EAMP - Environmental Assessment and Management Plan
Phase 1: Proposed Substations

FINAL REPORT

Palestine Electric Utility Management Project (EUMP)
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E. Draft Resettlement Policy Framework
F: Guidelines for Handling of Potential PCB Contaminated Oils and Components
EXECUTIVE SUMMARY

Project Outline
The project is funded by the World Bank and forms part of the proposed Electric Utility Management Project (EUMP). The aims of the EUMP are to improve the performance of the Palestinian power sector through development of new transmission and distribution systems and institutional strengthening of PEA and regional distribution companies.

This environmental study is provided as an Environmental Assessment and Management Plan. Specifically it covers the engineering works for the development of new 161/33/22 KV substations in the northern, central and southern parts of the West Bank.

The report is structured to facilitate expanding of the EAMP as information from the ongoing feasibility study for the interconnections to Egypt and Jordan become available, and a clearer idea of what the transmission system and requirements for rehabilitation and extension of the distribution net will be.

Project Works
It is important to understand the scope of the works, in order to also understand the Consultant’s approach in dealing with both the evaluation of the environmental impacts, and the subsequent reporting.

The summarised works items are shown in Table A below.

Table A. Components of the EUMP

<table>
<thead>
<tr>
<th>Component</th>
<th>Transmission system</th>
<th>Works Element</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interconnections and sub-transmission system</td>
<td>- Line routing and system-configuration</td>
<td>- Techno-economic assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 4 new sub-stations</td>
<td>- System analyses and design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Installation of NCC/SCADA</td>
<td>- Procurement and equipment installation</td>
<td></td>
</tr>
</tbody>
</table>

Distribution
Rehabilitation and extension of existing system | - System configuration and design | - Techno-economic assessment |
| | - Installation of pre-paid and automatic meters | System analyses |
| | | - Procurement and equipment installation |

Institutional
Technical assistance and capacity building | - Improved customer service | - Technical assistance, improved customer metering, use of accounting and billing systems, operation and maintenance |
| | - Strengthening of NEDCO | |
| | - Sector reforms | - Construction supervision for: detailed design and tender specs |
| | - Consultancy services for: Detailed design and construction supervision of transmission and distribution components | - Policy formulation for, Palestinian Electric Regulatory Commission) and Palestinian Electricity Transmission Limited, promotion of renewable energy sources |
| | - Promoting utilization of renewable energy sources, development of appropriate institutional and legal framework | |

Norconsult AS
Policy, Legal and Administrative Framework
The World Bank Governing policy is OP 4.01. At present this project is categorized as “B”. This means all components of the Project with the exception of capacity building will be subject to environmental assessment (EA).

The Palestinian National Authority, Ministry of Environmental Affairs MEnA has two formats for environmental assessment:

The first is an Environmental Scoping termed Initial Environmental Evaluation (IEE), which covers small projects, and/or projects that undertake works in already disturbed areas.

The second is a full Environmental Impact Assessment, which covers projects where impacts will occur to natural areas and/or to natural resources, as a result of new activities.

The regulations covering environmental assessment are covered principally by the Environment Law (NO(7) 1999) and the Environmental Assessment Policy (2000). In terms of this project, the works are covered under Annex 1 of the latter.

The consultant has not conducted public consultations to examine the need for possible compensation as a result of the works associated with the project (in light of World Bank OP and BP 4.12 Involuntary Resettlement). OP 4.12 may be triggered because precise locations of works have not yet been established. This is especially the case for the distribution component where existing structures are likely to limit access. As a result the report from the recent World Bank mission to the West Bank and Gaza comments that a draft Resettlement Policy Framework (RPF) has been prepared to cater for all possibilities. More specifically, OP4.12 may be triggered in the project by:

- Encroachments - resulting from locations where the right of ways of new overhead lines conflict with existing structures, properties etc.

- Unforeseen events, accidents, and by minor changes in project specifications that may cause damage to or loss of assets. In areas where dwellings, fences, etc. are close to proposed infrastructure rehabilitation and access is very confined.

Environmental Impacts
Overall, once the works are completed, there will be a significant net positive social and environmental benefit to the people of the West Bank and Gaza.

However, limited negative environmental and social impacts will occur for short periods during the works. By careful pre-planning by the organisation contracted to undertake the rehabilitation works all the negative impacts can be addressed through an EMP. Compensation issues if any arising from damage or destruction to assets will be addressed through the RPF.

The bulk of the impacts fall under Construction phase works, mainly excavation works for site preparation, foundations (transmission towers and poles) and transformers and stringing of overhead wires.

The secondary or indirect impacts of the line installation works will be disruptions to traffic, pedestrians, and safety issues where right of ways are located along pedestrian pathways and where they may block access to private and/or public property in both residential and commercial areas.

These impacts can be minimised, in terms of severity and duration, by ensuring that the excavation and construction works are limited to short working sections, and that works are carried out rapidly and efficiently.

1 Aide Memoire, World Bank mission to the West Bank and Gaza November 2007
The remainder of the impacts will be site specific, and generally within the operating sites of PEA and regional distribution companies. The EMP for the project has been drawn up according to the anticipated impacts from the rehabilitation works and subsequent operating phases.

**Conclusions**

The representative works as identified are unlikely to call for any permanent land take or destruction of houses and not necessitate any movement or resettlement of people. If assets are damaged or people’s lives disrupted, the RPF has been prepared to compensate for these actions.

From the impact assessment carried out the environmental acceptability of the project may be summarised thus:

**Terrestrial Ecology.** Very minor negative impacts; all capable of being reduced to an acceptable level through environmental management planning.

**Aquatic Ecology.** With the exception of a partly human induced drainage in the vicinity of the area identified as potential location for sub-station for Nablus (option 2), there are no open water bodies in the project area. Choice of the former location will encroach on grazing area for sheep/goats and habitat for birds (i.e. mainly storks).

**Water Quality:** Potential serious negative impacts on groundwater quality can result from accidental leakage or spills of oils, lubricants from construction machinery and/or transformers. The risk of such impacts will consequently need to be managed through safety procedures and installation of structures for containment of spills (i.e. for transformers).

**Air and Noise Quality:** Minor negative impacts associated with dust, fumes and noise from construction works and rock blasting.

**Landscape:** Very small-scale and largely temporary negative impacts associated with works areas.

**Socio-Economic and Cultural Environment:** Minor short-duration socio-economic impacts associated with construction works. Mitigation possible through an effective environmental management plan and resettlement policy framework.

**ACRONYMS**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EA</td>
<td>Environmental Assessment</td>
</tr>
<tr>
<td>EAMP</td>
<td>Environmental Assessment and Management Plan</td>
</tr>
<tr>
<td>EFR</td>
<td>Environmental Flow Requirement</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>EPB</td>
<td>Environmental Planning Brief</td>
</tr>
<tr>
<td>EUMP</td>
<td>Electric Utility Management Project</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographical Information System</td>
</tr>
<tr>
<td>HSC</td>
<td>Hazardous Chemicals and Substance</td>
</tr>
<tr>
<td>HEPCO</td>
<td>Hebron Electricity Company</td>
</tr>
<tr>
<td>IEC</td>
<td>Israeli Electricity Corporation</td>
</tr>
<tr>
<td>JDECO</td>
<td>Jerusalem District Electricity Company</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>PEA</td>
<td>Palestinian Energy Authority</td>
</tr>
<tr>
<td>RPF</td>
<td>Resettlement Policy Framework</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
</tr>
</tbody>
</table>
1 INTRODUCTION

1.1 Background and Justification for the Project

This environmental study falls under the Electric Utility Management Project (EUMP), which is funded by the World Bank and the European Investment Bank. The overall purpose and objective of the EUMP is to improve the efficiency and quality of electricity supply in the Palestinian areas through: (i) financing of critical investments for the strengthening and rehabilitation/ extensions of the transmission and distribution system in the West Bank and Gaza Strip and (ii) assisting with the implementation of sector reforms, capacity building and training.

As part of the former, Norconsult AS has been engaged by the PEA to conduct the Feasibility Study of the Interconnection of the Electrical Networks of “Egypt – Gaza Strip” and “Jordan – West Bank”. Whereas the overall aim of the interconnection study is to establish least cost options for establishing an independent electrical network and thereby increase the energy security in the Palestinian areas, the environmental study will form a framework for identification, assessment and management of environment and social concern for the project. Specifically, this relates to assessing the impacts resulting from the proposed system configurations; suggesting of alternatives and mitigation measures for minimizing adverse environmental impacts.

The EIA is an integral part of the loan agreements and is needed to comply with donor’s safeguards policies to obtain environmental permits and funding approvals for the project.

1.2 Components Requiring an Environmental Impact Assessment

Specifically, the EUMP consists of the following sub-components

- Transmission: New transmission lines and substations.
- Distribution: Supply and delivery of (a) cables, conductors and accessories; (b) transformers, auto-reclosures; (c) high tension and low tension switchgears; (d) equipment for 33 kV and 11 kV sub-stations.
- Institutional: Capacity building of the PEA and the utilities in the West Bank and Gaza to improve collection efficiency of tariffs and service delivery through pre-paid metering, implementing necessary sector reforms and design and construction of the proposed transmission and distribution infrastructure.

The environmental study is limited two the first two sub-components. Although it is conducted as an independent entity/ deliverable it is a part of the consultancy contract for the Interconnection study. In this regard it is important to keep mind that since that both projects commenced at roughly the same time in November 2007 that line routes, system configurations and extent of the rehabilitation / extension of the distribution network were not yet established. This environmental study will therefore be conducted in two phases with Phase 1 dealing with the proposed substations and Phase 2 the larger system configuration.

Initiation of Phase 1, which forms the subject matter of the current report, was precipitated by the fact that with suitable locations for substations identified, further project progress is largely dependent on obtaining necessary permits through undertaking EIA. However, noting the preliminary nature of project designs and the fact that the EIA will need to be expanded as the results from the technical study become available, the EIA at the current stage is provided as a combined Environmental Assessment and Management Plan (EAMP). It is structured to facilitate expanding as more information become available.
1.3 Terms of Reference (TOR) for the Study

The TOR and inherent scope of works for the study as described in Requests for Proposals (RFP) and Minutes of Meeting (MoM) from the contract negotiations can broadly be summarized as follows:

Goal of the assignment
As mentioned in the above sections EA is needed to comply with applicable donor and statutory policies and can best be understood as a process where the overall aim is to properly incorporate environmental and social aspects into the project design and implementation in a sustainable manner.

Objectives of the assignment
To carry out the EA on the proposed transmission and distribution components the assessment should:

i. Provide descriptions of the proposed substation sites, line routes and system configurations. Detail the elements of the development, highlighting areas to be reserved for construction and the areas which are to be preserved in their existing state.

ii. Outline the Legislations and Regulations relevant to the project.

iii. Identify the major environmental issues of concern through the presentation of baseline data which should include social and cultural considerations. Assess public perception of the proposed development.

iv. Predict the consequences of the proposed infrastructure environmental, social, economic, and cultural perspectives and develop plans to mitigate any adverse impacts, resolve conflicts and enhance positive ones.

v. Predict the likely impacts of the development on the described environment, including direct, indirect and cumulative impacts, and indicate their relative importance to the design of the development’s facilities.

vi. Identify mitigation action to be taken to minimise adverse impacts and quantify associated costs.

vii. Design a Monitoring Plan which should ensure that the mitigation plan is adhered to.

viii. Describe the alternatives to the project that could be considered at that site.

Outcomes of the EAMP
The expected output of the EAMP report will form a base for implementation of the project. Initially this will contribute to realization of the proposed substations.

Locations of the EAMP
The study area for the assignment is the West Bank and Gaza Strip. A point to note is that due to present security situation, fieldwork on the Gaza strip is not likely to be conducted. The assessments regards Gaza will consequently be based on secondary data (e.g. existing reports, documents and remote sensing data, google earth and satellite data).

Duration and timetable

- Preliminary EIA Report submitted as EAMP 31st December 2007
- Draft EIA Report 31st March 2008
- Final EIA Report 30th April 2008

Scope of works
The EIA is owned by PEA, and constitutes an integral part of the loan agreement and is a condition for project appraisal. Costs related to the EMP implementation should be clearly laid out, and source(s) of funding should be identified. To prepare the EIA report, the Consultant will:
Form a specialized team of experts required to prepare the EIA. The team should include the appropriate specializations to assess the potential impacts and propose a relevant and implementable EMP. The team should be led by a project manager who is knowledgeable of EIA studies for projects of this type and of this magnitude. The team should also include staff familiar with the environmental and social safeguard requirements of the World Bank.

Compile baseline data and existing studies to present the potential environmental and social sensitivities in the area to be served. Due to the nature of the project, it is expected that the consultant will rely to the extent possible on published data, in addition to carrying out representative site visits.

Compile, edit and prepare the Draft and Final Environmental Impact Assessment (EIA) Reports, including an Environmental Management Plan.

Consult with the various stakeholders on the project twice during the project preparation, and ensure that all comments are incorporated into the finalized report.

Contents of the Environmental Impact Assessment (EIA)
The EIA shall be a concise document, which focuses on the most relevant issues, and will elaborate on the consultation activities with various stakeholders involved power transmission including relevant state government officials, non governmental organizations etc.. In order to assess each of the project sub-components for their potential environmental impact(s), the EIA should include the following:

i. An EIA for proposed rehabilitation work; transmission lines/substations, and distribution systems; and
ii. An environmental management plan (EMP) that outlines the mitigation measures required for sub-components during the design, construction, and operation phases.

The EIA is to be conducted as a separate study from THE FEASIBILITY STUDY OF THE INTERCONNECTION OF THE ELECTRICAL NETWORKS OF "EGYPT - GAZA STRIP" (EG) & "JORDAN-WEST BANK" with separate and independent reports.

The following presents the table of contents of the EIA and explains the contents of the documents which can be followed but not limited to.

i. Executive Summary
ii. Project Description (to be supplied by PEA).
iii. Environmental Policy, Legal and Administrative Framework
iv. Environmental Baseline.
v. Analysis of Alternatives.
vi. Potential Environmental and Social Impacts
viii. Environmental Management and Training Plan
ix. Appendices
   a) Detailed Analysis of Data Collected / Measurements
   b) List of Preparations
   c) References
   d) Record of Meetings and Public Consultations.
   e) Draft Resettlement Policy Framework
   f) Guidelines for Handling of Potential PCB Contaminated Oils and Components
Scope of Services and Key Issues to be addressed
Transmission & Sub-Stations: Conduct an environmental impact assessment (EIA) for the proposed and sub-station sub-components. The EIA will include but not be limited to:

- Identification and analysis of relevant environmental and social issues;
- Identification and analysis of the most likely physical constraints;
- Definition of international standards for height, distance from habitation (clearances), livestock, for transmission lines;
- Route selection and right-of-way;
- Existing environment of the proposed project sites;
- Territorial description around the lines; including any endangered natural habitats to be crossed;
- Landscape of lines and sub-station sites;
- Land use;
- Economic and social benefits;
- Identification of any historical and cultural in the vicinity project sites;
- Specifications of materials to be used; and
- Any others site-specific environmental issues;

Distribution: Review the potential environmental impacts for the Distribution subcomponent, which will address a numbers of overhead lines and underground cables 33KV, 11KV and 0.4KV feeders need rehabilitation due to deficiencies including related transformers and switchgear 1 sub-stations connected to them. The review will include, but not be limited to:

- Detailed instructions on proper hazardous waste disposal for equipment being replaced;
- Identification of the presence of transformers 1 equipment with PCB's contaminated oils;
- Identification of any sites where PCB's have been improperly disposed of in the past;
- Specification for materials to be used;
- Definition of international standards such as clearances and hazards preventatives;
- Effects on land use interest by the right-of-way;
- Economic and social benefits;
- Any others site-specific environmental issues;
- Any necessary mitigation measures.

Overall:

- Analyze potential of alternatives to proposed sub- components if major, negative environmental impacts are identified.
- Identify necessary mitigation measures in all sub-components.
- Prepare an environmental management plan. The plan should include details of the management initiatives to be implemented during both the construction and operational phase of the project. The EMP should have three main components:
  - Institutional capacity issues.
  - Environmental mitigation implementation program; and
  - Monitoring program.

Special emphasis will be given to the following:

- Institutional Component:
  - The EMP should describe institutional responsibilities for environmental management of power sector, and the responsibilities for environmental monitoring, reporting and enforcement.

- Environmental Mitigation:
World Bank guidelines presents the key aspects of the mitigation plan. However, for each mitigation measure the EMP should clearly state the responsibilities for implementation and supervision, and cost.

- Environmental Monitoring Plan:
  - Monitoring should aim toward achieving the optimal operation performance as consistently as possible, while resulting in the minimum environmental and social impacts. The Monitoring Plan should clearly state the monitoring parameters, location, frequency, monitoring method, chemical analyses, responsibilities for implementation and supervision, and cost. Performance standards are typically based on national legislation and the guidelines contained in the World Bank's Pollution Prevention and Abatement Handbook.

Conduct public consultations with local stakeholders in conjunction with PEA on the contents of the EIA. Generally, one such consultation is carried out at an early stage of the study (scoping) while the second is conducted when the draft report is available. Public consultation events, feedback of the stakeholders, and the means the feedback was incorporated in the EIA should be clearly documented and presented in the EL4 report.

1.4 Approach and Methodology

In Palestine the Ministry for Environmental Affairs (MEhA) has drawn up draft regulations for EIA procedures. These regulations are assumed legally binding. The methodology adopted for this study conforms to conventional approaches to conducting EIAs for transmission lines, and comprises the following:

- Description of each of the proposed routes according to an appropriate set of criteria, e.g. vegetation type, landscape character, topography, land use etc.

- A framework of impact determinants identified as specific to transmission line projects. The key impact determinants are as follows:

  i. **Biophysical factors**

     | Fauna                          | Flora                          | Physical factors       |
     |--------------------------------|--------------------------------|------------------------|
     | Collision/electrocution        | Vegetation removal             | Soil/bedrock exposure, erosion |
     | Rare/endangered species       | Conservation status            | Terrain, soil stability/slope |
     | Nesting/roosting/movement      | Presence/threat of alien species | Wetlands/drainage lines  |
     | Loss of electricity supply    | Economic value                 |                        |
     | Benefit/decrement of changed habitat | Debris disposal              |                        |
     | Exposure to contaminants (e.g. herbicides, spills of fuel/lubricants) | Wind damage                |                        |
     |                                | Herbicide use                 |                        |
     |                                | Exposure to contaminants (e.g. herbicides, spills of fuel/lubricants) |                        |
Weather conditions
Geotechnical aspects
River crossings

ii. Socio-economic factors

Land use
Existing land use
Future land use
Tenure

Visual
Homo/heterogeneous landscape

Stakeholders
Consumer - Economic development
Landowner - Property value

Community
Consumer behaviour
Cultural resources/amenities
Resettlement
Labour
Public services
Public Safety

iii. Electro technical factors

Servitude
Compensation
Configuration of line/poles
Dimensions

Clearances
Horizontal/vertical
Security/public safety

Electrical effects
Electromagnetic fields
Audible noise
Radio interference

Constraints
Episodic events
Pollution
Access
Costs

➢ Using the typical impact evaluation criteria (extent, duration, intensity, probability, mitigation potential and significance), to compile summary assessment matrices for each of the proposed routes.

➢ Reporting on the above actions, with recommendations that emphasise specific controls and mitigatory measures for the construction and operation (including routine maintenance) phases of the project.

To obtain general information on EIA procedures, a meeting with the Ministry of Environmental Affairs (MEnA) was conducted on 22 November 2007. The minutes of meeting (MoM) are attached to this report (e.g. see Appendix D)

A field survey to examine the environmental aspects of the proposed substation sites was carried out in November 2007 by representatives of the PEA and the Norconsult Environmental Specialist. The results of the fieldwork are presented in the following.
2 PROJECT DESCRIPTION

2.1 Overview

The project entails the development of four new bulk 161/33/22 kV transmission substations and related 161 connection lines in the northern, central and southern areas of the West Bank including installation of NCC/SCADA to balance the power supply throughout the network. The load supplied from the existing connecting points (33 kV, 22 kV and 400 V) with Israeli Electricity Corporation (IEC) will be replaced and supplied from the new reconfigured sub-transmission and distribution system served under these new 161 kV substations. This modification will reduce the purchase tariff paid to IEC, since the new connection point will be at the 61 kV point.

Additional developments include the rehabilitation and extension of the sub 33 kV distribution system and installation of pre-paid meters throughout West Bank and Gaza in all utilities.

2.2 Construction Standards

Construction will be in accordance with applicable standards for the region and internationally. These are assumed to be:

- 161 kV double circuit lines on steel towers
- 161/33/22 kV substations with 2 line bays or more per station
- 33 kV lines on steel/ concrete poles.
- 33/0.4 kV distribution transformers pole mounted up to 315kVA.
- 0.4 kV lines on wood poles with wiring of twisted cables for less losses and maximum safety.
- Service connection cables single-phase self-supported overhead cable. For three-phase service connection, 4x25 mm2 is recommended.
- Metering by pre-paid meters.

Exact clearances of the various structures (substations, transmission and distribution lines) to be built as part of the project will depend on the number of circuits at each voltage and the according number of line bays at each substation location.

The EA is consequently based on range of clearances outlined in Table 1 below.

<table>
<thead>
<tr>
<th>Structure</th>
<th>RoW (meters)</th>
<th>Horizontal (meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>220/33 kV substation per line bay</td>
<td>30.5</td>
<td>70</td>
</tr>
<tr>
<td>220/33 kV substation outside clearance</td>
<td>6 (from fence)</td>
<td></td>
</tr>
<tr>
<td>220 kV line</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>110 kV line</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>33 kV line</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

2.3 Geographical Context and Analyses of Alternatives

To support the overall aim of the EUMP to enable regional interconnections and thus facilitate development of an independent electrical network in the Palestinian areas on the West Bank and the Gaza Strip, installation of substations is an absolute necessity. As a result only alternative locations are analyzed. Plans are also in place for substations in Gaza. However, their type and locations have not been decided. As a result this report only deals with the proposed substation locations on the West Bank. Future development on the Gaza Strip will be considered in the next phase of this study.
Apart from the constraint imposed by the current political situation with varying territorial jurisdictions and consequent need for Israelis to also agree on the proposed locations, criteria used in the selection of location alternatives include, but is not limited to the following (in un-prioritized order):

- Proximity to existing infrastructure (i.e. both electrical and built-up areas)
- Proximity to load centres
- Planned developments (i.e. both municipal infrastructure and industry)
- Site conditions (e.g. such as nature of landscape, ground and ecological conditions)

Figure 1 overleaf shows the identified locations on the West Bank. With the exception of Jenin in the North, several sites were identified at each regional location. Moving from north to south these are the two sites near Nablus, the four sites north of Jerusalem (JDECO) and the four sites in the south of Hebron (HEPCO).

Summarizing the results from the field survey the location alternatives, which appear to entail the least environmental and social impacts are the Nablus 1, JDECO 2 and 3 and the HEPCO 1 sites.

In contrast to Nablus 2, which lies on a stream bank (habitat for white storks and grazing of sheep), Nablus 1 is preferred because it is in an isolated and barren area. Interference with biodiversity (e.g. nesting birds, ecological habitat) and potential adverse effects from pollutant releases is considered to be significantly less than for the Nablus 2 site.

As for the remaining sites these are all in urban areas and consequently mostly entail impacts regards proximity to existing built-up and residential areas rather than adverse effects on ecological resources. In this regard the JDECO 2 and 3 sites are conveniently located next to existing IEC 161/33 kV substation with ample distance (more than 500 to nearby roads and 1 km) to any residential areas. Similarly, the HEPCO 1 site is preferred because of its proximity to the planned industrial development in this area as well as relative isolation as it is in an agricultural area.

Considering the permeable nature of the geology and role in recharging both local and regional aquifers – the main water resource, special care will need to be taken to prevent spills of pollutants (such as fuel and lubricants from construction machinery and transformers).

Similarly, the barren nature of the land and limited vegetation calls for extra care regards measures to minimise drifting (i.e. removal of soil) and consequent erosion.

Site descriptions of the identified location alternatives are organized according to the order in which the sites were visited starting with the Nablus 1 and 2 options and moving North to Jenin followed by the site options near Hebron and Ramallah in the South.
Figure 1. Locations of planned substations
2.3.1 Nablus 1 and 2

Location
The Nablus 1 and 2 sites are located approximately south and northwest of Nablus respectively. Situated in an isolated and barren area Nablus 1 appears more environmentally friendly than Nablus 2 which is close to a stream bank where white storks and sheep were observed. The specifics of each location are described in greater detail in the following.

Nablus 1
The site is located on a hilltop on the north side of the road approximately 3 km east of the junction near Za’tara.

Access is via a dirt road leading up to a 161 kV transmission line tower. The latter is a double circuit line heading east to Jordan, of which only once circuit is being used. One consequently plans to connect to substation to the vacant circuit.

Biophysical characteristics
General: Near the road where the elevation is lower and the area possibly is more sheltered from the wind there is a small grove of olive trees. These trees quickly became more dispersed and eventually disappeared as one approached the top of the hill and the transmission line tower where the terrain was rocky with low brush-like vegetation.

Geology and soil: The underlying geology is mainly weathered limestone. Judging by the coarse surface deposits and fractured outcrops permeability appears to be very good.

In accordance with the density of vegetation the soil is more mineralized with higher composition of particulate and clays towards the lower elevations than the contrary consisting mostly of a thin layer of rock debris (i.e. depressions can be understood as being filled with material from higher a higher elevations)

Vegetation: The brush-like vegetation referred to above. It is characterised by white to yellow clusters of flowery protrusions surrounded with small green leaves.
Nablus 2
The proposed site is situated next to a quarry and stone processing plant on the southern left side of the road.

Biophysical characteristics
General:
The area is relatively flat and derives its lush nature from the small stream which runs through it. The vegetation is characterised by a transition from tall grass and brushes near the stream to pasture further away from the stream banks.

Although the area was quite littered with empty plastic bags, tins and general solid waste, the area provides grazing for sheep and goats. In addition a number of white storks and pigeon were observed in and around the stream.

Geology and soil: Similar to the Nablus 1 site the area consists of weathered limestone and marble with soil thickness increasing toward the plain.

The surface deposits consisted of mixed clay and organic matter, and were quite muddy.

When commented that the hill on the opposite side of the road perhaps would be more suitable due to less vegetation and potential conflict with agriculture and birdlife, counterpart staff from PEA informed that the proposed site was closer to the existing 33 kV line to which it would be connected. In addition the stream was said to mainly consist of waste water from a nearby tannery. There were consequently plans to coordinate development of the substation with installation of a waste water treatment plant.

2.3.2 Jenin
Location
The site is located in the western corner within the proposed Jenin Industrial Estate (JIE). The arrow in the picture below marks the general location.

Access for the JIE has not been established. Instead the general area was viewed from a dirt road some km away.
Biophysical characteristics

**General:** The area belongs to the plain areas in the north around Jenin City and is characterised by a locally highly sensitive aquifer which constitute the main water resource.

**Geology and soils:** The Jenin plain is of quaternary origin and consists of alluvium from the surrounding calcareous rocks (limestone, dolomite, chalk and chert. The soils consist of unconsolidated laminated marl with alternating layers of siliceous sand.

### 2.3.3 HEPCO 1, 2, 3 and 4

**Location**

Four substation sites have been identified in the Hepco service area. Hepco 1 is located in a plain about 1 km outside of the border control on the western margin of the West Bank. The area is relatively undeveloped and like JIE it is one of the few areas that have been designated for industrial development on the West Bank. The remaining Hepco sites all lie within developed areas and consequently entail greater potential for conflicts with existing land use.

**Hepco 1 (view toward west)**

The picture shows the general area viewed toward the west. The arrow marks the proposed site, which is close to an existing industrial establishment.

Like Jenin ground conditions are quaternary alluvium derived from the nearby hills. The permeable nature of the materials suggest the presence of locally sensitive aquifer systems.

**Hepco 1 (view toward east)**

The picture shows the view toward the east. The border control can be seen in the distance.
Hepco 2 and 3
The picture looks east with the Hepco 1 and 2 sites located on the respective southern (i.e. left) and northern (i.e. right) side of the hillslopes. The valley is the same as the one which leads to the Hepco 1 site. An existing high voltage line spans the valley. Ground conditions are similar at both locations with unconsolidated overburden consisting of loamy alluvial soils on top of calcareous rocks. A closer view of both locations is shown in the following.

Hepco 2
The proposed site is near an existing high voltage tower. It appears that the area is used for cultivation. Although not so evident from the picture the distance to nearby buildings is limited with consequent potential for conflicts over land use.

Hepco 3
The picture looks west with the proposed site located near the top of the hill. The area is less built up than the Hepco 2 site.

Hepco 4.
The open area in the middle of the picture marks the proposed site. The site is close to existing high voltage lines, but will have to be positioned carefully to avoid conflicts with the surrounding built-up areas.
2.3.4 **JDECO 1, 2, 3 and 4**

**Location**
The sites are all on the northern border of Jerusalem with sites 1, 2 and 3 on the Israeli controlled side of the separation wall and site 4 on the Palestinian side. Sites 2 and 3 are near the existing IEC 161/33 kV substation in an industrial area whereas sites 1 and 4 are located along the east-west road that encircles Jerusalem. The latter locations are within existing urban areas and consequently entail greater potential for land use conflicts. The locations are shown and described as they are located from west to east in the following.

**JEDCO 2 (view south)**
The picture looks south and shows the proposed site between the RoW or alignment of the existing IEC 161 kV line to the right and 33 kV to the left.

Ground conditions consist of weathered bedrock (calcareous rocks) with scattered brushes.

**JEDCO 3 (view east)**
The picture looks east and shows the proposed location next to existing IEC 161/33 kV substation on the right. Ground conditions and vegetation are the same as for the JEDCO 1 site.

**JEDCO 1**
The picture looks west toward the JEDCO 2 and 3 sites. The proposed site lies in the open area between on the left (southern side) of the picture.
The JDCO 1 site in greater detail. The area and distance to buildings seem large enough to avoid conflicts over land use.

Ground conditions consist of weathered bedrock and alluvium.

**JDECO 4**

The JEDCO 4 site lies in an open area between the road and buildings on the southern side (left) of the road next to the existing 33 kV line.

Ground conditions are similar to the JDECO 3 site.

The JDCO 4 site in greater detail.
3 ENVIRONMENTAL POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 World Bank

The World Bank Governing policy is OP 4.01. Considering that project activities will be largely confined along existing infrastructure and road alignments, conflicts with natural habitats and sites of cultural/historical value are unlikely. As a result it is assumed that additional policies such as Natural Habitats (OP4.04) and Cultural Property (OPN 11.03) are not triggered by the project activities. However, upon using the screening checklist if it is found that any of these policies are triggered by a subproject, then a subproject specific EMP will be prepared and implemented, that will comply with the policy that is triggered.

Conflicts may, however, arise where residents/ businesses will have to be temporarily moved to allow access to erect poles and connect the overhead wires. The applicable policy concerning compensation and resettlement in these cases are World Bank OP and BP 4.12. The applicable policy and procedures are set forth in the Resettlement Policy Framework (RPF) to be included in the subsequent phase of this report. This document is disclosed separately by the World Bank.

At present this project is categorized as “B”. This means all components of the Project with the exception of capacity building will be subject to environmental assessment (EA). An explanation of category B requirements follows.

Category B: A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas — including wetlands, forests, grasslands, and other natural habitats — are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects.

The scope of EA for a Category B project may vary from project to project, but it is narrower than that of Category A EA. Like Category A EA, it examines the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

Main concerns for the EA will be the impacts arising from the siting/ routing of substations and high voltage transmission lines followed by the impacts arising from the rehabilitation/ extension of the sub-transmission and distribution network.

3.2 Ministry of Environmental Affairs (MEnA)

The Ministry of Environmental Affairs (MEnA) has two formats for environmental assessment.

The first is an Initial Environmental Evaluation (IEE) or screening, which covers projects were significant impacts are uncertain and/ or unlikely due to the size of the operation (e.g. such as smaller projects undertaking works in already disturbed areas). Based on the IEE the MEnA decides whether more detailed assessments in the form of revisions or a full scale EIA is necessary for licensing of the proposed operation.

The second is a full Environmental Impact Assessment, which covers projects where impacts will occur to natural areas and/or to natural resources, as a result of new activities. The regulations covering the environmental assessment are covered principally by the Environmental Assessment Policy through resolution (27-23/4/2000) and the Environmental Law of 1999.

Initial evaluation by the World Bank and PEA has determined that although impacts are anticipated to be limited and manageable that a limited EA and EMP are necessary.
Under the terms of the 1999 Regulations, the onus is on the Palestinian Energy Authority (PEA) to submit an EIA and EMP report for approval. Thereafter, MEnA will take up to 28 business days to review the project outline and determine whether EA approval would be withheld or the conditions under which approval would be granted.

In terms of this project, the works are covered under the Environmental Policy. The works schedules (as given in Table 1) are covered as indicated in Box 1. A flow chart of the EA administrative procedure is given in Figure 1 below.

**Box 1.**

**PROJECTS THAT REQUIRE PROJECT EAMP, PART B**

**Annex 1. Projects**

- Power Plants (incl. gas turbines, substations and high voltage lines).
- Quarrries and mines,
- Waste water treatment plants incl. main sewers
- Solid and hazardous waste disposals sites,
- Airports, landing strips, seaports, jetties and harbours,
- Major industrial estates (e.g. refineries, steel mills and cement plants)
- Major dams and reservoirs
- Major roads

**Annex 2: Others**

Extensions of existing projects of the types listed above and projects located in or near environmental sensitive areas such as:-

- areas prone to flooding and natural hazards;
- water catchments containing major sources for public, industrial or agricultural uses; and
- areas of human settlements (particularly those with schools and hospitals).

The project works are expected to be covered to the largest extent through an Environmental Management Plan (EMP). This document will be guided by applicable international (i.e. World Bank OP4.01) and MEnA 1999 and 2000 Regulations, in addition to regulations covering Waste Management, Noise, Air Pollution, Water Pollution, Disposal of Hazardous Wastes (in this instance, sewerage effluent), and Control of Pesticides and Toxic Substances.
Figure 2. EA administrative process
4 ENVIRONMENTAL BASELINE

4.1 Geography

Historical Palestine constitutes the western point of the arable lands of what is known as the Fertile Crescent, which curves around the Syrian Desert. Between the sea and the desert, the topography changes frequently, and often in sharp contrast, due to numerous movements in its surface formation and due to juxtaposition of its two very different subtropical climatic fronts: Mediterranean and desert climates. From the large fertile plains dominating the north, to the coastal plains in the west, the land relief rises suddenly in the east.

The mountains of the West Bank, with their highest point at Jabal al-Assur (1015 m, in the Ramallah region), offer a wide range of landscapes. The mountain chain is grooved by deep valleys (wadis), abundant for farming and wild vegetation. Further east, the rolling hills plunge into the depths of the Jordan Valley and the Dead Sea, which at 400 m below sea level is the lowest point on earth. Its record concentration of salt (290 g per litre at the surface) creates an unusual experience for swimming. To the south stretches the Negev (Nabq), a desert of rocks and mountains.

The Jordan Valley is a continuation of the Afro-Syrian rift which separates the African tectonic plate from the Asiatic one. The shifting of these plates has created an extraordinary depression which has three parts: the East African rift, the Red Sea and the Dead Sea rift, which continues to the mountains of Lebanon. On either side of the Jordan River, the rock formations are sliding in opposite directions (1 cm per year). The correspondence between the geological formations is perfectly visible every 105 kilometres. A good illustration is the copper mines of Feinan in Jordan (north of Shobak) and their twin mines of Timna in the Arava (20 km north of the Gulf of Aqaba).

Geologically the Gaza Strip and the West Bank are distinct. The coastal plain of Gaza is composed of sand dunes and fertile sandy sediments. Except for tufa (a porous limestone, kurkar in Arabic) there are no other rocks in this region. In contrast, the West Bank is dominated by low mountains: Mount Jarzim (881 m), Mount Nabi Samuel (875 m), and Mount Masharif or Mount Scopus (825 m). The rocks are principally composed of marine sediments (limestone and dolomite). The porosity of these rocks permits water to filter down to the non-porous strata, which supply water to the numerous aquifers in the region. In particular the highlands of the West Bank constitute the main recharge areas for the coastal aquifer of Israel.

4.2 Climate

The West Bank and surrounding areas have a Mediterranean climate characterized by long, hot, dry summers and short, cool, rainy winters, as modified locally by altitude and latitude. The climate is determined by the area’s location between the subtropical aridity characteristic of Egypt and the subtropical humidity of the Levant or eastern Mediterranean. January is the coldest month, with temperatures from 5 C to 10 C, and August is the hottest month at 18 C to 38 C.

The Middle Eastern summer is eased by breezes coming from the Mediterranean Sea. However, during the months of April, May and mid-June the area experiences waves of hot, dry, sandy and dust Khamaseen winds which originate from the Arabian desert.

About 70 percent of the average rainfall in the country falls between November and March; June through August are often rainless. Rainfall is unevenly distributed, decreasing sharply as one

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2 From Alternative tourism group [www.atg.ps](http://www.atg.ps)
moves southward. In the extreme south, rainfall averages less than 100 millimetres annually; in the north, average annual rainfall is 1128 millimetres.

Rainfall varies from season to season and from year to year, particularly in the Negev Desert. Precipitation is often concentrated in violent storms, causing erosion and flooding. During January and February, it may take the form of snow at the higher elevations of the central highlands, including Jerusalem. The areas of the country most cultivated are those that receive more than 300 millimetres of rainfall annually; about one-third of the area is cultivable. However, the inconsistency of rainfall throughout the months and years requires that most vegetable cultivation be supplemented with irrigation to ensure normal growth.

Palestine receives an average of seven hours of sunshine a day during the winter and thirteen hours during the summer. As a consequence, rooftop solar collectors are extensively used to capture the solar energy and to replace limited and expensive available energy resources.

The average annual relative humidity is 60% and reaches its highest rates during the months of January and February. In May, however, humidity levels are at their lowest. Night dew may occur in up to 180 days per year. An overview of the main weather parameters, temperature, precipitation, relative humidity and average wind speed is shown in Figure 3.
4.3 Flora and Fauna

General

Adjusting to different habitats (Mediterranean, semi-arid, coastal plain) the flora and fauna are represented in all their diversity. Over 2,800 species of plants have been identified here on a comparatively small area. In the last century there were still large wooded areas, but they were sacrificed when the railway was built and wood was required for it. Today, fruit trees (olive, almond, orange, apricot ...) dominate the countryside while wild species such as pine, cypress, carob, acacia and turpentine trees are limited to certain regions (in the Galilee and on Mt. Carmel), on the edges of villages and in wadis.

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4 From [www.wikipedia.org](http://www.wikipedia.org) and Alternative Tourism Group [www.atg.ps](http://www.atg.ps)
The vast wild desert or semi-desert mountainous spaces are a refuge for various wildlife species of which some can be observed in the wadis in the early morning or at dusk. The Nubian ibex (Capra ibex nubiana) and the Dorcas gazelle (Gazella dorcas) are common on the hills of the West Bank. In Wadi Araba, another gazelle (Gazella gazella) and the rock daman (Procavia capensis), a member of the marmot family, are amongst the most numerous and accessible animals. Predators also exist here: wolves (Canis lupus) are common in uninhabited areas, panthers (Panthera pardus) make their home in the arid mountains of the South Hebron Hills, and striped hyaena (Hyaena hyaena) live near remote villages where one sometimes hears their laughing cry.

**The Olive Tree**
The supreme symbol of Palestine, the olive tree symbolises the deep connection of Palestinians to their land and has a primordial place in Palestinian agricultural activity. The cultivation of olive trees and the production of oil have been recorded since Neolithic times; ancient jars containing olive oil dating from 6000 BC have been discovered in Jericho. In the ancient city of Ekron (Tel Miqne), over a hundred olive presses dating from the Iron Age have been discovered. The production capacity of this city of Philistine is estimated to have been half a million litres of olive oil annually. The very landscape has been sculpted by olive culture, in the creation of terraces to retain rain water. The traditional farming of the olive tree is a way of life as much in the West Bank as in the Galilee.

In the West Bank, about 10 million olive trees cover the hills. Olive trees make up 80% of tree-covered land in the West Bank and Gaza. Olive oil comprises 15%-19% of the Palestinian agricultural output, depending on season. In 2004, 30,000 metric tons of oil were forecast to be pressed from 151,000 metric tons of olives, and 11,426 metric tons were to be processed as pickled olives; the export of Palestinian olive oil to Arab countries has nearly ceased, however, due to movement restrictions. Indeed, of the 277 olive presses in the OPT, only 215 are operating; as a result of the declining economic situation, 62 presses are temporarily closed.

**Birds**
Ornithologists are advised to bring bird guides with them, as Palestine is undoubtedly an ideal observation post for bird lovers. In spite of its scarcity of land, more than 470 species have been recorded. Thanks to the area’s ecological diversity, various species either live here on a permanent basis or at least part of the year (349 species) or regularly pass through the coastal areas or the Jordan valley (121 species). The region is at the junction of the Asian, European and African continents and thanks to its wide variety of climate and topography, the region is a superb migratory route; ornithologists estimate that up to 500 million birds migrate in the spring and autumn.

Peak migration time is between March 10 and April 20. The West Bank with greater number of surface water resources, attracts the greatest number of birds. The Negev desert (Sahara en-Naqab) and the Jordan Valley also attract travellers thanks to their low barometric depressions or air thermals, which make it easy for birds to soar for long distances with a minimum of energy. The migration of storks is particularly remarkable and an impressive sight: Palestine and Israel are on the migratory route of 85% of the world’s stork population.
5 POTENTIAL IMPACTS AND CONVENTIONAL MITIGATION MEASURES

5.1 Methodology

The conventions used for the assessment of impacts are summarised in Table 2 below. The resulting assessments are structured with initial emphasis on the proposed substations. General impacts resulting from the erection of poles and overhead wires have been included to form a framework, which can be refined as information from the ongoing Feasibility study become available.

Table 2. Summary of conventions used for impact assessment

<table>
<thead>
<tr>
<th>Descriptive adjective</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status:</strong></td>
<td></td>
</tr>
<tr>
<td>- Positive.</td>
<td>Nature of the impact. - Beneficial environmental change.</td>
</tr>
<tr>
<td>- Negative.</td>
<td>- Adverse environmental change.</td>
</tr>
<tr>
<td><strong>Extent:</strong></td>
<td>The area affected by the impact.</td>
</tr>
<tr>
<td>- Local.</td>
<td>- Proposed Development Block.</td>
</tr>
<tr>
<td>- Sub-regional.</td>
<td>- Surrounding Districts/ villages.</td>
</tr>
<tr>
<td>- Regional.</td>
<td>- Area served by utility West Bank/ Gaza Strip.</td>
</tr>
<tr>
<td>- National.</td>
<td>- West Bank and Gaza Strip</td>
</tr>
<tr>
<td>- International.</td>
<td>- Mozambique and South Africa.</td>
</tr>
<tr>
<td><strong>Duration:</strong></td>
<td>The period over which impacts will continue.</td>
</tr>
<tr>
<td>- Short-term.</td>
<td>- Within a period of 6 months.</td>
</tr>
<tr>
<td>- Medium-term.</td>
<td>- Within a period of 6 months to 2 years.</td>
</tr>
<tr>
<td>- Long-term.</td>
<td>- For the lifecycle of the project.</td>
</tr>
<tr>
<td>- Permanent.</td>
<td>- Permanent – residual impacts.</td>
</tr>
<tr>
<td><strong>Intensity:</strong></td>
<td>The severity of impact on the site:</td>
</tr>
<tr>
<td>- Low.</td>
<td>- Impact of low severity - minor effects.</td>
</tr>
<tr>
<td>- Medium.</td>
<td>- Medium severity - major effects.</td>
</tr>
<tr>
<td>- High.</td>
<td>- High severity impacts.</td>
</tr>
<tr>
<td><strong>Probability:</strong></td>
<td>Description of the likelihood of impact occurring:</td>
</tr>
<tr>
<td>- Definite.</td>
<td>- Definite.</td>
</tr>
<tr>
<td>- Highly probable.</td>
<td>- Most likely.</td>
</tr>
<tr>
<td>- Probable.</td>
<td>- Distinct possibility.</td>
</tr>
<tr>
<td>- Improbable.</td>
<td>- Unlikely to occur.</td>
</tr>
<tr>
<td><strong>Confidence:</strong></td>
<td>Degree of confidence in predictions.</td>
</tr>
<tr>
<td>- Low.</td>
<td>- Poor confidence that predictions will occur.</td>
</tr>
<tr>
<td>- Medium.</td>
<td>- Good confidence that predictions will occur.</td>
</tr>
<tr>
<td>- High.</td>
<td>- Certain that predictions will occur.</td>
</tr>
<tr>
<td><strong>Significance:</strong></td>
<td>- Requires no further investigation, no mitigation or management.</td>
</tr>
<tr>
<td>- No significance.</td>
<td>- Requires mitigation and management to reduce impacts to acceptable levels (if negative).</td>
</tr>
<tr>
<td>- Moderate significance.</td>
<td>- Should influence a decision about the project if the impact cannot be mitigated or managed.</td>
</tr>
</tbody>
</table>

5.2 Construction Phase

5.2.1 Biophysical impacts

Soils

*Potential Impact* – Increase in erosion during site preparation and the excavations of foundations.
Increased risk of erosion may occur as a consequence of alteration of natural drainage patterns and/or run-off from soil stockpiles.

- Status: Negative
- Extent: Local
- Duration: Short term
- Intensity: Low
- Probability: High
- Significance: Low

*Mitigation Measures:* Every effort should be made to separate and remove or maintain the integrity of the topsoil (A horizon) to at least a depth of 20 cm. The separate removal, storage, and replacement of the topsoil and subsoil (lower horizons) ensure the preservation of the edaphic characteristics of the soil profile, and hence continued soil productivity.

*Potential Impact – Increased erosion along slope areas*

This potential impact is likely to occur at all sites, but with intensity increasing with the slope of the terrain.

Increased risk of erosion is associated with excavations of foundations for (substations and towers/poles) clearing the RoW and opening of access roads.

- Status: Negative
- Extent: Surrounding area
- Duration: Short term
- Intensity: High
- Probability: Highly probable
- Significance: High

*Mitigation Measures:* increasing the water retention capacity of soils, decreasing the volume and speed of superficial run-off and training of slopes (through installation of support structures).

Ground cover plants (e.g. creepers and the herbaceous stratum) with soil binding properties should be preserved and replanted, where necessary and possible.

Whenever poles need to be erected on sloping sites or near watercourses, special attention must be paid to re-vegetation using appropriate species. Nevertheless the most practical solution would be to leave intact the herbaceous stratum of creepers and shrubs. Where there is limited vegetation consideration must be given to installation of support structures.

Re-vegetation with slow growth-rate shrubs or with small stature and slow growth rate timber species will also contribute to water retention and subsequent decrease in erosion risk.

Whenever possible, access roads should not be constructed in steep sloped areas. If unavoidable least impact designs should be used.

*Potential Impact – Compacting of the soil*

This is typically caused by the repetitive operation of mainly heavy construction equipment (especially vehicles). Compacting of the soil results in a decrease of available space for water and air in the soil, making it difficult for roots to develop, which again affects the growth of plants. The more malleable soils, of a clay loam to clayish texture, are most prone to compaction.

- Status: Negative
- Extent: Surrounding Area
- Duration: Short term
- Intensity: Medium
- Probability: Definite
- Significance: Medium

**Mitigation Measures:** After completion of the construction phase, affected soils, (especially those used for agriculture) should be ploughed and ripped (i.e. tilled to a depth of 60 - 100 cm).

**Potential Impact** – Pollution caused by waste produced during construction

During the construction phase consumables such as fuels, lubricant oils, detergents, cement, and other chemicals will be used. At base camps, domestic refuse will also be generated.

- Status: Negative
- Extent: Surrounding area
- Duration: Short term
- Intensity: Medium
- Probability: Definite
- Significance: Low

**Mitigation Measures:** Construction sites, warehouses and temporary base camps should be kept clean, in order to avoid possible fires. The burying and abandoning of waste in temporary landfill sites requires that the soil’s upper horizon must be stockpiled and replaced on decommissioning the landfill site.

Pollutant materials, such as fuels, lubricants, detergents, cement and others must be handled with special care, in order to avoid spillage. Fuelling and washing of machinery should be conducted in places where potential spills can be contained (i.e. on impermeable platforms with dedicated collection facilities).

Concrete residues with no further use should not be arbitrarily disposed, but broken down into small pieces and disposed in appropriate landfill sites.

Biodegradable packages (paper, cardboard, wood) can be either disposed in landfills or incinerated. Plastic bags and packages that were used as toxic waste containers (fuels, lubricants, etc) should be rendered useless (torn or perforated) and deposited in landfills; any re-usable containers etc can be made available to local populations.

**Hydrology**

**Potential Impact** – Interference with natural drainage and flow perennial and seasonal rivers.

The accumulation of sediments and other debris from construction-related activities may cause alterations in river flows or riverbed morphology. Due to the arid climate perennial water bodies are scarce. With the exception of a small stream near one location alternative (i.e. Nablus 2) there were no perennial or seasonal water bodies. The significance of this impact is therefore considered low.

- Status: Negative
- Extent: Surrounding area
- Duration: Short term
- Intensity: Medium
- Probability: Probable
- Significance: Low
Mitigation Measures: Good practice for construction near water bodies generally includes the following:

- The installation of structures (both substations and poles/support structures) during construction should not be within a minimum distance of “50 metres measured from the highest water level reached during periods of intense precipitation”. Any exception must be previously notified and properly reasoned.

- Cut down tree trunks should not be deposited on riverbeds, even if temporarily dry (whenever tree trunks fall into the river, these should be removed immediately). Any removed vegetation should be disposed far from rivers or streams. Whenever possible, these remains should be collected manually and never incinerated.

- No materials originating from excavations shall be thrown into watercourses.

- Trees situated on the banks of rivers and streams must not be uprooted; it is recommended that they are pruned in order to adjust their shape or, if absolutely necessary, cutting the trunk at ground level.

- Whenever possible, the construction of access roads over watercourses should be avoided. When this is not possible, the crossing must be done at an acute angle (as tight as possible) but never perpendicular.

- When the construction of bridges (even temporary ones) cannot be avoided, special attention must be paid to the stability of the river or creek margins and to the need to preserve the riparian vegetation. Interference with the physical conditions, that allow the movement of fish, must also be kept to the minimum possible.

Vegetation and Flora

Potential Impact – Destruction of vegetation in the area to be cleared for installations of substations and in the corridor to be developed under the power line

Installation of substations, transmission and distribution lines requires site preparation (excavation of foundations) and clearing a corridor, free from obstacles, for the purpose construction and routine line maintenance. The clearing of this corridor entails the removal of all vegetation within the recommended RoW clearance for the line (e.g. 30 m for 161 kV line). Considering the arid climate and limited extent of vegetation this impact is also likely to be limited.

- Status: Negative
- Extent: Surrounding area
- Duration: Long term
- Intensity: High
- Probability: Definite
- Significance: Medium/Low

Mitigation Measures: Although vegetation can be removed mechanically, it is preferable to use manual labour, especially near the riverbanks and steep slope areas.

On no account should herbicides or fires be used. This should be reinforced with awareness education regarding the environmental impacts associated with different methods of vegetation clearance.
Trees located near the corridor, and considered potentially hazardous for the construction and/or operation of the power line, must be identified. Each tree must be assessed to determine the level of removal required (pruning to total removal).

**Potential Impact – Loss of the sensitive habitats**

The removal of vegetation for site preparation and clearing of RoWs may entail the destruction of areas of particularly important habitats, such as olive groves, the riparian vegetation and remnant forests. Within the context of the identified substation location this is only applicable at the Nablus 2 site as little or no vegetation was observed at the remaining substation sites. For installation of overhead lines potential loss of habitats remains to be ascertained.

- Status: Negative
- Extent: Localised
- Duration: Long term
- Intensity: High
- Probability: Definite
- Significance: Medium/Low

Mitigation Measures: No clearance of vegetation will be permitted within a minimum distance of 15 m from the highest level reached by the waters in rivers and other watercourses.

Existing swamps and temporary lagoons must be avoided. When this is not possible, special care must be taken regarding:

- The use of non-pollutant and corrosion proof materials for pole foundations,
- Spillage of fuels and lubricant oils; and
- Abandoning or depositing any other products in sensitive habitats.

### 5.2.2 Socio-economic impacts

#### Population

**Potential Impact – relocation of residents and their dwellings**

Several of the identified substation sites are in built-up areas, but none are likely to entail relocation of people. Proximity to existing buildings and the general public is more a concern with regards to aesthetics, audible noise from the corona effect and long-term effects from electromagnetic fields. These potential impacts are considered under the operational phase. Temporary relocation may, however, become necessary as part of the rehabilitation and extension of the distribution network. The following should therefore be regarded as guiding principles to be refined as the designs and specific configurations become available from the technical study.

- Status: Negative
- Extent: Localised
- Duration: Long term
- Intensity: High
- Probability: Definite
- Significance: Medium/High

Mitigation Measures: The overriding principle should be mitigation by re-alignment. If this is not possible (i.e. only envisaged in very special circumstances) it will be necessary to negotiate relocation and compensation for the affected families. In case relocation is necessary, as far as possible, the relocation of people, their dwellings and possessions to other localities, should not affect their social organisation. Special consideration should be applied in case where land-take
for electrical installations affects livelihoods (e.g. when income is derived from the land and dependent on the original location).

During negotiations with families requiring relocation the following considerations are applicable:

- Establishment of financial compensation for the loss of dwellings, agricultural land, crops and fruit trees;
- Availability of new land for agriculture and other affected businesses; the area/property should meet family needs to maintain income generating potential;
- Zero or positive impact on household incomes derived from the sale of products and services – Existence of or proximity to employment opportunities;
- Access to communications and transport routes;

For the purpose of this project:

- Re-location = moving dwellings 50 – 100 m
- Resettlement = not applicable (i.e. this entails moving people to a different geographic location. Entails issues such as cultural assimilation in host areas, access to natural resources, livelihoods and services, etc.)

**Potential impact – Loss of access to land**

- Status: Negative
- Extent: Localised
- Duration: Permanent
- Intensity: High
- Probability: Definite
- Significance: High

**Mitigation Measures:** Similar as outlined above proposed structures should be re-aligned if they hinder access to land. If this is not possible it will be necessary to negotiate a financial compensation for potential affected families and or companies. During negotiations the following considerations are applicable:

- Availability of new land/property
- Zero or positive impact on household incomes derived from the sale of products and services;
- Ensure harvesting of affected crop fields
- Compensation to take into account loss of income generation.

**Potential Impact:** Disruption to traffic and pedestrian access

In urban areas excavations of foundations and the installation of overhead lines is likely to disrupt traffic, pedestrian access and pose a general hazard to bystanders if not managed properly.

- Status: Negative
- Extent: Surrounding area
- Duration: Short term
- Intensity: Medium
- Probability: Probable
- Significance: Low

**Mitigation Measures:** Where construction works are to take place near major roads, traffic detour routes must be pre-arranged with the City Council and the Traffic Department. In the case of dual
carriageways, one side of a carriageway may be closed and single lanes used as temporary
detours, while a line section is installed, and then the other side can be closed in a similar fashion.
Where it is not possible to redirect traffic around works locations, the sections under repair /
construction should be closed off and traffic rerouted according to a schedule drawn up by the
Contractor in cooperation with the City Council Engineer.

Access at entry and exit points to works sites should be controlled and heavy trucks should be
assisted by traffic controllers as they enter and leave works sites.

Potential Impact: Presence of non-resident labour and their temporary camps

In the case of the proposed substations these will be built by Israeli companies with labour from
the region. Construction is consequently not likely to entail migrant labour.

Temporary accommodation will, however, be necessary for workers involved in the construction
of overhead transmission lines. It is assumed that most workers will travel home to their families
weekly. Conflicts arising from workers interaction with local populations are therefore considered
to be limited.

- Status: Negative
- Extent: Surrounding area
- Duration: Short term
- Intensity: Medium
- Probability: Probable
- Significance: Low

Mitigation measures: create awareness among workers in order to foster good relationships with
local communities, ensure that mechanisms exist for effective negotiation, mediation and conflict
resolution.

Although the potential for spreading of sexual transmitted diseases is considered to be very
limited, awareness creation should be included as part of the environmental management plan.

Potential Impact: Public and occupational safety

Potential negative health impact from exposure to transformers oils

It is anticipated that rehabilitation/ reconfiguration of the distribution system will entail a check of
existing transformers to replace units and/ or inherent oil to ensure proper functioning and that no
transformers contain PCB’s. It is consequently essential that the necessary routines and
procedures are put in place to ensure safe the safe handling of such oils. This will be described in
a separate document to be attached to this report.

- Status: Negative
- Extent: Localised
- Duration: Short term
- Intensity: Medium
- Probability: Probable
- Significance: High

Mitigation measures: All workers should go through a training course on handling of transformer
oils to ensure that appropriate:

- Protective clothing is worn
- Procedures are followed regards refilling, storage and disposal
- Containment and clean-up actions are taken in case of spills
- Warning/notice is given

**Agriculture**

A small loss of agricultural land 1-2 hectare is likely to occur at the proposed Jenin and HEPCO 1 site. Smaller losses of arable land may apply to the HEPCO 2 and 3 sites. The applicability of this impact to the construction and rehabilitation of the distribution lines will need to be checked pending information from the technical study.

However, several sections of the distribution lines are likely to traverse cultivated fields. During construction, temporary and/or permanent loss of land will unavoidable.

*Potential Impact – Loss of agricultural land*

This will occur at above mentioned substation locations pole locations and also wherever access roads are constructed.

- Status: Negative
- Extent: Localised
- Duration: Long term
- Intensity: Medium
- Probability: Highly probable
- Significance: Low

**Mitigation measures:** Reaching agreement with land users, regarding financial compensation and/or resettlement on new lands.

*Potential Impact – Loss of crops, harvests and fruit trees*

Loss of crops, harvests and fruit trees will occur if cultivated lands are lost and when the line and temporary access roads cross these lands. The extent of impact is limited, and it can only be better defined after the negotiation phase defined in the Environmental Management Plan (EMP).

- Status: Negative
- Extent: Localised
- Duration: Short term
- Intensity: Medium
- Probability: Definite
- Significance: Low

**Mitigation measures:** Reaching agreement with land users, regarding financial compensation and facilitating the harvest of potentially affected crops.

**Historical, archaeological and holy sites**

*Potential Impact – Interference with any discovered sites of archaeological or cultural value*

During fieldwork, no sites of interest were identified and also there is no available information about the occurrence of any sites with archaeological or cultural value along the course of the distribution network. However, during the excavation work or during the opening of roads or trails, the discovery of sites with such value may occur.

- Status: Negative
- Extent: Localised
- Duration: Permanent
- Intensity: Medium
- Probability: Probable
- Significance: Low

*Mitigation Measures:* The discovery of any material, believed to be of cultural and/or archaeological value must be reported to the relevant competent authority. Specific training and information on this material should be provided to the technicians that will be working in loco.

When in doubt about a potential discovery, the work must be interrupted until the competent authorities assess the situation.

*Potential Impact – Interference with holy sites*

No holy forests or lakes, that serve large communities or family groups, were found. However, in its final course, the line might run over traditional family cemeteries.

- Status: Negative
- Extent: Localised
- Duration: Permanent
- Intensity: Medium
- Probability: Probable
- Significance: Low

*Mitigation Measures:* Where this kind of impact is unavoidable, traditional procedures should be respected (Hebrew, Muslim and Christian as relevant).

**Areas of particular ecological importance**

*Potential Impact – Loss of high ecological value forests*

No such forests were found at the proposed substation sites or en-route. The applicability of this potential impact will need to be checked as configuration of the electrical network is established.

- Status: Negative
- Probability: Improbable
- Extent: Localised
- Duration: Permanent
- Intensity: High
- Significance: High

*Mitigation Measures:* Construction should aim to minimise the destruction of forest and special precautions should be taken into consideration during construction, for example:

- Do not open any additional access roads within the reserve but, where possible, use the servitude of the line;
- The use of heavy equipment and machinery should not be permitted;
- Avoid the unnecessary destruction of vegetation shorter than 3,5 meters high within the servitude, and do not cut down any trees outside this area.
- Implement stricter mitigation measures related to erosion, soil compaction, pollution, propagation of invasive plants and interference with bird life within the reserve area.

### 5.3 Operation Phase

#### 5.3.1 Biophysical impacts

**Vegetation**

*Potential Impact:* Accelerated propagation of invasive plants.
Considering the limited land-take for substations and arid nature of the terrain this potential impact is more applicable regards the clearing of a RoW for new transmission lines. The latter creates the right conditions for the propagation of invasive plants. These species may be particularly detrimental to rare and endemic vegetation and agriculture because they are very difficult to combat. A successful invasion by exotic species can be devastating for ecosystems because in most cases it is impossible to eradicate or even effectively limit their numbers.

- Status: Negative
- Extent: Surrounding area
- Duration: Long term
- Intensity: Low
- Probability: Probable
- Significance: Low

**Mitigation Measures:** The maintenance crews must be trained to recognize alien invasives and must systematically carry out their elimination. These crews must also create awareness among subsistence farmers in the vicinity of the line about the need to fight these invasive plants.

**Fauna**

Bird interference with electrical installations is a global phenomenon and therefore merits special attention. This is particularly the case for transmission and distribution lines, but may also be applicable to substations if inherent structures offer attractive shelter. The types of bird interaction with power lines that are likely to occur include electrocution, collision, pollution and nesting.

**Potential Impact:** Bird interference.

Interference may have a positive impact, e.g. the use of poles as nesting sites and the use of the lines as roosts, and also a negative impact, e.g. injuries caused by collisions, death by electrocution, and corrosion of the insulating materials due to the residues left by the birds.

- Status: Negative & Positive
- Extent: Surrounding area
- Duration: Long term
- Intensity: Medium
- Probability: Highly probable
- Significance: Medium

**Mitigation Measures:** A set of conventional technical solutions can be applied, including installation of barriers, employing designs which deter approaching animals, the reorientation of poles, deflection devices that make the lines more visible, and insulation against residues. The effect on species will need to be examined in greater detail as the design configurations are established.

**Hydrology and soil**

**Potential Impact** – Pollution caused by accidental release of oil from transformers

The malfunctioning of transformers during operation may cause release of inherent oil (lubricant), which may infiltrate in the ground and affect underlying aquifers and/ or nearby streams/ rivers.

- Status: Negative
- Extent: Surrounding area
- Duration: Short term
- Intensity: Medium
- Probability: Definite
Significance: Low

_Mitigation Measures:_ Transformers and electrical installations containing oils or other potential pollutants must be placed on appropriate containment structures (i.e. impermeable surfaces with collection basins).

As for the construction phase pollutant material (fuel, lubricants, detergents etc) must be handled with special care, in order to avoid spillage. Fuelling and washing of machinery should be conducted in places where potential spills can be contained (i.e. on impermeable platforms with dedicated collection facilitates).

**Air**

_Potential Impact_ – Atmospheric pollution from transformer generated fires

The electrical malfunctioning of transformers may cause the oil in the transformer to ignite with consequent potential for violent fires and associated air pollution from release of harmful gases and particulate material.

- Status: Negative
- Extent: Locally
- Duration: Short term
- Intensity: Medium
- Probability: Probable
- Significance: Medium

_Mitigation Measures:_ Consideration must be given to prevailing wind directions and natural barriers when locating substations. Whenever possible substations should be not be located directly upwind from nearby residential communities and in such a way that natural topographic features (hills and trees) may retard pollutant spreading. The extent of this potential impact will of course depend on distance to nearby communities and is more important for substations in urban areas than those in peripheral or in rural areas.

**Weather (temperature, wind, ice, rain snow and electrical storms)**

_Potential Impact_ – Failure/ equipment malfunctioning due to weather.

As dependence on the use of electricity grows, it is increasingly important that the electrical installations operate more reliably in extremes of weather than in the past. With emphasis on substations the following considerations apply.

- Status: Negative
- Extent: Surrounding area
- Duration: Long term
- Intensity: Medium
- Probability: Definite
- Significance: Medium/ Low

_Mitigation Measures:_

Temperature: It is necessary to design a substation for the extreme temperatures expected. Extreme temperatures could affect circuit breakers, relay protection, or the bus.

Wind: As a minimum, substations should be resistant to wind velocities in the order of 130 to 90 km/h near the coast and high altitude areas. design. Local conditions may dictate more stringent wind designs.
Ice: A substation should continue to operate despite ice accumulation. Generally, consensus equipment standards specify ice loadings for both electrical and mechanical withstands. The complete substation assembly should also be undamaged by ice accumulation. From the ice accumulation history for a given substation’s location, the engineer can judge whether more severe loadings than consensus equipment standards are necessary.

Rain: A substation should be designed to be operable under predictable conditions of rainfall. Additionally, it is desirable that substation drainage be sufficient enough to exhibit little standing water within a few hours after a heavy rainfall.

Snow: Snow introduces an extremely variable hazard to substations because of uncertainties in drifting and accumulation. The substation has to be impervious to snow damage, and consideration needs to be given to snow accumulation and the maintenance of clearances. The engineer should seek local data on this weather variable.

Electrical Storms: The two measures normally employed for substation lightning protection are surge arresters and shielding. Surge arresters provide little protection against direct strokes. Shielding is provided by overhead wires, masts that are extensions of structures, or independent masts. A combination of surge arresters and shielding will reduce the probability of damage from lightning.

**Earthquakes**

*Potential Impact:* Failure/ equipment malfunctioning due to earthquakes.
Earthquakes albeit of mostly smaller magnitude are frequent throughout the West Bank and the surrounding areas as the region lies along the northern extension of the African rift system.

- Status: Negative
- Extent: Surrounding area
- Duration: Long term
- Intensity: Medium
- Probability: Definite
- Significance: Medium/ Low

*Mitigation Measures:* Substations subjected to intense earthquakes will most likely be damaged; however, seismic design practices can minimize the damage. Although some substation equipment is inherently shock resistant, the foundations, structures, equipment anchors, insulation, and conductors may not be. Designs that minimize damage should be utilized in high seismic areas. Consideration should be given not only to replacement costs but also to lead times for delivery of replacement equipment.

**Airborne Foreign Material**

*Potential Impact:* Accumulation of airborne seeds, leaves and debris.

Dust and salts may accumulate on electrical installations and interfere with cooling, which may lead to damage and malfunctioning.

- Status: Negative
- Extent: Locally
- Duration: Long term
- Intensity: Medium
- Probability: Probable
- Significance: Medium/ Low

*Mitigation Measures:* Substations should be located so as to minimize exposure to flying debris by shielding from prevailing wind directions.
### 5.3.2 Socio-economic impacts

#### Population

*Potential Impact:* Objectionable appearance

Electrical installations interfere with general aesthetics and may elicit controversy due to urban nimbyism effect (i.e. not in my back yard).

- **Status:** Negative
- **Extent:** Locally
- **Duration:** Long term
- **Intensity:** Medium
- **Probability:** Probable
- **Significance:** Medium/ Low

*Mitigation Measures:* Appearance is becoming increasingly important to the public. In some areas, zoning regulations and suggestions by civic organizations often mean screening, low-profile designs, or other measures to improve appearance. Substations and alignment of overhead lines should consequently be located in a way that they are not strikingly visible to the public and in that harmonizes with the surrounding landscape respectively (e.g. a substation set back from a heavily travelled road may require little or no architectural treatment to be acceptable). Engineering of transmission, distribution, and substation facilities should be coordinated to develop the least overall objectionable layout.

*Potential Impact:* Audible noise

Sources of audible noise within a substation include transformers, voltage regulators, circuit breakers, and other intermittent noise generators. Among the sources, transformers have the greatest potential for producing objectionable noise. In addition corona, which is localized incomplete dielectric failure, causes a hissing sound, which may be objectionable. However, corona noise occurring at voltages of 230 kV and below is seldom serious.

- **Status:** Negative
- **Extent:** Locally
- **Duration:** Long term
- **Intensity:** Medium
- **Probability:** Definite
- **Significance:** Medium/ Low

*Mitigation Measures:* Corona noise is usually kept to a tolerable level if guidelines for minimizing electrical effects are followed. Design for 345 kV systems will normally require extra-high-voltage (EHV) connectors and fittings or corona shields to reduce the amount of noise from corona to tolerable levels. As the EUMP deals with voltages far below this limit, corona is not likely to pose a significant impact.

Good practice for noise control is to locate transformers the maximum possible distance from the substation fence. If noise is anticipated to be a problem, reduced sound levels are available from the transformer manufacturer or the equipment layout should be arranged to permit the installation of a sound barrier. Anticipated future requirements should also be considered since additional transformers will increase the noise level.

As a general rule, substation noise will not be a problem if, when combined with ambient noise, it is less than 5 dBA above the ambient noise level. It may be desirable to measure the ambient noise levels at locations of concern. Measurements should be taken during the quietest periods,
approximately midnight to 4 a.m. Calculation of the resultant sound level will then indicate whether further study is required.

**Potential Impact:** Electrostatic and electromagnetic effects.

Consideration should be given to preventing radio and television interference that could result from visible corona as well as occupancy by people and livestock close to electrical installations.

- Status: Negative
- Extent: Locally
- Duration: Long term
- Intensity: Medium
- Probability: Probable
- Significance: Medium/ Low

**Mitigation Measures:** Significant corona could be caused by energized parts having small radii or from small-diameter conductors, particularly when conductive climatic conditions prevail. Experience has shown, though, that conductor fittings and energized parts other than conductors do not produce serious corona at phase-to-phase voltages of 230 kV and below. As this exceeds the voltage levels to be used, radio and television interference from corona should not be a problem.

Provided that the recommended clearances are observed electromagnetic fields are not harmful to people or animals. However, the long term effects of exposure to electromagnetic fields are not known. Consequently no one should live close to substations or electrical installations. As a general rule a natural barrier such as a road, fence, line of trees etc between the electrical installation and nearby residences is advisable.

**Potential Impact** – Public and occupational safety

Substations and transformers should be safe for people who may have occasion to be near them.

- Status: Negative
- Extent: Locally
- Duration: Long term
- Intensity: Medium
- Probability: Definite
- Significance: Medium/ Low

**Mitigation Measures:** The primary means of ensuring public safety at substations and transformers as part of the distribution network is by the erection of a suitable barrier (e.g. such as a metal fence for a substation and mounting on poles/ enclosed housing for smaller transformers).

Unless local restrictions are more conservative, the US Rural Utility Service Design Guide (RUS Bulletin 1724E-300) recommends 8 feet for the fence height consisting of 7 feet of fabric and a 1-foot extension of barbed wire. Similarly, recommended height for pole mounted transformers are XX meters.

Metal fences for substations have to be properly grounded. Additional means of protecting the public are provided through adequate design of all facilities inside the fence and the addition of a peripheral ground outside the fence.

Appropriate warning signs should be posted on the substation’s peripheral barrier fence. The engineer should specify their location and design. Substations, no matter how small, should have one sign per side, as a minimum. Signs should be both in Arabic, English and Hebrew.
For transformers the similar guidelines apply (i.e. they have to be properly grounded and labelled with appropriate warning signs).

Table 3. Summary of impacts

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>CONSTRUCTION PHASE</th>
<th>OPERATION/MAINTENANCE PHASE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biophysical</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erosion during site preparation and the excavations of foundations.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Increases erosion along slope areas</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Soil Compaction</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Pollution caused by waste produced during construction</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Interference with natural drainage and flow perennial and seasonal rivers</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Destruction of vegetation in the areas to be cleared for installations of substations and overhead power lines</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Loss of sensitive habitats</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Socio-economic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relocation of residents and their dwellings</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Loss of access to land</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Disruption to traffic and pedestrian access</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Presence of non-resident labour and their temporary camps</td>
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<td>Public and occupational safety</td>
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<td>Loss of agricultural land</td>
<td>✓</td>
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</tr>
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<td>Loss of crops, harvests and fruit trees</td>
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<td></td>
</tr>
<tr>
<td>Interference with any discovered sites of archaeological or cultural value</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Interference with holy sites</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Loss of high ecological value forests</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Public and occupational safety</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

| **Biophysical** | | |
| Accelerated propagation of invasive plants | ✓ | |
| Bird interference | ✓ | ✓ |
| Pollution caused by accidental release of oil from transformers | ✓ | |
| Air pollution from transformer generated fires | ✓ | |
| Failure/ equipment malfunctioning due to weather | ✓ | |
| Failure/ equipment malfunctioning due to earthquakes | ✓ | |
| Accumulation of airborne seeds, leaves and debris | ✓ | |

| **Socio-economic** | | |
| Objectionable appearance | ✓ | |
| Audible noise | ✓ | |
| Electrostatic and electromagnetic effects | ✓ | |
| Public and occupational safety | ✓ | |
| Increased security of energy supply | ✓ | |
| Improved commerce and industry conditions | ✓ | |
| Improved conditions for overall development | ✓ | |
5.4 Conclusions

The project is feasible from the environmental and socio-economic viewpoints.

The project will have some negative impacts, but these are mostly localised and of low to medium significance. Although the summary of impacts in the above table reflect the combined effects of substations and later the development of transmission and distribution lines, the assessment has endeavoured to separate the impacts with initial emphasis on the former.

In this regard the most significant impacts are related to proximity to existing built up-areas, small loss of agricultural land and in one instance the potential reduction in size of stream bank vegetation and habitat for birds and grazing of livestock (e.g. the Nablus 2 site). However, these impacts can largely be mitigated by site selection.

The substation sites that appear the most advantageous from an environmental and social perspective are the Nablus 1, JDECO 2 and 3 and HEPCO 1 site. At Jenin there is no alternative, but the identified site is considered sensible.

Subsequent impacts from construction of new transmission lines are mainly related to clearing of ROWs where these conflict with sensitive habitats (e.g. remnant patches of forests, olive groves and orchards) and where rehabilitation and extension of the distribution network entail temporary relocation and/or loss livelihoods where these are tied to specific locations needed for the proposed infrastructure. However, all the impacts are susceptible to mitigation and most of the mitigation measures can be easily applied.

The major positive impact is the supply of energy and the consequent potential for induced development. Realisation of the project will significantly increase the security and reliability of energy supply.

An environmental management plan has also been proposed and should be followed in order to minimise negative impacts and enhance the positive ones.
6 ENVIRONMENTAL MANAGEMENT AND TRAINING PLAN

6.1 PART 1. BACKGROUND INFORMATION

6.1.1 Preamble

An Environmental Management Plan contains instructions allowing the investor/proponent to integrate the environmental concerns emerging from the environmental assessment (EA – this study) into the process of project implementation. Compliance with these instructions is the responsibility of the owner of the project, in this case PEA. Subsequently, in all of the project’s lifecycle phases, PEA must delegate responsibilities to other parties intervening in the project, namely the contractor (and subcontractors), so as to guarantee that guidelines and instructions are complied with.

The EMP comprises a range of general and specific recommendations, which collectively act as the basis for environmental management (impact mitigation) and control, during the construction and operation phases of the project. The majority of impacts described above in chapter 5 are of a temporary nature and mostly limited to the construction phase. The remaining impacts can easily be monitored as long as the project makes provision for regular inspection and monitoring.

This document thus serves to identify the principles, responsibilities, activities and (some) methodologies that the contractor shall adopt to effectively manage environmental impacts during the construction phase of the project and that PEA shall adopt during the operation phase. The EMP is a dynamic document and can be reviewed and updated as necessary throughout the duration of construction by the contractor staff responsible for implementing the EMP.

Purpose of the Environmental Management Plan

The purpose of the Environmental Management Plan (EMP) is to provide environmental standards for the construction, operation, and routine maintenance of the proposed substations and subsequent transmission and distribution network.

i. The Contractors are legally required to comply with the frame of reference and standards of the project. While this EMP provides background information, it is the Contractor’s responsibility to verify the accuracy of any information provided and, irrespective of any inaccuracy or incompleteness, to comply with the frame of reference and standards.

ii. The frame of reference for the environmental standards is to avoid impairing (a) the health or wellbeing of people, and (b) land capability.

iii. PEA should monitor compliance with the frame of reference and project standards.

iv. The Contractor should be required to present method statements to PEA for approval for a number of construction activities. The ultimate responsibility for non-compliance with the standards in this document lies solely with the contractor.

v. PEA retains the right to enforce compliance with the standards irrespective of non-compliance that it might, at its sole discretion, condone in certain instances.

Scope of work

The scope of work covers material and construction requirements for:

- Clearance of sites and RoWs for substation and overhead lines
- Excavation of foundations
- The placing of backfill around foundations
- Access track lay-down, turning and parking areas
- The storage and protection of topsoil
- Temporary construction worker camps
- Erosion control and re-vegetation

6.1.2 Introduction to the EMP

The Environmental Impact Study has served to identify key issues associated with the project. To reduce or avoid negative effects of the project activities, mitigation measures are proposed. The Environmental Management Plan (EMP) below presents the mitigation measures discussed in this EA.

The EMP is a dynamic document to be used throughout the project. The principles of the EMP are to be incorporated into the contractual agreements between PEA and PEA’s contractors who are appointed to undertake the required work. In addition, certain commitments are required from PEA.

PEA Commitment
PEA is committed to ensure that construction of the substations and subsequent electrical network is undertaken according to the recommendations of this report. PEA is committed to undertake their work in such a way that is respectful to the local people and their land and resources.

PEA has undertaken to manage operations in a manner that protects the environment and the health and safety of employees, customers, contractors and the public. To this effect, PEA and/or the contractor should:

- Advise managers, supervisors and employees of safety, health and environmental requirements, and hold them accountable for performance;
- Manage activities to minimise environmental and human health impacts and provide workplaces where recognised hazards are minimised or controlled;
- Provide professional staff to support safety, health and environmental protection commitments;
- Monitor, evaluate and report performance in safety, health and environmental protection;
- Provide training when needed to protect human, environmental, cultural and physical resources;
- Failure to report incidents and wilful non-compliance with PEA policy will result in disciplinary action in accordance with internal disciplinary guidelines

Environmental commitment and quality management for the project
The contractor should:

- Comply with all of the requirements of the EA and EMP and shall, in accordance with accepted standards, employ techniques, practices and methods of construction that will ensure compliance with this standard and, in general, minimise environmental damage, control waste, avoid pollution, prevent loss or damage to natural resources, and minimise effects on surrounding landowners, occupants and the general public.
- Prevent or minimise the occurrence of accidents which may cause damage to the environment, prevent or minimise the effects of such accidents and shall return the environment to a state as close to the condition existing prior to any such accident as possible.
Should it be considered by Government Authorities that the construction activities of the contractor in the Construction Right of Way are causing unacceptable environmental damage, the contractor shall immediately consult with the appropriate government authorities and PEA and agree upon the remedial measures to be undertaken. Such agreed remedial measures shall be undertaken immediately to prevent further damage and to repair any damage that may have occurred.

Commence any remedial measures within a reasonable period following the receipt of a written instruction from PEA to do so.

Be open to periodic environmental compliance audits by PEA and provide the necessary information for such purposes. In addition the contractor shall implement their own audits to ensure conformance with the requirements of the EMP.

Prepare and submit plans to PEA demonstrating the method according to which compliance with the environmental standards will be accomplished. While PEA may comment on any inadequacies in these plans, the ultimate responsibility for non-compliance with the standards in this document lies solely with the contractor.

Levels of responsibility for the management and implementation of the EMP
The responsibilities of key members of the contractor team are detailed below.

Project Director
- Overall responsibility for ensuring that the project EMP, Procedures and Method Statements are prepared and implemented, and that they comply with all legislative and contract requirements.
- Ensuring and partaking in regular reviews of the Environmental Management Plan.
- Provide a regular report to management and ensure that findings and recommendations are responded to and implemented as necessary.
- Ensure non-conformities are reported.
- Ensure non-conformities are corrected within the required time frame and that remedial solutions are effectively implemented.
- Ensure subcontractors fulfil their environmental obligations

Construction Manager
- Procedures and Method Statements
- Organisation of labour, plant, transport and equipment to perform the work in accordance with the environmental requirements
- Responsible for ensuring all sub contractors are aware of the contractor’s Environmental Policy and the requirements of the EMP, Procedures and Method Statements
- Ensure the project is constructed in accordance with Project Drawings, the Contract, and the environmental requirements stated in the EMP
- Implement agreed actions resulting from audits or inspections

Environmental Manager
- Review and implement the EMP, Environmental Procedures and Method Statements
- Promoting and communicating environmental issues to personnel and ensuring project staff are briefed on their responsibilities under the EMP
- Advising the Construction Manager of statutory/other environmental requirements
- Liaison with statutory and non-statutory authorities and the public
- Provision of environmental induction training for all staff and sub-contractors
- Undertaking environmental site inspections to ensure compliance with the EMP
- Advising the Construction Manager on the actions to be taken arising from audits of the project
- Day to day liaison with the Construction Manager and briefings of crews.
- Recommending solutions to environmental problems as they are foreseen or encountered
- Development of pollution control and emergency response plans, including provision of adequate pollution control equipment
- On-site advice, reporting and investigation of all environmental incidents
- Establishment of adequate arrangements for the storage, disposal and recycling / re-use of waste
- Establishment of adequate arrangements for the storage of fuel, oils and lubricants on the site and at the construction base
- Regular liaison with PEA and Environmental Site Officers
- Land Liaison
- Liaison with landowners (commercial and subsistence) and tenants. This process should be used to establish compensation requirements.
- Undertake site inspections to monitor working practices and ensure landowners and farmers requirements are fulfilled.
6.2 PART 2. COMPONENTS OF THE ENVIRONMENTAL MANAGEMENT PLAN

6.2.1 Health, Safety and Environment

Environmental awareness plays an important role in achieving compliance for environmental management. In this regard the following steps shall be taken to ensure all contractor and subcontractor staff are informed and trained appropriately:

- Environmental Awareness Orientation shall be given to all employees, subcontractors and consultants as part of their general orientation. PEA to verify the HSE procedure for Training and Induction of the contractor.

- Basic environmental auditing and compliance training should be provided to the Safety Officers on site and persons responsible for the day to day monitoring of environmental performance.

- The Environmental manager should have the necessary training to conduct compliance audits throughout the duration of the project.

- The Environmental manager will promote onsite environmental awareness through talks / meetings and promotions throughout the extent of the project.

- All environmental incidents that occur on site will be reported and addressed through the HSE reporting procedure of the contractor

- A register will be maintained that will log all environmental complaints raised by landowners, occupiers or the general public in connection with construction activities. This register will be available to PEA for periodic review.

- The register shall be regularly updated and shall maintain records including the name of the complainant, his or her domicile and contact details, the nature of the complaint and any action that was taken to rectify the problem.

- The Environmental manager in conjunction with the HSE manager will be responsible for drafting the environmental complaints report, handling complaints and maintaining the register.

Health and safety of local populations

The construction of the substations and subsequent electrical network may result in overhead wires (incoming, outgoing as well as distribution lines) passing in close proximity to existing built-up (some of which are residential) and agricultural areas.

Lack of care or lack of information can cause accidents, almost always with severe consequences. Thus, people living in the area under direct influence of construction works, future electrical installations, people moving in the vicinity, and end point users should be informed by PEA or their appointed representative regarding appropriate security precautions, for example:

- Not allowing children to play near construction sites (e.g. such as climbing of the poles or fences)
- Warn children not to play with kites and slingshots near the power lines.
- Avoid trimming high trees located near the energy cables
- Avoid handling broken cables
- Education relating to the use of electricity in the home
Disruption to traffic and pedestrian access
Construction works in urban areas are likely to disrupt traffic, pedestrian access and pose a general hazard to bystanders.

To avoid unnecessary hold-up, limit delays and general nuisance, works across major roads will need to be carefully planned and coordinated with the City Council Engineer and Traffic Department to redirect traffic as necessary.

The movement of heavy construction related traffic to and from site should be monitored and assisted by traffic controllers.

Warning signs should be displayed informing by-passers of imminent danger regards ongoing works.

6.2.2 Training
All personnel including, the contractor’s own workforce, sub-contractors staff and any external consultants should receive combined Health, Safety and Environmental induction training. This induction should be carried out before any employees are allowed on site and training records, should be maintained by the contractor’s HSE department.

The induction course should be supplemented by talks on specialised topics and specific operations. Handouts of instructions and procedures should be issued as required. An extended induction should be delivered to provide further information on environmental management to key personnel.

6.2.3 Consultation with statutory and non-statutory bodies and the public
Contractor management are responsible for identifying any additional requirements for consultations, and liaising with PEA. Copies of all correspondence and a summary matrix of consultations undertaken by the contractor should be kept in the project environmental files and copied to PEA.

In this context, it is essential that all stakeholders have access to information about the project and its potential repercussions. This will serve to facilitate collaboration from the public sector and from other institutions regarding the project.

As a minimum, consultations should be undertaken with the following individuals and organisations:

- Local Authorities,
- Property owners and affected communities, to ensure impacts associated with the construction process have a minimal impact on present activities and agricultural practices and to verify any compensation claims.
- Relevant authorities (especially MEnA) with regard to the working methods and reinstatement of the environment.
- Civil Aviation authorities should be informed (by PEA) about the project and especially the location of the network. This will facilitate evaluation of any potential interference that it might cause on existing flight routes. This in turn may result in recommendations regarding the installation of appropriate signalling equipment along some of the lines.

6.2.4 Environmental Impact Assessment
The contractor should develop detailed plans and method statements for the elements of construction for which such information is required by the EA and EMP. These procedures and
method statements should take into account the findings of the EA and the environmental standards required, and should include:

- Location and construction of material storage depots
- Location and construction of temporary construction worker camps
- Preparing and reinstating working areas
- Disposal of waste arising from the RoW clearance, excavations and the works generally
- Methods to deal with any potentially contaminated ground, water, or ground water
- Methods to dispose of water in trenches and excavations
- Dust control method
- Noise control method

6.2.5 Environmental Monitoring

A competent ecologist should be employed where required to supervise works in the relevant sensitive areas (see section below), and monitor potential impacts designated in this report.

Site Inspection and Audits

The contractor must develop appropriate protocols for regular site inspections and audits that monitor compliance with environmental legislation and best practice. PEA personnel should participate in this process in the context of capacity building for environmental management.

Method Statements and Procedures

The contractor should produce detailed procedures and method statements to address specific construction activities as required by the EMP. These should detail how the environment are to be protected and environmental impacts prevented or mitigated during the detailed design, construction and pre-commissioning stages of the project. The Procedures, plans and method statements are for:

- Construction of campsites,
- Waste management,
- An emergency plan that will enable rapid and effective response to all types of environmental emergencies in accordance with recognised international standards,
- A fire prevention and fire emergency management plan as part of the environmental plan,
- A method statement for the control of invasive alien plants,
- A detailed method statement for major river crossings,
- The method of preparation, soil amelioration fertilising and seeding to be used in rehabilitating each area of the works and post establishment maintenance regime to be implemented,
- Reinstatement Plan.

All Plans, Procedures and Method Statements should be reviewed by PEA or an appointed competent representative prior to acceptance and adoption.

Location and planning of campsites and construction material storage depots

General conditions:

- Campsites and any storage depots should be constructed in areas that minimise the potential for ecological impact and public nuisance.
- Campsites should not be located within or in close proximity to main population centres in order to minimise risks of in-migration and other nuisance affecting these communities.
- The contractor should comply with all relevant laws and regulations concerning water provision, sanitation, wastewater discharge and solid waste disposal.
In addition campsites should not be located:

- In any area in which vegetation is pristine, as defined in this report.
- In areas of special sensitivity (riparian zones and pristine woodland).
- Within 200 m of any watercourse.
- In any area that could cause nuisance or safety hazards to surrounding communities (consent must be obtained from local communities).
- Without authorisation from PEA.

Prior to the establishment of a campsite, a method statement should be prepared and submitted to PEA for review. The method statement should contain the following information:

- Site location and layout
- Vegetation types
- Topsoil management
- Solid waste disposal
- Erosion control
- Litter management
- Water supply
- Management of bush fire risk
- Rehabilitation

**Access (roads/routes) to campsites and construction areas**

Access to campsites shall be via one of the following:

i. A public road
ii. An existing private road or track with the consent of the relevant owner or local community

Where there is no existing road access, the construction of a new access road will not be permitted. If no alternative site is available, all materials must be carried to the site by hand.

The utility and safety of any existing access will not be lowered by use for the construction work or construction-related activities, nor shall spillage, littering, accelerated erosion, or other environmental impact, occur. The contractor should ensure compliance with these requirements.

**Vegetation clearing and site levelling for campsite and depot construction**

The extent of the campsite/depot should be marked out to ensure that only the required area is disturbed by construction activities.

The environmental manager or an appropriate environmental consultant should check the site prior to clearing activities (in the planning phase) to ensure that all the environmental requirements have been fulfilled in the planning phase and to verify that the area does not contain sensitive ecosystems or threatened species.

If necessary, vegetation clearing should be done by hand and all vegetative rootstock material should be stockpiled for use in rehabilitation when the site is to be decommissioned. Additionally, any topsoil that is graded during site levelling activities should be stored separate from the rootstock for use in rehabilitation later.

All appropriate measures (e.g. berms and contours) should be made to prevent erosion of the stockpiles (e.g. such as ensuring that the height of rootstock and topsoil stockpiles do not exceed 2 m).
Access control
The number of entry and exit points to campsites should be restricted to control access and for security reasons, as well as to prevent the movement or the expansion of campsite activities outside the premises.

Every precaution should be taken to ensure that activities of the contractor do not compromise the lifestyle or security of local communities, nor result in the loss, injury or death of any domestic animals or game.

Hazardous chemicals and substance (HCS) control
All HCS should be handled, stored and disposed of in a safe and responsible manner, in order to prevent the contamination of soils, pollution of water and/or harm of people or animals as a result of the use of these materials.

The contractor should comply with all applicable laws, regulations, permit and approval conditions and requirements relevant to the storage, use, and proper disposal of hazardous materials. Hazardous materials and wastes shall be identified as defined by a recognised international standard.

The contractor shall prepare a method statement for the management of hazardous and toxic materials and waste on or off the construction site. This plan should include, but not be limited to, measures to prevent contamination of soils, pollution of water, accidental fires and risk/injury to people or animals.

Landfill of hazardous materials and wastes on the construction site will be prohibited.

The contractor’s HSE procedure for chemical hazards communication and control shall be followed.

In addition to this procedure the following measures should be taken with special emphasis on the storage and handling of fuels and lubricants:

Routines and procedures for handling of potential PCB contaminated transformer oils
Separate guidelines for handling of Polychlorinated Biphenyls (PCB) and PCB-free insulating oil and insulating oil components will be prepared and attached as an appendix to this report.

Storage and handling of fuels and lubricants
Fuel storage facilities with a capacity greater than 1000 litres should be located on flat or gently sloping ground. A bund (berm) should surround the area and be capable of containing at least 125% of the total capacity of the storage containers. The bund and the floor of the storage area should be constructed with impermeable material or be lined to ensure that petroleum products cannot escape.

All fixed storage areas should be enclosed by a security fence with a lockable gate. Symbolic signs depicting ‘no smoking’ ‘no naked flames’ and ‘danger’ should be displayed, and should conform to a recognised standard.

Fixed fuel storage, the servicing or refuelling of any vehicle or equipment should not be within 100 meters of any settlement, within 100m of a watercourse or wetland, within a floodplain, or where there is the potential for spilled fuel to enter a watercourse or ground water. Fixed fuel storage should always be located within the construction campsites.

Where crossing watercourses and wetlands, on-site tools and equipment, such as pumps, compressors and generators should be placed on bermed impermeable sheeting (e.g., polyethylene or other similar material) to prevent hydraulic fluid or fuel leaks from contaminating
soil or ground water or entering any watercourse or wetland. All reasonable precautions should be taken to prevent fuel and lubricant spills during construction. To this end, the contractor should ensure that:

- There is no overfilling of diesel bowsers and equipment tanks.
- Regular audits are performed to verify that no leaking or defective equipment is brought onto site.
- Any oils or lubricants discharged during routine vehicle servicing on site are captured using drip trays, containers or other appropriate containment measures.
- Equipment is repaired regularly to ensure that no fuel, oil or hydraulic leaks occur.

All equipment that is required to work in fish-bearing waters should be cleaned of oil, grease and other contaminants that may affect aquatic life. Sufficient absorbent material shall be made available on site to manage accidental spills. An inventory of this equipment and its location on site should be prepared and included in the method statement.

Accidental spillage of fuels and oils, or other hazardous substances, should be cleaned up immediately and should be reported through the incident reporting procedure and communicated to PEA. Measures taken to remediate the spill problem shall be recorded within the incident report and communicated to PEA.

Management of storm water, wash water and effluent on site (Polluted site drainage)
All attempts shall be made to prevent the discharge of any pollutants from the site into the neighbouring environment, such as, lime, chemicals and fuels, as well as untreated sewage effluent.

Where possible storm water and effluent shall be diverted and treated through municipal services.

Where services are not available the following measures shall be taken for storm water management:

- Drainage structures (channels, ditches, sumps) should be constructed to effectively drain runoff from the campsite. Particular care should be taken to ensure facilities in high rainfall areas are capable of dispersing maximum predicted rainfall.
- Every attempt should be made to prevent contamination of the storm water system.
- In the event of a major spill the main drainage points exiting the property should be blocked off to capture contaminated runoff.

Where services are not available the following measures shall be taken for effluent management:

- Contaminated water from ablution facilities, kitchens, laundry and other wash areas should be separated into wash water and sewage streams.
- Wash water should be directed to a soak away. Wash water should first be passed through a grease trap to remove the grease. In most cases sewage should be diverted for treatment in septic tanks and soak away systems.
- Where feasible conservancy tanks should be used and serviced regularly to ensure treatment capacities are not exceeded.
In some instances a portable effluent treatment plant may be provided on site where septic and conservancy tanks are not feasible.

The location, construction and management of all sewage and water treatment facilities will be in accordance with regulations approved by PEA

**Management of water supplies**
Where possible, municipal water supplies should be used at campsites.

If municipal services are not available (e.g. in remote areas) water should be trucked in and stored and treated in tanks/reservoirs on site. Treatment of water will be according to the World Health Organisation Standards for drinking water.

If the only option is to extract water from a nearby surface body (river/dam) or from a groundwater resource (i.e. borehole) the appropriate applications should be made with the regulatory bodies to undertake this activity. In such cases water for cooking and washing should be stored separately from drinking water and treated in accordance with the WHO standards.

All staff should be appropriately informed of the need to conserve water on site and to be “water wise”.

**Management of campsite sanitation and hygiene**
The contractor’s HSE procedure for camp sanitation and hygiene should be followed to manage this aspect of the project.

**Waste management plan and procedures**
Every effort should be made to reduce, re-use, or recycle waste produced by construction activities.

The contractor’s HSE procedure for waste management should be followed on site. Additions or modifications to this procedure are provided below:

**Handling and disposal of domestic (Bio-Degradable) waste**
All necessary approvals shall be obtained for the local disposal of domestic waste.

Prior to establishment of each campsite a method statement should be prepared verifying that the proposed waste disposal site and method of disposal meet the requirements.

The method statement should include the following:

- The nature and quantity of the waste to be disposed
- The location of the site
- The legal status of the site (use rights, verification of absence of concessions)
- The current use of the site
- Surrounding land use within two kilometres
- Surface water within 1km
- Site vegetation
- The depth to the static water table
- Geo-hydrological conditions between the surface and the water table
- The availability and depth of suitable cover material
- Temporary site security and access control
- Method of landfill construction and disposal
- Litter management
- Final closure and rehabilitation of the site
A system should be set up for solid waste control and removal. Domestic waste should not be left uncontained, and temporary storage should be managed to keep out unauthorised people and animals. Bins should be emptied daily. The Works areas should be kept clean and tidy at all times. Littering and the random discard of solid waste on the site should be prevented.

**Management of community nuisance and hazards**
Construction teams should respect the property and rights of local inhabitants at all times and should treat all such persons with deliberate courtesy.

Access over land, the integrity of fences, the closure of gates, control of bush and forest fires, littering, dust control, noise abatement, harassment of domestic and wild animals, sedimentation and contamination of ground and surface waters, damage to landscape, crops and vegetation, and all such environmental matters referred to elsewhere in this standard, should be controlled in the best interests of the local inhabitants.

**Trespassing and protection of plants and wildlife**
Measures should be taken to prevent trespassing on construction sites.

Public entry to the site should be prohibited. To protect vegetation from trampling walkways the contractor should ensure that employees remain within the construction sites, RoWs or on approved access roads.

**Fire prevention and control**
All necessary precautions should be taken to prevent the ignition and spread of bush fires caused either deliberately or accidentally as a result of the work being performed.

The contractor’s HSE procedure for fire prevention and protection should be followed to manage this aspect.

A method statement should be prepared for fire prevention and emergency management as a part of the Environmental Plan to be submitted to PEA prior to establishment on site. The method statement should include the following:

- Sources of fire risk
- Procedures to be followed to minimise the risk of accidental bush fires caused by any activity related to the Works
- Procedures to be followed to control an accidental bush fire
- Fire fighting equipment that should be maintained on site and deployed in the event of an emergency

The method statement should deal with all areas of the works, including campsites and the construction RoW.

Open fires should be prohibited except at specified areas of the Works where the risks of escape are low and can be managed.

Employees should be briefed during the orientation-training programme of the risks and potential consequences of starting fires. Employees should also be warned of the risks of careless discard of cigarette butts.

Adequate fire fighting equipment should be provided at specified localities on the work site to meet any emergency resulting from ignition of a bush fire.
Dismantling and rehabilitation of construction campsites
All structures erected by the contractor should be dismantled, removed and where possible used for the construction of future campsites.

Any rubble generated from the dismantling of campsites should be dumped at an approved disposal site.

Pollution control structures (sumps, septic tanks, grease traps etc.) should be emptied and the waste dumped according to the waste management procedure.

Once emptied these structures should be removed with particular care to avoid any possible ground or water contamination.

If the structures are not to be re-used at other campsites they should be disposed of appropriately. All other waste should be handled according to the waste management procedure.

Once the area has been cleared of all material the ground should be prepared for rehabilitation. This may involve ripping, harrowing or disking areas where ground has become compacted by equipment and structures.

The original topsoil stockpiled at the campsite should then be evenly spread over the disturbed areas.

The stockpiled rootstock should then be spread over the topsoil and where necessary erosion control structures (contours and furrows) should be placed.

The area should then be left to rehabilitate through the process of natural succession.

The Environmental manager should monitor the campsite to determine the success or failure of rehabilitation.

Archaeological sites, graves and sacred sites
The contractor should ensure that construction does not damage or destroy any archaeological sites.

In the event that archaeological sites are found in areas that will be impacted by construction, the contractor should provide an independent evaluation of the significance of the site and mitigate the impacts.

In addition the contractor should comply with the following requirements with respect to the management of archaeological impacts:

- A contracted archaeologist should, with reasons, classify any sites found into three key categories:
  - Those requiring no mitigation
  - Those requiring limited mitigation, such as mapping and collection of scatters and surface artefacts

- Those requiring extensive mitigation such as mapping and excavation (rescue)

- Graves and sacred sites should not be disturbed by construction unless agreement is reached with the affected communities.
Vegetation clearance

The following general methods for clearing vegetation at construction sites and in the RoW of electrical installations should be adhered to.

- No machinery (except chain saws) should be used for vegetation clearing.
- Any commercially valuable hardwood species should be separately stockpiled wherever they are cleared from the servitude. The appropriate authorities should then be informed of the location of these stockpiles.
- During clearance all large indigenous trees (basal diameter >400mm) within the RoW are not to be removed. These large trees should be marked using whitewash. It is the responsibility of the contractor to ensure that the vegetation clearing activities does not damage the marked trees.
- Under no circumstances should vegetation be cleared outside of the RoW or the areas defined by the development plans.
- Within the RoW vegetation should be cleared to the minimum degree necessary for construction.
- Cleared vegetation, in particular indigenous vegetation, should be placed in windrows along the perimeter of the RoW.
- In some instances excessive vegetation may need to be dumped to reduce fire risk at the site, and should only be dumped in pre-approved dumpsites.
- No form of controlled burning should be permitted to dispose of cleared vegetation.
- Where local people should have access to the wood cleared from the construction right of way. Alternatively, access breaks across the pipeline should be left at convenient intervals for use by surrounding inhabitants.
- Every attempt should be made to co-ordinate construction activities so as not to interfere with farming activities.

Clearing of woodland vegetation

Clearing of woodland vegetation is anticipated to be extremely limited. However, in so far as this is necessary an environmental site officer (ESO) should be present to ensure that the following guidelines are adhered to:

- Marking trees not to be cut down
- Monitoring clearance in riparian zones along minor and major streams
- Surveying for the presence of species of conservation concern
- Woodlands should be cleared by hand regardless of how dense the vegetation is.
- Every attempt should be made to collect and stockpile cleared vegetative material for return to the RoW after construction.
- Excessive material representing a fire risk shall be removed and dumped at a pre-approved dumpsite.
- Particular care should be taken to prevent damage to riparian trees.
- Where possible sods of wetland vegetation should be removed and stockpiled for replacement after construction. The sods of wetland vegetation should be watered to ensure survival of the re-vegetation material.
- Any indigenous trees marked in the field should not be removed.

**Excavations of foundations for substations, transmission towers and distribution poles**
Similar guidelines for trench excavation, removal and stockpiling of subsoil include:

- Subsoil should be excavated to the required depth, in accordance to construction drawings and specifications.
- The minimum width of trench should not be less than indicated in the construction drawings.
- Subsoil (excavated spoil) should be stockpiled in windrows and should not exceed 2 m in height.
- Adequate openings should be provided in the spoil bank to allow normal drainage in the area and prevent any possibility of damming and flooding.

**Preparation of the trench bed**
- The preparation of the trench bed should be in accordance with project specifications using material obtained from the subsoil/spoil stockpile.

**Backfill of subsoil (spoil) and topsoil to the trench**
- The methods to be employed for the shaping and filling of the trench should be in accordance with the project drawings and project specifications.
- As far as possible subsoil should be replaced in the same sequence as removed to restore the original trench profile and should be crowned with sufficient surplus earth to allow for settlement.
- Backfill material should be deposited and manually compacted over the entire area. The backfilled surface should be graded flush with the undisturbed surface where they adjoin.
- Care should be taken to ensure that excavated material is returned to the location from which it was removed.

**Construction at river crossings**
The applicability of this guideline will need to be checked as the system design is established. As a general rule the contractor should prepare a method statement, which should be submitted and approved by MEnA prior to undertaking the works. The method statement should include:

- The proposed timing and duration of river crossing construction.
- An itemised list of the equipment that should be used for the excavation, laying of the cable, backfilling of the trench and control of water.
- Measures that should be used to ensure that identified and surveyed trees in the riparian fringe within the RoW that are scheduled for protection, shall not be damaged during construction.
- Measures that should be used to stabilise river embankments after construction (where necessary).
During construction every provision should be made to maintain the natural flow of any drainage line affected by construction.

The following methods shall be adopted when rehabilitating the riparian zones at river crossings:

- The river channel embankments shall be returned at least to the pre-existing profile;
- Measures using indigenous grasses to permanently stabilise disturbed areas should be used if necessary;
- Debris disposal and clean up should be carried out to return the river course to its pre-existing condition prior to construction.

**Cleanup and preparation of disturbed areas for re-vegetation**

As soon as backfilling is complete, the RoW should be cleaned up by:

- Removing surplus material,
- Restoring services to their original condition,
- Disposing of refuse,
- Smoothing disturbed earth,
- Any additional work necessary to leave the RoW as close to its original condition as possible.

**Restoration of ground contours and erosion control**

Concentrated runoff should be prevented along or next to the construction RoW by shaping the land, establishing vegetation, and taking other appropriate measures to absorb and disperse runoff.

Banks of watercourses should be restored in a manner that will resist erosion while settlement of the fill occurs.

Where erosion control is required, erosion control measures should be implemented.

**Removal and disposal of refuse and surplus materials**

All surplus materials within the RoW shall be collected and disposed of according to the contractor’s waste management plan.

**Remediation of compacted soils and general ground preparation (return of topsoil)**

Where necessary, a plough or scarifier should be used to break up any underlying soil compacted by construction activities on and off the right-of-way.

Where necessary scarifying of areas where topsoil has been conserved should be carried out prior to replacement of topsoil.

Care should be taken to avoid soil inversion if scarifying is carried out where topsoil has not been removed.

Any ripping or scarifying operation should be restricted to a depth of 100 mm.

In all cases, the backfilled trenches for submarine cable crossings and pole excavations should be covered by an even layer of topsoil to a minimum depth of 150 mm.

Return and/or addition of stockpiled rootstock and mulch material
- Cut woody vegetation should be retained along the RoW and spread evenly across the RoW during the clean-up operation.
- Tree trunks, limbs and stumps shall not be placed in watercourses or gullies.
- Where necessary large tree limbs should be stockpiled and distributed to local communities.
- On steep slopes additional sterile mulch material (straw) may be used.

Re-vegetation of disturbed areas

In most cases areas disturbed by construction should be left to re-vegetate through natural processes of succession from soil stored seed banks, rootstock and mulch material. This will be achieved by the spreading of topsoil, rootstock and mulch material from stockpiles established during clearing and trenching activities.

Control of alien and invasive plant species

As far as practical the control of alien and invasive plant species should be controlled manually (e.g. hand pulling, slashing, ring barking). The use of herbicides as a control option should be avoided as far as possible, particularly near any water body.

All invasive alien material removed from the RoW should be disposed of in such a manner as to prevent the spread of the species into other areas (e.g. controlled burning or burying in deep excavations).

Activities and related costs to PEA

All of the activities described in the EMP are the responsibility of the contractor and any subcontractors with the exception of the following, which remain the responsibility of PEA.

- Dissemination of information about the project.
- Education/awareness campaigns about the dangers associated with transmission line networks and the domestic consumption of electricity.
- The processing of any applications for compensation arising from the loss of land, fruit trees, crop production or possibly resettlement.

The EMP provides essential information for inclusion in the phase tender book; the protocol for selecting a contractor after the EMP has been approved by the World Bank and MEnA.

The list of measures presented in the EMP and analysis of impacts and mitigation measures should be integrated in the construction company contract. Thus, all potential contractors should have access to this information for the purpose of tendering.

In this context, the following components of the EMP are considered to be of particular importance to potential contractors.

- Erosion control measures
- Alien invasive control measures
- Soil compaction.
- Pollution
- Riparian zone conservation
- Loss of pristine habitat
- Rehabilitation along RoWs
- Waste disposal

Table 4 below summarises activities that remain the responsibility of PEA. It is suggested that the inherent costs be estimated in detail in conjunction with the tendering phase when detailed information on designs and construction procedures are known.
Table 4. Summary of PEA activities and related costs during project implementation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimated costs</th>
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<tbody>
<tr>
<td>Throughout the Project</td>
<td></td>
</tr>
<tr>
<td>Meetings with relevant public &amp; private sector institutions, NGOs &amp; CBOs</td>
<td>Depends on number, location &amp; existing PEA resources</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>During Construction</td>
<td></td>
</tr>
<tr>
<td>Indemnities</td>
<td>Properties (if applicable): evaluated at Market prices, by relevant authorities</td>
</tr>
<tr>
<td></td>
<td>Fruit trees: Number of trees X price per tree.</td>
</tr>
<tr>
<td></td>
<td>Crops: Cultivated area X average production/ha X price per kg.</td>
</tr>
<tr>
<td></td>
<td>(Criteria for unit prices and production averages: determined by Government)</td>
</tr>
<tr>
<td>Regular monitoring of construction activities (independent of the contractor &amp; possibly in collaboration with regional MEnA)</td>
<td>Vehicle Hire (one day per month), subsistence etc:</td>
</tr>
<tr>
<td>Appointment of an Environmental Site Officer (ESO) for monitoring construction in environmentally sensitive areas.</td>
<td>Salary for 3 – 4 month period.</td>
</tr>
<tr>
<td>Post-Construction</td>
<td></td>
</tr>
<tr>
<td>Biannual monitoring of areas where erosion control measures were implemented</td>
<td>Vehicle Hire (twice per year), subsistence etc:</td>
</tr>
<tr>
<td>Periodic monitoring of re-vegetation in sensitive habitats</td>
<td>Vehicle Hire (four times per year), subsistence etc:</td>
</tr>
<tr>
<td>Education and awareness campaigns regarding the dangers of electricity</td>
<td>Possibly in collaboration with an NGO, at least one visit to each of the impacted communities.</td>
</tr>
</tbody>
</table>

6.3 EMP Summary

To facilitate use of the Environmental Management Plan (EMP), summaries of the potential impacts and proposed are included in Tables 5-6 below. The monitoring plan and implementation schedule are included in outline form in Tables 7-8. The latter including costs will be elaborated in greater detail as information become available.
## Table 5. A. Mitigation

<table>
<thead>
<tr>
<th>Sub-Project Activity</th>
<th>Potential Environmental and Social Impacts</th>
<th>Proposed Mitigation Measure(s) (Incl. legislation &amp; regulations)</th>
<th>Institutional Responsibilities (Incl. enforcement and coordination)</th>
<th>Cost Estimates</th>
<th>Comments (e.g. secondary impacts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><em>Soils- Increased erosion and compacting of and pollution from fuels and lubricants</em></td>
<td>Separate removal, storage and replacement of soil layers to preserve edaphic characteristics, Preservation/ re-planting of vegetation and slope training to increase water retention capacity and reduce volume and speed of run-off, Ploughing and ripping to regenerate compacted soils, Designated sites with barriers to prevent infiltration of pollutants</td>
<td>Contractor with site supervision by PEA environmental site officer (ESO) and overall by environmental manager officer (EMO)</td>
<td>Salary for hiring of ESO, vehicle hire and fuel</td>
</tr>
<tr>
<td>Pre-Construction Phase</td>
<td></td>
<td><em>Hydrology – Interference with natural drainage patterns</em></td>
<td>Maintaining recommended clearances/ standards to prevent obstruction of water bodies</td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td>Construction Phase</td>
<td><em>Vegetation and flora – Destruction of vegetation and loss of sensitive habitats</em></td>
<td>Careful removal or re-alignment to avoid potential conflicts</td>
<td>As above</td>
<td>As above</td>
<td></td>
</tr>
</tbody>
</table>
|                      | *Socio-economic – Relocation/ loss of land/ access to land and assets and disturbance to traffic* | Re-alignment of structures to avoid conflicts, or negotiation of compensation (according to World Bank Guidelines) Prior arrangement with traffic/ city authority to redirect traffic, posting of appropriate signs | Contractor to notify PEA or relevant city authorities (e.g. for traffic). ESO to monitor PEA to undertake | As above | **

**Table 5. A. Mitigation**
<table>
<thead>
<tr>
<th>Sub-Project Activity</th>
<th>Potential Environmental and Social Impacts</th>
<th>Proposed Mitigation Measure(s) (Incl. legislation &amp; regulations)</th>
<th>Institutional Responsibilities (Incl. enforcement and coordination)</th>
<th>Cost Estimates</th>
<th>Comments (e.g. secondary impacts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>relocation and compensation</td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td>Operation and Maintenance Phase</td>
<td>Historical, archaeological and holy sites – Inference with any discovered sites</td>
<td>No such sites identified yet, if discovered further work should be halted and relevant authorities contacted which can assess and give clearance for further work.</td>
<td>As above</td>
<td>As above</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>As above</td>
<td>As above</td>
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<td></td>
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<td></td>
<td>As above</td>
<td>As above</td>
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<td></td>
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<td></td>
<td></td>
<td>As above</td>
<td>As above</td>
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<td></td>
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<td></td>
<td>As above</td>
<td>As above</td>
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<td></td>
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<td>As above</td>
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<td></td>
<td></td>
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<td>As above</td>
<td>As above</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td>Sub-Project Activity</td>
<td>Potential Environmental and Social Impacts</td>
<td>Proposed Mitigation Measure(s) (Incl. legislation &amp; regulations)</td>
<td>Institutional Responsibilities (Incl. enforcement and coordination)</td>
<td>Cost Estimates</td>
<td>Comments (e.g. secondary impacts)</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
<td>---------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Objectionable appearance</td>
<td>Siting and employing of least impactful designs to minimize visual impact</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public and occupational safety</td>
<td>Erecting barriers and posting of warning signs to prevent public access/ interference</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audible noise and electrostatic and electromagnetic effects</td>
<td>Employing of appropriate/ recommended design criteria</td>
<td>As above</td>
<td>As above</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6. B. Monitoring**

<table>
<thead>
<tr>
<th>Proposed Mitigation Measure</th>
<th>Parameters To be Monitored</th>
<th>Location</th>
<th>Measurements (Incl. methods &amp; equipment)</th>
<th>Frequency of Measurement</th>
<th>Responsibilities (Incl. review and reporting)</th>
<th>Cost (equipment &amp; individuals)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Construction Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction Phase</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation and Maintenance Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Cost for all Phases</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Table 7. C. Institutional Strengthening and Training for Implementation**

<table>
<thead>
<tr>
<th>I. Institutional Strengthening Activity</th>
<th>Position(s) (Institutions, PIUs, Contractors, Construction Supervision Consultants)</th>
<th>Scheduling</th>
<th>Responsibilities</th>
<th>Cost Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation Measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring Requirements (incl. compliance)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### I. Institutional Strengthening Activity

<table>
<thead>
<tr>
<th>Position(s) (Institutions, PIUs, Contractors, Construction Supervision Consultants)</th>
<th>Scheduling</th>
<th>Responsibilities</th>
<th>Cost Estimates</th>
</tr>
</thead>
</table>

### II. Training Activity

<table>
<thead>
<tr>
<th>Participants</th>
<th>Type of Training</th>
<th>Content (Modules, etc.)</th>
<th>Scheduling</th>
<th>Cost Estimates</th>
</tr>
</thead>
</table>

| EMP Implementation, Re-design, Conflict Resolution, etc. | | | | |
| Environmental Processes, Methods & Equipment | | | | |
| Environmental Policies & Programs | | | | |

### Table 8. D. Scheduling and Reporting

<table>
<thead>
<tr>
<th>Activity</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 2</th>
<th>etc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation Measures</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td>Institutional Strengthening</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
<tr>
<td>Training</td>
<td>Q1</td>
<td>Q2</td>
<td>Q3</td>
<td>Q4</td>
</tr>
</tbody>
</table>
APPENDIX A: DETAILED ANALYSIS OF DATA COLLECTED / MEASUREMENTS

To be included as part of EA of proposed line routes and configuration of the electrical network in phase 2 of this report.
APPENDIX B: LIST OF PREPARES

This report has been prepared by:

Johan Knudsen  Water Resources and Environmental Specialist
Norconsult AS, Engineering and Management Consultants
Vestfjordgt. 4, 1338 Sandvika, Norway
APPENDIX C: REFERENCES

Aide Memoire, World Bank mission to the West Bank and Gaza November 2007


Jenin Industrial Estates Feasibility Study, Volume III Environmental Impact Assessment, 20XX

Palestinian Environmental Law NO (7) 1999

The Palestinian Environmental Assessment Policy, Palestinian National Authority, Ministry of Environmental Affairs (MEnA), April 2000

Selected web sites:
www.atg.ps
www.wikipedia.org
www.southtravels.com
APPENDIX D: RECORD OF MEETINGS AND PUBLIC CONSULTATIONS

At the time of writing this report on the environmental impacts and proposed mitigation measures for the identified substation sites on the West Bank only meetings with PEA and personnel from the local distribution companies have been conducted. As actual sites for substations and the configuration of the sub-transmission network become established, public consultations with affected stakeholders will commence. Descriptions of the latter will be included in the Phase 2 of this study, which is expected to be completed in April 2008.
Minutes of Meeting

EIA - Interconnection of the Electrical Networks of "Egypt - Gaza Strip (EG) and Jordan - West Bank (JW)

Meeting:  Introduction
Date, time, place:  21 November 2007, PEA - Ramallah
Participants:  Adam Ahmad (Env. Authority, adam_ahmad2007@yahoo.com), Yaser Abu Shanab (Env. Authority), PEA personnel and Johan Knudsen (Consultant)

Comments:  Comments

Next meeting:  TBA (to be announced)

<table>
<thead>
<tr>
<th>Item no.:</th>
<th>Item:</th>
<th>Resp./due date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Terms of Reference (TOR) for the EIA</td>
<td>Consultant</td>
</tr>
<tr>
<td></td>
<td>It was explained that the EA study would emphasise EIA and preparation of an EMP for the transmission sub-component of the study. This includes the development of 4 new 161/33/22 KV sub-stations in the northern, central and southern parts of the West Bank and the related 161KV transmission lines.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>With regards to the distribution sub-component including rehabilitation and extension of the existing networks information was to scare to ascertain the EIA requirements during the proposal. It was consequently decided as part of the contract negotiations that this item would be clarified during the inception based on meetings with the World Bank’s representatives in Jerusalem.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The format of the EIA-report will be developed in a framework format where typical impacts and mitigations measures are listed. In this way the report can easily be expanded as more information become available.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>EIA Policy and Process in Palestine</td>
<td>Env. Authority</td>
</tr>
<tr>
<td></td>
<td>Copies of the Environmental Policy and Laws for Palestine were handed over to the Consultant. It was agreed that any additional relevant information would be sent per email.</td>
<td></td>
</tr>
</tbody>
</table>
Minutes of Meeting

EIA - Interconnection of the Electrical Networks of "Egypt - Gaza Strip (EG) and Jordan - West Bank (JW)

Meeting: Proposed sites for substations
Date, time, place: 26 November, Nablus and Jenin

Participants: Personnel from PEA in Ramallah, JDECO and municipality in Nablus, Johan Knudsen (Consultant)

Comments: Comments

Next meeting: TBA (to be announced)

Item no.: Item: Resp./due date:

1 Nablus sites:
   The meeting was held at the proposed substation sites south and west of Nablus. Mr Ibrahim of JDECO Nablus explained that the former location was to be preferred because it is next to the existing 161 kV line and additionally lies in a remote area.
   The second location west of Nablus is also relatively far away from any built-up areas, and consequently would entail negligible social impacts. However, in contrast to the surrounding barren landscape the proposed substation site lies on a marsh like plain with tall grass vegetation and abundant bird life. There were consequently concerns that the selected site would entail greater environmental impacts. To this JDECO responded that the stream resulted from waste water discharge and that the vegetation and birdlife mostly was induced.

2 Jenin site:
   Before going to the site, which is in the area proposed for the Jenin industrial estate, the Consultant and accompanying PEA personnel met with the mayor and other key people from the municipality.
   Upon arriving at the proposed site, the Consultant remarked why the area (being highly productive agricultural land) had been chosen for industrial development. The municipality explained that Jenin was one of the few areas on West Bank with sufficient space, ease of access and where also the Israelis agreed to industrial development.
   Following the site visit the municipality invited everybody for an extraordinary lunch at one of the local restaurants.
Minutes of Meeting

EIA - Interconnection of the Electrical Networks of "Egypt - Gaza Strip (EG) and Jordan - West Bank (JW)

Meeting:

Proposed sites for substations

Date, time, place:

27 November 2007, SELCO - Hebron

Participants:

Basel A. AL-Qadi (SELCO, basel@selco.ps), Nayef Hosni AL-Hoor (SELCO info@selco.ps), Thor Lyaaas (Consultant) Johan Knudsen (Consultant)

Comments:

Comments

Next meeting:

TBA (to be announced)

<table>
<thead>
<tr>
<th>Item no.:</th>
<th>Item:</th>
<th>Resp./due date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>SELCO</td>
</tr>
<tr>
<td></td>
<td>The meeting started with a brief introduction by Mr. Basel AL-Qadi of SELCO, its history and present high priority to increase collection efficiency by installing the pre-paid metering system. The Consultant together with SELCO then went through the proposed substation sites to plan the subsequent field visit.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Visit to substation sites</td>
<td>Consultant</td>
</tr>
<tr>
<td></td>
<td>With the exception of the HEPCO 1 site near the border with Israel in the west, the remaining 3 sites are all located within the built-up areas of Hebron. It was obvious that the latter would probably entail greater potential for conflicts with nearby residents than the HEPCO 1 site which is also the preferred site.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>De-briefing</td>
<td>SELCO/ Consultant</td>
</tr>
<tr>
<td></td>
<td>The observations as outlined in 2 above was discussed with Eng. Nayef Hosni AL-Hoor (the director of SELCO). The Consultant informed that it would compile a framework EIA for the proposed sites (i.e. implying that expected impacts and mitigation measures for construction of the sub-transmission and distribution network also will be included.</td>
<td></td>
</tr>
</tbody>
</table>
## Minutes of Meeting

EIA - Interconnection of the Electrical Networks of "Egypt - Gaza Strip (EG) and Jordan - West Bank (JW)

<table>
<thead>
<tr>
<th>Meeting:</th>
<th>Proposed sites for substations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date, time, place:</td>
<td>28 November 2008, JDECO – Ramallah and East Jerusalem</td>
</tr>
<tr>
<td>Participants:</td>
<td>Mr Mansor Nassar (JDECO, ) and Johan Knudsen (Consultant)</td>
</tr>
<tr>
<td>Comments:</td>
<td>Comments</td>
</tr>
<tr>
<td>Next meeting:</td>
<td>TBA (to be announced)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item no.:</th>
<th>Item:</th>
<th>Resp./due date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Visit to substation sites</td>
<td>JDECO/ Consultant</td>
</tr>
<tr>
<td></td>
<td>In the JDECO area four potential sub-station sites have been identified. Similar to the HEPCO sites most of these lie near existing buildings. The preferred site is the JDECO X site adjacent the existing IEC substation.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There are also ongoing efforts to identify another suitable location in case the latter is not accepted by the Israeli authorities.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Debriefing/ follow-up</td>
<td>JDECO/ Consultant</td>
</tr>
<tr>
<td></td>
<td>No specific activities were identified except that JDECO would inform PEA of changes in status of the propose sites.</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E: RESETTLEMENT POLICY FRAMEWORK (RPF)

The attached RFP is a draft prepared for the Electric Utility Management Project (EUMP). It is intended to be updated as the configuration of the transmission and consequent extent of rehabilitation/ re-configuration of the distributions components become available.
APPENDIX F: GUIDELINES FOR HANDLING OF POTENTIAL PCB CONTAMINATED OILS AND COMPONENTS