

**Power Distribution
Enhancement Project
TA 4876 (PAK)**

**INITIAL ENVIRONMENTAL
EVALUATION**

**MEPCO Transformer Extension and
Augmentation Sub-projects**

Submitted to

Asian Development Bank

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by

Multan Electric Power Company

for

**Government of the Islamic
Republic of Pakistan**

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ABBREVIATIONS

ADB	Asian Development Bank
COI	Corridor of Influence
CSP	Country Strategy Program
DoF	Department of Forests
DFO	Divisional Forest Officer
DGS	distribution grid substation
DISCO	independent electricity distribution company
DX	distribution transformer
DXL	distribution network transmission line
DIZ	Direct Impact Zone
EA	Environment Assessment
EARF	Environment Assessment Review Framework
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
GDP	Gross Domestic Product
GOP	Government of Pakistan
GIS	Gas Insulated Switchgear
ITC	Increase transformer capacity - augmentation
MEPCO	Multan Electric Power Company Limited
Leq	equivalent sound pressure level
MPL	maximum permissible level
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
PC	public consultation
PEPA	Provincial Environmental Protection Agency
PEPAct	Pakistan Environment Protection Act 1997 (as regulated)
PPMS	Project Performance Monitoring System
PWD	Public Works Directives
REA	Rapid Environmental Assessment
SEA	Sectoral Environmental Assessment
SEL	instantaneous sound pressure level
SIA	Social Impact Assessment
S-P	sub-project
SR	Sensitive Receiver
TOR	Terms of Reference

Rupee, PKR Unit of Pakistan currency. \$US approx R60

1. INTRODUCTION

1.1 Overview

1. This document is the Initial Environmental Examination for the Tranche 1 extension and augmentation sub-projects of Multan Electric Power Company (MEPCO). This IEE was prepared under TA4876 of the Asian Development Bank (ADB) Power Distribution and Enhancement Multi-tranche Finance Facility (PDEMFF).

2. Government of Islamic Republic of Pakistan (GoP) has requested ADB to provide the PDEMFF to facilitate investments in power distribution and development of networks of eight independent distribution companies (DISCOs) that distribute power to end user consumers. The funding from ADB is expected to be released in stages (tranches). The Power Distribution Enhancement (PDE) Investment Program is part of the GoP long term energy security strategy. The proposed ADB intervention will finance new investments in PDE and assist capacity building of sector related agencies. The investment program will cover necessary PDE development activities in secondary transmission/distribution networks of eight DISCOs and the PDEMFF loan is proposed to be approved by ADB in 2008. The PDEMFF activities include extension (additional transformers) and augmentation (replacement of transformers with higher capacity) distribution line extensions, new and replacement distribution lines, additional sub-stations, transformer protection and other non network activities such as automatic meter reading, construction equipment and computerized accounting. New distribution lines to and from various network facilities and some of the above activities will also be included in the later tranches.

3. This IEE presents the results and conclusions of environmental assessment for the eleven (11) extension and augmentation sub-projects proposed by MEPCO and is submitted by Pakistan Electric Power Company (PEPCO) on behalf of MEPCO. PEPCO has been nominated by Ministry of Water and Power (MOWP) to act as the Executing Agency (EA) with each DISCO being the Implementing Agency (IA) for work in its own area. PEPCO's role in the processing and implementation of the investment program is that of a co-ordinator of such activities as preparation of PC-1s and PFRs, monitoring implementation activities; that includes submission of environmental assessments for all sub-projects in all tranches of the PDEMFF under ADB operating procedures. An IEE has been carried out to fulfill the requirements of ADB Guidelines (May 2003¹²). This IEE study report is used to complete the Summary Initial Environmental Examination (SIEE) for disclosure by ADB if necessary³.

¹ Initial project classification was carried out in 2006 and the Category is B. Most of the construction impacts will take place with only local impacts and there are no potential significant environmental impacts associated with the T1 (tranche one) sub-project construction. Initial environmental reconnaissance and REA carried out by consultants under ADB guidelines in May 2007 indicated that all the T1 sub-projects will be Category B.

² Environmental Assessment Guidelines (ADB May 2003)

³ Category A projects that are deemed by ADB's chief compliance officer to be environmentally sensitive for the purposes of (i) the 120 day rule, and (ii) the environmental management plan requirement could involve projects that are near or in environmentally sensitive areas. At this stage no component of the T1 sub-projects under consideration is actually within a critical area and therefore the MFF tranche as a whole is Category B.

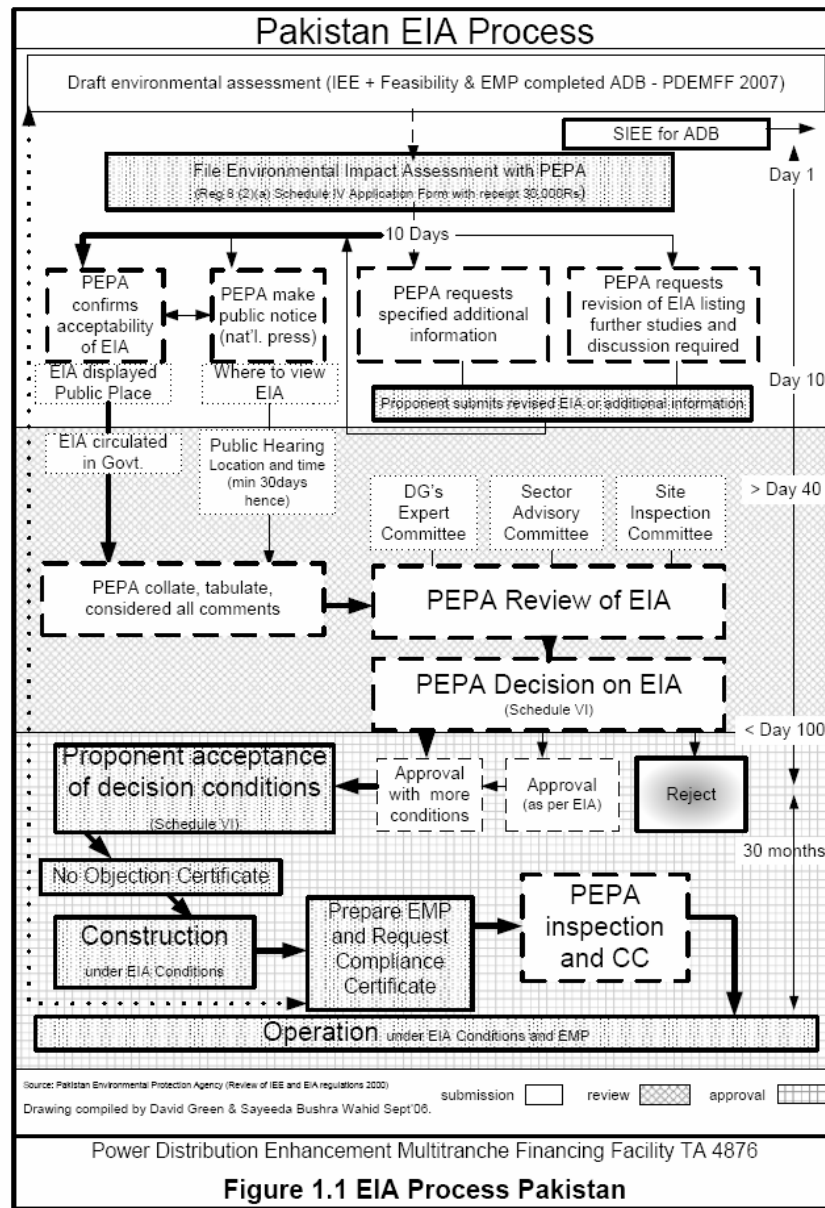
1.2 Requirements for environmental assessment

4. Under the MFF loan procedures of ADB, implementation of safeguards is to be achieved by environmental assessment of every sub-project to be undertaken following *ADB Environment Policy (2002)* and *ADB Environmental Assessment Guidelines (2003)*. Power distribution enhancement and development type projects, that are limited to expansion of already developed facilities, have typically been classified as Category B. Each sub-project has been subject to environmental assessment after categorisation and the focus was on the most significant issues.

5. Under GoP regulations, the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations (2000) categorizes development projects into two schedules according to their potential environmental impact. The proponents of projects that have reasonably foreseeable impacts are required to submit an IEE for their respective projects (Schedule I).

6. Projects that have more adverse environmental impact (Schedule II) are required to submit an environmental impact assessment (EIA) to the respective provincial Environmental Protection Agency (EPA). Distribution lines and sub-stations are included under energy projects and IEE is required for distribution lines of 11kv and less and large distribution projects (Schedule I). EIA is required by GoP for all projects involving transmission/distribution lines of 11kv and above and for grid sub-stations (Schedule II).

7. Expansion of facilities within existing sub-stations including extensions and augmentations of facilities within existing sub-stations are not listed as requiring environmental assessment. However because all the projects involve distribution equipment of 11kv and above at grid sub-stations there could be a technical requirement for EIA under GoP laws.



8. In that context a Framework of Environmental Assessment (FEA) on power extensions and augmentation sub-projects has been prepared by consultants and submitted to the Pakistan EPA, after hearings with provincial EPAs, which sought to “exempt” preparation of EIA/IEE for such small-scaled sub-projects such as those covered by this IEE.

Letter dated 29th June 2007 - Ref 2(1)2004-W/KCP-DD from Pak EPA Sajjad Hussein Talpur, Dy Director (EIA/Mont) to NTDC, Muhammad Tahir Khan, Project Director PPTA, NTDC, WAPDA House, Lahore

**GOVERNMENT OF PAKISTAN
PAKISTAN ENVIRONMENTAL PROTECTION AGENCY
H # 311, MAIN MARGALLA ROAD, F-11/3, ISLAMABAD.**

No. 2(1)2004-W/KCP -DD (EIA) Islamabad, 29th June, 2007.

Subject: ASIAN DEVELOPMENT BANK (ADB) FUNDED TRANSMISSION
ENHANCEMENT PROJECT – ENVIRONMENTAL IMPACT
ASSESSMENT.

I am directed to refer to NTDC's letter No. PD/PPTA/NTDC/531-33, dated 1st February, 2007 on the subject cited above.

2. It is stated that the contents of the draft frame work for Environmental and Social Impact Assessment of Grid Station Extension and Augmentation Projects in Power Sector has been carefully examined. Kindly appreciate that under section 12 of Pakistan Environmental Protection Act, 1997, it is mandatory requirement to ensure compliance of IEE/EIA Regulations, 2000, the proponent of project has to ensure to follow prescribed procedure.

3. However, while going to through the contents of draft framework, it has been noted that the proponent of this development activity will be following the prescribed procedure under IEE/EIA Regulations, 2000. However, only for argumentation of existing facilities, the framework would apply. Kindly note that this agency presumes that the proponent while taking developmental activities would also be consulting the provincial EPAs and follows their advice.

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Mr. Muhammad Tahir Khan,
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National Transmission & Dispatch Company Ltd.,
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140-141-WAPDA House,
Lahore.

Power Distribution Enhancement Multitranchise Financing Facility TA 4876

Figure 1.2 Letter from Pakistan Federal EPA on EIA Process

9. In response to the FEA submitted by NTDC to the Pakistan EPA⁴ it has been clarified that all proponents must follow section 12 of the Pakistan Environmental Protection Act for all projects and furthermore that, only for augmentation projects by following the FEA, the required procedures under section 12 would be completed. Pakistan EPA has also assumed that all proponents will consult with the relevant provincial EPAs (PEPA) and follow their advice. In 2006 Punjab EPA requested disclosure of the scope and extent of each subproject in order that the Director General of PEPA can determine if additional land is required and the need for IEE or EIA.

⁴ Letter dated 29th June 2007 – Ref 2(1)2004-W/KCP-DD from Pak EPA Sajjad Hussein Talpur, Dy Director (EIA/Mont) to NTDC, Muhammad Tahir Khan, Project Director PPTA, NTDC, WAPDA House, Lahore

1.3 Scope of the IEE Study and Personnel

10. This IEE study has included field reconnaissance for all 11 of the sub-projects with surveys taking place from June to September 2007. The Study Area for each subproject was the sub-station and immediate environs. The areas inside the sub-stations for improvement works were identified and the sensitive receivers immediately adjacent to the sub-stations were recorded, including any irrigation facilities, water supply, habitable structures, schools, health facilities, hospitals, religious places and sites of heritage or archaeological importance and critical areas⁵ within about 50m of the edge of the sub-station boundary walls.

11. The field studies were undertaken by a core study team with experience of environmental assessment for power projects in Pakistan. Mrs Sayeda Bushra Waheed, Mr Wali Waheed and Dr Iftikhar Ahmad. Dr David Green International Environmental Consultant (IEC) conducted preliminary scoping, surveys and assessment activities and co-ordinated the field surveys and analysis. Mrs Sayeda Bushra Waheed, Mr Waheed and Dr Ahmad were also responsible to supervise collation of information and co-ordinate the various public consultation activities. Dr David Green, provided leadership and guidance with regards to the essential detailed assessments of design, construction, operational and decommissioning impacts, noise, air quality and waste disposal. The environmental team also benefited from technical support and other important information on the impacts of the proposed power works provided in feasibility reports prepared for MEPCO⁶ by expert consultants dealing with engineering, power transmission, socio-economic, re-settlement and institutional aspects.

12. The study process began with scoping and field reconnaissance during which Rapid Environmental Assessments² were carried out to establish the potential impacts and categorization of network enhancement activities. The environmental impacts and concerns requiring further study in the environmental assessment were then identified. The methodology of the IEE study was then elaborated in order to address all interests. Subsequently both primary and secondary baseline environmental data were collected and the intensity and likely location of impacts were identified with relation the sensitive receivers; based on the work expected to be carried out at each site. The significance of impacts from the power transmission expansion works was assessed and, for those impacts requiring mitigation, measures were proposed to reduce impacts to within acceptable limits.

13. All the extension and augmentation projects covered in this IEE will only involve work within an existing sub-station to either, (i) replace an existing transformer with one of a higher capacity (ITC or augmentation) or (ii) add a transformer (extension). Therefore in these projects that involve work within an existing sub-station to improve the network performance the sole stakeholder is MEPCO. Therefore the requirement for public consultation (PC) can be seen to be satisfied by consultation with MEPCO who are clearly in support of their own project. Therefore under ADB requirements, the need for environmental assessment process to include meaningful public consultation during the completion of the draft IEE can be seen to be satisfied by the support of MEPCO for their own projects.

⁵ Critical areas as published by the PEPA on the website put in specific reference

⁶ Feasibility reports produced by the BPI consultants team under TA 4876 PAK.

1.4 Policy and Statutory Requirements in Pakistan

14. Direct legislation on environmental protection is contained in several statutes. The Pakistan Environmental Protection Act (1997) has bearing on this IEE. Since the projects covered in this IEE will only involve work within an existing sub-station other environmental legislation will not be triggered.

15. The Constitution of Pakistan distributes legislative powers between the federal and the provincial governments through two 'lists' attached to the Constitution as Schedules. The Federal List covers the subjects over which the federal government has exclusive legislative power, while the Concurrent List contains subjects regarding which both the federal and provincial governments can enact laws. "Environmental pollution and ecology" is included in the concurrent list; hence both the federal and the provincial governments can enact laws on this subject. However, to date, with a few exceptions the federal government has enacted laws on environment, and the provincial environmental institutions derive power from the federal law.

National Environmental Quality Standards

16. The PEPA covers the improper disposal of all solid and liquid waste and specific limitations are placed on wastes and emissions from particular industries. The National Environmental Quality (Protection and Quality Regulations 1990, 1996 and 2000) identify specific industrial sources for control and an Environmental Protection License is required to discharge waste to the environment under controlled conditions. Where the project contractors require cement, concrete or granite based products for power improvement the materials must be obtained from facilities having a relevant and current Environmental Protection License.

Solid waste management

17. The vast majority of waste in Pakistan comes in the form of domestic refuse and the requirements for solid waste management from such sources are covered by local authority legislation which has allowed some reasonable control of waste management in some urban areas. Elsewhere in the country the municipal or village authorities or TASIL (not typical of the areas in which the MEPCO sub-projects are located) are responsible to ensure proper disposal. However the lack of technical and financial resources has frustrated waste management planning. Fly tipping of waste outside towns and villages away from habitation is not an uncommon sight outside some district centers of habitation.

18. There will be waste associated with the MEPCO addition and augmentation projects but unusually in this case the majority of likely waste will be in the form of small amounts of construction waste and any leaked or residual transformer oil that may fall to the soil. The replaced transformers will be retained, stockpiled and reused.

1.5 Structure of Report

19. This report reviews information on existing environmental attributes of the areas around the Study Area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, social and economic aspects

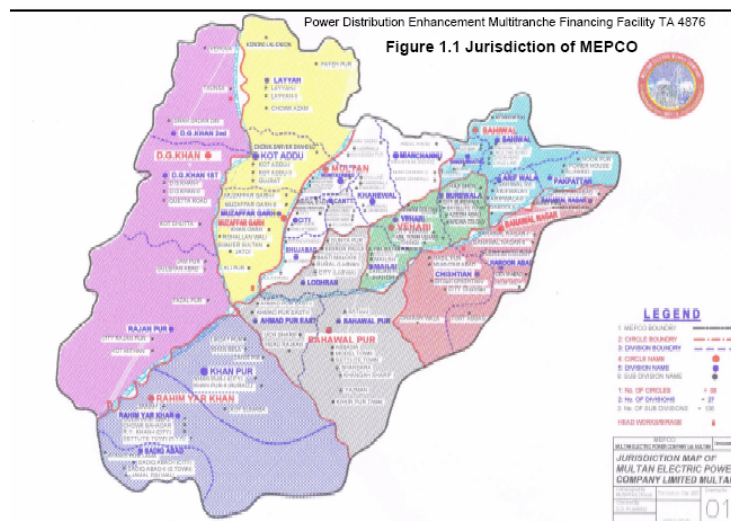
and cultural resources are included. The report predicts the probable impacts on the environment due to the proposed project enhancement and expansion. This IEE also proposes various environmental management measures. Details of all background environmental quality, environmental impact/pollutant generating activities, pollution sources, pollution control equipment, predicted environmental quality and related aspects have been provided in this report. References are presented as footnotes throughout the text. Following this introduction the report follows ADB guidelines and includes:

- Description of the Project
- Description of Environmental and Social Conditions
- Assessment of Environmental Impacts and Mitigation Measures
- Institutional Requirements Environmental Management Plan
- Public Consultation
- Findings, Recommendations and Conclusions

2. DESCRIPTION OF THE PROJECT

2.1 Type of Project

20. The sub-projects in this IEE are all improvements to the equipment that supports the power distribution network at eleven (11) existing distribution grid sub-stations (DGS) that have been prioritized by MEPCO and selected to be included in the PDEMFF Tranche 1. The proposed works will all be within existing DGS according to MEPCO.



21. All the sub-projects selected in Tranche 1 are extension subprojects (Table 2.1). The environmental assessments that have been carried out follow ADB Environmental Assessment Guidelines 2003 and GoP's environmental assessment regulations and guidelines.

Table 2.1: MEPCO Tranche1 Sub-projects

DISCO	Sub-project No.	Project Name	Brief Description
MEPCO	85	Bahawalnagar	Add line bay
MEPCO	86	Bahawalpur 220 kV	Add line bays
MEPCO	88	Chistian	Add line bay
MEPCO	112	Gujrat South	Add bays
MEPCO	157	Khan Pur	Add 26MVA transformer
MEPCO	159	Shujabad	Add 26MVA transformer
MEPCO	160	Bonga Hayat	Add 26MVA transformer
MEPCO	161	Rajan Pur	Add 26MVA transformer
MEPCO	162	Feroza	Add 13MVA transformer
MEPCO	163	Sama Satta	Add 26MVA transformer
MEPCO	164	Liaqat Pur	Add 26MVA transformers

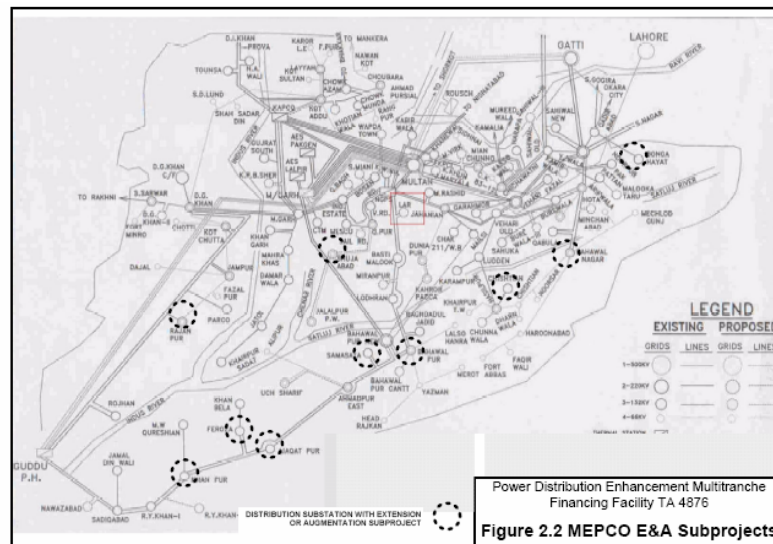
Source: TA Consultants. S=site inspection by date,

2.2 Categorisation of the Project

22. Categorization is based on the most environmentally sensitive component of the Project and therefore the twenty five sub-projects at the

existing DGS are categorized as a Category B. Tranche 1 is also Category B under ADB requirements² and this IEE report is based on that assumption.

23. At this stage the methods to install or replace the transformers are fairly well defined. There are few if any potentially significant environmental features and the works will all be within the eleven existing DGS and will not encroach on any land outside the sub-stations according to MEPCO. There is no foreseeable significant disturbance outside the substations and waste disposal should not be a significant consideration if routine environmental management procedures and engineering controls are implemented thoroughly.



24. The aspects of the project with potential for any likely environmental impacts have been assessed, focusing on significant impacts from the extension and augmentation and any knock on effects from impacts such as waste disposal.

2.3 Need for the Project

25. Pakistan is a country with an economy of improving performance with a wide network of power distribution. However the standards and conditions of the power distribution are inadequate to meet rapidly growing power demand. This situation limits reliable power distribution and therefore the contribution of the power sector to national development and economic growth. To cope with the constraints, the existing power distribution infrastructure has to be improved and upgraded. The overall contribution of power infrastructure also requires institutional arrangements and capacity that support strategic management of the sector, and planning and management of investments. Overall the proposed PDEMFF Project has been designed in addressing both investment and institutional aspects in the sector.

26. The Tranche 1 projects will contribute to the improvement of the overall performance of the power distribution sector, improving distribution efficiency, broadly widening access to power to drive economic opportunities.

The beneficiaries of the sub-projects will be people, companies, and government and non-government agencies in Pakistan that use power distribution services directly and indirectly. Communities indirectly served by the sub-projects will benefit from improved, secure faster distribution services. Power users will benefit in terms of secure power and improved power safety and potentially increased productivity.

2.4 Location and Scale of Project

27. The extension projects will all be within the eleven existing DGS (Figures 2.1 and 2.2) and will not encroach on any land outside the sub-stations.

28. The extension sub-projects will involve the delivery and connection of an additional transformer in line with other transformers within the available space in an existing DGS.

29. The augmentation sub-projects will replace an existing transformer in an existing DGS with a transformer of a higher capacity (ITC or augmentation). The transformer that is replaced will not be wasted but will be removed and transferred to at another MEPCO facility where it will be reconditioned, stored and eventually transferred to another DGS to be reused. The Project Proponent (MEPCO) plans to have the T1 completed by mid to late 2009. The details for the implementation of the 11 extension sub-projects are in development.

2.5 MEPCO Subprojects

30. The 11 subprojects are in the heart of urban Multan, in the fringe areas near Multan city, and in other cities and villages in the jurisdiction of MEPCO. The areas surrounding the relevant DGS are described in the reviews of environmental implications (REI) that are presented in Appendix 2. Photographs of the DGS are presented in Appendix 3. The extension and augmentation projects are spread out around sites within the MEPCO jurisdiction (Figure 2.2).

31. **Bahawalnagar** The Sp proposes switch yard expansion by a line bay. The expansion project will be located entirely within the existing substation which is located at DGS that is located on Link road from Bahawalpur Karachi road between Dera Masti and Khanka Sharif, 1 km from Rojanhwali, Tehsil and District Bahawalnagar. Ground water table is at 3 – 5 m, brackish and not drinkable. Water supply to DGS is from pumping of Fordwah Canal. There is a potential risk of contamination of ground water from a major spill or leaks. North of DGS is extension of Islam Nagar, to the east is a huge forest reserve (Eucalyptus and Accacia sp), to the south is the main gate, main road and access road and to the west is Islamnagar. Yard has the potential for expansion of bays.

32. **Bahawalpur** The Sp proposes switchyard expansion by adding two line bays. The expansion project will be located entirely within the existing substation that is located in DGS which is located on Link road from Bahawalpur Karachi Road between Dera Masti and Khankah Sharif in Mauza Yar Mohammad and Mari Sheikh Shajra, Tehsil and District Bahawalpur.

Ground water table is at 20 – 22 m and water is not drinkable. Tube wells are running at 116 – 125 m. DGS is drawing water from donkey pump. There is potential risk of ground water contamination from major spill or leaks. North and east to the DGS are sand dunes. To the south is main gate, access road and settlement, 5 – 20 houses and cultivated land and along the west wall is vacant land and graveyard. Road access is fine. Yard has potential of DGS expansion.

33. **Bonga Hyatt** .The sub project proposes to augment an existing 10X13 MVA 132/11 kV power transformer with a 20X26 MVA 132/11 kV power transformer. The augmentation will take place in the existing sub station . The sub station is located on Depalpur-Pakpattan road in Mauza Nanakpur , Tehsil and District Pakpattan. Water table is 20-22 meters and is drinkable but salt content is higher than the permissible limit .Tube wells are running at 116-125 meters . There is a minor risk of ground water contamination . To the north of the DGS is the access road and highway (Kasur – Multan Road) , to the east is a water course and 2-3 meters south of the DGS is private agricultural land . To the west is located a private housing society (Marla Housing Society) . The yard had potential for extensions.

34. **Chistian** Sp proposes an addition of an line bay. The extension project will be located entirely with in the existing substation which is located at DGS that is located on Bahawalpur road in Chak Fordwah, Tehsil: Chistian, District: Bahawalnagar. Ground water table is at 8 – 10 m, donkey pump and tube well is available in the DGS. There is a minor risk of contamination of ground water from a major spill or leaks. North of DGS are two acres of vacant land and Rana Town, to the east is cultivated land, to the south is Railway line in front of DGS, railway crossing, highway petrol pump, opposite to the railway crossing, to the south is Scrap WAPDA colony and cultivated land. Road access is fine. Yard has the potential for expansion of the DGS.

35. **Feroza** The sub project proposes an extension of transformer capacity by adding a transformer of 10X13 MVA 132 kV power transformer to an existing transformer of 10 x 13 MVA. Feroza extension project will be located entirely with in the existing substation which is located on DGS that is located on a side road from Rahim Yar Khan road to Bhalwalpur road at Feroza Hayat Lar, Tehsil: Liaqatpur, District: Rahim yar khan, Ground water table is at 4 – 5 m saline. Water for drinking is brought from canal i.e., located 1 km. There is potential risk of contamination from a major spill or leaks. North to the DGS is cultivated land and 132 kV line to the east, a primary school adjacent to DGS wall, Basti consisting of 3 – 4 houses, to the south is 132 kV line and drain at 10 m. To the west is main gate & branch road to Feroza to Lar. Road access to the DGS is fine. Total land area of the DGS is 60 kanals Yard has the potential of expansion.

36. **Gujrat South** Sp proposes an extension in transformer capacity of Gujrat south DGS by adding 2 line bays and one transformer bay. Gujrat south extension project will be located entirely within the existing substation which is located at DGS that is located on Multan to Lar road in Gujrat Twon, Tehsil and District Gujrat. There is no boundary wall around the DGS and the grid is fenced by barbed wire. There are mango gardens around DGS. Water table is at 200 m and drinkable. Road to DGS is fine. North to the DGS is

open cultivated area, to the west open cultivated area and transmission lines. Yard has potential for expansion.

37. **Khan Pur** . The Sp proposes an extension in transformer capacity of Khanpur DGS by adding a transformer of 26 MVA to existing transformer. The expansion project is located entirely within existing substation that is located at DGS which is located on Rahimyar Khan road in Mauza and Tehsil Khanpur and District Rahim Yar Khan. Ground water table is at 18m and tube wells are running at 67m. There is a potential minor risk of ground water contamination from a major spill or leaks. To the north of the DGS is cultivated land. To the south are main gate, road and poultry farm. Road access is fine. Yard has potential for expansion.

38. **Liaquat Pur** The sp proposes an extension of transformer capacity by adding two transformers of 20X26 13 MVA 132/11 kV to the existing substation. Liaquatpur extension project will be located entirely within the existing substation which is located at DGS that is located on Abbasian road in Chack 23 Abbasian, District Multan. Ground water table is 13 – 15 m down and hard. There is a minor risk of contamination from spill or leak. To the north of DGS is road along DGS and 132 KV line from Samma Satta, to the east is vacant state land and private land. To the south Forest office along DGS, 5 shops across the road and vacant land on all sides, to the west road to Qasim Bangla. 2 R canal at 10 m. Primary school, high school, college, clinics and a civil hospital are located at 1.5 km from DGS. Road to the DGS is fine. Yard has the potential for DGS expansion.

39. **Rajan Pur** .The sp proposes an extension in transformer capacity of the Rajanpur DGS by adding a transformer of 26 MVA to an existing transformer of 132 MVA 132/11kV power transformer to an existing sub station. The extension project will be located within the existing substation that is located at DGS which is located on Rajanpur Road in Mauza, Tehsil and district Rajan pur. Ground Water table is at 17 – 18 m. Donkey pump and tube well are at a depth of 67m. There is minor potential risk for the contamination of the ground water. North to DGS is WAPDA colony, main gate & access to the east, south is WAPDA colony and to the west is Divisional Operation Office. Access to the DGS is fine. Yard has the potential of expansion

40. **Samma Satta**. The extension subproject will be located entirely within the existing substation .The Sp proposes extension in transformer capacity of Samma Satta DGS by adding a transformer of 20X26 MVA 132/11 MVA transformer. The project will be located within the existing substation that is located at DGS which is located on Samma Satta road near Paras Textile mill in Samma Satta, Tehsil and District, Bahawalnagar. Ground water is at 22 – 26 meter, brackish and not drinkable, water at 200 m is also brackish (tube well). There is minor potential risk for ground water contamination from major spill or leaks. There are cultivated fields around DGS and there is no boundary wall around it. North to the DGS is Samma Satta road, to the east, south and west is cultivated land. The road access to DGS is fine. Yard has potential of DGS expansion.

41. **Shujabad** . The Sp proposes an extension of transformer capacity of the Shujabad DGS by adding a transformer of 20X26 MVA to an existing 10 x 13 MVA transformer. The project will be located entirely within the existing substation that is located at DGS which is located on Multan to Lar road in Mouza Shahpur, Tehsil and District Shujabad. Ground water table is at 200 m (by bore) and is drinkable. There is minor potential risk of contamination of ground water from a major spill or leak. Road access to DGS is fine. North, south and west to the DGS is cultivated land with transmission line on west, towards east, Multan Lar road. Yard has potential for DGS expansion.

3. DESCRIPTION OF THE ENVIRONMENT

3.1 Sub-project Areas

42. The general characteristics of the extension and augmentation sub-project areas vary considerably. Many are in the urban areas in the MEPCO jurisdiction. Other are in rural areas Multan City and other urban centers.

43. Typically there are a few buildings including residential and other social infrastructure that are located within 50m of the DGS.

44. In all DGS there is plenty of room for the construction of the extension and augmentation projects (Appendix 3). Access in all cases will be via the main entrance that joins the nearest main road.

3.2 Physical Resources

Topography, Geography, Geology, and Soils

45. The area of the MEPCO jurisdiction extends beyond Multan district, to several other districts (DG Khan, Rahim Yar Khan, Bahawalpur, Bahawalnagar, Sahiwal, Muzafargar and Vehari). The topography of the area is relatively flat with a remarkable uniformity of physical conditions. The soil of the district is of alluvial in nature, with typically about a 1-2 meter deep layer of sand everywhere below the surface.

46. The sub-project DGS have all been constructed to a very similar design in various areas in the MEPCO jurisdiction (Appendix 3). The natural soils within the sub-station boundaries have been covered with cobblestones, bricks or concrete in various areas.

47. Some small volumes of soil will need to be removed to create the footings and foundations for the new transformers. At this stage there is no identified requirement for disposal of any unsuitable spoil.

3.3 Climate and Hydrology

48. There is little variation of altitude above sea level between the DGS where the MEPCO Tranche 1 sub-projects will take place and thus little or no variation between the climates of the project areas. The climate in all areas is typical of that of the central Punjab.

49. The climate of Multan is typical of that of southern Punjab. The maximum temperature in summer reaches 42°C. In winter the minimum temperature is 4.5°C. The mean maximum and minimum annual temperatures in summer is 32.6°C and 28.6°C respectively. The summer season starts from April and continues till October. May, June and July are the hottest months. The winter season starts from November and continues till March. December, January and February are the coldest months.

50. The rainy season starts in July and ends in September. Annual rainfall is 398 millimeters. More rains occur in July and August than in any other months. Most of the winter rains are received in the months of March and April.

51. Climate will have little bearing on the minor environmental impacts from the installation of transformers in the extension and augmentation sub-projects.

3.4 Groundwater and Water Supply

52. Irrigation by open wells has been an essential part of the agricultural system in the district, but now most of these have been replaced by canal tubewells, which irrigate about 4,000 hectares area.

53. The installation of tubewells, especially in the non-perennial track, is increasing fast. A large part of the district is being irrigated by tubewells. In some of the tehsils, the Water and Power Development Authority has supplied electricity connections, but most tubewells are still run by diesel engines.

54. There is a potable piped water supply in the areas around most MEPCO sub-projects. In outlying areas, the local population is generally reliant on supply from tube wells, as well as occasional open wells and hand pumps. There should be no impact on these sources of water by the construction of the extension and augmentation sub-projects.

3.5 Surface Water

Rivers and Surface Drainage

55. Three rivers pass through the Multan district. The Ravi river flowed within a kilometer of Multan city till the 18th century, but now its discharge is greatly reduced due to supplies taken off by the Bari Doab Canal system, and during most of winter, its bed is dry.

56. Similarly, flows in the Chenab and Sutlej rivers have also decreased after construction of headworks on the upstream. The south-western part of the district receives water from both these rivers, and the intervening land near the confluence of Chenab and Sutlej is regularly flooded during the summer.

57. Amongst the natural streams (*nallahs*), the more well known are the *nallah* Wali Muhammad, the *nallah* Gujbatta and the *nallah* Bakhtowah.

58. Irrigation is largely dependent on network of tubewells, canal tubewells irrigation canals from various sources from the rivers Ravi, Chenab and Sulej. The total area irrigated by canals (off taking from river Chenab at Trimmu, and from the Ravi at Sidhnai Headworks) is 11,000 hectares. There are about 14,500 tubewells, irrigating about 410,000 hectares. About 4000 hectares area is irrigated by canal wells.

59. The sub-project DGS have all the natural soils within the sub-station covered but the cobblestones allow surface water to drain away from some areas to the underlying soil. In other areas brick and concrete channels divert rain water to surface drains.

3.6 Air Quality

60. Multan is famous for dust, and particulate pollution in the air is often high during hot, dry and windy days. Movement of motorized vehicles can also

raise dust along unpaved roads. Otherwise, air quality in the most of the sub-project area appears fairly good based on observation during the study period although areas nearer the busy main roads are clearly impacted by vehicle fumes and dust. It is unlikely that large powered mechanical equipment will be needed for the extension and augmentation projects other than delivery lorries and lifting cranes. There may also be neighbouring domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households. Other industrial sources are very few and limited to occasional factories. The major source of atmospheric pollution for the operational phase will be from vehicles on nearby roads and any industrial facilities nearby. Such emissions will be very well dissipated in the open terrain.

61. The other major source of air pollution is dust from arising from construction or other ground or soil disturbance. The extension and augmentation projects may in some cases require minor civil works to create or repair or improve supporting foundations for transformers.

Noise and Vibration

62. Noise from vehicles and other powered mechanical equipment is intermittent in most urban areas. There are also the occasional calls to prayer from the PA systems at the local religious locations and there are other occasional disturbances typical of the urban setting. However the proposed power extension and augmentation projects should not be noisy or create vibration nuisance.

3.7 Ecological Resources

63. Wildlife, which was once diverse and abundant in the district, is now reduced almost to extinction. There are thus no significant terrestrial or aquatic biological resources in the urban areas near the sub-projects. No protected or religious trees have been identified in the sub-stations. There are a few planted trees and shrubs in sub-station gardens that may act as food trees for some birds.

64. The rest of the land adjacent to the sub-stations is mostly dominated by urban or agro-ecosystems. Home gardens also play a role in the local ecology. Some gardens are fairly large and many species of flora, including large trees are present but these would not be affected by the extension and augmentation sub-projects in Tranche 1.

65. None of the extension and augmentation sub-projects in Tranche 1 is near any area devoted to the preservation of biodiversity through dedication as a national parks and wildlife sanctuary. There are no protected areas near the transmission alignment.

3.8 Economic Development

Agriculture, Industries, and Tourism

66. **Agriculture:** The main crops in the subproject area during winter are wheat, gram, rapeseed, mustard, toria, barley and other cereals, and during summer cotton, rice, jawar, bajra, maize and sugarcane. In addition, there are

subsidiary crops known as Zaid Rabi like melon, tobacco and potatoes and Zaid Kharif like potatoes and chillies.

67. Horticulture: The main fruits grown in the district are mango, many kinds of citrus including orange, sour-lemon, sweet lemon, and other fruit like pomegranate, guava and dates. Orchards of good varieties of mangoes like Anwar Ratol, Dasehri and Langra are scattered all over the district. The tehsils of Multan and Shujabad, have the largest area under gardens. Shujabad is particularly famous for its mango gardens.

68. Industries: Major industries include cotton ginning and processing, cotton textiles, silk and art silk textiles, carpet and rug making, woolen textiles, edible oils, tanning and leather finishing, dying, bleaching and finishing of textiles, fertilizers, soap manufacturing, clay products, pharmaceutical preparations, and agricultural machinery. Cottage industries include chemical, silk/woolen carpets, coloured bricks, household linens etc.

69. Tourism: There are hundreds of places of interest in and around Multan, which attract tourists, e.g. Multan Fort, Mausoleums of Sh. Bahawal Haq, Rukn-e-Aam, Hazrat Gardezi Shrine, Musa Pak Shaheed, Shah Shams Tabrez, Samadhi of Diwan Sawan Mal, the Sun Temple, the Temple of Prahladpuri, etc, which attract a large number of visitors.

70. There are thousands of industrial and commercial businesses in the vicinity of the Tranche 1 extension and augmentation sub-projects reliant on the efficient distribution of electrical power. There are also agricultural businesses on the fringes of the urban areas and tourism is also an important business in Multan.

Transportation

71. There is a network of inter-city roads in the district, connecting all tehsil headquarters and important towns. A variety of bus services are available on these routes. Trucks are used to transport freight over longer routes across the study area and between market centres. Farm tractors are available in some areas and are used to convey local produce to market as well as for agricultural purposes. The District is also connected with other districts by two railway lines, i.e. the Faisalabad – Multan branch railway line and the Lodhran – Shujabad – Multan railway line. Multan is also linked by air with other parts of the country through regular flights.

72. The air, rail and road transport systems are all reliant to some extent on electrical power and thus the majority of the local population is reliant on the power network for transportation.

Power Sources

73. The transmission lines for electrical power in the MEPCO run in a complex grid with more than one hundred sub-stations (Figures 2.1 and 2.2).

3.9 Social and Cultural Resources

Population and Communities

74. The total population of Multan district was just over 3 million in the 1998 census. According to the 1998 Census the population of the district is 99%

Muslims. Minorities include Christians, Ahmadis, Hindu (Jati), Scheduled castes etc. Siraiki is the predominant language being spoken in the district, representing 61% of the population followed by Punjabi spoken by 22%, Urdu 16% and Pushto 1% while others speak Sindhi, Balochi, Brahavi, Dari etc.

75. In 1998, of the total employed persons 39.5 % had elementary occupations, followed by skilled agricultural and fishery workers representing 25.5 %, service workers, shop and market sales workers 17.6 %, and craft and related trade workers representing 5.1%.

76. There are many newly developing urban localities where families from middle and upper classes of society from all religions and castes are taking up residence. These new localities are creating an increased demand for better provision of electrical power from the network.

77. None of the extension and augmentation sub-projects will require relocation or resettlement. There are many important cultural or archeological sites in Multan, but there are no cultural and archeological sites located in the vicinity of any of the Tranche 1 extension and augmentation sub-projects.

Education and Literacy

78. The literacy ratio in Multan district has increased from 23.5 % in 1981, to 43.4 % in 1998. The literacy ratio for males is 53.3 %, and 32.3 % for females. The ratio is much higher in urban areas than rural areas for both males and females.

79. There are over 2,000 educational institutions in Multan district, from mosque / primary to postgraduate level. Multan also has the Nishtar Medical College and Multan University.

80. All the educational institutions are reliant on reliable power. Many Government and private schools are located near the Tranche 1 extension and augmentation sub-projects.

Health Facilities

81. There are 14 hospitals with 1644 beds, 57 Dispensaries with 34 beds, 8 Rural Health Centers with 160 beds, 67 Basic Health Units with 134 beds, 3 T.B. Clinics, 34 Sub Health Centers, 13 Mother & Child Health Care centers in Multan district, and a Civil Hospital in Multan city. Nishtar Hospital is attached with Nishtar Medical College. There are two Tehsil Headquarters Hospitals, in Shujabad and Jalalpur Pirwala tehsils. There are also other hospitals of voluntary organizations which provide health cover to the general public. Medical facilities are located near many of the Tranche 1 extension and augmentation sub-projects.

4. SCREENING POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Project Location Impact Assessment and Mitigation

82. The Tranche 1 extension and augmentation sub-projects will involve expansion of facilities within existing sub-stations (DGS) and therefore sensitive receivers (SR) are set well back from the power equipment outside the DGS boundaries. In the case many of the extension and augmentation sub-projects there some sensitive receivers (SR) within a few metres of the DGS boundary walls and the SRs are in the form of residential buildings, some schools and shops in the surrounding villages as shown in Attachment 2.

83. The location and scale of the works are very important in predicting the environmental impacts. This process of impact prediction is the core of the IEE process and it is critical that the recommendations and mitigation measures are carried out according to with reference to the conditions on the ground in the affected areas in the spirit of the environmental assessments process. In this section the potential environmental impacts are reviewed. If impacts are predicted to be significant enough to exceed accepted environmental standards, mitigation is proposed in order to reduce residual impact to acceptable levels and achieve the expected outcomes of the project being implemented. Therefore, it is essential that a proper analysis is carried out during the project planning period. In this regard, the impact prediction plays a vital role as these predictions are used for developing mitigation measures and any alternative options, if appropriate. When the detailed designs are completed the impacts and mitigation measures will need to be further reviewed to take account of how the contracts are set up and in the light of any fine tuning of the sub-projects.

84. The environmental management plan (Section 5 and EMP matrix Appendix 4) has been compiled based on the available information and shall be reviewed in due course at project inception and through construction in order to feed back and [provide revised mitigation for any significant unpredicted impacts. The analysis primarily the key environmental issues likely to arise from sub-project implementation, to prescribe mitigation measures to be integrated in the project design, to design monitoring and evaluation schedules to be implemented during sub-project construction and operation, and to estimate costs required for implementing sub-project mitigation measures. The EMP plan must be reviewed when the sub-projects reach the inception stage by the project management and be approved before any construction activity is initiated, to take account of any subsequent changes and fine tuning of the proposals.

4.2 General Approach to Mitigation

85. During the preparation for the sub-project construction phase the future contractors must be notified and prepared to co-operate with the executing agency, project management, supervising consultants and local population in the mitigation of impacts. Furthermore the contractor must be primed through bidding stages and the contract documentation to implement the EMP in full and be ready to engage trained environmental management

staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency (PEPCO) must be prepared for this. In this regard the MEPCO must fulfill the requirements of the law and guidance prepared by FEPA on the environmental aspects of power projects and the recommendations already made for sub-projects in this IEE and under Pakistan's PEPA law.

86. The location of the residences, temples, schools, hospitals and civic cultural and other heritage sites has been reviewed in Section 3. Few if any of the residences and schools are close enough to sub-projects that there will be potential impacts in the construction stage from disturbance and significant noise and dust. Water is available in the study area although surplus water may not always be available to suppress dust at many locations in the dry season.

4.3 Prevention of ground contamination

87. Best international practice includes control measures to contain oily residues. Transformer oil and lubricants that may be released in the operational stage from maintenance and from a catastrophic failure that would result in loss of all transformer oil. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are also facilities in some sub-project DGS maintenance yards for recycling (dehydrating) oil for breakers.

88. The transformers, transformer oil stocks and the transformer oil dehydration machines or are not installed on impervious surfaces. Therefore in order to be in line with best international practice some mitigation measures are required to prevent soil contamination.

89. The areas upon which the new transformers, transformer oil stocks and the transformer oil dehydration machines located should have an impervious surface with bunding and high enough edges to capture 110% of the total volume of oil that is housed within the bunded area. Oil and oily residues should therefore be captured at source and maintenance should take place in these dedicated areas away from surface water resources. With such mitigation installed no impacts should arise in sub-projects. A programme to introduce bunding in all substations should be introduced in the medium to long term as the transformers are upgraded (ITC) or replaced as resources permit.

4.4 Cultural Heritage, Temples, Religious Sites, Social Infrastructure

90. The location of temples and other cultural and other heritage SR sites with respect to the sub-projects has been reviewed in Section 3. No temples or religious sites are so close to the works in the DGS as to cause a nuisance. There will be sufficient buffer distance between the works and the SR such that no major significant impact would be expected from the works. However provision should be made for public consultation to be undertaken at the implementation stage to ensure no nuisances arise.

91. The clinic/hospitals are all well separated from the boundary walls of the sub-project DGS and there will be sufficient buffer distance between

the works and the SR such that no major significant impact would be expected from the works. However, public consultation should also be undertaken.

92. The location of schools and some residences places them within 10m from the edge of the sub-project DGS boundary wall in many cases. Whereas the scale of the works for Tranche 1 extension and augmentation sub-projects is well within the DGS boundary wall there should be sufficient buffer distance between the works and all the SR such that no significant impacts can be expected from the works, particularly in terms of noise, vibration and dust. However provision should be made for public consultation to be undertaken at the implementation stage to ensure no nuisances arise.

4.5 Potential Environmental Impacts in Construction

Encroachment, Landscape and Physical Disfiguration

93. The extent of Tranche 1 extension and augmentation sub-projects is well within the existing DGS boundary wall and therefore no additional encroachment, landscape or impacts associated with physical disfiguration of the urban cityscape or rural landscape are expected from construction.

94. Potential disfiguration of the landscape can however result from the uncontrolled excavation of raw materials such as rock, gravel and sand from neighboring areas. Extraction of rock based materials is not necessary on these sub-projects and is already banned by the authorities except under license.

Cut and Fill and Waste Disposal

95. The Tranche 1 extension and augmentation sub-projects should not require any significant cutting and filling but minor excavations and piling will be required in the DGS where the new transformers are to be located to create the footings.

96. Mitigation measures must focus on the minimization of impacts. If surplus materials arise from the removal of the existing surfaces these can be used elsewhere on the sub-projects before additional soil rock, gravel or sand extraction is considered. The use of this immediately available material will minimize the need for additional rock based materials extraction. The extraction of raw materials should be minimized by the re-use on-site for landscaping of all rock and soil based materials extracted for excavation of foundations etc.

97. If off-site disposal of surplus materials is necessary this must also be negotiated through local authority approvals prior to the commencement of construction.

98. Contractual clauses should be included to require each contractor to produce a materials management plan (one month before construction commences) to identify all sources of cement and aggregates and to balance cut and fill. The plan should clearly state the methods to be employed prior to and during the extraction of materials and all the mitigation measures to be employed to mitigate nuisances to local residents. Mitigation measures shall seek to control the impacts at source in the first place. The construction

supervising consultant (engineer) shall be responsible to update the cut and fill estimates and create Materials Master Plan to facilitate materials exchange between the different contracts in the Tranche 1 sub-projects to provide an overall balance for materials and minimize impacts on local resources.

4.6 Trees, Ecology and Protected Areas

99. Surveys have been made at all sub-project locations and whereas trees are present in some sub-stations there should not be any need for disturbance of trees in the Tranche 1 extension and augmentation sub-projects.

100. If for some unforeseen reason Reserved Trees or other trees do need to be removed permission should be obtained from the forest authority after written justification.

101. At this stage no areas require removal of woodland. However if specimen trees of religious plantations are affected the owners should be given the resources and opportunity to reinstate the woodland long term and a plantation compensation plan should be drawn up to replant the woodland/trees. In the event that the land is not suitable for plantation then other areas should be identified to replace the cut trees and sufficient areas should be identified to allow plantation of trees at a rate of say 3:1. The replacement ration should allow for a high mortality rate among the newly planted trees in the dry environment or otherwise as based on advice from the forest authority.

102. A requirement shall be inserted in the contracts that no trees are to be cut in the DGS without the written permission from the Supervising Consultant who may permit the removal of trees if unavoidable on safety and technical engineering grounds after written justification.

4.7 Hydrology, Sedimentation, Soil Erosion

103. The Tranche 1 extension and augmentation sub-projects are all on flat sites and should only require minor excavations and piling. Therefore there is little potential for the works to have impact on local water resources. There should be no need for erosion control and there should not be any significant runoff from stockpiles.

4.8 Air Pollution from Rock Crushing, Cut, Fill, & Asphalt

104. Field observations indicate that ambient air quality is generally acceptable considering the urban and urban fringe environments where the Tranche 1 sub-projects are located. Any local emissions from powered mechanical equipment needed for the construction will to be rapidly dispersed and no impacts are expected.

105. Major earthworks are not envisaged but minor excavations and piling will be required in the DGS where the new transformers are to be located and to create the footings and bunds for containment of leaked oily waste. Where earthworks are required they will contribute to increasing dust. However the scale of the works at any one location is not likely to cause excessive dust. Therefore dust control from works at this scale should be

easy to achieve at little extra cost. In order to avoid complaints of dust nuisances the following mitigation measures should be carried out as a matter of good housekeeping:

- (i) Dust suppression facilities (back pack water sprayer) shall be available where earth and cement works are required.
- (ii) Areas of construction (especially where the works are within 20m of the SRs) shall be maintained damp by watering the construction area.
- (iii) Construction materials (sand, gravel, and rocks) and spoil materials will be transported trucks covered with tarpaulins.
- (iv) Storage piles will be at least 30m downwind of the nearest human settlements.
- (v) All vehicles (e.g., trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark or smoky emissions in excess of the limits described in the NEQS.

106. The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources. If large stockpiles ($>25\text{m}^3$) are necessary they should be enclosed with side barriers and covered with tarpaulins when not in use and at the end of the working day to enclose dust.

107. Bitumen will not generally be required. If bituminous compounds are to be applied by hand labour methods and melted in heaters the fuel used shall be kerosene, diesel or gas fuel. Fuel wood shall not be used for heating bitumen; neither should bitumen be used as fuel.

108. Bitumen drums should be stored in a dedicated area, not scattered around the sub-project and any small accidental spills of bitumen or chemicals should be cleaned up immediately. The waste including the top 2cm of any contaminated soil and disposed of as chemical waste to an approved landfill or approved local authority disposal site.

4.9 Noise, Vibration and Blasting

109. There will be no requirement for blasting for the Tranche 1 extension and augmentation sub-projects. At this stage the specific methods for installation of transformers with regard to supporting civil works is not known but soft ground is not generally present and piling should not be needed and would not be a preferred method for foundations in vibration sensitive DGS. Therefore noise and vibration should not be an issue during constructions of Tranche 1 extension and augmentation sub-projects.

4.10 Sanitation, Solid Waste Disposal, Communicable Diseases

110. The main issues of concern are uncontrolled disposal of waste by construction workers, unmanaged disposal of solid and liquid wastes into watercourses and natural drains. There should not be any significant amounts of waste from the works and because the works will be under close supervision of the MEPCO authority within the DGS these issues can be controlled at source.

111. In order to maintain proper sanitation around construction sites the workforce will be allowed to use the flush toilets in the sub-station control, facilities.

112. Vectors such as mosquitoes should not be a significant consideration bearing in mind the type and scale of works for the Tranche 1 extension and augmentation sub-projects.

4.11 Potential Environmental Impacts in the Operational

Air Pollution and Noise from the Enhanced Operations

113. Based on observations of many different types of transformer at numerous Tranche 1 extension and augmentation sub-project sites, noise and vibration should not be a nuisance to any nearby SRs. Although one transformer will be added for the extension projects the incremental addition to noise levels will not cause a significant disturbing effect for the SRs in the vicinity of the sub-projects.

114. Some switchgear that may be installed may contain SF6. Typically losses of the SF6 gas are very minor in the operational phase but it is noted that all halogenated gases can potentially accrue “greenhouse gas effects” if they are released in significant quantities. However well installed SF6 equipment should not leak significant amounts of gas and in leakage is checked routinely from all such equipment. Six monthly reports are already made in case there is a need for SF6 to be topped up. The maintenance of the equipment should be geared to achieve a gradual reduction in SF6 usage (leakage) which can therefore be monitored to slowly eradicate any such impacts. If SF6 leakage becomes excessive the respective plant will be overhauled to reduce eradicate the leakage.

115. If there is a suspicion that there has been a leak of sulphur hexafluoride or by products at any substation the immediate substation area should be evacuated, the controlling engineer must be informed, pending investigation by an authorized person. Thus atmospheric environmental impacts from SF6 can be mitigated and are not expected to be significant.

Pollution from Oily Run-off, Fuel Spills and Dangerous Goods

116. Control measures will be needed for oily residues such as transformer oil and lubricants. Transformer oil is supplied in drums from an imported source and tap tanks are topped up as necessary on site. There are facilities in some sub-project DGS maintenance yards for recycling (dehydrating) oil for breakers. However the areas upon which these recycling facilities are located have no dedicated drainage which can capture run-off. Oily residues and fuel should be captured at source and refueling and maintenance should take place in dedicated areas away from surface water resources. No significant impacts should be allowed to arise in sub-projects.

117. If for some reason there are oily releases they should be cleaned up immediately. The waste including the top 2cm of any contaminated soil and disposed of as chemical waste to an approved landfill or approved local authority disposal site.

Pollution from Oily Run-off, Fuel Spills and Dangerous Goods

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119. If for some reason there are oily releases they should be cleaned up immediately. The waste including the top 2cm of any contaminated soil and disposed of as chemical waste to an approved landfill or approved local authority disposal site.

4.12 Enhancement

120. Environmental enhancements are not a major consideration within the numerous Tranche 1 extension and augmentation sub-project sites. However it is noted that it is common practice at many such sites to create some local hard and soft landscaping and successful planting of fruit trees and shrubs has been accomplished in many sites. This practice should be encouraged as far as practicable.

5. INSTITUTIONAL REQUIREMENTS & ENVIRONMENTAL MANAGEMENT PLAN

121. In this section, the mitigation measures that are required, for Tranche 1 extension and augmentation sub-projects, to reduce residual impact to acceptable levels and achieve the expected outcomes of the project, are discussed. The Environmental Management Plan is based on the type, extent and duration of the identified environmental impacts for Tranche 1 extension and augmentation sub-projects. The EMP has been prepared following best practice and by reference to the *ADB Environmental Assessment Guidelines 2003*.

122. It is important that the recommendations and mitigation measures are carried out according to the spirit of the environmental assessment process and in line with the guidelines. The EMP matrix is presented as Attachment 4. The impact prediction (Section 4) has played a vital role in reconfirming that typical mitigation measures and approaches will achieve the necessary environmental controls based on the feasibility and detailed design assumptions available at this stage.

123. Prior to implementation and construction of the sub-projects the EMP shall be reviewed by the MEPCO and amended after detailed designs are complete. Such a review shall be based on reconfirmation and additional information on the assumptions made at the feasibility stage on positioning, alignment, location scale and expected operating conditions of the sub-projects. For example, in this case if there are any additional transmission lines or extension of the sub-station boundaries to be included, the designs may be amended and then the performance and evaluation schedules to be implemented during project construction and operation can be updated, and costs estimates can be revised. The IEE and EMP should then be revised on a sub-project by sub-project basis.

124. The IEE and EMP plan must be reviewed by the project management and if approved by the PEPA (if required) before any construction activity is initiated. This is also an ADB requirement in order to take account of any subsequent changes and fine tuning of the proposals. It is recommended that before the works contract is worked out in detail and before pre-qualification of contractors that the full extent of the environmental requirements for the subproject(s) and the IEE and EMP are included in the bidding documents. Past environmental performance of contractors and awareness of environmentally responsible procurement should also be used as indicators for prequalification of contractors.

125. In order to facilitate the implementation of the EMP, during the preparation for the construction phase the MEPCO must prepare the future contractors to co-operate with all stakeholders in the mitigation of impacts. Furthermore the contractor must be primed through the contract documentation and ready to implement all the mitigation measures. MEPCO will need to make provision to retain the trained environmental management staff already engaged (in post in MEPCO and LESCO) and these staff should audit the effectiveness and review mitigation measures as the sub-projects are rolled out. MEPCO will also need to confirm that contractors and their

suppliers have complied with all statutory requirements and have appropriate and valid licenses and permits for all powered mechanical equipment and to operate in line with local authority conditions.

126. The effective implementation of the EMP will be audited as part of the ADB mid term review of loan conditions and the executing agency must prepare for this at the inception stage.

127. The details of EMP given in the Attachment 4 are for the Tranche 1 extension and augmentation sub-projects. The EMP matrix will be different for the more complicated sub-station and line projects that involve impacts to land outside the existing sub-stations and for which separate dedicated IEEs and EMPs have been prepared.

128. The impacts have been classified into those relevant to the design/preparation stage, construction stage and operation and maintenance stage. The matrix provides details of the mitigation measures recommended for each of the identified impacts, time span of the implementation of mitigation measures, an analysis of the associated costs and the responsibility of the institution. The institutional responsibility has been specified for the purpose of the implementation and the supervision. The matrix is supplemented with a monitoring plan for the performance indicators. An estimation of the associated costs for the monitoring is given with the plan. The EMP has been prepared following best practice and the *ADB environmental assessment guidelines 2003*.

129. The EMP (Attachment 4) was prepared taking into account the limited capacity of MEPCO to conduct environmental assessments of the sub-projects. MEPCO has engaged an environmental specialist (as already in post LESCO). It is expected that a graduate environmental specialist will remain in post for the foreseeable future while the loan is active. However it is also strongly recommended that for sub-projects in future Tranches that the MEPCO be prepared to engage more support where necessary especially if full scale EIAs are required for some line and substation subprojects (e.g. senior environmental specialist with at least 10 years experience in environmental management five years site experience in environmental monitoring and auditing) to guide the subsequent formal assessment and submission process under the PEPAAct and monitor compliance with the EMP. As of August 2007, the MEPCO has not yet shown much commitment to developing in-house environmental and social capability.

130. The newly appointed environmental staff members will need a good level of awareness and will be responsible for addressing environmental concerns for sub-projects potentially involving hundreds kilometers of distribution lines and DGS. Whereas some of their work may in future be delegated to consultants they will need more training and resources if they are effectively provide quality control and oversight for the EMP implementation. They will require robust support from senior management staff members and the management consultant if they are to address all environmental concerns for the sub-projects effectively. Specific areas for immediate attention are to appoint environmental specialist(s) have them experienced or trained in EMP auditing, environmentally responsible procurement, air, water and noise pollution management and ecological impact mitigation. It is recommended that an environmental specialist

consultant with 10 years experience be made available to all the DISCOS through the TA attached to the PDEMFF to cover these aspects full time for at least the first six months of the PDEMFF project and that on a call off basis with local support those services are retained for the life of the PDEMFF loan. The newly appointed graduate environmental staff members can then shadow the environmental specialist to improve awareness and hopefully provide independent quality control and oversight for the EMP implementation within 12 months.

131. In order to achieve good compliance with environmental assessment principles the graduate environmental staff for the project implementation team must be actively involved, prior to the outset of the implementation design stage, to ensure compliance with the statutory obligations under the PEPAct. It is also recommended that MEPCO Board allow direct reporting to Board level from the in-house Environmental and Social Unit (ESU). If the ESU requires resources for larger sub-projects then environmental specialist consultants could be appointed through the relevant project implementation unit to address all environmental aspects in the detailed design. It is recommended that the project management unit (PMU) should liaise directly with the ESU to address all environmental aspects in the detailed design and contracting stages. The graduate environmental staff will cover the implementation of environmental mitigation measures in the project packages.

132. The graduate environmental staff specialist will:

- a. work in the PMU with MEPCO to ensure all statutory environmental submissions under PEPAct and other environmentally related legislation are thoroughly implemented;
- b. work in the PMU with MEPCO to ensure all environmental requirements and mitigation measures from the environmental assessment of sub-projects are included in the contract prequalification and bidding documents;
- c. work with MEPCO to execute any additional IEE and IEE requirements needed due to fine tuning of the sub-projects and that environmental performance targets are included in the contracts prior to project commencement;
- d. work in the PMU with MEPCO to ensure all environmental requirements and mitigation measures from the IEEs and IEEs and environmental performance criteria are incorporated in the sub-project contracts or variations and that the EMP is effectively implemented;
- e. work with management (consultants), supervising consultant and contractors to manage and monitor the implementation of the project EMP.
- f. work with management to ensure that the Environmental Assessment Review Framework (EARF) is fully applied, adequately resourced and implemented for future Tranches of the PDEMFF.

133. Overall implementation of the EMP will become MEPCO's responsibility. Other parties to be involved in implementing the EMP are as follows:

Contractors: responsible for carrying out the contractual obligations, implementing all EMP measures required to mitigate environmental impacts during construction; and

Other government agencies: such as regional PEPA and state pollution authorities, Department of Forests, Department of Wildlife Services, who will be responsible for monitoring the implementation of environmental conditions and compliance with statutory requirements in their respective areas and local land use groups at the local levels.

134. Considering that other government agencies that need to be involved in implementing the EMP, training or harmonization workshops should be conducted for all ESUs in all DISCOS every six months or twice each year, for the first 2 years (and annually thereafter) to share the monitoring report on the implementation of the EMP in each DISCO and to share lessons learned in the implementation and to achieve a consistent approach decide on remedial actions, if unexpected environmental impacts occur.

135. The monitoring plan (Attachment 5) was designed based on the project cycle. During the pre-construction period, the monitoring activities will focus on (i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time. Where detailed design is required (e.g. for power distribution lines and avoidance of other resources) the inclusion and checking of designs must be carried out. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, and some performance indicators will be monitored to record the Sub-projects environmental performance and to guide any remedial action to address unexpected impacts. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts. The potential to use local community groups contacts for monitoring should be explored as part of the activities in setting up the Environmental and Social Unit which should have regular meetings with the NGOs as a matter of good practice and to discuss matters of mutual concern.

136. At this stage, due to the modest scale of the new power distribution projects and by generally keeping to non-sensitive and non-critical areas the construction and operational impacts will be manageable. No insurmountable impacts are predicted providing that the EMP is implemented to its full extent and required in the contract documents. However experience suggests that some contractors may not be familiar with this approach or may be reluctant to carry out some measures. In order that the contractors are fully aware of the implications of the EMP and to ensure compliance, it is recommended that environmental measures be costed separately in the tender documentation and that payment milestones are linked to environmental performance, *vis a vis* the carrying out of the EMP.

137. The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency must be prepared for this. In this regard the MEPCO (the IA) must be prepared to guide the design engineers and contractors on the environmental aspects.

6. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Approach to Public Consultation

138. The public consultation (PC) process with various stakeholders for Tranche 1 has been approached so as to involve public and other stakeholders from the earliest stages. Public consultation has taken place during the planning and design and viewpoints of the stakeholders have been taken into account and their concerns and suggestions for possible improvements have been included where appropriate. Much of the PC process to date has revolved around concerns for the mitigation of construction impacts and the possible side effects from the proximity of high voltage power lines. PC has therefore been conducted for the sub-station and line sub-projects that may incur some impacts over land outside existing sub-stations and that PC is reported in the dedicated IEEs for those sub-projects. There is also ongoing consultation for land acquisition and resettlement (LAR) and the completion of the Resettlement Plan (RP) is documented separately. It is expected that this process will continue through all stages of the sub-projects in order to accommodate stakeholders' aspirations and to orient the stakeholders positively towards the project implementation and where possible to harness co-operation over access issues in order to facilitate timely completion.

139. The Tranche 1 extension and augmentation sub-projects the whole of each sub-project in design, construction and operational stages is only likely to affect the areas within the DGS premises. There are unlikely to be any significant impacts outside the DGS except for perhaps temporary minor inconveniences to traffic when new transformers are transported to site. Therefore MEPCO is the major relevant stakeholder and MEPCO are in favour of and support their own sub-project proposals. However some consultation was also conducted with residents and other stakeholders near the MEPCO extension and augmentation subprojects and the major concerns of the public, based on consultation at the substation projects, seems to be to get employment in the construction phases.

7. FINDINGS RECOMMENDATIONS AND CONCLUSIONS

7.1 Findings and Recommendations

140. This study was carried out at the planning stage of the project. Predominantly secondary data and site reconnaissance were used to assess the environmental impacts. The potential environmental impacts were assessed in a comprehensive manner. The report has provided a picture of all potential environmental impacts associated with the sub-projects, and recommended suitable mitigation measures. This study recommends that some further follow up studies are undertaken during project processing in order to meet the ADB requirements.

141. There are some further considerations for the planning stages such as obtaining clearance for the project under the Pakistan Environmental Protection Act (1997) but environmental impacts from the Tranche 1 extension and augmentation sub-projects will mostly take place during the construction stage. There are also some waste management issues for the construction and operational stage that must be addressed in the detailed design and through environmentally responsible procurement. At the detailed design stage the number of and exact locations for transformer extensions and augmentations and other enhancements may change subject to detailed surveys but the impacts are likely to be broadly similar at most locations and impacts have been reviewed in the environmental impact section of this IEE report.

142. The Tranche 1 extension and augmentation sub-projects require a number of key actions in the detailed design phase. Prior to construction the MEPCO must disclose the projects to Federal EPA and receive clearance certification from the PEPA. MEPCO must complete an EMP that will be accepted by the PEPA and agreed by the contractor prior to signing the contract. The information provided in this report can form the basis of any further submission to PEPA as required in future.

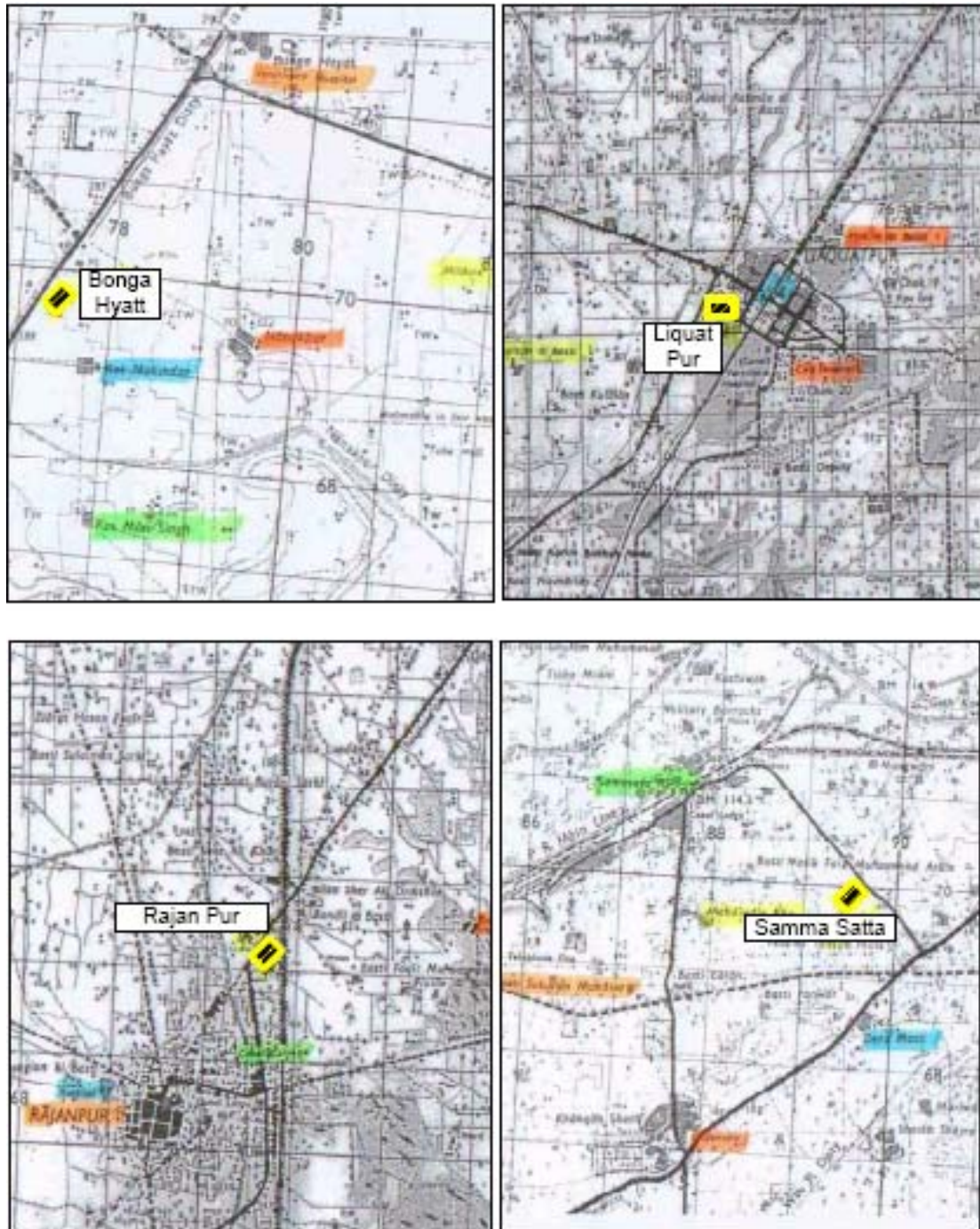
143. The reporting of extension and augmentation sub-projects are restricted to the enhancements indicated in this report but further details are required if land is required or for any other improvements along the alignment where land acquisition, resettlement and compensation may need to be considered. Based on the other sub-projects providing further documentation for any new future proposed alignments should not be difficult tasks and this can be conducted as the detailed designs are worked out and to dovetail with the existing system and minimize adverse impacts and maximize benefits. Social impact assessment and due diligence has been completed in tandem with this IEE for relevant sub-projects.

144. During the commissioning phase waste disposal monitoring should ensure that statutory requirements have been met. Monitoring activities during project operation will focus on periodic recording environmental performance and proposing remedial actions to address any unexpected impacts.

7.2 Conclusion

145. There are no insurmountable environmental impacts for the Tranche 1 extension and augmentation sub-projects that are feasible and sustainable options from the power distribution, engineering, environmental, and socioeconomic points of view. Implementation of the EMP is required and the environmental impacts associated with the sub-project need to be properly mitigated, and the existing institutional arrangements are available. Additional human and financial resources will be required by the MEPCO to complete the designs and incorporate the recommendations effectively and efficiently in the contract documents, which should be linked to payment milestones. The proposed mitigation and management plans are practicable but require additional resources.

146. This IEE, including the EMP, should be used as a basis for an environmental compliance program and be included as an appendix to the contracts. The EMP shall be reviewed at the detailed design stage. In addition, any subsequent conditions issued by Pakistan EPA as part of the environmental clearance should also be included in the environmental compliance program. Therefore, continued monitoring of the implementation of mitigation measures, the implementation of the environmental conditions for work and environmental clearance, and monitoring of the environmental impact related to the operation of the Tranche 1 extension and augmentation sub-projects should be properly carried out and reported at least twice per year as part of the project performance reports.



Power Distribution Enhancement Multitranche Financing Facility TA 4876

Appendix 1. A. Location of Bongar Hyatt, Liqat Pur, Rajan Pur and Samma Satta - MEPCO

Appendix 3

Photographs of the MEPCO E&A Subproject Locations

Photograph 1
Subproject 2 Bahawalnagar ITC 40MVA transformer.



Photograph 1
Subproject 2 Bahawalnagar ITC 40MVA transformer.



Photograph 2
Subproject 2 Bahawalpur ITC 40MVA transformer.



Photograph 1
Subproject 2 Bahawalnagar ITC 40MVA transformer.



Photograph 1
Subproject 2 Bahawalnagar ITC 40MVA transformer.



Photograph 1
Subproject 2 Bahawalnagar ITC 40MVA transformer.



Environmental Management Plan – Matrix July 2007 (to be reviewed)

Appendix 4 - Environmental Management Plan Matrix

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Resp imp MM	Resp mon MM
DESIGN STAGE						
1. Social Impacts	To ensure no adverse impacts due to the property and resettlement.	1. QESCO selects locations site that will not affect any public built-in property or house; no additional land is required Complete IEE for E and A projects and gain NOC fro PEPA.	Check location before PFR satisfactorily.	Actual site location with map in PFR and IEE.	QESCO / ESU	QESCO and ADB
2. Waste disposal	Ensure adequate disposal options for all waste including transformer oil, unsuitable soils, scrap metal.	1. Identify sufficient locations for disposal of transformer oil, unsuitable soils, scrap metal "cradle to grave". 2. Include in contracts for unit rates for re-measurement for disposal. 3. Designate disposal sites in contracts and cost unit disposal rates accordingly.	1. During designing stage no later than pre-qualification or tender negotiations 2. Include in contract.	Locations approved by EPA and QESCO and waste disposal local authorities.	EPA and QESCO with the design consultant	QESCO and CSC
3. Soil contamination	Eliminate opportunities for oil contamination of soil and groundwater.	1. Design containment and bunds under all newly installed transformers to retain 110% of total transformer oil contents. 2. Include contingency measures to recondition or dispose of oil released in an emergency.	1. During designing stage no later than pre-qualification or tender negotiations	All E & A substations.	QESCO with the design consultant	QESCO and CSC
4. Statutory	Conform to legal requirements	Inform local EPA of scope of all subprojects.	6 months in advance of procurement	QESCO for all Subprojects	QESCO	QESCO and ADB
CONSTRUCTION STAGE						
1. Orientation for Contractor, and Workers	To ensure that the CSC contractor and workers understand and have the capacity to ensure the environmental requirements and implementation of mitigation measures.	1. QESCO to engage environmental specialist to monitor and progress all environmental statutory and recommended obligations. 2. Conduct special briefing for managers and / or on-site training for the contractors and workers on the environmental requirement of the project, record attendance and achievement test. 3. Agreement on critical areas to be considered and necessary mitigation measures, among all parties who are involved in project activities. 4. Continuous progress review and refresher sessions to be followed	Induction for all site agents and above including all relevant QESCO staff / new project staff before commencement of work. At early stages of construction for all construction employees as far as reasonably practicable	All staff members in all categories. Monthly induction and six month refresher course as necessary until contractor complies	QESCO and CSC record details	QESCO & CSC to observe and record success

Appendix 4 - Environmental Management Plan Matrix

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Resp imp MM	Resp mon MM
2. Air quality	To minimize effectively and avoid complaints due to airborne particulates.	1 - CONTROL ALL DUSTY MATERIALS AT SOURCE. 2. Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.	All construction sites.	All E & A locations.	Contractor to maintain acceptable	QESCO /CSC
3. Construction Waste Disposal	Minimize the impacts from the disposal of construction waste.	Waste management plan to be submitted to the CSC and approved by QESCO one month prior to starting of works. 1. Estimating the amounts and types of construction waste to be generated by the project. 2. Investigating whether the waste can be reused in the project or by other interested parties. 3. Identifying potential safe disposal sites close to the project, or those designated sites in the contract. 4. Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites. 5. Piling up of loose material should be done in segregated areas to arrest washing out of soil. Debris shall not be left where it may be carried by water to down stream flood plains, dams, lagoons etc. 6. Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations. 7. Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA. 8. Waste transformer insulating oil to be recycled, reconditioned, or reused at an appropriate SS or other facility. 9. Machinery should be properly maintained to minimize oil spill during the construction. 10. Solid waste should be disposed at an approved solid waste facility open burning is illegal and contrary to good environmental practice	Update monthly	1. Dumping: A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for agreement	1. Contractor 2-10. CSC should supervise and take action to complete contractor's relevant activities according to IEE / EMP requirement & environmental standards.	QESCO / CSC
4. Safety Precautions for the Workers	To ensure safety of workers	1. Providing adequate warning signs 2. Providing workers with skull guard or hard hat and hard toe cap shoes. 3. Contractor shall instruct his workers in health and safety matters, and require the workers to use the provided safety equipment. 4. Establish all relevant safety measures as required by law and good engineering practices.	Prior to commencement and during construction	All E and A substation works identified by the CSC with contractor.	Contractor and CSC	QESCO / CSC
5. Traffic Condition	Minimize disturbance of vehicular traffic and pedestrians during haulage of equipment and machinery	1. Avoid blocking access roads during works. 2. Routing to avoid vicinity of schools and hospitals to be considered.	Prior to the installation/ construction.	Location of SRs to be identified relevant to traffic.	Contractor and CSC	QESCO /CSC

Appendix 4 Page 2 of 3

Appendix 4 - Environmental Management Plan Matrix

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Resp imp MM	Resp mon MM
6. Institutional Strengthening and Capacity Building	To ensure that QESCO officials are trained to understand and to appreciate EMP	Capacity building activities were taken by Environmental Officer in Tranche 1. Environmental Management Unit (EMU) was setup with in QESCO under Director Operations in Tranche 1. Development of harmonization and strengthening plan for the EMU should be taken up.	Initiate prior to construction and continue beyond project completion	AWARENESS TRAINING FOR ALL MANAGEMENT AND SENIOR STAFF IN QESCO AT SENIOR ENGINEER AND ABOVE IN PMU AND RELATED UNITS	QESCO	QESCO & ADB
OPERATIONAL STAGE						
1. Social safety Impacts	Ensure no encroachments / construction under the transmission line. No violation of clearances spaces.	Necessary signboards with limits of height clearances to be placed properly. Identify and prevent any illegal encroachments under the TXLs..		all subprojects in future tranches	QESCO	QESCO
2. Operational Waste disposal	Minimize the impacts from the disposal of oily residues.	1. Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations. 2. Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA. 3. Waste breaker insulating oil to be recycled, reconditioned, or reused. 4. Machinery should be properly maintained to minimize oil spill during the construction. 5 Solid waste should be disposed at an approved solid waste facility open burning is illegal and contrary to good environmental practice	Update monthly	1. Dumping: A list of temporary dumping areas to be prepared by QESCO for agreement	QESCO ESU.	QESCO

CSC = Construction supervision consultant or equivalent. DGS= Distribution grid substation

Appendix 5
Table 1 Environmental Monitoring Plan for MEPCO E&A Projects

No.	Environmental Monitoring Tasks ¹	Implementation Responsibility	Implementation Schedule
1	Design Phase		
1.1	Audit project bidding documents to ensure IEE and EMP is included.	MEPCO through environmental officer	Prior to issue of bidding documents.
1.2	Monitor final site selection and its environmental compliance with EMP	MEPCO through environmental officer	Prior to MEPCO approval of contractor's survey.
1.3	Monitor the performance of environmental training and briefings and of the environmental awareness of project staff and MEPCO	MEPCO through environmental officer	Ongoing, prior to and during implementation of works.
2	Construction Phase	MEPCO through environmental officer	
2.1	Regular (monthly) monitoring and reporting (quarterly) of contractor's compliance with contractual environmental mitigation measures	MEPCO through environmental officer	Continuous throughout construction period.
2.2	Monitor the thorough implementation of detailed EMP	MEPCO through environmental officer	During all phases of the subprojects
2.3	Commissioning phase monitoring of as built equipment versus environmental performance criteria	MEPCO through environmental officer	At commissioning.
3	Operation and Maintenance Phase	MEPCO through environmental officer	
3.1	Observations during routine maintenance inspections of facilities. Inspections will include monitoring implementation of operational mitigation measures versus environmental criteria specified in EMP, waste management and operational noise.	MEPCO through environmental officer	As per MEPCO inspection schedules
3.2	Monitoring decommissioning of other plant required for installation of MFF funded components and waste disposal.	MEPCO through environmental officer	During the life of the project

¹ Monitoring of issues related to compensation of landowners for land acquisition and loss of production, etc. are addressed in the Resettlement Action Plan.

Appendix 5 Table 2: Summary of Estimated Costs for EMP Implementation for Tranche 1

Item	Sub Item	Estimated Total Costs [PRS]	Estimated Total Cost [USD]
Staffing, audit and monitoring	1 person for 2 years	1,200,000	19,900
Monitoring activities	As detailed under EMP	5,000,000	83,000
Mitigation measures	As prescribed under EMP and IEE	8,000,000	132,800
Transport	1 vehicle for 2 years	1,000,000	16,600
Contingency	3% contingency	456,000	7,600
Total		15,656,000	259,900

