriate skills, qualifications and/or experience prior to employment.

181. During construction, Project Management Unit / Environmental Management Staff (PMU/EMS) and the Assistant Plant Manager in collaboration with PGESCo Site Manager will ensure that all contracts with Contractors and sub-contractors stipulate all construction management measures (as given in this ESMP), operational design criteria and environment, health and safety standards which must be implemented at the project site.

182. Implementation of these measures will be enforced by PMU/EMS and the Assistant Plant Manager and supervised by the Assistant Plant Manager, supported by CEPC Project Manager in collaboration with PGESCo Site Manager, who will have direct responsibility for the Environment, Safety and
Table 12

Key Environmental Issues Associated with the Development of the Proposed Power Plant Identified During Local ESIA and RPF Scoping and Consultation

<table>
<thead>
<tr>
<th>Key issue discussed</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Project</td>
<td>All parties consulted expressed their overall approval for the project. Local Stakeholders commented that the power plant will be central to securing power supply for the industrial and commercial activities in the area and will benefit the local economy through labor opportunities.</td>
</tr>
<tr>
<td>Social and Economic Impact</td>
<td>Local stakeholders and council leaders considered the social and economic impact of the plant to be wholly positive.</td>
</tr>
<tr>
<td>Land Acquisition/Compensation</td>
<td>There was a clear and common appreciation when fair compensation rules were explained.</td>
</tr>
<tr>
<td>Waste water discharge and the aquatic environment</td>
<td>All local stakeholders expressed concern about the quality and quantity of water in the El-Rayyah El-Beheiry segment and the quality of water which will be discharged from the power plant. It was however acknowledged that there are no significant aquatic ecosystems close to the power plant. The suggestion was made that treated sanitary wastewater, if not discharged to the area’s sewer system, could be used for irrigation of landscaped areas and treated industrial wastewater would be directed to the circulating water discharge system.</td>
</tr>
</tbody>
</table>
| Air Quality                                              | There was big concern over the following issues:  
  - compliance with air quality standards and the effect that non-compliance and subsequent plant closure could have on security of employment in the area;  
  - accumulated effects of the air quality in the El-Kata atmosphere and the impact of the power project;  
  - back-up light fuel oil usage in agricultural areas. |
| Ecology of the Site                                       | A big concern was raised about keeping the surrounding cultivated areas without harm. There was significant attention to keeping a landscape area inside the power plant fence.                      |
| Bankline & Canalbed Morphology                           | Some parties expressed their fears of causing damaging effects due to sedimentation and erosion processes associated with cooling water abstraction and discharge.                                           |
| Environmental Compliance                                 | An underlying concern expressed by all local stakeholders was compliance with environmental regulations. Assurances from CEPC are sought to the effect that CEPC will guarantee implementation of the environmental compliance measures which will be stated in the Environmental and Social Management Plan. |
Quality Assurance program on site during construction and operation. The Assistant Plant Manager is responsible for ensuring that construction works comply with the requirements of the ESMP and all environmental permits. His key roles will be to:

- assume the interface with authorities for environmental authorizations and permits;
- act as the Assistant Plant Manager for local authorities, industrial and commercial interests and any other interested parties;
- ensure that mitigation measures to reduce impacts during the construction phases are implemented;
- ensure that monitoring to be undertaken during construction is implemented;
- ensure compliance with the environmental and social management plan; and
- ensure that health and safety requirements are respected.

**During Power Plant Operation**

183. During operation, direct responsibility for environmental compliance and the implementation of the mitigation, management and monitoring measures described in this Summary and in Section 7 of the Main Report, will continue to be with the Plant Environmental Staff under direct supervision of the Assistant Plant Manager. This position, will report directly to the Chairman/General Manager of CEPC/GNPP.

184. The Assistant Plant Manager will be based at the site and will be responsible for recruiting, training and managing his staff. He will be responsible for implementing the mitigation and management measures described above and for monitoring and record keeping of the following:

- stack emissions;
- air quality;
- noise emissions;
- quality of water discharge; and
- waste management.

185. In his role, the Assistant Plant Manager will also be responsible for maintaining any pollution control equipment and for developing and implementing procedures for safe handling and storage of any hazardous materials used on site.

186. Chemicals used during plant operation are process-related. Hazardous chemicals to be used include chlorine (5500 kg/hr), sulfuric acid (7000 kg/day in frequency once per day). Handling, storage and application of these chemicals will be used under strict regulations of handling hazardous materials stipulated by Law 4/1994.
187. The Assistant Plant Manager will also have lead responsibility for maintaining a written Environmental Register with respect to environmental impacts as required under Egyptian and World Bank guidelines. The written records will identify the characteristics of discharges and emissions, details of periodic testing including results, procedures for follow-up environmental safety actions and the person in charge of this follow-up. Should any prescribed standards be breached, PMU/EMS, through the Assistant Plant Manager, will immediately inform the EEAA and disclose the procedures being taken to rectify non-conformity.

188. Results of environmental monitoring as described above, shall be recorded and submitted to the EEAA, EEHC and to any other party (i.e. WB, .. etc.) as required. The EEAA and WB are entitled to audit the project company in order to ensure conformity with environmental standards and requirements.

189. In addition, the project company must keep a record of any significant environmental incidents occurring at the plant including accidents and occupational illnesses, spills, fires and other emergencies. The Assistant Plant Manager will be responsible for ensuring that these records are maintained up to date and are available on site.

190. The Assistant Plant Manager will supervise and lead the Environmental Department (ED) and the Environmental Management Staff (EMS) directed by the ED. Figure 9 illustrates the environmental department within the organizational structure of the Giza North power plant and Figure 10 gives the organization of the EMS.

9.2 Environmental Training

191. The Project Company will ensure that the power plant is manned 24 hours a day, 7 days per week. All staff employed at the plant will be trained in the following:
   - general operation of the power plant;
   - specific job roles and procedures;
   - occupational health and safety; and
   - contingency plans and emergency procedures.

192. Training will include:
   - induction training on appointment;
   - specialist training (as required for their prescribed job role); and
   - refresher training as required.
Figure 9
Environmental Department (ED) within the Organizational Structure of Giza North Power Plant

Giza North Power Plant Manager

Assistant Plant Manager

Industrial Safety Dept.

Security Dept.

Secretariat

Plant Affairs General Dept.

Workshop

Financial Dept.

Civil Dept.

Stores & Procurement Dept.

Manpower

Transportation Dept.

I & C General Dept.

Boiler I&C Dept.

Turbine I&C Dept.

Water Treatment I&C Det.

I & C Lab. Workshop Dept.


Generators & Motors Dept.

Transformers & C.B Maint. Dept.

Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. General Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

Boiler Aux. Equipment Dept.


Generators & Motors Dept.

Transformers & C.B Maint. Dept.

Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

Boiler Aux. Equipment Dept.


Generators & Motors Dept.

Transformers & C.B Maint. Dept.

Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

Boiler Aux. Equipment Dept.


Generators & Motors Dept.

Transformers & C.B Maint. Dept.

Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

Boiler Aux. Equipment Dept.


Generators & Motors Dept.

Transformers & C.B Maint. Dept.

Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

Boiler Aux. Equipment Dept.


Generators & Motors Dept.

Transformers & C.B Maint. Dept.

Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

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Boiler Aux. Equipment Dept.

Water Treatment I&C Det.

Boiler Maint. Dept.

Turbine Maint. Dept.

Turbine Aux. Equipment Dept.

Boiler Aux. Equipment Dept.
Figure 10
Environmental Management Staff (EMS) within the Project Management Unit (PMU)

Prior to Operation

Giza North PROJECT MANAGER

PMU

Assistant Project Manager

ENGINEERING CONSULTANT

Head of Environmental Management Staff (EMS) (3-4 staff members)

Implementation of ESMP Measures

Environmental Monitoring & Reporting

Data Collection for Physical Environmental Condition to Support Engineering

Environmental Data Collection & Analysis

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

During Operation

Giza North PLANT MANAGER

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector

Assistant Plant Manager

Head of Environmental Department (3-4 staff members)

Air Quality Monitoring

Noise Monitoring

Water Effluents Monitoring

Occupational Health & Safety

Environmental Management & Emergency Procedures

EEHC Chairman

EEHC Executive Board Member for Studies

EEHC Head of Environmental Sector
193. The training program will be designed to ensure that appropriate skilled staff are used to operate the power plant at all times. Aspects of occupational health and safety and emergency procedures are described below.

194. In addition to this environmental training for all staff employed at the plant, special environmental training will be given to the staff employed for the EMU. They will receive training in the following:

- day-to-day monitoring activities;
- monitoring the stack emissions;
- collection and analysis of air quality data;
- monitoring the water effluents;
- collection and analysis of water quality information;
- use of monitoring equipment, operation and maintenance;
- industrial hygiene;
- occupational health and safety; and
- emergency and contingency procedures.

Table 13 illustrates the recommended training for the EMS.

9.3 Occupational Health and Safety

195. CEPC/GNPP will establish and integrate policies and procedures on occupational health and safety into the operation of the power plant which meet the requirements of Egyptian and World Bank guidelines as given in Section 2 of the report. The policies and procedures will also be designed to comply with all manufacturers safety data sheets for chemical storage and usage, so as to provide a safe and healthy working environment.

196. Occupational health and safety programs will be supported by staff training for the power plant and the appointment of the Assistant Plant Manager. The training will include, but will not be limited to, the following:

- general area safety;
- specific job safety;
- general electrical safety;
- handling of hazardous materials;
- entry into confined spaces;
- hearing conservation;
- repetitive stress disorders;
- Code of Safe Practices;
- use of personal protective equipment; and
- first-aid.
Table 13
Recommended Training Required for the PMU/EMS

<table>
<thead>
<tr>
<th>Training Course</th>
<th>Contents</th>
<th>Type of Training</th>
<th>Participants</th>
<th>Proposed Scheduling</th>
<th>Cost Estimate (L.E.)</th>
</tr>
</thead>
</table>
| General EHS Training:  
• Induction Training on Appointment  
• Specialist Training  
• Refresher Training (as required) |  
• General operation of the power plant.  
• Specific job roles and procedures.  
• Occupational Health & Safety:  
  - general area safety;  
  - specific job safety;  
  - general electrical safety;  
  - handling of hazardous materials;  
  - entry into confined spaces;  
  - hearing conservation;  
  - repetitive stress disorders;  
  - Code of Safe Practices;  
  - use of personal protective equipment; and  
  - first-aid.  
• Contingency Plans & Emergency Procedures. | Classroom and On-job training. | All power plant staff, including EMS. | Once before project implementation and during operation for refresher training. | Included in construction & operation cost. (around US$ 145 k) |
| Special Environmental Training on Environmental Aspects of Power Generation and Monitoring. |  
• Allover Environmental Performance of the P.P.  
• Day-to-day monitoring activities.  
• Monitoring the stack emissions.  
• Collection & analysis of air quality data.  
• Monitoring the water effluents.  
• Collection & analysis of water quality information.  
• Use of monitoring equipment, operation and maintenance.  
• Industrial Hygiene. | Classroom and On-job training. | EMS. (3-4 staff members) | Once before project implementation and monitoring program. | Included in construction & operation cost. (around US$ 10 k) |
| Environmental Auditing and Inspection, including periodic safety audits |  
• Environmental Auditing Techniques.  
• Auditing Checklists.  
• Environmental Auditing Reports.  
• Safety Audits:  
  - Physical inspections;  
  - Review of plant records;  
  - Interviews with staff. | Classroom and Field Exercises. | EMS. | Once after project implementation | Included in operation cost. (around US$ 10 k) |
| Social Communications |  
• Communications Skills.  
• Mass Communications. | Classroom and Field Exercises. | EMS. | Once before project implementation and monitoring program. | Included in construction & operation cost. (around US$ 10 k) |
197. The training will include induction courses when staff are first employed at the power plant, with specialist and refresher training as required by the job role. Training will be updated annually and occupational health and safety procedures will be included within the Operations Manual for the power plant.

198. The safety record at the power plant will be reviewed each month at a formal meeting, led by the Assistant Plant Manager, where the agenda items, comments and attendance will be recorded and kept on file.

199. In addition, periodic safety audits will be conducted to verify compliance with safe working practices, which will comprise physical inspections, review of plant records and interviews with staff. The audits will assign responsibility for any corrective action necessary to mitigate a potential hazard and allow the tracking of the completion of the corrective measure.

9.4 Emergency Procedures and Accident Response

200. Instructions on emergency measures necessary to safeguard employees and the wider environment will be prepared as part of the Operations Manual for the power plant.

**Accident Response**

201. As part of the preparation of emergency procedures and the plans for accident response arrangements, the project company will carry out the following:

- review industry-specific and Egyptian and World Bank standards and regulations;
- establish general guidelines on potential safety and accident risks;
- prepare job-specific operating instructions where appropriate;
- establish safety and security notices for hazardous materials;
- prepare specific emergency operating instructions;
- provide protective equipment (including clothing, air and ear protection etc.) as required;
- evaluate information and feedback from employees; and
- record and investigate all accidents, injuries and incidents.

202. Contingency plans and emergency procedures are being developed to cover events due to operational failures, natural causes and acts of third parties. The plans and procedures will cover, as a minimum, the following:

- fire;
- explosion;
- bomb alerts;
- leaks and spills of hazardous materials;
- structure or equipment failures;
• injuries and illnesses;
• risk from natural disasters (wind, sandstorm, earthquake); and
• third-party risks (potential impacts of an accident occurring at another industrial facility which may impact upon the power plant).

Oil Spill Contingency Plan

203. As Good practice and part of the ESMP, CEPC/PMU/EMS will prepare an Oil Spill Contingency Plan to be ready for implementation by the start of construction activities.

204. Natural Gas will be delivered to the site by pipelines in a quantity of about 6 Millions m$^3$/day.

205. Light fuel oil will be delivered to the site by road and stored in:
• three 20,000 m$^3$ tanks for the light fuel oil (oil no. 2 / sollar).

206. These tanks are surrounded contained within separate retention area which is designed to contain 110% of one tank.

207. The plan will cover the following activities.
• delivery;
• handling;
• spills; and
• cleanup.

208. The plan will detail procedures, responsibilities, chains of command, information flows, monitoring and documentation. Previously illustrated Figure 12 presents institutional arrangements for the Giza North power project.

10. IMPLEMENTATION SCHEDULE AND REPORTING

209. Environmental and social management and monitoring activities will be implemented (according to the ESMP), following the same project schedule, as all activities are mainstreamed in the project design. Achievements/problems will be reported in the project quarterly progress reports and should be timely addressed by the project management and the Bank.

11. CONCLUSIONS

210. The Project Company proposes to develop a new combined cycle power plant of total capacity 3x750 MWe at the area reserved for the Giza North Power Plant on land owned by the CEPC Company. The site is a rural setting and does not contain significant residential environmental sensitivity of importance.
211. The key environmental issues associated with the power plant are as follows:
- Emission of oxides of nitrogen to the air;
- Generation and disposal of liquid effluents including cooling water;
- Emission of noise; and
- Socio-economic impacts.

212. The Environmental and Social Impact Assessment has evaluated the potential environmental impacts during construction and operation of the proposed power plant. In particular, the potential impacts of the flue gas emissions to the air, generation and disposal of liquid effluents including cooling water; and the emissions of noise have been assessed using sophisticated modeling techniques, which include consideration of the ambient background environment and the characteristics of the releases or emissions, and predicts the potential impacts which may occur.

213. The Environmental and Social Impact Assessment has, also, evaluated the potential socio-economic impacts during construction and operation of the proposed power plant.

214. It is anticipated that the power plant will provide a net positive socio-economic impact through the provision of employment opportunities and attraction of economic investment into the area. In addition, the use of local labor (95% during construction), will maximize these positive impacts through the development of the local skill base and will also generate increased demand for local services, materials and products.

215. Land expropriation is not likely for the sub-projects, including interconnecting transmission lines and gas pipeline. However, in order to handle any potential future changes, a Resettlement Policy Framework (RPF) is prepared by ECG separately in a stand alone document to be attached with this ESIA report. Fair compensation, if any, will be paid for the right of way according to the Law 63 of the Year 1974 and the recommendations set out in the RPF. The ESMP will be revised after exact routes for both of the gas connection an transmission lines are available.

216. The assessment indicates that no significant environmental and social impacts will occur as a result of the construction or operation of the power plant and, when taken together, the overall environmental and social impact will not be significant.

12. REFERENCES AND CONTACTS

References and Documents Consulted


42. Dr. Mahmoud Hussein (September 2009): Marine Ecological Baseline and Impact Assessment Study for the Giza North Power Station; National Authority for Remote Sensing and Space Sciences (NARSS), Ministry of High education, Scientific Research & Technology.

43. Prof. Dr. Osama A. Aly (September 2009): Assessment of Water Quality Along Selected Sites for the Construction of Electric Generation Station at Giza North, National Research Center.


Contacts

217. Key persons contacted for comments or further information include the following:

- Chairman of the EEHC: Dr. Mohamed Awad
- Executive Board Member for Planning, Research and Affairs of Service Companies: Dr. Kamel Yassin
- Chairman of CEPC: Eng. Ahmed Imam
- Counsellor for Environmental Management and Studies; EEHC: Eng. Maher Aziz Bedrous
- Project Manager of ECG: Eng. Hassan El-Banna
Annex I

CHANCE FIND PROCEDURES

Chance find procedures will be used as follows:

(a) Stop the construction activities in the area of the chance find;
(b) Delineate the discovered site or area;
(c) Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities and the equivalent take over;
(d) Notify the supervisory Engineer who in turn will notify the responsible local authorities and the General Authority of Antiquities immediately (within 24 hours or less);
(e) Responsible local authorities and the General Authority of Antiquities would be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archeologists of the General Authority of Antiquities (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values;
(f) Decisions on how to handle the finding shall be taken by the responsible authorities and the General Authority of Antiquities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;
(g) Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the General Authority of Antiquities; and
(h) Construction work could resume only after permission is given from the responsible local authorities and the General Authority of Antiquities concerning safeguard of the heritage.

These procedures must be referred to as standard provisions in construction contracts, when applicable. During project supervision, the Site Engineer shall monitor the above regulations relating to the treatment of any chance find encountered are observed.
## Annex II

### LIST OF EIA AND SOCIAL ASSESSMENT TEAM MEMBERS

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ECG</strong></td>
<td></td>
</tr>
<tr>
<td>Project Manager</td>
<td>Eng. Hassan El-Banna</td>
</tr>
<tr>
<td>Atmospheric Dispersion Modeling Specialist</td>
<td>ECG Air Quality Dept.</td>
</tr>
<tr>
<td>Socio-economic Specialist</td>
<td>ECG Socio-economic Studies Dept.</td>
</tr>
<tr>
<td>Solid &amp; Hazardous Waste Management Specialist</td>
<td>ECG Waste Management Dept.</td>
</tr>
<tr>
<td>Ecologist</td>
<td>Dr. Mahmoud Hussein</td>
</tr>
<tr>
<td>Air Quality Measurements</td>
<td>National Research Center</td>
</tr>
<tr>
<td>Water Quality Measurements</td>
<td>National Research Center</td>
</tr>
<tr>
<td>Al-Azhar University, Faculty of Engineering</td>
<td>Dr. Mohamed Youssry and the team</td>
</tr>
<tr>
<td>MB. Consultant</td>
<td>Consulting team of the Firm</td>
</tr>
<tr>
<td>CSC Consulting Firm</td>
<td>Geological Special team</td>
</tr>
<tr>
<td>EcoConServe</td>
<td>Quantitative Risk Assessment team</td>
</tr>
<tr>
<td>Hydraulics Research Institute</td>
<td>Dr. Fathi El-Gamal, Eng. Ibrahim El-Dessouki and the team</td>
</tr>
<tr>
<td><strong>EEHC Supervisor</strong></td>
<td></td>
</tr>
<tr>
<td>Counsellor for Environment Management and Studies Sector</td>
<td>Eng. Maher Aziz Bedrous</td>
</tr>
</tbody>
</table>
Egypt, Arab Republic of

Giza North Additional Financing Project

Executive Summary

Resettlement Policy Framework

Of

Nubaria-Metnama Gas Pipeline

And

Giza North Power Plant
Introduction

The Egyptian Natural Gas Company (GASCO) is carrying out multiple projects to support the expanding national gas grid. Among them is a proposed 32” diameter, 105 km long pipeline to transport natural gas from the Nubaria power station to a Pressure Reduction Station at the North Giza power station, and continuing to join the Metnama pipeline at an area called Nawa or Ezbet Swelem. The planned paths of the pipelines will run through agricultural lands, crosses several transportation routes and waterways, and may potentially encounter and disrupt inhabited areas and farms during the construction phase. The prepared Environmental and Social Impact Assessment (ESIA) showed that the project will not result in any type of physical resettlement for local population and the only impact related to involuntary resettlement will be limited to temporary livelihoods interruption due to temporary disturbance to agriculture land use during construction. The potential impact on the local livelihoods due to the construction of the gas line is elaborated on this RPF.

The purpose of the RPF is to establish resettlement objectives, organizational arrangements and funding mechanisms for any resettlement operation that may be necessary. When during implementation the exact extent of land acquisition becomes known, a Resettlement Action Plan (RAP) or abbreviated RAP - depending on the scale and severity of impacts - will be prepared. The various steps in preparing a RAP have been outlined in this document. It should also be emphasized that the resettlement process should be completed prior to the start of physical works.

Local cultivation is taking place on the route of Nubaria Metnama gas pipeline, where farmers own or hire land. In most of the cases, the farming activities is the sole source of livelihoods for the local farmers and the majority of them are of poor farmers with very limited agriculture land shares. Based upon Gasco experience from many similar gas pipelines projects across Egypt, the company is quite familiar with the impacts associated with the needs of both temporary and permanent land acquisition. They are fully aware of the type of land acquisition, land and crop compensations associated with the construction stage and the values of community participation in the process. The policy of compensation of Gasco goes in line with the Egyptian legislation related to these aspects. In several ways, the Egyptian legislations, most importantly The Egyptian Irrigation and Drainage Law number 12 year 1984 and relevant ministerial decrees, accords with the World Bank Safeguard OP 4.12 on involuntary resettlement. Gasco compensation system for affected lands, crops and trees involves:

1. According to Law 10 Year 90, a temporary land acquisition decree is issued for the land required for the establishment of the pipeline route. The decree is enforced after obtaining the official agreement from the Local People Assembly.
2. Compensations are also paid according to the decree of the Ministry of Agriculture 346/2007 with relevance to the compensation for the crops and tress located on the gas pipelines route, for the of public interest and land improvements.
An agriculture committee and the survey/inventory/census committee formed from a representative from Gasco (Environmental, project, legal managers, ……etc), a representative from the Contractor, a representative of the Local Governorate Unit and a representative from the Agriculture Association where the line passes carry out the inventory survey and prepare lists of PAPs, amount of affected crops and trees for each affected farmer and the amount of compensation that should be estimated in accordance with the price of the crops and tress of the Directorate of Agriculture in the Governorate where the line will pass.

These lists should be approved by Gasco, the Contractor and the Agriculture Association and they should be announced in the Agriculture Association.

For lands that are cultivated by squatters and those who are not registered with the Agriculture Association, evidences for duration of squatting or the so-called “Stable squatting” are required. GASCO provides compensation in market price under satisfactory and agreeable manners to squatters who cultivate the land without official documents that prove the legal rights.

3. In cases of the line passing urban areas of land that could be used for establishing buildings, the owners is compensated for being not allowed to use the land where the pipelines will pass and the right of way of 2 m from each side inside urban planned areas and 6 m from each side outside the urban boarders. This is done in accordance with law 4/1988 related to gas pipelines and as per the market price.

4. In cases when the land where the pipelines are passing entered the urban boarder (due to urban expansion) after the project completion, the affected owner resort to the Higher Council of Compensation at the Ministry of Petroleum which is Headed by a Councillor from the State Council. The committee consults with the Governorate representatives for pricing the affected land and estimating the compensation.

In case the affected owners are not satisfied with the amount of compensation, he/she resort to the Court.

5. In cases where the pipeline passes State owned land, no fees/compensations are paid and the Contractor is obliged to return the situation to its original conditions before construction.

6. In cases where the pipelines passes land that is owned by any Ministry (e.g. the Irrigation, Tourism …etc), a compensation is paid according to the requirements of the affected Ministry.

7. In cases of purchasing land for the purposes of the valve rooms, reduction and distribution stations, negotiations are carried out with the owner of the land before purchasing the land, according to the status of his ownership to the land. Agreement is signed and approved by the Company Chairman and a cheque with
the value of the compensation is issued and submitted to the land owners and a selling contract for the Holding Company.

8. In all cases Gasco is paying directly to the affected persons without any intermediary parties.

Gasco policy goes in line with the World Bank OP 4.12, particularly in issues related to establishing dialogues with community members and the transparent sharing of information. However, the grievance redress mechanism of Gasco needs to be developed further in order to adopt a more proactive approach than largely relying on the traditional approaches.

The consultation activities carried out as part of the scoping and disclosure of the ESIA showed clearly that farmers believe that as long as their rights in fair compensation are guaranteed, they are willing to accept the projects and the various temporary or permanent land acquisition. However, the current political changes underway in the country after the people-led Revolution of 25th January 2011 necessitates the need for more emphasis on community participation in the compensation process. The traditional dispute resolution mechanisms used to involve interference of the police in some of these cases. Currently, different participatory mechanisms should be ensured in order to organize the land acquisition issues. Gasco showed willingness to involve community level grievance redress mechanisms in order to minimize the cases where conflict accelerates and necessitate the resort to courts. Community level grievance redress mechanisms could involve the engagement of natural leaders from the villages or NGOs trustworthy members. This approach is perceived to be a key proactive approach that goes in line with the World Bank OP 4.12.

Nubaria-Metnama Gas Pipeline Broader Context

The Nubaria-Metnama gas pipeline starts from the valve room at the end of the Abu Homos-El Nubaria 42" diameter gas pipeline, near Nubaria Electrical Power Station. Then the pipeline continues south, parallel to El Rayh El Nasry, for approximately 62 km. During the first 45 km, the pipeline runs parallel to EL Rayh EL Nasry. For the last 17 km, the pipeline runs parallel to El Katatba-Borkoash asphalt road (this road is also parallel to El Rayh El Nasry), then runs east to cut across El Rayh El Nasry and the railway and El Rayh El Bahery until the turnoff to North Giza Electrical Power Station.

The pipeline then starts again from the turnoff of North Giza Electrical Power Station and continues east through north part of El Ata City. The pipeline then cuts through the Nile River (Rashed Branch) and continues parallel to the river for about 14 km. Then the pipeline cuts through El Rayh El Monofy and continues through the Nile Delta heading east. Eleven (11) valve rooms will be constructed along the pipeline and PRS is present inside the North Giza Power Station to deliver 425,000 m$^3$/hour, at an output pressure of 27 bar and an output temperature of 7° C. The station consists
of 3 filtering lines (to clean the gas from any particles), 5 reduction lines (to reduce the gas pressure to the desired value), and 3 measurement lines. Additionally 3 heaters will be used.

**Project’s Impacts and Vulnerable Population/ Project Affected Persons (PAPs)**

The project is expected to result in several positive social impacts. However, the construction work will involve activities that will result in disturbance for the current land use in the projects’ sites. The route length is 105 kilometre, among which about 20 km are roads and crossings in the Nile, the total land that will be temporarily expropriated during construction will be about 400 :500 Feddans of the agricultural lands. Based on team observation, the crops in the area are diverse and involve several types of fruit trees. Winter crops include wheat, broad beans and clover, as well as vegetables including tomatoes and onion. Summer crops are maize and melons.

Under the project, the potentially affected persons are mainly of farmers whose lands will be used by the project either temporarily or permanently. Those who will be affected temporarily are the farmers whose lands will be crossed by the pipeline. Permanent land acquisition might happen in one of the cases:

a) The need for land expropriation to establish the PRS (not applicable to these projects)

b) The valve rooms land which require permanent land acquisition and is purchased with full market price from the owners of the land.

c) Due to urban expansion and in cases where the agriculture land gets inside the cities borders, the owner of the land – by law - becomes allowed to use the land in construction purposes. In such cases and in order for Gasco to secure the land where the pipelines are crossing and prevent any activities that may damage the pipelines, they buy land form the owners in market price under satisfactory, agreeable and appropriate agreement and this is regarded as permanent land acquisition.

The calculation of the ESIA and the RPF team showed that the amount of land that will be temporarily used by the project is about 400 : 500 Feddans of agriculture land will be temporarily affected during construction. Moreover, around 3 Feddans should be purchased for the valve rooms.

It is very challenging to quantify the number of potentially affected persons under this stage of the project as the final route of the projects has not been finally determined. Moreover, no readily available information was found to show the land share holding and allow for accurate calculation of land. The linear layout of the gas pipelines route made it impossible for team to use the land share holding indictors in calculating the number of affected farmers. The RPF team made a rough estimate for the numbers of PAPs from the valve rooms components. It was found that Nubaria Metnama gas pipelines will affect 11 farmers.

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\(^1\) The calculation where based on the length of the line that will cross agriculture land multiplied by a width of 20 m for excavation.
The Resettlement Policy Framework

It is a widely accepted fact, if left unmitigated, involuntary resettlement under development projects may give rise to economic, social and environmental risks. The purpose of the Resettlement Policy Framework (RPF) is to address any cases of involuntary resettlement that may arise, as well as clarify the organizational arrangements that may be needed during sub-projects preparation and implementation phases. This includes compensating all Project Affected Persons (PAPs) for the loss of lands, properties, and livelihoods resulting from displacement and resettlement, as well as assisting these people in relocation and rehabilitation. The objectives of the RPF correspond to those of the World Bank's policy on involuntary Resettlement, namely:

- To avoid or minimize (whenever possible) involuntary resettlement and land acquisition through design efforts.
- If involuntary resettlement and land acquisition is unavoidable, to execute resettlement and compensation activities as sustainable development programs
- To assist Project Affected Persons in their efforts to improve their livelihoods and standard of living or at least to restore them to pre-displacement levels

When the exact extent of land acquisition becomes known during the implementation phase, site specific Resettlement Action Plan (RAP)s or abbreviated Resettlement Plan (ARPs) will be prepared, depending on the scale and severity of impacts. The resettlement process should be finalized prior to the commencement of any physical works.

Egyptian Legislations and the World Bank OP 4.12

The RPF has been prepared within the framework of the related Egyptian Legislations and the WB OP 4.12.

It presented the Institutional Arrangements for property expropriation and compensation in Egypt, including the central level (the Egyptian General Authority for Land Survey), the local level, several local departments and directorates are involved in the resettlement most importantly, the Directorate of Housing and Infrastructure, the Department of Physical Planning, the Department of Amlak, the Department of Land Surveying, the Department of Social Affairs, the Department of Legal Affairs, the Local Governorate Units (LGUs) and the Agricultural Associations. On the stakeholders level, the relevant NGOs, CBOs and elected councils together with PAPs play crucial roles in ensuring that the participatory decision making, planning, implementation and monitoring process is inclusive and transparent.

It is the Government of Egypt’s policy to pay compensation or offer assistance to people whose lands and properties are affected by projects undertaken by the Government. The main Egyptian Legislations that regulate these issues are:
Executive Summary

- The Egyptian Constitution
- Egyptian Civil Code
- Physical Planning Law (Law 3/1982)
  - Prime Ministerial Decree No. 160 of 1991
  - Prime Ministerial Decree No. 2166 of 1994
  - Law No. 27 of 1956
- Law 10/1990 for the Expropriation of Ownership for Public Interest

As part of the crop compensation system, Egypt’s agricultural drainage network is a vast one and the Egyptian Public Authority for Drainage Projects (EPADP) has a long-standing history of implementing subsurface drainage networks. During the implementation of these systems on active agricultural lands, farmers are subject to temporary loss of crops on part of their land and thus losing income. Consequently, EPADP has developed a well established system for providing affected farmers with crop compensations for land areas temporarily put out of production due to the execution of subsurface drainage systems. These procedures should apply to any type of projects, including the gas pipelines projects, when dealing with crop compensation issues.

Consultations and Provision of Timely Information:

The EPADP includes a dedicated department for drainage advisory services and is given the level of a General Directorate. This General Directorate for Drainage Advisory Services (DAS) is represented with each of EPADP’s field offices at the regional levels as well as the levels of the general directorates and drainage districts. The overall mandate of the DAS is to increase farmer’s awareness with regards to the drainage systems. In this regards, the DAS holds consultations at three progressing levels as follows: (i) consultations at the governorate level, (ii) consultations at the level of the central directorates, and (iii) consultations at the level of the interventions.

Implementation Procedures:

The procedures for crop compensation are regulated by a series of Ministerial Decrees issued by the Minister of Water Resources and Irrigation. The most recent decree is no. 358 for the year 2008 and is dated 31 July 2008. This decree specifies the procedures to be followed for administering the process as well as the crop compensation unit rates on which the calculations are based (the decree includes a comprehensive list including numerous varieties of summer crops winter crops, vegetables, medical plants, decorative plants, palm trees, fruit trees, forestry and flowers).

During the execution of the project, any due crop compensations are paid directly by the Contractor to farmers under the supervision of EPADP and in coordination with the relevant agricultural association (s). In order to ensure representation of all concerned parties in the crop compensation process, a Crop Compensation Committee, or more than one if needed, is established at the level of each general directorate responsible for the implementation of subsurface drainage works. This
committee is headed by the general directorate’s engineer in charge of the drainage project and includes one member from each of the following: (i) representative of the contractor executing the works, (ii) head of the relevant agricultural association from the Ministry of Agriculture and Land Reclamation (MALR), (iii) board member of the agricultural association nominated by the association’s board, and (iv) village head in the project area. The above-mentioned committee is entrusted with the following responsibilities:

- Identification of the agricultural areas affected by the project.
- Calculating the crop compensations due in accordance with the unit rates stated in the Ministerial Decree.
- The committee delegates to the Contractor to prepare, within a maximum period of 30 days, a crop compensation register in coordination with the agricultural association and village head.
- The crop compensation register identified to the committee is then publicly displayed at the bulletin board within the relevant agricultural association office as well as within the drainage directorate office and the village local council office.
- Any grievances related to the posted crop compensation information shall be submitted within 30 days to be investigated by the Crop Compensation Committee within the following 30 days.
- OP 4. 12 requires that dispute handling will be set up with the aim of settling disputes amicably. Grievance could be approached through both proactive and reactive approaches.

**Proactive approach**

- Transparent disclosure of information.
- Establishing a committee of influential representatives to review any grievances.
- The existence of the free hot line 149 of GASCO for complaints and grievance announced on GASCO markers in the field.
- Raising the awareness of PAPs with the various grievance mechanisms.
- Raising the awareness of GACO field supervisor who are available in the field on daily basis during construction with the importance of responsiveness to PAPs and the mechanisms to do that.

**Reactive approach**

- Settle disputes amicably.
- PAPs to contact GASCO hotline in cases if grievance.
- Handling the grievance and complaints of PAPs and reimbursing fair compensations.
- Responses form GASCO officers in charge of responding to complaints and grievance.
- Working towards solving any disputes on the local level.
- Focus on ensuring that PAPs get fair treatment.
It is crucial that the project pays special attention to strengthening the proactive approach to grievance. This will largely help the poor and vulnerable groups of poor farmers to avoid getting into trouble related to accelerated disputes.

**Crop Compensations**

The valuation of crop compensation amounts applicable to affected farmers are regulated by a series of Ministerial Decrees issued by the Minister of Water Resources and Irrigation. The most recent decree is no. 358 for the year 2008 and is dated 31 July 2008.

This decree specifies the procedures to be followed for administering the process as well as the crop compensation unit rates on which the calculations are based (the decree includes a comprehensive list including numerous varieties of summer crops, winter crops, vegetables, medical plants, decorative plants, palm trees, fruit trees, forestry and flowers). In the remote case of crops not included in the Ministerial decree, the matter is presented to EPADP’s board for identifying a suitable crop compensation unit rate.

The valuation of crop compensations areas are measured by field surveys during implementation for measuring lengths of affected areas along the pipelines route based on a width of 20 m. for excavation and construction work.

The WB’s policy on involuntary resettlement and the compensation of Project Affected Persons is clearly spelled out under the Bank’s operational safeguard policy (OP) # 4.12. the Resettlement Instruments include Resettlement Policy Framework (RPF), Resettlement Action Plan (RAP) and the Process Framework. A Resettlement Action Plan (RAP) or abbreviated RAP – depending upon the scale of impacts - is prepared when all the details of the project are known at appraisal.

A Policy Framework covers direct economic and social impacts that both result from, and are caused by project:

(a) The involuntary taking of land resulting in: (i) relocation or loss of shelter, (ii) lost of assets or access to assets and, (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location.

(b) The involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

(c) Project activities resulting in involuntary resettlement that in the judgment of the Bank, are (i) directly and significantly related to the project, (ii) necessary to achieve project objectives as set forth in the project documents and, (iii) carried out, or planned to be carried out, contemporaneously with the project.
RAP Preparation and Approval Process

The RAP process involves the following and should be done at early design stage of project component:

- Categorization of project activities with respect to land needs
- Conduct socio-economic survey to determine assets and households affected
- Use of RAP where more than 200 individuals are affected, abbreviated RAP if scale and severity of impacts are more limited.
- Organize and conduct stakeholders consultation
- Linking the RAP with projects and projects

The RPF presents the full required details of each of these components in order to ensure compliance with the WB OP 4.12.

The RPF also presents the key gaps between the Egyptian legislations and the WB OP 4.12 and presents local based suggestions in order to bridge these gaps
Giza North 3x750 MWe Gas-fired Combined Cycle Power Project

Resettlement Policy Framework (RPF)

Giza North Power Plant Electrical and Gas Interconnection Projects

Executive Summary

May 2011
Project No. 1583

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TABLE OF CONTENTS

LIST OF ACRONYMS AND ABBREVIATION

LIST OF FIGURES

GLOSSARY

1. THE PROJECT AND THE ROLE OF THE RPF

2. OBJECTIVES OF THE RPF FRAMEWORK

3. LEGISLATIVE FRAMEWORK FOR RESETTLEMENT IN EGYPT

4. WORLD BANK SAFEGUARD POLICIES

5. GAPS AND MEASURES TO BE CONSIDERED

REFERENCES
LIST OF ACRONYMS AND ABBREVIATION

ARP  Abbreviated Resettlement Action Plan (RAP)
GNPPP  Giza North Power Plant Project
CDA  Community Development Association
CAPMAS  Central Agency for Public Mobilization and Statistics
CEPC  Cairo Electricity Production Company
DAS  Drainage Advisory Services
EA  Environmental Assessment
EDHS  Egyptian Demographic and Health Survey
EEAA  Egyptian Environmental Affairs Agency
EEHC  Egyptian Electricity Holding Company
EETC  Egyptian Electricity Transmission Company
EIA  Environmental Impact Assessment
EPADP  Egyptian Public Authority for Drainage Projects
ESA  Egyptian Survey Authority
ESIA  Environmental and Social Impact Assessment
ESIAF  Environmental and Social Impact Assessment Framework
IR  Involuntary Resettlement
LDU  Local Development Unit
NGO  Non Governmental Organization
NUPG  National Unified Power Grid
OTL  Overhead Transmission Line
PAF  Project Affected Family
PAP  Project Affected Persons
RAP  Resettlement Action Plan
RPF  Resettlement Policy Framework
SRO  Social and Resettlement Officer
TOR  Terms of Reference
WB  World Bank

Exchange Rate: US$ / L.E. = 5.45 as of December 2009
LIST OF FIGURES

Figure -1 : Proposed Satellite Map Showing the Route of the Connection to the 500 kV National Grid

Figure -2 : Satellite Map Showing the Route of the Connection to the 220 kV National Grid

Figure -3 : Topographic Map Showing the Route of the Connection to the 220 kV National Grid

Figure -4 : Satellite Map Showing the Proposed Route of the Giza North (Nubaria - Metname) Gas Pipeline Project

Figure -5 : Topographic Map Showing the Proposed Route of the Giza North (Nubaria - Metname) Gas Pipeline Project
GLOSSARY*

**Census:** Household survey that covers all Project Affected Persons irrespective of entitlement or ownership. It provides a complete inventory of all project affected persons and their assets. It can be used to minimize fraudulent claims made by people who move into the area affected by the project in the hope of being compensated and/or resettled.

**Project Affected Persons:** Persons who are affected by the involuntary taking of land and / or the involuntary restriction of access to legally designated parks and protected areas.

**Environmental Impact:** An effect (both positive and negative) on an environmental resource or value resulting from infrastructure development projects.

**Environmental and Social Impact Assessment (ESIA):** A systematic procedure for enabling the possible environmental and social impacts of development projects to be considered before a decision is made as to whether the project should be given approval to proceed.

**Involuntary:** Actions that may be taken without the displaced person’s informed consent or power of choice.

**Involuntary Resettlement (IR):** The unavoidable displacement of people and/or impact on their livelihood, assets and common property resulting from development projects that create the need for rebuilding their livelihood, sources of income and asset bases.

**Monitoring:** The process of repeated observations and measurements of environmental and social quality parameters to assess and enable changes over a period of time.

**Public Involvement:** The dialogue encompassing consultation and communication between a project proponent and the public. It includes dissemination, solicitation and presentation of information.

**Rehabilitation/Resettlement:** A term often used to describe the process of reestablishing lifestyles and livelihoods following resettlement. The term is also used to describe construction works that bring a deteriorated structure back to its original conditions.

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Resettlement Action Plan (RAP): A time-bound action plan with a budget, setting out resettlement strategy, objectives, options, entitlements, actions, approvals, responsibilities, monitoring and evaluation.

Social Impact: An effect (both positive and negative) on a social issue resulting from infrastructure development projects

Stakeholders: Those who have an interest in project development and who will be involved in the consultative process, and includes any individual or group affected by, or that believes it is affected by the project; and any individual or group that can plan a significant role in shaping or affecting the project, either positively or negatively, including the host community/population.

Vulnerable Groups: Distinct groups of people who might suffer excessively from resettlement effects, such as, the old, the young, the handicapped, the poor, isolated groups and single parents.
ESIA for Giza North Combined Cycle 3x750 MWe Power Project
May 2011- Project No. 1583

Giza North 3x750 MWe GAS-FIRED
COMBINED CYCLE POWER PROJECT

Resettlement Policy Framework (RPF)

Giza North Power Plant Electrical
Interconnection Project

Executive Summary

1. THE PROJECT AND THE ROLE OF THE RPF

The Giza North 3x750 MWe Combined Cycle Power Plant Project is an integral part of the Egyptian Electricity Sector's on-going program to meet the ever-increasing demand for electricity generation. The project includes evacuation of the generated electricity to the National Unified Power Grid (NUPG) via interconnecting Overhead Transmission Lines (OTL). These interconnecting transmission lines will connect the electricity users and consumers to the National Electricity Network (Figures 1, 2 & 3). The project, also, includes obtaining fuel gas via interconnecting the power plant to the gas pipeline network (Figures 4 & 5) (a separate RPF for gas pipeline project has been prepared by GASCo).

Since some of the sub-components related to associated infrastructure (gas and water pipes, electricity transmission, access roads) may result in land acquisition, OP 4.12 on involuntary Resettlement has been triggered and a Resettlement Policy Framework (RPF) has been prepared. An RPF is the instrument used because the nature and extent of land acquisition resulting from the above infrastructure are not known at appraisal. The purpose of the RPF is to establish resettlement objectives, organizational arrangements and funding mechanisms for any resettlement operation that may be necessary. When during implementation the exact extent of land acquisition becomes known, a Resettlement Action Plan (RAP) or abbreviated RAP - depending on the scale and severity of impacts - will be prepared. The various steps in preparing a RAP have been outlined in this document. It should also be emphasized that the resettlement process should be completed prior to the start of physical works.

The current status with regard to transmission lines, gas pipeline, potable water connection and access roads is as follows:

→ Transmission Lines

The Giza North power plant will be connected to the Egyptian Unified Power System (UPS), which is owned and operated by the Egyptian Electricity Transmission Company (EETC), an affiliate company to the EEHC, via connecting transmission lines. Connection methodology includes evacuation of power generated by the three modules (3x750 MWe) via both 220 kV and 500 kV national grids. The connection methodology will include the following:
A. **Connection to the 220 kV grid:**

- Construct four circuits 220 kV underground cables Abo-Ghaleb / Giza North with length 5 km.

- Construct 220 kV double circuit O. H. T. L – Ashmoun / Giza North 220 kV with length about 10 Km.

Figure -1 and Figure-2 depict the proposed route of the connection to the 220 kV grid.

B. **Connection to the 500 kV grid:**

- Construct Giza North substation 500 /220 kV with 2x500 MVA transformers.

- Release 500 kV (O.H.T.L) Samallout 500 / Cairo 500 from Cairo 500 S/S side and extending it with a length of 1x35 km to Giza North 500 S/S to become Giza North 500 / Samallout 500 with a length about 244 km.

- Construct 500 kV single circuit (O.H.T.L) Cairo 500 / Giza North 500 with length about 35 km.

Figure -3 depicts the proposed route of the connection to the 500 kV grid.
Figure – 1

Satellite Map Showing the Route of the Connection to the 220 kV National Grid
Figure – 2

Topographic Map Showing the Route of the Connection to the 220 kV National Grid
Figure – 3

Proposed Satellite Map Showing the Route of the Connection to the 500 kV National Grid
Figure – 4

Satellite Map Showing the Proposed Route of the Giza North (Nubaria - Metname) Gas Pipeline Project
Figure – 5

Topographic Map Showing the Proposed Route of the Giza North (Nubaria - Metname) Gas Pipeline Project


→ Gas Pipeline

A proposed route has been identified to feed the Giza North power project, which will extend from Nubaria to the west north of the power project site until Metnama to the east of the power project site. The proposed route has approximately a length of around 100 km. final selection of the route is not determined yet (see Figures 4 & 5).

→ Potable Water Connection

Potable water supply to the power plant will mainly be obtained as a byproduct of water treatment facility within the power plant itself. Process water will be abstracted from the El-Rayyah El-Beheiry canal for power plant usage and supplied via desalination and demineralization facilities for boiler make-up and other processes. Part of this treated water is further purified, disinfected and processed for human uses, mainly as potable water.

The other alternative for supplying potable water to the power plant is the potable water network of the El-Kata area. This network distributes the water of the El-Rayyah El-Beheiry, after treatment, purification and disinfection to domestic uses, including potable water.

At any cases, eventhough potable water network may exist to the power plant site, the power plant produces its demand of potable water via its own water treatment system. No potable water pipelines are envisaged to be extended particularly for the power plant.

→ Access Roads

The main transport infrastructure linking the Giza North area to the country main ports facilities is principally based on road network. The site is accessible through the major Regional Road from Cairo to El-Khatatba via Qanater Delta Barrage. This road directly passes the site along its pathway from Cairo southeast to Itay El-Baroud northwest. Actually, the site entrance gateway is located directly on the Road. No major access roads are envisaged to be constructed particularly for the Giza North power project.

Local livelihoods: A few part time fishermen utilize the waters near the planned power plant. Based upon experience from a number of similar plants elsewhere along the Nile River and its branches, as well as the opinions of the fishermen, the impacts of slightly warmer water on fisheries is likely to be positive.

2. OBJECTIVE OF THE RPF Framework

The objectives of this framework correspond to those of the World Bank's policy on Involuntary Resettlement, namely:

- To avoid or minimize (whenever possible) involuntary resettlement and land acquisition through design efforts.
- If involuntary resettlement and land acquisition is unavoidable, to execute resettlement and compensation activities as sustainable development programs, whereby sufficient
investment resources are provided to give the Project Affected Persons an opportunity to share in project benefits. Displaced and compensated persons shall be meaningfully consulted and given opportunities to participate in planning and implementing Resettlement Action Plan (RAP)s.

- To assist Project Affected Persons in their efforts to improve their livelihoods and standard of living or at least to restore them to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

3. LEGISLATIVE FRAMEWORK FOR RESETTLEMENT IN EGYPT

Property expropriation and compensation in Egypt is initiated and executed at central, local and, stakeholders levels. On the central level, the governmental agency in charge of the implementation of the expropriation acts issued for public interest is the Egyptian General Authority for Land Survey (“ESA”), except for projects handled by other entities pursuant to a law to be issued in this respect. As mentioned above, ESA is charged with the formation of the expropriation and compensation committees.

Usually the executing body could be other Ministries or Governorate. Accordingly, this executing agency would be responsible for paying the compensation to affected groups through ESA or under its supervision, offering alternative resettlement options, and implementing the resettlement project.

The Egyptian Constitution recognizes three main types of ownership. Article 29 of the 1971 Constitution provides that “Ownership shall be under the supervision of the people and the protection of the State. There are three kinds of ownership: public ownership, co-operative ownership and private ownership”.

In accordance with Article 34 of the Constitution: “Private ownership shall be safeguarded and may not be placed under sequestration except in the cases defined by law and in accordance with a judicial decision. It may not be expropriated except for the general good and against a fair compensation as defined by law. The right of inheritance shall be guaranteed in it.” According to this article, it is understood that procedures for private property expropriation are considered to be exceptional. The competent jurisdiction shall be entitled to take cognizance of the lawsuits raised by individuals against the administration for appropriate compensations.

Within the framework of the Constitution, the Civil Code, in articles 802-805 concerning private property, has recognized the private ownership right. Article 802 has stated that the owner, pursuant to the law, has the sole right of using and/or disposing his property. In Article 803, land ownership has been defined as land with all things above and below it and pursuant to the law, the property of the surface may be separated from the property of what is above or below it.

Then, Article 805 provides that “No one may be deprived of his property except in cases prescribed by law and this would take place with an equitable compensation.”

Law No. 3, 1982 for Physical Planning, in its Sixth chapter concerning District Renewal (this also applies for slums' redevelopment or resettlement projects) has obliged the concerned local body entitled to renewal to first plan and prepare the proposed relocation sites where the occupants of the original area under renewal or redevelopment, would be resettled. The
concerned local body should first prepare these relocation sites to be suitable for housing and proceeding different activities of the relocatees prior to their transfer to the new site.

Article 40 of this law stated that it is not allowed to commence with the resettlement before at least one month from officially notifying the PAPs with their new destination. Any occupant, who would be subjected to the resettlement and receives a new housing unit, has the right to complain of its unsuitability within 15 days of receiving the notification to a specialized committee formulated by the concerned governor. The committee should reach its decision concerning the complaint within a maximum one month period. However, the right to complaint does not include the location of the new resettlement site, rather it is only limited to the unit itself.

Law 3/1982 allows compensation by: (i) taking the value of the property; or (ii) postponing the taking of such value in full or in part until all or part of the area in question is sold.

Article 47 of Law 3, 1982 authorized the concerned Governor to formulate compensation committee.

**In addition:**

- Law 3 of 1982: added to the foregoing list acts aiming at the establishment of green areas and public parking.
- Prime Ministerial Decree No. 160 of 1991: added to the list the establishment of governmental educational buildings
- Prime Ministerial Decree No. 2166 of 1994: added fishery farms established by ministries, governmental departments, local government units, and public authorities.
- Law 557/54, which was later amended by Law 252/60 and Law 13/62, lays down the provisions pertaining to the expropriation of real estate property for public benefit and improvement.
- Law No. 27 of 1956, which stipulates the provisions for expropriation of districts for re-planning, upgrading, and improvement, and the amended and comprehensive Law No.10 of 1990 on the expropriation of real estate for public interest.

**Expropriation of Ownership for Public Interest (Law 10/1990)**

Although, the constitution prohibits the expropriation of private property except for public interest against compensation determined pursuant to the law, Law 10 of 1990 concerning the Expropriation of Ownership for Public Interest was issued to reflect this constitutional mandate. In addition, expropriation of property is further regulated by Law 59 of 1979 concerning the Establishment of New Urban Communities and Law 3 of 1982 concerning Urban Planning.

The term **“public interest”** in the context of expropriation has been defined in Article 2 of Law 10/1990. The Article specifies the acts that are considered for public interest.

The procedures taken to the transfer of ownership and compensation are administrative, with no judicial interference except in the assessment of the compensation amount.

Disputes over compensation assessment: These disputes are subject to legal jurisdiction as follows: The authority in charge of the expropriation procedures shall refer the disputes over
the compensation assessment submitted to court. The court shall examine the complaint quickly and its judgment shall be conclusive.

The right of the public authority to expropriate needed real estate property also includes the right to temporarily occupy / take over this privately owned property. Law No. 577 of 1954, Law No. 27 of 1956, and the new Law No. 10 of 1990 pertaining to property expropriation, include provisions regarding temporarily occupying property.

**Expropriation Procedures**

According to the Law 10, 1990 the expropriation procedures involves (i) declaration of public interest pursuant to a Presidential Decree accompanied with a memorandum on the required project and a complete plan for the project and its buildings (Law 59/1979 and Law 3/1982 provide that the Prime Minister issues the decree) and, (ii) the decree and the accompanying memorandum must be published in the Official Gazette. A copy for the public is placed in the main offices of the concerned local government unit. Many operational steps should be followed based on these procedures.

**Valuation and Compensation Methods**

Determination of the valuation methods and compensation to be given to PAPs is made at two separate levels:

- The first is made by the Expropriating Entity in order to meet the requirement that the estimated compensation amount is deposited with ESA prior to proceeding with the remaining formalities as described in the preceding section.

- The second level is a review of that estimated compensation by the Compensation Estimation Committee within ESA.

**Grievance & Redress Procedures**

The current Egyptian laws and regulations stated that the concerned owners and holders of rights have the right, within 30 days from the date of posting and publishing the lists and information of the expropriated properties, to object to the information contained in such lists. The objection is made to the main offices of the Expropriating Entity or the administration to which it is attached within the governorate in which the property is located.

**4. CROP COMPENSATIONS IN EGYPT**

The Egyptian Electricity Transmission Company (EETC) will use the same procedures for crop compensation developed for drainage projects if transmission lines, or gas pipelines, pass on active agricultural land.

Egypt's agricultural drainage network is a vast one, with a long-standing history of implementing subsurface drainage projects. During the implementation of these systems on active agricultural lands, farmers are subject to losing crops on part of their land and thus losing income. Consequently, the concerned authority (Egyptian Public Authority for

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Drainage Projects, EPADP) has developed a well established system for providing affected farmers with crop compensations for land areas temporarily put out of production due to the execution of subsurface drainage systems.

The procedures for crop compensation are regulated by a series of Ministerial Decrees issued by the Minister of Water Resources and Irrigation. The most recent decree is no. 358 for the year 2008 and is dated 31 July 2008. This decree specifies the procedures to be followed for administering the process as well as the crop compensation unit rates on which the calculations are based (the decree includes a comprehensive list including numerous varieties of summer crops winter crops, vegetables, medical plants, decorative plants, palm trees, fruit trees, forestry and flowers).

5. WORLD BANK SAFEGUARDPOLICIES

The WB’s policy on involuntary resettlement and the compensation of Project Affected Persons is clearly spelled out under the Bank’s operational safeguard policy (OP) # 4.12.

Resettlement Instruments

- Resettlement Action Plan
- Resettlement Policy Framework
- Process Framework

In projects triggering OP 4.12 the task team must decide which of the above three instruments are appropriate for the project in question, and the necessary documentation must be prepared by appraisal.

Policy Objective and Principles

The principle policy objectives of OP 4.12 are:

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.

- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.

- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

Scope and Coverage of RPF

A Policy Framework covers direct economic and social impacts that both result from, and are caused by project:

(a) The involuntary taking of land resulting in: (i) relocation or loss of shelter, (ii) lost of assets or access to assets and, (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location.
(b) The involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.

(c) Project activities resulting in involuntary resettlement that in the judgment of the Bank, are (i) directly and significantly related to the project, (ii) necessary to achieve project objectives as set forth in the project documents and, (iii) carried out, or planned to be carried out, contemporaneously with the project.

**Valuation of Assets**

In compliance with paragraph 6 of the OP 4.12, a Resettlement Action Plan (RAP) or a resettlement policy framework should apply to impacts covered under paragraph 3 (a) of Bank’s resettlement policy.

**Implementation Procedures**

Each eligible PAP will sign a compensation certificate together with the authorized project representative.

Compensation will be paid prior to the PAP vacating the land. Actual vacation will be monitored by project in cooperation with local authorities.

**Grievance Redress Mechanisms**

In such compensation and resettlement operations, it often appears that many grievances originate from misunderstandings of the Project policy, or result from neighbor conflicts, which can usually be solved through adequate mediation using customary rules. Most grievances can be settled with additional explanation efforts and some mediation. This is why a first instance of dispute handling will be set up with the aim of settling disputes amicably.

**Documentation and tracing**

A template form for claims should be developed. It is advised that these forms be collated on a quarterly basis into a database held at project level.

**Budget and Funding**

Based on the preliminary quantitative estimate of affected assets and affected people presented, the budget for resettlement activities associated with the First Year should be prepared and a summary of implementation Plan presented.

**Disclosure Requirements for Bank Resettlement Documents**

The Bank insists on both the participation of PAPs and public disclosure of relevant resettlement documents. PAPs should be meaningfully consulted and should be given the opportunity to participate in both planning and implementation of resettlement programs.

**Consultation & Implementation Process**

Consultation on the RPF was held and will continue to be organized by the appropriate government agency through the project implementation. Information and consultation are proposed to be implemented in the course of the preparation of RAPs and ARPs.
Monitoring and Evaluation

Monitoring and Evaluation (M&E) are key components of the RPF/RAP. They have the following general objectives:

- Monitoring of specific situations or difficulties arising from the implementation, and of the compliance of the implementation with objectives and methods as set out in the RPF/RAP.

- Evaluation of the mid- and long-term impacts of the resettlement process on affected households’ livelihood, environment, local capacities and economic development.

Monitoring aims to track project implementation will address the following aspects:

i) Social and economic monitoring.
ii) Technical monitoring.
iii) Grievances and grievance management system.
iv) Annual monitoring report will be developed and issued by the project.

While ensuring the evaluation process, the project will utilize:

- This RPF as its guiding instrument,
- The Egyptian laws and regulations as described above in Section 2 and as they stand as of the approval of this RPF.
- The applicable World Bank Safeguard Policies as they stand as of the approval of this RPF, i.e. OP 4.12 on “Involuntary Resettlement”.

Evaluation of resettlement activities will be part of general assessment and review activities undertaken for the Project as a whole.

6. GAPS AND MEASURES TO BE CONSIDERED

Legal and Regulatory Gaps

The subsequent paragraphs of this section will set the stage for (i) further dialogue and discussion between the Bank and appropriate institutions in Egypt and for (ii) relevant Egyptian institutional bodies to explore how legal and administrative steps may be taken to ensure that domestic law is supplemented by additional measures to achieve equivalency between the two systems.

The following are legal and regulatory gaps between the Egyptian law and Bank policy and measures to be considered,

Temporary acquisition of land:
- Gap: Lack of legal provision in Egyptian law to compensate temporarily occupied land for public interest. The lack of national law to protect project affected people from temporary acquisition of land fall short of the Bank's OP 4.12 objectives and
principles. However for temporary acquisition of agricultural land for purposes of implementing irrigation and/or drainage works, the national procedures are aligned with the Bank's OP 4.12 measures.

- **Measure**: discussion with Egyptian authority to draw their attention to the Bank’s policy regarding compensation for temporary acquisition of land to persons impacted by that decision of a project.

**Temporary occupation of structure:**
- **Gap**: Inadequate legal provision to determine the market value and compensation for temporarily occupied structures involves compensating project affected people below market price. The practice of compensating project affect people below the value of temporarily taken property is contrary to the Bank’s full replacement value policy principle.

- **Measure**: Dialogue with Egyptian authority on the Bank's policy in involuntary resettlement with focus on compensation for: (i) temporary land acquisition with minor inconvenience; (ii) structures that are temporarily acquired; (iii) precluding use of the structure and (iii) moving and restoration expenses.

**The right of squatters**
- **Gap**: The right of squatters has not been addressed in Egyptian law. This is major policy difference and gap with the Bank’s OP 4.12. However, there are resettlement cases in which the Egyptian government has compensated squatters because of the political sensitivity.

- **Measure**: Egyptian practices regarding the right of squatters can be employed to deepen discussion leading toward legislative solutions. Bank’s discussion with Egyptian authorities may help address and formalize the treatment of squatters in line with the Bank’s OP 4.12.

**Vulnerable groups:**
- **Gap**: Egyptian regulation has no provision on how vulnerable groups should be treated in case of involuntary resettlement. This is a major shortfall from the Bank’s policy which states: “particular attention is paid to the needs of vulnerable groups among those displaced, especially those below the poverty line, the landless, the elderly, women and children, indigenous peoples, ethnic minorities, or other displaced persons who may not be protected through national land compensation legislation”.

- **Measure**: Need to take steps to lead the Egyptian authorities to pay attention to vulnerable groups in order to ensure that these groups are consulted meaningfully in the process of selecting resettlement options and in receiving financial support. A social survey assessing the impact of crop compensations on farmers and the extent of farmer vulnerability could be undertaken in this regard.

**Disturbance allowance:**
- **Gap**: There is a difference between Egyptian law and the Bank’s OP 4.12 addressing compensation for loss incurred as a result of business disturbance. Egyptian regulation makes no allowance for business disturbance losses while the Bank policy
requires 10% of the total business loss compensation is paid as an income disturbance allowance.

- **Issues:** In the absence of Egyptian law to address disputes that may arise from business disturbance, the Bank’s policy on disturbance allowance may not be enforced as effectively as it should be. The lack of equivalency between the two systems may result in implementation conflict and in unfair treatment of PAPs.

**Asset value increased due to previous public interest project:**

- **Gap:** The Egyptian law states that should the value of the expropriated property increase as result of prior public interest works in a previous project, such increase shall not be calculated in determining the compensation value. This is inconsistent with OP4.12 which requires full replacement cost for losses of assets attributable directly to the project.

- **Issues:** This requirement contradicts Egyptian legal provision stated in article (20) of Law 10/1990 which requires the expropriating agency to determine compensation on the basis of prevailing prices at the date of issuance of the expropriation decree. It also contradicts the principle of full replacement cost of OP4.12.

**Monitoring and Evaluation (M&E):**

- **Gap:** Monitoring or evaluation measures are not stipulated in Egyptian regulation. Lack of the necessary legal provision needed to put in place monitoring and evaluation measures can negatively impact the accountability and transparency. Programs and plans may not be able to benefit from corrective action in cases of mistakes or receive rewards in cases of good performance.

- **Measure:** It is imperative the Bank move toward advancing the monitoring and evaluation principles stated in OP 4.12. Social and economic impacts will have to be measured; the amounts of compensation will have to be known and accounted; the efficiency and effectiveness of grievances and redress mechanisms will have to be evaluated and progress in the resettlement process will have to be reported and known. In terms of crop compensation activities, it is proposed to integrate into the post-implementation activities undertaken by EETC/CEPC/DAS, relevant monitoring and evaluation tasks related to crop compensation procedures (e.g. amounts of compensation paid, time taken to ensure compensation payment, number of grievances and redress cases received and addressed…etc). A study to define the nature of such M&E activities and their social impact could be undertaken as part of a social survey study.

The following are legal fits between the two systems but capacity constraints at individual and institutional levels and measures to be considered.

**Full replacement cost:**

- **Possible capacity constraints:** Egyptian regulations use prevailing price in the affected areas to calculate and compensate project affected people for their expropriated property. The prevailing price is assessed by a specialized committee created by the government. However previous Egyptian experiences show that the full replacement principle as stated by OP 4.12 has not been realized by the affected group. This problem can be linked to lack of capacity. Staff involved in calculating the value of the property may not have been trained and/or equipped adequately. The
institutions mandated to facilitate and ensure the assessment of the expropriated property at market value may not have the appropriate instruments or the institutional culture to ensure they fulfill their mandates.

- **Measure**: As stated in table 1, this area would require capacity building for the concerned local government staff and the implementing agency. Additional training for the evaluators should be considered, and the mandated institution needs to be enhanced, equipped and sensitized.

**Temporary losses of business:***

- **Possible capacity constraints**: In a situation where involuntary resettlement cause a temporary loss of business, Egyptian law stipulate that entitlement for compensation for temporary losses of business is determined by a committee. However compensation paid by the committee is usually below market price. The practice of paying/compensating affected business owners below their net loss is against the Bank’s full replacement value principle. In case of crop compensations the procedures stated in the relevant section above shall be followed.

- **Measure**: Sensitize and discuss with Egyptian authority how the Bank’s policy addresses the issues of temporary loss of business income with special focus on importance of: (i) compensating the business with its net loss and (ii) providing new premises or rental allowance for new premises if old location is undesired, (iii) covering business’ cost of relocation, personnel and equipment to a new location.

**Provision of timely and relevant information:***

- **Possible capacity constraints**: While Egyptian law requires the provision of information to those the project affects, the experience in Egypt suggests that PAPs have not been part of the resettlement consultation, planning and implementation process. This practice is not in line with OP 4.12 policy principles which states: “Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs”. In case of crop compensations the procedures stated in the relevant section above shall be followed.

- **Measure**: It is important the Bank start to negotiate or discuss with authorities on how to translate what has been stipulated in the law into practice. The notion of access to information by project affected people, the importance of participatory approach while planning and implementing Resettlement Action Plan (RAP) should be made clear to the authorities.

**Grievances:**

- **Possible capacity constraints**: The Egyptian law provides the creation of Specialized Committees to address grievances driven by misunderstandings of the project policy, or resulting from conflict(s) among neighbors. Nevertheless existing grievance mechanism processes embrace long procedural steps and take a long time to resolve disputes. The practice denies project affected groups a direct channel for grievance adjudication and delays resolution of disputes in an appropriate time prior to resettlement. In case of crop compensations the procedures stated in the relevant section above shall be followed.

- **Measure**: The Bank must advance to the government of Egypt the notion of adopting first tier grievance management mechanisms, which should occur by the Project at
project levels. This would provide aggrieved people with an avenue for amicable settlement without necessarily initiating time-consuming Court actions.

**Recommendations**

On the basis of results obtained from the preceding analysis, the following section will advance (i) key preliminary recommendations and (ii) general points which may be included in the policy dialogue with the Egyptian authorities.

**Key Recommendations**

- When planning project and resettlement strategies, the affected group should be informed about the displacement and participate in defining resettlement options from the earliest stage of the process, that is even before issuing the decree for public interest,
- It is essential a cut-off date be clearly spelled out to assure the right of affected groups and yet avoid subsequent problems,
- It is critical to conduct a detailed economic study evaluating expected properties to be expropriated and this exercise should be carried out by a professional body (private or public) able to define the real-market value,
- It is important to consider establishing a specialized unit within the management of the project to address grievances at the early stages of the project and the inception of the Resettlement Action Plan (RAP). The unit should include representation from local governmental executive bodies in addition to representatives from the local affected community,
- It is imperative to undertake a detailed socio-economic study focusing on the affordability of the probable impacts on assets and livelihoods of affected people with particular attention to vulnerable subsets,
- The process governing Resettlement Action Plan (RAP)ning and implementation should have full transparency and project affected people must have their voice heard and incorporated into the overall program via an established project unit,
- It is important to enlist high profile government officials as champions at an early stage of the process. Their role is vital in implementing and solving urgent conflict issues and this is crucial for building the trust within local communities to assure the project's success,
- Craft and operationalize fair, quick and transparent grievance and redress mechanisms.
- Active involvement of traditional leaders within the local community is also a cornerstone for the success of the project.

**Discussion**

In addition to the above recommendations, it is also important to focus on the following issues in order to close existing policy gaps:
- Right of squatters to be compensated
- Right of customary owners to be compensated
- Valuation of compensation should be based on the date of implementing the resettlement not the date of issuing the decree of public interest.
- Publication of list of properties should be done in compliance with the law.
- Disputes over land or structure ownership or tenure should be solved through a specialized committee to expedite PAP compensation payments.
- Compensation should be defined based on transparent criteria that cover both real market value and transfer cost. This is to be applied to residential and economic activities for different tenure status (e.g., owners, tenants, squatters, customary owners).
- Compensation is to be paid prior to displacement/resettlement (in case of crop compensations, they should be paid not later than the timing on which the income generated from the agricultural activity would have been made in-line with the procedures stated in this RPF report).
- Compensation is valued based on date of implementation rather than date of issuing decree
- For poor households and vulnerable groups, compensation should be linked with soft loans for paying the price of alternative housing or job opportunities
- Resettlement option is to be avoided and to be ranked as the least preferred option.
- In case resettlement is inevitable, the option with minimum number of displaced people should be selected
- The resettlement decision should be supported with detailed technical documents (maps, drawings, reports) showing the scope of resettlement.
- All technical steps and procedures should be explained to affected people prior to resettlement in order that they be prepared for displacement.
- Several committees should be established for preparation, implementation, management, assessment of compensation and monitoring of project operations. Those committees should include representatives from different central and local executive bodies to ensure the coordination of different tasks within the process.
- The role of NGOs and CBOs in mediating, informing and supporting socio-economic aspects related to resettlement has to be explored in project.
- NGOs and CBOs could play important roles in bridging the gaps between the government and local communities, especially during the displacement process.
- Affected families should be offered various options for displacement and resettlement in locations for resettlement and compensation mechanisms
- The affected people should have the right to claim redress about a resettlement location.

- The compensation value should be based on real market assessment that can enable the affected group to have equivalent shelter or economic value.

- An effective monitoring mechanism should be established to follow up on the impact of the resettlement process on the livelihoods of affected persons.

- Rehabilitation programs should be designated for affected groups to overcome the negative impact of resettlement.

- Socio-economic support from local government and NGOs should be provided for displaced persons during and after the resettlement (e.g., small and short-term credit for transfer and for start-up of new business, soft-loans for housing improvement).
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