Initial Environmental Examination

Conversion of 66kV Tamman Grid Station to 132kV & New 132kV Double Circuit Feeding Transmission Line

February 2017

PAK: MFF – Power Distribution Enhancement Investment Program (Tranche 4)

Prepared by Islamabad Electric Supply Company, Federal Capital for the Asian Development Bank.

NOTES

(i) The fiscal year (FY) of the Government of the Islamic Republic of Pakistan and its agencies ends on 30 June.
(ii) In this report "$" refer to US dollars.

This Initial Environmental Examination is a document of the Borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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Re: Fw: Re: Loan 3096-PAK PDEIP, Tranche 4 - Final IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations and Feeding Transmission Lines

Nurlan Djenchuraev to: Safia Shafiq 23/02/2017 06:27 AM
Cc: Ehtesham Z. Khattak, Liaqat Ali

Dear Safia,

IEEs are fine with me and can be disclosed.

Best,
Nurlan

Nurlan Djenchuraev
Senior Environment Specialist
PSG, Office of the Director General
Central & West Asia Department
Asian Development Bank
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ADB

Safia Shafiq Dear Nurlan, Please let us know if the attached I... 22/02/2017 09:53:47 PM

From: Safia Shafiq/Consultants/ADB
To: Nurlan Djenchuraev/CWRD/ADB@ADB
Cc: Ehtesham Z. Khattak/PRM/ADB@ADB, Liaqat Ali/PRM/ADB@ADB
Date: 22/02/2017 09:53 PM
Subject: Fw: Re: Loan 3096-PAK PDEIP, Tranche 4 - Final IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations and Feeding Transmission Lines

Dear Nurlan,

Please let us know if the attached IESCO IEEs (map removed) can now be disclosed on ADB and IESCO websites.

Thanks and regards,

Safia Shafiq
Environment Specialist (Consultant)
Pakistan Resident Mission
Asian Development Bank

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Khayaban-e-Suhrawardy G-5, Islamabad, Pakistan.
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From: PMU IESCO Islamabad <iescopmu@hotmail.com>
Date: 02/22/2017 06:53PM
Cc: "ekhattak@adb.org" <ekhattak@adb.org>, "lali@adb.org" <lali@adb.org>, "ndjenchuraev@adb.org" <ndjenchuraev@adb.org>, Yasin PMU <yasin_ktk@hotmail.com>
Subject: Re: Loan 3096-PAK PDEIP, Tranche 4 - Final IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations and Feeding Transmission Lines

(See attached file: Final IEE_Dande Shah Bilawal GS & Feeding TLine (22.02.2017).pdf)
(See attached file: Final IEE Jand GS & Feeding TLine (22.02.2017).pdf)
(See attached file: Final IEE Lakarmar GS & Feeding TLine (22.02.2017).pdf)
(See attached file: Final IEE Tamman GS & Feeding TLine (22.02.2017).pdf)

Dear Ma'm Safia

The IEEs have been revised by removing the said map. The Final IEEs are attached for perusal and record. Please convey ADBs concurrence, so as to upload the IEEs on IESCO website.

Regards.

Mohammad Yasin

Deputy Manager (Envt & Social)

O/O **Chief Engineer (Development)**

Project Management Unit
IESCO, Islamabad.

From: sshafiq.consultant@adb.org <sshafiq.consultant@adb.org>
Sent: 21 February 2017 12:33
To: iescopmu@hotmail.com
Cc: ekhattak@adb.org; lali@adb.org
Subject: Fw: Re: Fw: Loan 3096-PAK Power Distribution Enhancement Program, Tranche 4 - Comments on the IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations

Dear Yasin,

Please refer to Nurlan's email below and incorporate the required changes.

Regards,

Safia Shafiq
Environment Specialist (Consultant)
Pakistan Resident Mission
Asian Development Bank

Level 8, North Wing, Serena Office Complex,
Khayaban-e-Suhrawardy G-5, Islamabad, Pakistan.
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-----Forwarded by Safia Shafiq/Consultants/ADB on 02/21/2017 12:30PM -----

==========
To: Safia Shafiq/Consultants/ADB@ADB, Zhang Lei/CWRD/ADB@ADB
From: Nurlan Djenchuraev/CWRD/ADB@ADB
Date: 02/21/2017 10:39AM
Cc: Ehtesham Z. Khattak/PRM/ADB@ADB, Liaqat Ali/PRM/ADB@ADB
Subject: Re: Fw: Loan 3096-PAK Power Distribution Enhancement Program, Tranche 4 - Comments on the IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations
==========

Dear Safia,

All 4 IEEs address my all my comments. The only exception is the following paragraph:
1. Para 150 - Tamman
2. Para 154 - Lakarmar
3.Para 149 - Jand
4. Para 150 - Dande Shah

where the phrase "During the execution phase, all the" needs to be completed or removed. All 4 IEEs can be disclosed after addressing this minor issue, removing red highlights, and subject of confirmation from Lei on the below question. I also attach the updated CMs.

Dear Lei,

Please confirm if the map (Figure 3.1) is in line with ADB's DER requirements.

Thanks,
Nurlan

Nurlan Djenchuraev
Senior Environment Specialist
PSG, Office of the Director General
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Asian Development Bank
www.adb.org
The Asian Development Bank (ADB) is an Asia regional devel
organization dedicated to reducing poverty in Asia and the P
through loans, grants, research and technical assistance to its
member countries, as well as investments in private compani

From: Safia Shafiq/Consultants/ADB

To: Nurlan Djenchuraev/CWRD/ADB@ADB
Cc: Zhang Lei/CWRD/ADB@ADB, Ehtesham Z. Khattak/PRM/ADB@ADB, Liaqat Ali/PRM/ADB@ADB
Date: 20/02/2017 07:40 PM
Subject: Fw: Loan 3096-PAK Power Distribution Enhancement Program, Tranche 4 - Comments on the IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations

Dear Nurlan,

Sending you the IESCO IEEs for final review. All your comments have been addressed, and the comments matrices are also attached for your reference.

Regards,

Safia Shafiq
Environment Specialist (Consultant)
Pakistan Resident Mission
Asian Development Bank

Level 8, North Wing, Serena Office Complex,
Khayaban-e-Suhrawardy G-5, Islamabad, Pakistan.
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-----Forwarded by Safia Shafiq/Consultants/ADB on 02/20/2017 04:38PM -----
To: Safia Shafiq/Consultants/ADB@ADB
From: Liaqat Ali/PRM/ADB
Date: 02/20/2017 03:36PM
Cc: Nurlan Djenchuraev/CWRD/ADB@ADB, Ehtesham Z. Khattak/PRM/ADB@ADB, Zhang Lei/CWRD/ADB@ADB
Subject: Fw: Loan 3096-PAK Power Distribution Enhancement Program, Tranche 4 - Comments on the IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations

(See attached file: Reviewed IEE of Dande Shah Bilawal GS & Feeding TLine - Final Report_20.02.2017.pdf)
(See attached file: Reviewed IEE of Jand GS & Feeding TLine - Final Report_20.02.2017.pdf)
(See attached file: Reviewed IEE of Lakarmar GS & Feeding TLine - Final Report_20.02.2017.pdf)
(See attached file: Reviewed IEE of Tamman GS & Feeding TLine - Final Report_20.02.2017.pdf)

Dear Safia:

Please review and forward the IEEs to Nurlan for clearance. I understand that Nurlan has only one comment for these IEEs sent for Danda Shah Bilawal and was applicable for all IEEs.

Regards,
Liaqat Ali, Project Analyst, Pakistan Resident Mission
Level 8, North, Serena Office Complex, G-5, Islamabad/Pakistan
Tele: (92-51) 2600351-69/2087210 Fax: (92-51) 2600365-66/2087397-98
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To: "lali@adb.org" <lali@adb.org>
Cc: "ekhattak@adb.org" <ekhattak@adb.org>, "sshafiq.consultant@adb.org" <sshafiq.consultant@adb.org>, "zlei@adb.org" <zlei@adb.org>, "ndjenchuraev@adb.org" <ndjenchuraev@adb.org>
Date: 20/02/2017 03:07 PM
Subject: Fw: Loan 3096-PAK Power Distribution Enhancement Program, Tranche 4 - Comments on the IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations

From: iescopmu@iesco.com.pk <iescopmu@iesco.com.pk>
Sent: Monday, February 20, 2017 1:54 PM
To: lali@adb.org
Cc: ekhattak@adb.org; sshafiq.consultant@adb.org; zlei@adb.org; ndjenchuraev@adb.org
Subject: re: Loan 3096-PAK Power Distribution Enhancement Program, Tranche 4 - Comments on the IEEs for Danda Shah Bilawal, Lakarmar, Jand and Tamman Grid Stations

Dear Liaqat Ali Sb

Attached herewith find the IEE reports of Tranche-IV savings projects duly revised in light of comments received on 13 Feb, 2017 and 20 Feb, 2017. The changes made have been highlighted in Red colour in the reports. The comments wise reply on the received sheets is also attached for ready reference.

Kindly review the reports and accord approval.

Regards.

Mohammad Yasin

Deputy Manager (Envt & Social)
PMU, IESCO, Islamabad

For C.E(Dev)
IESCO, Islamabad

(See attached file: Reviewed IEE of Dande Shah Bilawal GS & Feeding TLine - Final Report_20.02.2017.pdf)(See attached file: Reviewed IEE of Jand GS & Feeding TLine - Final Report_20.02.2017.pdf)(See attached file: Reviewed IEE of Lakarmar GS & Feeding TLine - Final Report_20.02.2017.pdf)(See attached file: Reviewed IEE of Tamman GS & Feeding TLine - Final Report_20.02.2017.pdf)(See attached file: CM for IEE Danda Shah Bilawal-nd.docx)(See attached file: CM for IEE Jand Grid Station.doc)(See attached file: CM for IEE lakarmar Grid Station-rev.docx)(See attached file: CM for IEE Tamman Grid Station.doc)[attachment "Reviewed IEE of Dande Shah Bilawal GS & Feeding TLine - Final Report_20.02.2017.pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "Reviewed IEE of Jand GS & Feeding TLine - Final Report_20.02.2017.pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "Reviewed IEE of Lakarmar GS & Feeding TLine - Final Report_20.02.2017.pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "Reviewed IEE of Tamman GS & Feeding TLine - Final Report_20.02.2017.pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "CM for IEE Danda Shah Bilawal-nd.docx" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "CM for IEE Jand Grid Station.doc" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "CM for IEE lakarmar Grid Station-rev.docx" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "CM for IEE Tamman Grid Station.doc" deleted by Nurlan Djenchuraev/CWRD/ADB]

[attachment "Final IEE_Dande Shah Bilawal GS & Feeding TLine (22.02.2017).pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "Final IEE Jand GS & Feeding TLine (22.02.2017).pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "Final IEE Lakarmar GS & Feeding TLine (22.02.2017).pdf" deleted by Nurlan Djenchuraev/CWRD/ADB] [attachment "Final IEE Tamman GS & Feeding TLine (22.02.2017).pdf" deleted by Nurlan Djenchuraev/CWRD/ADB]

ISLAMABAD ELECTRIC SUPPLY COMAPNY

INITIAL ENVIRONMENTAL EXAMINATION REPORT (IEE)

OF

Conversion of 66 kV Tamman Grid Station (to 132 kV)

&

New 132 KV Double Circuit Feeding Transmission Line

POWER DISTRIBUTION ENHANCEMENT PROJECT (PDEIP)

LOAN NO.: 3096 – PK

TRANCHE - IV SAVINGS SUBPROJECT

UNDER
ASIAN DEVELOPMENT BANK
MULTI TRANCHE FINANCING FACILITY (MFF)

February 2017

Prepared & Submitted By

ENVIRONMENTAL & SOCIAL SAFEGUARD UNIT
OFFICE OF GENERAL MANAGER (DEVELOPMENT)
MANAGEMENT UNIT
ISLAMABAD ELECTRIC SUPPLY COMPANY (IESCO)
ISLAMABAD – PAKISTAN

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FIGURES AND MAPS

TABLES:

ABBREVIATIONS

ADB	Asian Development Bank
COI	Corridor of Influence / Impact
CSP	Country Strategy Program
DFO	Divisional Forest Officer
DIZ	Direct Impact Zone
DoF	Department of Forests
EA	Environmental Assessment
EARF	Environment Assessment Review Framework
EIA	Environment Impact Assessment
IEE	Initial Environmental Examination
EMP	Environmental Management Plan
E&SS	Environment & Social Safeguard
FMC	Facility Management Consultant
GDP `	Gross Domestic Product
GIS	Gas Insulated Switchgear
GOP	Government of Pakistan
GS	Grid Station
GSS	Grid Sub-Station
LARP	Land Acquisition and Resettlement Plan
Leq	Equivalent sound pressure level
MPL	Maximum permissible level
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
PC	Public Consultation
PEPA	Punjab Environmental Protection Agency
PEPAct	Pakistan Environment Protection Act 1997 (as regulated and amended)
PPMS	Project Performance Monitoring System
REA	Rapid Environmental Examination
SIA	Social Impact Assessment
SP	Subproject
SR	Sensitive Receiver
TL	Transmission line
TOR	Terms of Reference
TSW	Technical Services Wing
Rupee, PKR	Unit of Pakistan Currency.

1. INTRODUCTION

1.1 Overview.

1. This document is the Initial Environmental Examination (IEE) Report for the Conversion of 66 kV Tamman Grid Station to 132 kV and feeding 132 KV Double Circuit Transmission Line, Tranche IV savings sub-project, proposed by Islamabad Electricity Supply Company; (IESCO) under Asian Development Bank (ADB) financed Power Distribution and Enhancement Investment Project Tranche-IV (savings). The Initial Environmental Examination Report has been prepared according to the Asian Development Bank (ADB) Safeguard Policy Statement (SPS) 2009.

2. Islamabad Electric Supply Company (IESCO) will implement the Tranche-IV project in the shape of 14 Nos. extensions of line bays and 28 Nos. augmentation subprojects. These 43 sub-projects will be implemented in Islamabad, Rawalpindi, Attock, Jehlum and Chakwal.

3. IESCO through savings in Tranche – IV have further envisaged conversion of 04 Nos. grid stations from 66 KV to 132 KV. The conversion of Tamman grid station from 66 KV to 132 KV and feeding T/Line is part of these savings sub projects. This conversion work will be carried out on IESCO's owned land of approximately 47 kanals (5.7 Acres) at existing 66 KV grid station Tamman within the premises of existing 66 KV grid station. The proposed transmission line will mostly follow the existing transmission line route between Talagang / Lakarmar to Tamman grid station avoiding populated areas, public community structures, cultivated lands as well as environmental issues.

4. Government of Pakistan (GoP) has requested ADB to provide the multi-tranche financing facility (MFF) to facilitate investments in power distribution and development of networks of Independent Distribution Companies (DISCOs) that distribute power to end user consumers. The Power Distribution Enhancement Investment Program (PDEIP) is part of the GoP long term energy security strategy. The proposed ADB intervention will finance new investments in PDEIP and assist capacity building of sector related agencies. The investment program will cover necessary development activities in secondary transmission / distribution networks of DISCOs. Tranche-IV loan has been approved by ADB in 2014 and loan effectiveness date is 17.07.2014. The MFF activities include extension (additional transformers) and augmentation (replacement of transformers with higher capacity) distribution line extensions, new and replacement of distribution lines, additional substations, transformer protection and other non-network activities. New distribution lines to and from various network facilities and some of the above activities will also be included in the later trenches. The proposed MFF facility has been designed to address both investment and institutional aspects in the electrical power sector.

5. PEPCO has been nominated by Ministry of Water and Power (MOWP) to act as the Executing Agency (EA) with each DISCO (IESCO) 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 coordinator of such activities as preparation of PC-1s and PFRs (Periodic Financing Request), monitoring implementation activities; An Initial Environmental Examination study has been carried out to fulfill the requirements of ADB Safeguard Policy Statement (2009). This Initial Environmental Examination Report is used to compile the study of Initial Environmental Examination for disclosure by ADB if necessary.

1.2 Need of the Study

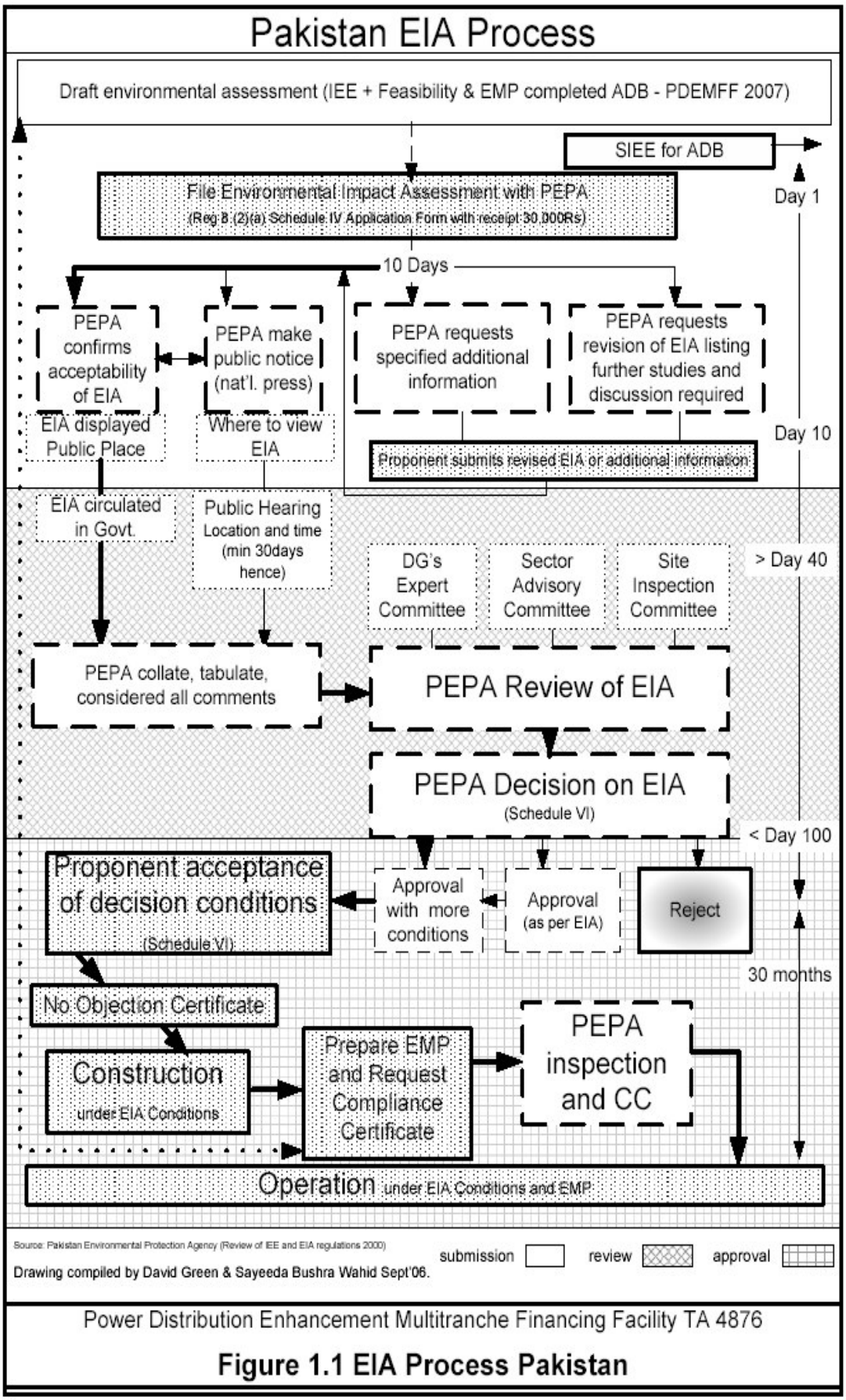
6. The project is being financed by Asian Development Bank (ADB), therefore the project is governed by ADB SPS (2009). The objectives of ADB's safeguards are to (i) avoid adverse impacts of projects on the environment and affected people, where possible; (ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is impossible; and (iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

7. In addition, the Pakistan Environmental Protection Act, 1997 (PEPA 1997) requires the proponents of every development project in the country to submit either an Initial Environmental Examination (IEE) or "where the project is likely to cause an adverse environmental effect," an Environmental Impact Assessment (EIA) to the concerned environmental protection agency (EPA). The Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 issued under the PEPA 1997 provide separate lists for the projects requiring IEE and EIA.

8. The Initial Environmental Examination requirements of the GoP for grid stations and power distribution subprojects are different to those of ADB. Under GoP regulations, the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations (2000) categorizes development subprojects into two schedules according to their potential environmental impact. The proponents of subprojects that have reasonably foreseeable impacts are required to submit an Initial Environmental Examination (IEE) Report for their respective subprojects (Schedule I). The proponents of subprojects that have more adverse environmental impacts (Schedule II) are required to submit an environmental impact assessment (EIA) Report. Distribution lines and substations are included under energy subprojects and Initial Environmental Examination Report is required for sub transmission / distribution lines less than 11kV, and large distribution subprojects (Schedule-I). EIA is required by GoP for all subprojects involving sub transmission / distribution lines of 11kV and above and for Grid Station (GS) substations (Schedule-II) The schematic map of Pakistan EIA process is given below **Figure 1.1**.

9. Most of the construction impacts will take place with only local impacts and there are no potential significant environmental impacts associated with this sub-project construction. Initial Environmental Reconnaissance and Rapid Environmental Assessment (REA) were carried out by IESCO under ADB guidelines in July 2016 indicated that all the sub-project falls in Category B; therefore, an Initial Environmental Examination (IEE) Report has been prepared for approval from ADB. .

10. The sub project was part of 6th STG and IESCO has already received approval from Punjab – EPA, Lahore for construction /execution of the subproject in 2014. The NOC stands valid for 3 years.



Power Distribution Enhancement Multitranche Financing Facility TA 4876

Figure 1.1 EIA Process Pakistan

1.3 Scope of the IEE Study and Personnel.

11. The Study Area included the identification of sites physical ecological and Socio – economic resources more specifically irrigation facilities, water supply, habitable

structures, schools, health facilities, hospitals, religious places and sites of heritage or archaeological importance and critical areas (if any) within about 100m of the designated grid station (DGS) boundary and 30m of transmission line routes (15m on each side).. The works are envisaged to involve construction of the 132kV yard, construction of the bases, foundation pads and towers to support the distribution line under the subproject by IESCO/contractor and supervised by the IESCO management.

12. The field studies were undertaken by Assistant Manager (Environment) & Assistant Manager (Social Impact) of Environmental & Social Safeguard Unit IESCO along with the field survey teams. The study team also benefited from technical support and other important information on the impacts of the proposed works briefed by the IESCO technical staff dealing with engineering, power transmission, socio-economic, re-settlement and institutional aspects.

13. A scoping and field reconnaissance was conducted on the subproject site, during which a Rapid Environmental Assessment (REA) was carried out to establish the potential impacts and categorization of subproject activities. The methodology of the IEE study was then elaborated in order to address all interests. Subsequently primary and secondary baseline environmental data was collected from possible sources, and the intensity and likely location of impacts were identified with relation to the sensitive receivers; based on the work expected to be carried out. The significance of impacts from conversion works and construction of new transmission line were then assessed and, for those impacts requiring mitigation, measures were proposed to reduce impacts to within acceptable limits.

14. Public consultations (PC) were carried out in February 2009 and once again during Dec. 2016 / Jan. 2017 for preparation of this IEE report in line with EPA and ADB requirements. Meaningful consultations will be once again carried out before and during the execution of work. Under ADB requirements the Environmental Examination process must include meaningful public consultation during the completion of the draft IEE. In this IEE the PC process included verbal disclosure of the sub-project works as a vehicle for discussion. Consultations were conducted with local families and communities along the site of Tamman grid station & feeding 132 KV double circuit transmission line tower sites and staff of the subproject management. The responses from correspondents have been included in **Appendix – III** and summarized in Section 10 of this IEE. IESCO will once again carry out public consultation with stakeholders during the updating of Land Acquisition and Resettlement Plan (LARP) and before the commencement of civil work.

2. POLICY AND STATUARY REQUIREMENTS IN PAKISTAN

15. Direct legislation on environmental protection is contained in several statutes, namely the Pakistan Environmental Protection Act (1997), the Forest Act (1927), the Punjab Wildlife Act (1974). In addition the Land Acquisition Act (1894) also provides powers in respect of land acquisition for public purposes. There are also several other items of legislation and regulations which have an indirect bearing on the subproject or general environmental measures.

2.1 Statutory Framework.

16. 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, only the federal government has enacted laws on environment, and the provincial environmental institutions derive their power from the federal law. The Punjab Environmental Protection Act 1996 is now superseded by the Pakistan Environmental Protection Act (1997). The key environmental laws affecting this subproject are discussed below.

2.1.1 Pakistan Environmental Protection Act, 1997

17. The Pakistan Environmental Protection Act, 1997 is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The act is applicable to a wide range of issues and extends to air, water, soil, marine, and noise pollution, as well as to the handling of hazardous wastes. The key features of the law that have a direct bearing on the proposed subproject relate to the requirement for an initial environmental examination (IEE) and environmental impact assessment (EIA) for development subprojects. Section 12(1) requires that: "No proponent of a subproject shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination [IEE] or, where the subproject is likely to cause an adverse environmental effect, an environmental impact assessment [EIA], and has obtained from the Federal Agency approval in respect thereof. The Pakistan Environmental Protection Agency has delegated the power of review and approval of IEE/EIA to the provincial environmental protection agencies, in this case the Punjab EPA.

2.1.2 Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000

18. The Pakistan Environmental Protection Act, 1997 (PEP Act) provides for two types of Environmental Examinations: initial environmental examinations (IEE) and environment impact assessments (EIA). EIAs are carried out for subprojects that have a potentially 'significant' environmental impact, whereas IEEs are conducted for relatively smaller subprojects with a relatively less significant impact. The Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2002, (the 'Regulations'), prepared by the Pak-EPA under the powers conferred upon it by the PEP Act, categorizes subprojects for IEE and EIA. Schedules I and II, attached to the Regulations, list the subprojects that require IEE and EIA, respectively.

19. The Regulations also provide the necessary details on the preparation, submission, and review of IEEs and EIAs. The following is a brief step-wise description of the approval process:
    (i) A subproject is categorized as requiring an IEE or EIA using the two schedules attached to the Regulations.
    (ii) An EIA or IEE is conducted as per the requirement and following the Pak-EPA guidelines.
    (iii) The EIA or IEE is submitted to the concerned provincial EPA if it is located in the provinces or the Pak-EPA if it is located in Islamabad and federally administrated areas. The Fee (depending on the cost of the subproject and the type of the report) is submitted along with the document.
    (iv) The IEE/EIA is also accompanied by an application in the format prescribed in Schedule IV of the Regulations.
    (v) The EPA conducts a preliminary scrutiny and replies within 10 days of the submittal of a report, a) confirming completeness, or b) asking for additional information, if needed, or c) returning the report requiring additional studies, if necessary.
    (vi) The EPA is required to make every effort to complete the IEE and EIA review process within 45 and 90 days, respectively, of the issue of confirmation of completeness.
    (vii) Then the EPA accords their approval subject to certain conditions:
    (viii) Before commencing construction of the subproject, the proponent is required to submit an undertaking accepting the conditions.
    (ix) Before commencing operation of the subproject, the proponent is required to obtain from the EPA a written confirmation of compliance with the approval conditions and requirements of the IEE.
    (x) An EMP is to be submitted with a request for obtaining confirmation of compliance.
    (xi) The EPAs are required to issue confirmation of compliance within 15 days of the receipt of request and complete documentation.
    (xii) The IEE/EIA approval is valid for three years from the date of accord.
    (xiii) A monitoring report is to be submitted to the EPA after completion of construction, followed by annual monitoring reports during operation.

20. Distribution lines and grid substations of 11 kV and above are included under energy subprojects in Schedule II, under which rules EIA is required by GoP. Initial environment examination (IEE) is required for distribution lines less than 11 kV and large distribution subprojects (Schedule I). An EIA submission is therefore required by the relevant EPA for the subject subproject, in this case the Punjab Environment Protection Agency (EPA) as the proposed subproject will be located in Islamabad.

21. There are no formal provisions for the Environmental Examination for expanding existing distribution lines and grid substations but Punjab EPA has requested disclosure of the scope and extent of each subproject in order that their Director General can determine if additional land is required and the need for statutory Environmental Examination.

22. Conversion of Tamman grid station and feeding transmission line subproject was part of 6th STG for which IESCO has already obtained NOC from Punjab – EPA, Lahore on 30.06.2014 including the construction /execution of the subproject. The NOC stands valid for 3 years.

2.1.3 National Environmental Quality Standards (NEQS), 2010

23. The National Environmental Quality Standards (NEQS) have been prepared by Pakistan Environmental Protection Agency under the section 6, of Pakistan Environmental Protection Act 1997. The NEQS, first promulgated in 2000 have recently been revised in October 2010. These NEQS specify the following standards:

    A. Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment and sea (three separate set of numbers).

    B. Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources, For power plants operating on oil and coal:
    - Maximum allowable emission of sulphur dioxide,
    - Maximum allowable increment in concentration of sulphur dioxide in ambient air,
    - Maximum allowable concentration of nitrogen oxides in ambient air, and
    - Maximum allowable emission of nitrogen oxide for steam generators as function of heat input.

    C. Standards for Motor Vehicle Exhaust and Noise
    - For in-use Vehicles
    - For New Vehicles
      - Emission standards for Diesel Vehicles
      - Emission standards for Petrol Vehicles

    D. Standards for Ambient Air that specifies maximum allowable concentration of pollutants (10 parameters) with two effectiveness dates i) 1st July, 2010 and ii) 1st January, 2013 along with recommended measurement method.

    E. Standards for Drinking Water quality. The pollutant parameters have been classified as i) Bacterial, ii) Physical, iii) Chemical (essential inorganic & toxic inorganic), iv) Organic and Radio-active; and

    F. Standards for Noise for 4 zones/ categories; Residential (A), Commercial (B), Industrial (C) and Silence Zone (D).

24. The NEQS are enlisted in **Appendix – VII.**

25. The gaseous emissions and liquid effluents during construction of Grid stations and transmission lines to the environment during construction and operation must meet the NEQS requirement.

2.1.4 ADB's Safeguard Policy Statement (SPS), 2009

26. The Safeguard Policy Statement (SPS) builds upon the three previous safeguard policies on the environment, involuntary resettlement and indigenous peoples, and brings them into one single policy that enhances consistency and coherence, and more comprehensively addresses environmental and social impacts and risks. The Safeguard Policy Statement (SPS) was approved by the Board of Directors of ADB on 9 June 2009. The SPS applies to all ADB-supported projects reviewed by ADB's management after 20 January 2010. ADB works with borrowers to put policy

principles and requirements into practice through project review and supervision, and capacity development support. The SPS also provides a platform for participation by affected people and other stakeholders in project design and implementation.

27. ADB's safeguard policy aims to help developing member countries (DMCs) address environmental and social risks. The objectives of ADB's safeguards are to:
    (i) Avoid adverse impacts of projects on the environment and affected people, where possible;
    (ii) Minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
    (iii) Help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

28. ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:
    (i) Environmental safeguards,
    (ii) Involuntary resettlement safeguards, and
    (iii) Indigenous Peoples safeguards.

29. ADB staff, through their due diligence, review, and supervision, will ensure that borrowers/clients comply with these requirements during project preparation and implementation. These safeguard requirements are as follows:

(i) Safeguard Requirements 1: Environment,

It discusses the objectives and scope of application, and underscores the requirements for undertaking the environmental assessment process. These requirements include:

- Assessing impacts,
- Planning and managing impact mitigations,
- Preparing environmental assessment reports,
- Disclosing information
- Undertaking consultation,
- Establishing a grievance mechanism, and
- Monitoring and reporting

(ii) Safeguard Requirements 2: Involuntary Resettlement,

Safeguard Requirements 2 outlines the requirements that borrowers/clients are required to meet in delivering involuntary resettlement safeguards to projects supported by the Asian Development Bank (ADB). The requirements under Involuntary Resettlement are:

- Undertaking the social impact assessment and resettlement planning process,
- Preparing social impact assessment reports and resettlement planning documents,
- Exploring negotiated land acquisition,
- Disclosing information and engaging in consultations,
- Establishing a grievance mechanism, and
- Resettlement monitoring and reporting.

(iii) Safeguard Requirements 3: Indigenous Peoples

Safeguard Requirements 3 outlines the requirements that borrowers/clients are required to meet in delivering Indigenous Peoples safeguards to projects supported by ADB. Its requirements are:

- Undertaking the social impact assessment and planning process;
- Preparing social impact assessment reports and planning documents;
- Disclosing information and undertaking consultation, including ascertaining consent of affected indigenous peoples community to selected project activities;
- Establishing a grievance mechanism; and
- Monitoring and reporting.

(iv) Safeguard Requirements 4: Special Requirements for Different Finance Modalities

ADB provides a variety of investment instruments, including program loans, sector finance, multi-tranche financing facilities (MFFs), emergency assistance loans, financial intermediaries and corporate finance. Safeguard Requirements 4 outlines the special requirements for different finance modalities that borrowers/clients are requested to meet.

2.1.5 Other Relevant Laws

30. There are a number of other federal and provincial laws that are important in the context of environmental management. The main laws potentially affecting subprojects in this MFF are listed below.

31. The Punjab Wildlife Protection Ordinance, 1972 empowers the government to declare certain areas reserved for the protection of wildlife and control activities within in these areas. It also provides protection to endangered species of wildlife. As no activities are planned in these areas, no provision of this law is applicable to the proposed subproject.

32. The Forestry Act, 1927 empowers the government to declare certain areas reserved forest. As no reserved forest exists in the vicinity of the proposed subproject, this law will not affect to the proposed subproject.

33. The Antiquities Act of 1975 ensures the protection of Pakistan's cultural resources. The Act defines 'antiquities' as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, Government of Pakistan, any archaeological discovery made during the course of the subproject.

2.1.6 Comparison of International and Local Environmental Legislations

34. The ADB SPS requires application of pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards. The SPS states that when host country regulations differ from these standards, the EA will achieve whichever is more stringent.

35. A comparison of applicable local and international guidelines for air quality has been provided in **Appendix – VII (A)**. In general, the NEQS standards for air quality are most stringent in comparison to USEPA, WHO and the World Bank standards. The only exception is the TSP parameter for the annual mean where the World Bank standard (100 ug / m3) is more stringent than the NEQS standard (360 ug / m3). Apart from this one exception, the NEQS standards have been used for the proposed project.

36. Similar to the standards for air quality, the comparison of noise standards provided in **Appendix – VII (B)** clearly shows that NEQS standards for noise are more stringent in comparison to the World Bank/IFC standards. The only exception is the daytime noise level standard for Industrial areas where the World Bank/IFC standard is more stringent (70 dB (A)) in comparison to NEQS (75 dB (A)) and so for this particular parameter, the World Bank/IFC standard will be used. Apart from this one exception, the NEQS standards have been used for the proposed project.

37. Moreover the standards for water quality clearly show that NEQS for water are same as WHO standards as shown in the Table.

38. IESCO is legally bound to comply with National Environmental Protection Act 1997 & IEE / EIA Regulation 2000 and to regulate its emission / effluents under NEQS 2010 Moreover as per comparison, it is clear that NEQS are more stringent.

2.2 Structure of Report.

39. This IEE reviews information on existing environmental attributes of the Study Area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, socio-economic aspects and cultural resources are included. The report predicts the probable impacts on the environment due to the proposed subproject enhancement and expansion. This IEE also proposes various environmental management measures. Details of all background environmental quality, environmental impact / pollutant generating activities, pollution sources, predicted environmental quality and related aspects have been provided in this report. The contractor will be liable to carry out the Water testing, Noise measurement and air quality testing of the project site before the commencement of work and the same will be set as baseline data. References are presented as footnotes throughout the text. Following this introduction the report follows ADB Safeguard Policy Statement (2009) & guidelines and includes:

- Description of the subproject.
- Description of Environmental and Social Conditions.
- Assessment of Environmental Impacts and Mitigation Measures.
- Institutional Requirements and Environmental Monitoring Plan.
- Public Consultation.
- Recommendations and Conclusions.

3. DESCRIPTION OF THE PROJECT

3.1 Type of the Project:

40. The subproject involves conversion of Tamman grid station from 66 KV to 132 KV and construction of Feeding 132 KV Transmission Line. This sub-project has been proposed by Islamabad Electric Supply Company (IESCO) under Tranche IV Savings, to provide additional power to Tamman town and adjacent areas.

41. This subproject will be located at Tamman, a town of Chakwal District in the Punjab province of Pakistan. The town is an administrative subdivision, of the IESCO. It lies to the east - south of the district capital Chakwal. It is located at about 120 kilometers from the district capital-Chakwal and 40 kilometer from Talagang on main Tamman – Mial road.

42. IESCO is a public utility company, providing electricity to the Islamabad Capital Territory (ICT), northern districts of the Punjab Province (Rawalpindi, Attock, Jhelum and Chakwal) and southern areas of Azad Jammu and Kashmir (AJK). The IESCO was registered in April 1998 under the Companies Ordinance 1984, Pakistan. Initially, it was working as one of the eight Area Electricity Boards (AEBs) of the Water and Power Development Authority (WAPDA).

3.1.1 Grid Station Conversion Component

43. The sub-project works is upgradation / Tamman grid station from existing capacity of 66KV to 132 KV. The scope of work includes addition of 1 x10/13 & 1x20/26 MVA, 02 Nos. L/Bays & 02 Nos. T/f Bay, 132/11 kV Power Transformers and allied equipment.

44. The sequence of the activities for the conversion works of grid station are as below:

- First of all, the grid station is identified where up-gradation /conversion is required / necessary. This is carried out on the basis of load on the existing feeders, load on the nearby existing grid stations, trend of the load growth and future outlook of the area.
- The counter plan and soil investigation are carried out and results are sent to design department/ Technical Services Wing (TSW). The TSW prepares the detailed design of the grid station, including the civil design, construction drawings, and general layout plan along with equipment detail.
- Once the civil design is available, estimates are prepared and approvals obtained from concern authority.
- Subsequent to the above, tendering and contract awarding is carried out for the civil construction.
- Parallel to the civil works, the grid station equipment (transformers, breakers, isolators, control panels, feeder and allied equipment) is obtained from the central stores / purchased through tendering.
- The equipment is handed over to GSC Department, who installs it by themselves if the project is executed by GSC; else the works are carried out by the contractor under supervision of GSC.
- Once the installation is complete, the system is tested jointly by the GSO and GSC Division.
- After the testing, the grid station is commissioned and put into operation.

45. For the proposed project, the material will be procured through goods tendering, while construction work conversation of grid station will be carried out by GSC Directorate

of IESCO, wherein they will be responsible for the supply, installation and commissioning of the entire grid station conversion work.

3.1.2 Transmission Line Component

46. This subproject component involves construction of about 20 km 132 kV Feeding Transmission line. The scope of work includes foundation, erection and stringing of approximately 156 Nos. of towers / poles of 132 kV feeding T/line. This line will connect the existing 132 KV Talagang / Lakarmar grid station to the proposed grid station.

47. The sequence of activities which are carried out for the laying of transmission lines and 11Kv feeder are as follow:

- First of all a reconnaissance site visit is carried out by the GSC Department in order to determine feasible routes for the transmission line.
- Three candidate routes are marked on the map, and sent to the Design Department.
- The Design Department approves one of the three routes.
- The GSC carries out detailed survey (plain tabling as well as profiling) of the approved route and sent to the Design Department.
- The Design Department prepares the detailed design.
- Material is procured after tendering.
- Tendering for the construction works is carried out and contract awarded.
- After the award of contract, the contractor mobilizes and establishes a camp/site office usually within the boundary of existing grid stations (depending on the availability of space).
- Construction activities are started by demarcating the pole locations. Temporary Right of Way (RoW) is required along the transmission line route to carry out the construction activities. Additional temporary RoW is required for the routes to access the transmission line corridor/tower locations during the construction phase.
- Compensation is determined in accordance to revenue record and disbursed for damaged crops and affected structures if any.
- Subsequent to the above, excavation for tower foundation is carried using appropriate machinery, such as excavator etc. Once excavation is complete, construction of the tower foundation is taken in hand and after that erection of tower is carried out followed by stringing of conductor and accessories (e.g. insulators, etc.) installation.
- After the completion of installation activities described above, testing is carried out. After that the line is commissioned and put into operation.

48. For the proposed project, the construction works of transmission line material will be procured through contract. The GSc directorate of IESCO will be responsible for the construction work i.e foundation, erection, and stringing of the transmission line works.

3.2 Categorization of the Project:

49. Categorization is based on the most environmentally sensitive component of a sub project. The aspects of the subproject with potential of significant environmental impacts need to be assessed in detail and this initial environmental examination study has therefore focused on the significant impacts possible from the construction activities of the subproject.

50. The site for the proposed grid station, as well as the route of the proposed transmission line, is located in a rural cum urban setting, with no / less settlements and other infrastructure around the site. The Conversion of 66 kV Tamman Grid Station & feeding 132 kV Double Circuit Transmission Line, Tranche IV Savings sub-project is categorized as a Category B subproject under ADB requirements and this IEE report is based on that assumption.

3.3 Need for the Project

51. The conditions of the power transmission system in Pakistan are inadequate to meet rapidly growing demand for electrical power. To cope with the constraints, the existing power transmission infrastructure has to be improved, expanded and upgraded. Overall the proposed Power Distribution Enhancement Investment Program (PDEIP) in the form of Tranche-I, II, III and IV has been designed to address both investment and institutional aspects in the electrical power sector.

52. Power demands around the Tamman and in Chakwal area have increased rapidly, especially in summer months, therefore, the existing system is unable to cope up with the increasing demands of the domestic, commercial and industrial sectors.

3.4 Location and Scale of Project:

53. As elaborated earlier, this subproject will be located at Tamman, a town of Chakwal District in the Punjab province of Pakistan. The town is an administrative subdivision, of the IESCO. It lies to the east - south of the district capital Chakwal. It is located at about 120 kilometers from the district capital – Chakwal and 40 kilometer from Talagang on main Tamman – Mial road. The location of Tamman grid station is shown in **Figure 3.1** and the transmission line route is shown in **Figure 3.2.**

54. This IEE report has been prepared based on the approved EIA report of 6th STG (2009) and REA conducted in July 2016, when the preliminary designs for the Conversion of 66 kV Tamman Grid Station & construction of feeding 132 kV Double Circuit Transmission Line, Tranche IV Savings sub-project, was completed and the overall requirements for installation of the equipment had been identified. Impacts from Conversion of 66 kV Tamman Grid Station & feeding 132 kV Double Circuit Transmission Line, Tranche IV Savings sub-project, are envisaged to be minor as land for conversion of grid station is already available, so no additional land needs to be acquired for conversion works. Furthermore no land will be acquired for construction of the towers

55. The construction activities under the conversion works are expected to include the usual localized civil works such as extension of the main yard, including excavation and concreting of foundations for the new transformers, capacitor banks, cable trays and terminal tower (within the proposed grid station compound), installation of the transformers, equipment and fittings, cabling, installation of allied equipment, and construction of the control rooms and offices. The conversion works will be carried out within the boundary of existing grid station

56. The construction works under the feeding transmission line will include digging/excavation and concreting of tower / pole foundations, erection of towers and stringing of conductor on the towers/poles. The new towers would transverse very small area of cultivated land and mostly hilly barren area and along existing 66 kV transmission line route with minimal environmental impact. The proposed route of the stringing and construction of new feeding transmission line also appears to be environmentally feasible and technically appropriate.

57. The transmission line design is based on the following parameters **(Table 3.1)** with regard to minimum clearance level for 132 kV transmission line, based on WAPDA Power Distribution System Construction Drawings prepared by Distribution Design Cell, Power Wing WAPDA.

Table 3.1: Permissible Conductor Clearances at 65 °C

No.	Description	Clearances (m)
1	Cultivated land traversed by vehicles	6.7
2	Roads & Streets	7.9
3	Communication and power lines (up to 66 KV)	2.7
4	Highways	7.9
5	Railroads	7.9
6	Electrified railroads trolley wire	3.85
7	River at high flood	9.1
8	Places accessible to pedestrians only	7.9
9	Building roofs not accessible to people	5.2
10	Tops of trees (Orchards)	5
11	Canals	9.1

Source: *Distribution Design Cell, Power Wing WAPDA.*

3.5 Proposed Schedule for Implementation:

58. Designs of the grid station, equipment layout, review of environmental management and construction processes could take several months. When the detailed designs are completed, tendering and award of contract will take place over about three to six months. The construction period will follow afterwards.

59. IESCO has requested the ADB to extend the loan closing period by further one year to accommodate the completion of proposed project under Tranche-IV savings including this sub project. The proposed schedule of Tranche-IV savings project implementation schedule is provided below **(Table 3.2)** and IESCO's letter for extension in closing date is presented in **Appendix – V**.

Table 3.2: Expected Time Schedule of Tranche – IV Project (Tentative).

	Activity	Year 2017				Year 2018			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.	**Procurement of Goods.**								
i.	Bid Period and Evaluation.								
ii.	Contract Award.								
iii.	Delivery of Goods								
2.	**Augmentation and Expansion.**								
i.	Installation.								
ii.	Handover/ Commissioning								

Figure 3.1: Location of existing 66 kV Tamman Grid Station on Google Map.

Figure 3.2: Proposed 132 kV Talagang – Tamman Transmission Line on Google Map.

4. ANALYSIS OF ALTERNATIVES

60. This Chapter discusses various project alternatives that were considered during the design phase. The alternatives in this Chapter have been organized in three broad categories: management, site and technical alternatives.

4.1 Management Alternatives:

4.1.1 No Project Option.

61. As described in chapter 3, the electricity demand has been increasing during the past several years, and this trend is expected to continue as a result of the on-going economic uplift in the country. The key factors fueling the increasing power demand include increasing population, rapid urbanization, industrialization, improvement in per capita income and village electrification.

62. In order to match the increasing trend in the power demand, regular investments in various segments of the power network - generation, transmission, and distribution - is vitally important. Otherwise, the gap between the supply and demand will keep on increasing in future.

63. The proposed project seeks to upgrade the secondary transmission and grid network of the IESCO system. Establishing new grid station and augmenting/conversion/upgrading the existing ones will provide the much needed relief to the existing over-loaded system, while also accommodating additional load in future. The new grid station and the augmenting/conversion/upgrading in the existing works will also reduce the line losses and power breakdowns, thus also resulting in the reduction of financial loss of IESCO.

64. In case the proposed project is not undertaken, the IESCO system will not be able to cope with the increasing demand in future, the existing system will remain over-loaded, line losses will also remain high, and the system reliability will progressively decrease, with increasing pressure on the system. The Utility will also forego the opportunity of increasing its consumers as well as revenue associated with the system expansion.

65. In view of the above, the 'no project' option is not a preferred alternative.

4.2 Site Alternatives

4.2.1 Site for Grid Stations

66. The existing grid station under the saving projects have already ample space and area for the conversation work hence no alternative site for grid stations has been needed to consider as alternative.

4.2.2 Transmission Line Routes

67. While selecting the transmission line route, the GSC crew generally identifies three options. These include the shortest possible route between the two ends of the proposed transmission line. However this may not always be the most feasible route, in view of the settlements or any other sensitive area that come in the way. Therefore the most preferable route is the one which avoids settlements and other sensitive areas.

68. Similarly, for the proposed project, the GSC surveyor team identified three alternate routes on GD maps. During the field survey for transmission lines, the

IESCO's team considered multiple route options, and made efforts to avoid settlements and other sensitive locations as far as possible.

69. The proposed transmission line route will generally follow the existing line route from Talagang to Tamman avoiding populated areas, public community structures, cultivated lands as well as environmental issues. The transmission line is expected to be about 20 km in length. Single circuit transmission line will be constructed on the double circuit poles / Towers.

70. The proposed route ***(Route 3 of Figure 4.1)*** of the transmission lines is most feasible because there are no social issues, with no physical displacement. Only crop and tree compensations are involved during the construction phase. The local communities during the discussions held showed no concern with proposed route of transmission lines.

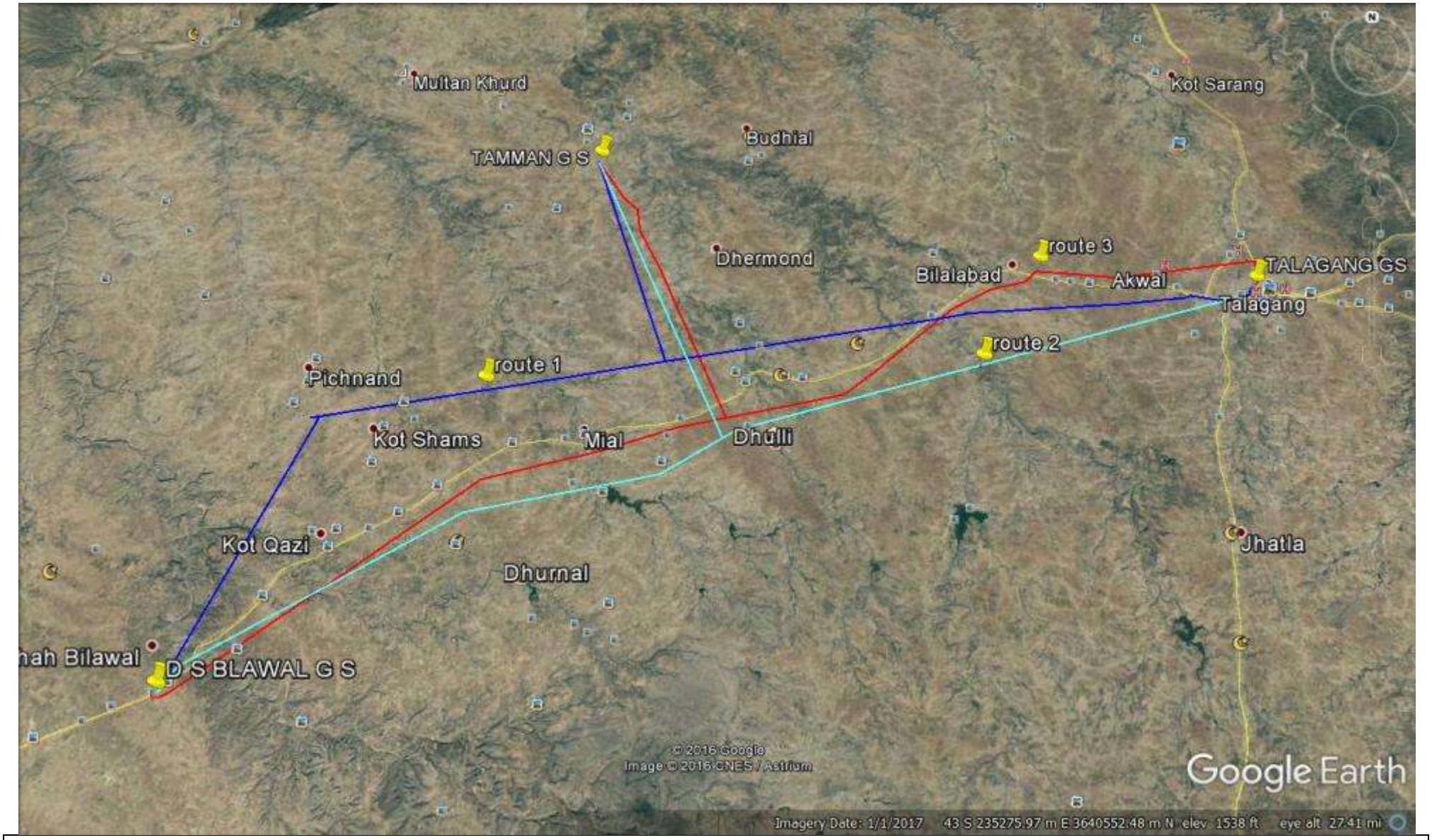


Figure 4.1: Proposed 132 kV Talagang – Danda Shah Bilawal Transmission Line alongwith Alternative Route
(Route 3 in red colour is selected as suitable route).

4.3 Technical Alternatives

4.3.1 Type of Grid Station

71. Generally, two types of grid station designs are available, these are:
    - Air Insulated (Conventional)
    - Gas-insulated

72. *Air Insulated / Conventional Grid Stations:* The air insulated grid stations have open yards for transformers and their accessories, and the control panels and feeder panels are placed indoors. These grid stations require a large area (about 4 acres), which might be a problem in congested urban areas. The environmental and socioeconomic aspects of this type of grid station include safety hazard for the nearby population, particularly in the congested urban areas.

73. *Gas Insulated Grid Station:* The Gas Insulated Stations (GIS) on the other hand employ a very compact design, and most of equipment is fully enclosed and gas insulated. This allows the entire system to be placed indoors in considerably small space compared to the conventional design. However, the cost of these grid stations is several times higher than the conventional ones.

74. For this sub-project, this alternative has not been considered as the grid station (conventional) is already available with ample space for conversion works.

4.3.2 Type of Circuit Breakers

75. Generally, three types of circuit breakers designs are available, these are:
    - Oil-filled circuit breakers
    - SF-6 circuit breakers
    - Vacuum circuit breakers

76. Traditionally, oil-filled circuit breakers used to be installed at the 132-KV and 11-KV levels. The environmental aspects of the oil-filled circuit breakers essentially pertain to the soil and water contamination caused by the possible oil leakage.

77. However, now SF-6 circuit breakers are available for 132-KV and above, and vacuum circuit breakers are available for the 11-KV system.

78. These breakers have very effective arc-quenching characteristics, compared to the old oil-type breakers. Pure SF6 is physiologically completely harmless for humans and animals. It's even used in medical diagnostic. Due to its weight it might displace the oxygen in the air, if large quantities are concentrating in deeper and non ventilated places. It has no eco-toxic potential, it does not deplete ozone.

79. Due to its high global warming potential of 22.200 it may contribute to the man made greenhouse-effect, if it is released into the atmosphere. However in electrical switchgear the SF6 gas is always used in gas-tight compartments, greatly mini-missing leakage. This makes the real impact on greenhouse effect very negligible. SF6 insulated switchgear is used world-wide. Recent measurements show the current concentration of SF6 in the atmosphere is very small, about 3.2 parts per trillion by volume (pptv). In comparison, CO, concentration is estimated at 355 parts per million (ppmv). The relative contribution of SF6 to global warming (or emission rate) is

estimated to be about 0.01%. In 100 years, at its present rate, it's contribution is estimated to be less than 0.1%. Total enclosure of circuit breaker also means that the equipment is almost completely independent from the environment.

80. Therefore, these modern circuit breakers are the preferred option for the proposed project.

4.3.3 Type of Transformer Oil

81. Traditionally, transformer oil - meant for providing insulation and cooling of the transformer windings - used to contain poly-chlorinated biphenyls (PCB), a man-made chemical known for its excellent dielectric properties. However, this chemical was then found to be highly toxic, and more importantly, chemically very stable. Hence this chemical would not decompose or disintegrate naturally. Due to this property of PCB, it was included in a group of chemicals collectively known as persistent organic pollutants (POPs).

82. IESCO's specifications for the procurement of transformers clearly mention that the transformer oil should be PCB-free (though no tests are performed to confirm this). The equipment purchased as part of this project would be PCB-free.

83. According to ADB's Prohibited Investment Activities List which states: "The following do not qualify for Asian Development Bank financing: point 2. Production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phase outs or bans, such as "(c) polychlorinated biphenyls".

4.3.4 Type of Transmission Line Towers

84. *Single Circuit vs. Double Circuit:* For the 132-KV transmission lines, there are two possible options for the type of the towers: single circuit and double circuit. The single circuit towers are designed for one circuit of the transmission line only, and there is no room for the second circuit in the future. On the other hand, using the double circuit towers provides the future expansion capacity on the same towers. The cost of the double circuit towers is slightly higher than the single circuit variants, however, in view of their expansion capacity, these towers are the preferred options for all the single circuit transmission lines which are included in the proposed project.

85. The environmental and socioeconomic aspects of the double-circuit tower include smaller footprint and lower land acquisition requirements (compared to two single-circuit towers).

86. *Tower vs. Tubular Pole*: The base of the transmission line towers is about $10m^2$, and finding this much space in congested urban areas may be a problem. For such applications, WAPDA / IESCO have been using tubular steel poles which require considerably less space. These poles are quite expensive compared to the conventional towers. **Figure 4.1 & 4.2** show typical tower and Korean tubular pole respectively. The environmental and socioeconomic aspect of the tubular pole includes smaller footprint, compared to the conventional tower.

87. The "Talagang & Tamman grid station T/line" would need to pass through rural area and some congested town areas. Therefore for this transmission line, the

preferred option would be to use towers in rural areas and tubular poles in congested urban area.

Figure 4.2: Typical Tower for cultivated & barren Land.

Figure 4.3: Korean Tubular Pole for city and high density populated areas

5. DESCRIPTION OF THE ENVIRONMENT

5.1 Project Area.

5.1.1 General Characteristics of Project Area

88. The proposed sub-project is located at Tamman, District Chakwal. The grid station site is located in a generally urban area, with no cultivated lands on any side i.e. north, south, east and west. Access to grid station is from the main Tamman – Mial Road.

89. The proposed transmission line is expected to be about 20 km in length approximately and will generally follow the route of existing 66-KV line. The transmission line route will avoid populated areas, public community structures, cultivated lands as well as having minimal environmental and resettlement issues between Talagang / Lakarmar grid station to Tamman grid station. Single circuit of the transmission line will be constructed on the double circuit poles. The transmission line is located mostly in the barren areas of the semi-foot hills & arid region.

5.1.2 Affected Administrative Units

90. The area to be indirectly affected by the construction of new 132 KV feeding transmission line will require 30 meter wide strip as working corridor during construction work, so an area of 30m will be affected along the whole feeding transmission line. The transmission line will pass through mostly the barren land from the Talagang / Lakarmar to Tamman DGS.

91. The transmission line may traverse only a few private farmlands, crops and which is the less than 10 per cent of total area to be transverse by the transmission line. For most of its length it would transverse hilly barren area, which is 90 percent of the total length of the T/line.

5.2 Physical Resources.

5.2.1 Topography, Geography, Geology, and Soils

92. Parts of the project area Talagang, Tamman, Danda Shah Bilawal, Mianwali and Lakarmar,) fall in the Potohar Plateau and salt range respectively.

93. The Potwar (or Potohar) Plateau has a flat to gently undulating surface, broken by gullies, which is a typical example of accelerated erosion. The Plateau slopes from northeast to southwest, and mostly drains into the Indus River through its main hydrological artery, the Soan River. The Salt Range presents a complete geological sequence from Pre-Cambrian to the late Tertiary periods.

94. According to the District census report, the Potohar Upland, commonly called the Potohar Plateau, spreading over 2.2 million-hectare of Punjab Province, lies to the south of northern mountains and is flanked in the west by River Indus and in the east by River Jhelum. This 1,000-2,000 feet (305-610 m) upland is a typical arid landscape with denuded and broken terrain characterized by undulations and irregularities. These are a few outlying spurs of Salt Range in the south, and those of Kheri Murat and Kala Chitta

Range in the north. Two seasonal streams - Rivers Haro and River Soan - flow from east to the west and after crossing the region in the north and in the middle respectively, fall in the Indus. River Kanshi traverses the eastern part of the plateau from north to south and drains into River Jhelum. These rivers and other hill torrents have cut deep valleys and are of little use for irrigation. Agriculture is thus almost entirely dependent on rainfall of 15-20 inches (380-500 mm)' and on the small dams built in the catchment areas of the streams.

95. The prevailing geologic conditions in the region are the results of extensive inundation, depositions, coastal movements, and erosions over a long period of time in the geological ages. Consequently, the region is one of folded mountains with sharp peaks, ridges, and a deeply incised youthful drainage system. The rock types are predominantly sedimentary.

96. The geology of the region is closely related to the formation process of Himalayan ranges resulting in intense deformation with complex folding, high angle strike-slip faults and crust thickening expressed in a series of thrust faults. The important tectonic changes which have had so much influence in the region are feebly visible, and it is only by considering the geology on a broader regional scale, as well as in site specific detail, that the effects can be appreciated.

97. The soil of project is mostly alluvial. The alluvial deposits transported by the water and its tributaries have contributed soil characteristics very specific to a Flood Plain. Generally, the soil of Rawalpindi region is variable in character and inclined to be dry. However, it is normally very fertile and rich in potential plant nutrients. The soil deposits normally comprise layers of silty clays/clayey silt and fine to medium sands. The depth of bedrock in the project region is not known.

98. According to the 1998 census of Pakistan the district Chakwal had a population of 1,083,727 of which 47.72% were urban.

5.2.2 Climate and Hydrology

99. According to the District census report, climate of the district varies with altitude. The temperature generally remains between 2^{o}C to 40^{o}C. The Potohar Upland, commonly called the Potohar Plateau, spreading over 2.2 million-hectare of Punjab Province, lies to the south of northern mountains and is flanked in the west by River Indus and in the east by River Jhelum. This 1,000-2,000 feet (305-610 m) upland is a typical arid landscape with denuded and broken terrain characterized by undulations and irregularities. These are a few outlying spurs of Salt Range in the south, and those of Kheri Murat and Kala Chitta Range in the north. Two seasonal streams - Rivers Haro and River Soan - flow from east to the west and after crossing the region in the north and in the middle respectively, fall in the Indus. River Kanshi traverses the eastern part of the plateau from north to south and drains into River Jhelum. These rivers and other hill torrents have cut deep valleys and are of little use for irrigation. Agriculture is thus almost entirely dependent on rainfall of 15-20 inches (380-500 mm)' and on the small dams built in the catchment areas of the streams.

100. Water scarcity is becoming a widespread issue in Pakistan as the growing population largely depends on ground water pumping for agricultural and

living. Deep water table, low rainfall and rising needs in hot weather put the people in acute short supply of water. Particularly, in the North Punjab, comprising four districts in arid zone namely Rawalpindi, Chakwal, Jhelum and Attock, people depend on rainwater sources and groundwater pumping through tube-wells and water pumps.

101. As per Field Appraisal Report TMA Chakwal 2006, No aquifers are available in the sub soil except for some confined layers bearing water in small quantities, recharged by precipitation. Such water dries out with continuous pumping. The water table depth in the city varies from 70 to 100 ft due to undulating topography itself. Most of the available water in the sub soil is brackish with TDS value ranging from 800-2000 PPM. Some marginal quality waters are found in certain areas which are of perched nature and have small volumes hardly enough to be pumped out by hand pumps. The depth of hand pumps installed in the city varies from 100 to 150 ft. Some dug / open wells (20 – 25 Nos.) have been constructed in depressions in the out skirts of the city with 30-35 ft depth. In city the depth of such wells is 100-125 ft. Small quantity of perched water is available in these wells after precipitation but it depletes in dry spell. Hence the wells cannot be taken as a sure source of water. The quality of water in these wells and hand pumps varies from place to place.

5.2.3 Irrigation:

102. On account of mountainous topography, a very small percentage of cultivable land is irrigated by means of small water channels which are made to bring water from rivers and nullahs. In most of the cases, spring water is diverted for irrigating paddy fields and vegetable fields by means of small channels.

103. The main vegetables grown in the district are brassica, turnip, radish, tomato, chili, garlic, onion, lady-finger, bringel, etc.

5.2.4 Surface Water & Water Supply

104. According to the District census report, 62.80 per cent of the housing units in the district use piped water, majority of which has that facility in their own houses. Rest of the population fetches water from springs and Nullas. Piped water supply is available in the subproject area.

5.2.5 Rivers and Tributaries:

105. Indus River flows along the western boundary of the district in a north to south direction. Seasonal Nalas and other numerous rivulets also flow in the area. No water body exists within 100m of the subproject area ***(Figure 5.1)***.

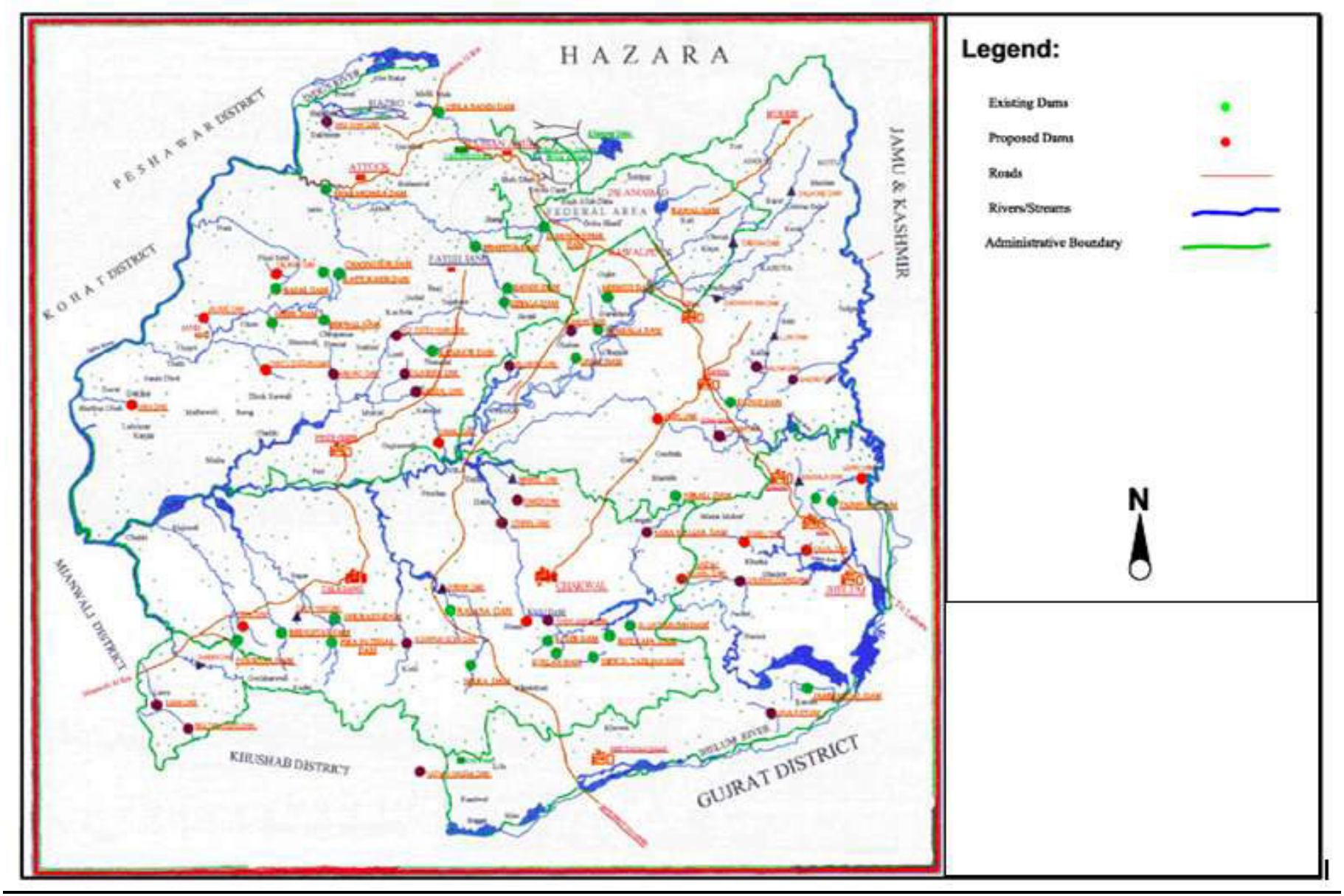


Figure 5.1: Map showing Water Resources in Project Area.

5.2.6 Air Quality

106. Air quality in most of the project area appears good based on observation during the study period. Emissions should be controlled at source under the EMP. There will be a few items of powered mechanical equipment to be used in the stringing and construction of transmission line works that even may not give rise to complaints of dust and other emissions because due to hilly area and Nalas dust may not generate much. However if there is any, these should be minor and easily dissipated. Domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households, are minor.

107. There should be no source of atmospheric pollution from the project. In the operational phase the industrial facilities with fuel powered mechanical equipment will be the main polluters. All such emissions will be very well dissipated in the open terrain and there will be no cumulative effect from the project. The project area is distant from major sources of air pollution like industries or urban type traffic, domestic sources such as burning of wood and kerosene stoves, etc. or fugitive sources such as burning of solid wastes. Air quality in the project area visually appeared very good during the study period.

108. The other major source of air pollution is dust arising from construction and other ground or soil disturbance, during dry weather, and from movement of vehicles on poorly surfaced or damaged access roads. It has been observed that dust levels from vehicles may even be high enough to obscure vision significantly temporarily.

109. The contractor will be liable to carry out the air quality testing of the project site before the commencement of work and the same will be set as baseline data.

5.2.7 Noise

110. Noise from vehicles and other powered mechanical equipment is intermittent. There are also the occasional calls to prayer from the PA systems at the local mosques but there are no significant disturbances to the quiet rural setting. However, the construction from the proposed power expansion will use powered mechanical equipment. Subjective observations were made of background noise and also of individual vehicle pass by events. Based on professional experience background daytime noise levels are probably well below 55dB (A) L90.

111. The contractor will be liable to carry out the Noise measurement & testing of the project site before the commencement of work and the same will be set as baseline data.

5.3 Biological Resources.

5.3.1 Flora

112. Pine, Kai, fir and other trees like poplar, *shisham, kikar*, willow, walnut, *ban-akhore,* and mannu are found plentiful in the district. Among flowers zianna, dahlia, merrygold, cosmos, daffodil aster and rose of different kinds are found in the district. Mostly the population of the rural areas is very much keen and eagerly devoted in plantation of fruit plants and to suffice the purpose, agriculture nurseries are affording the demand of general masses.

5.3.2 Fauna

113. Wild life of the district is mostly confined in Pothar range where kokla, Himalyan thar, leopard cat and bear are found. Among birds *murgh zareen*, *shahin*, danger chakor and moned pheasant are available. *Murgh zareen* and *shahin* are confined to forests on high hills and chakor is commonly found in the lower parts.

5.3.3 Protected Areas / National Sanctuaries

114. In Pakistan there are several areas of land devoted to the preservation of biodiversity through the dedication of national parks and wildlife sanctuaries. There is no wetland except Indus River along the boundary of the district. Similarly there is no protected area or national Sanctuary near the area of works of the subproject.

5.4 Economic Development.

5.4.1 Agriculture, Livestock and Industries

115. Except for a few places in district which are irrigated by means of water channels drawn from springs and hill torrents, other areas depend on the rainfall. The major crops of the district are maize and wheat but at some places gram, bajra, peanuts and jawar are also cultivated. Pulses of all kinds are also grown in different areas of the district. Beans of a good variety are cultivated in abundance. Similarly the soil of this district is ideal for grains. Sarsoon is also grown in different parts of the district.

116. The subsistence holding of the individual in the district is very small and they avail joint family system. Most of the people started horticulture instead of sowing other crops, with a view to gain livelihood in an easy way.

117. The district is deficit in food grains production. The local production hardly suffices for 2 to 3 months. The population of the district depends mainly on food grains/flour supplied by the Food Department, Punjab. Other commodities of daily use are brought from Jhelum, Mianwali, Rawalpidi and other neighboring markets.

118. Ponies and donkeys are kept for carrying load. Buffalo and sheep/goat are kept almost in every home for milk and other products.

119. For treatment and looking after the livestock, Tehsil & District veterinary hospitals and dispensaries are available in the district.

5.4.2 Communication

120. Chakwal is connected with rest of Pakistan by roads viz: Peshawar – Rawalpindi – Karachi Provincial Highways system (GT Road) & Motorway via National Highways. There is also railway line available in the district.

5.4.3 Energy Sources

121. As per secondary available data about 85.77 percent housing units are using wood as cooking fuel in their houses while 8.9 percent are using gas for their purpose. 2.1 percent are using kerosene oil as a source of cooking fuel in their houses.

5.5 Social and Cultural Resources.

5.5.1 Population Communities and Employment

122. As per secondary available data, total population of Chakwal district is 1.50 Million according to the estimated figures of 2016 on the basis of last population census report 1998. According to the 1998 census of Pakistan the district had a population of 1,083,727 of which 47.72% were urban. The rural population of the district is about 52.28 percent of the total population.

123. Almost all the population of the district is Muslim. They constitute 99 per cent of the total population in rural as well as in urban areas. There are very few Christian, Hindu, Qadiani, schedule caste and other communities which are only 1 per cent of the total population according to census report of the district.

124. Much like rest of the country, the male members of the family in the project area are the breadwinners, both in rural and urban areas. The total male population, on average 47 % is economically active, while remaining 53 % are inactive. Among them 25 % are under the age of 10, remaining are students, domestic workers, landlords, property owners, retired persons, disabled and unemployed.

125. The bigger part of the rural population belongs to middle class or lower middle class, because of small landholdings and barani (rain-fed) area.

126. A new economic factor has been introduced by the establishment of new factories in Chakwal and a large industrial area in the Jhelum, Chakwal and oil field region of Attock, in Chakwal and Abbottabad where a few large cement factories are already installed.

Table 5.1: List of Major Industry in Chakwal District.

District	Major Industries.
Chakwal	**Big Industry:** Kohinoor Spinning Mills, Chakwal Textile Mills, Kohinor Textile Mills, Al Qaim Textile Mills, Al Qadir Textile Mills, Mehr Textile Mills, Al Faisal Flour Mills, Rizwan Textile Mills, Janjua Flour Mills, **Small Industries:** Brick Kilns, Poultry Farms, Hatcheries, Fish Farms, Cattle Farms, Quail Farms, Marble Factories, Furniture Manufacturing Units, Shoe Manufacturing Units, Clay Crockery Manufacturing Units. **Cottage Industries:** Embroidery, Stitching, Khussa Making, Wood Work, Clay Utensils, Clay Toys, Dying, Metal Works, Silver and Gold Ornaments, and Fireworks.

5.5.2 Education and Literacy

127. The Chakwal district has the largest number of schools, colleges and universities among all the districts falling in IESCO region after Rawalpindi district. There are 07 Nos. Universities and colleges, 208 Nos. High Schools and 1208 Nos. Primary & Middle schools and a numbers of the other technical educational institutes in the district. The enrollment ratio is 47.2% both in male & female. However, the geographical distribution of these facilities is not even in the area. In general, the cities and towns have more schools and colleges, compared to the rural areas. Consequently, there is a

general trend in these areas to go to the cities, particularly for higher education.

128. A Government secondary School for boys and a mosque are located at 30 ft from the boundary wall of the existing grid station. Both the school and mosque were built after the construction of the existing 66kV grid station. The school Principal was consulted regarding their concerns related to construction activities. Major concerns included noise pollution and traffic management during construction activities. These impacts will be mitigated by the implementation of Environmental Management Plan.

5.5.3 Health Facilities

129. District Health Officer Supervises the health care activities at the district level. Chakwal has both public and private medical centers. The largest hospital in Chakwal is DHQ hospital. According to the Federal Bureau of Statistics of the Government of Pakistan, in 2008 there were 02 hospitals, 66 dispensaries, and 15 Maternity and Child Welfare Centers in the district.

5.6 Cultural Heritage and Community Structure.

130. There are 03 Nos. of sites of archeological, cultural, historical and religious significance in the Chakwal. The major ones include the archeological and historical buildings. A list of these places located in the subproject area is provided in Table 4.1, however no major historic or archaeological feature of noted within about 500m of the works.

131. Most of the population in Chakwal and Pothar region are ethnically Punjabis of Aryan origin. The major casts/tribes/braderies of the area are Rawal, Junjua, Chohan, Awan, Mughal, Qureshi, Syed, Bhatti, Satthi, Ghakkar, Rajput, Gujar, Jatt, Jalap, Minhas, Gondal, Shiekh, Kahut, Arain and Kashmiri.

Table 5.2: Places of Archeological, Historical or Religious Significance.

No.	Description.	Location.
1	Kallar Kahar.	District Chakwal.
2	Datas Raj.	Choa Saidan Shah, District Chakwal.
3	Malot Fort.	Between Kallar Khar and choa Saidan Shah District Chakwal.

***Source**: Guidelines for sensitive and critical areas; Pak-EPA*

6. SCREENING POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Project Location.

6.1.1 Impact Assessment and Mitigation

132. The proposed sub-project involves the Conversion of 66 kV Tamman grid station to 132kV and construction of approximately 20km feeding 132 kV Double Circuit Transmission Line.

133. The location and scale of the works are very important in predicting the environmental impacts. Therefore, it is essential that a proper analysis is carried out during the subproject planning period. 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, and with reference to the conditions on the ground in the affected areas in the spirit of the environmental examination process. In this section the potential environmental impacts are reviewed. Where impacts are significant enough to exceed accepted environmental standards, mitigation is proposed in order to reduce residual impact to acceptable levels. 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 subproject proposals.

134. The Environmental Management Plan (Section 7 and EMP Matrix **Appendix – I**) has been prepared based on the assessment and shall be reviewed in due course at subproject inception and through construction in order to provide a feedback on any significant unpredicted impacts. It is based on the analysis of impacts, primarily to document key environmental issues likely to arise from subproject implementation, to prescribe mitigation measures to be integrated in the subproject design, to design monitoring and evaluation schedules to be implemented during subproject construction and operation, and to estimate costs required for implementing subproject mitigation measures. The EMP must be reviewed in the subproject inception by the subproject management and approved before any construction activity is initiated, to take account of any subsequent changes and fine tuning of the proposals.

6.2 General Approach to Mitigation:

135. Based on professional experience on some projects, contractors have put emphasis on the financial compensation for nuisances. This may be acceptable for some social impacts where evacuation is necessary or where houses have been accidentally damaged, however it is not best international practice to accept payment for environmental impacts. An approach whereby, the subproject contractor pays money for nuisances rather than `control impacts at source will not be acceptable. This practice should not be allowed, and financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance.

136. During the preparation for the subproject construction phase the future contractors must be notified and prepared to co-operate with the executing

and implementing agencies, subproject management, construction 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 or train staff in the management of environmental issues and to audit the effectiveness and review mitigation measures as the subproject proceeds.

137. The effective implementation of the EMP will be audited as part of the loan conditions and the executing agency (IESCO) must be prepared for this. In this regard the IESCO must fulfill the requirements of the law and guidance prepared by Pak EPA on the environmental aspects of power subprojects and the recommendations already made for the subproject in this IEE and under Pakistan's PEP Act.

138. The location of the residences, mosques, schools, hospitals and civic, cultural and other heritage sites has been reviewed in Section 4 & 5. There are no other sensitive receivers or structures close to the feeding transmission line route. There could be some potential impacts in the construction stage from disturbance caused by noise and dust. The transmission line alignment is through cultivated fields and or hilly barren area, and no receptors such as residences, mosques or schools close enough to the alignment are to be significantly affected by the works.

139. Work on the tower sites could cause some generation of air borne dust, but any nuisance from this is likely to be very localized and temporary. Other project activities, e.g. movement of heavy vehicles on unpaved tracks during the works, could generate considerable dust. Water is available in the study area, although surplus water may not always be available to suppress dust at vulnerable locations in the dry season. Therefore as a general approach it is recommended that where works are within 15m of any residential sensitive receivers, the contractor should install segregation between the works and the edge of the sensitive receivers. The segregation should be easily erectable 2.5m high tarpaulin sheet and designed to retain dust and provide a temporary visual barrier to the works. Where dust is the major consideration the barrier can take the form of tarpaulins strung between two poles mounted on a concrete base. These can be moved along from tower base to tower base as the work proceeds.

140. Noise from the construction of the towers should not be a major consideration unless very close to schools or hospitals where construction should be avoided at sensitive times. In addition to the physical effect of mitigating dust and noise with barriers installation of such measures should be discussed with the local population and serve as a vehicle for further public consultation at the implementation stage to assist in public relations.

6.2.1 Cultural Heritage, Mosques, Religious Sites, and Social Infrastructure

141. The location of mosques and other cultural and other heritage and sensitive receiver sites has been reviewed in Section 5. There are no mosques or other religious sites close to the proposed transmission line ROW.

142. The nearest clinic / hospital are more than 100m from the edge of the subproject or transmission line route. The transmission line may, however, cross katcha and or pacca roads. Apart from these features, there will be

sufficient buffer distance between the works and any other sensitive receivers, so that no significant impacts should be expected. Public consultation should be undertaken at the implementation stage to ensure nuisances are not allowed to escalate for the sensitive receivers close to the transmission line route.

6.3 Potential Environmental Impacts in Construction Phase.

6.3.1 Encroachment, Landscape and Physical Disfiguration

143. The extent of the proposed power expansion is moderate and should not extend beyond the power corridor (RoW) created by the subproject. No significant landscape impacts are expected from Conversion of 66 kV Tamman Grid Station & construction of feeding 132 KV Double Circuit Transmission Line, Tranche IV savings sub-project.

6.3.2 Cut and fill and waste disposal

144. Disposal of surplus materials must also be carried out carefully to avoid / minimize the environmental disturbance. The subproject work should not involve any significant cutting and filling but minor excavations (down to 4m) and piling may be required to create the foundations for transformer and towers. It is envisaged (depending on the mode of contract) that the surface under the towers will need to be scrabbled to remove unstable materials, or to stockpile topsoil.

145. Mitigation measures must focus on the minimization of impacts. In order to allow the proper functioning of the settlement sites (access to villages) during construction it is recommended that consideration be given to erect temporary hoardings immediately adjacent to the nearest houses and shops if they are within 15m on each side of the power distribution line tower construction.

146. If surplus materials arise from the removal of the existing surfaces from specific areas, these should be used elsewhere on the subproject before additional soil, rock, gravel or sand is brought in. The use of immediately available material will generally minimize the need for additional rock based materials extraction from outside.

147. The subproject detailed designers have so far estimated that no substantial additional materials will be required subject to confirmation at the detailed design stage.

148. Financial compensation shall not be allowed as mitigation for environmental impacts or environmental nuisance. Mitigation measures shall seek to control the impacts at source in the first place. The engineer shall be responsible to update the subproject cut and fill estimates and create Materials Master Plan to facilitate materials exchange between the different contract areas along the power line and sub-contractors on the power line and to provide an overall balance for materials and minimize impacts on local resources.

6.3.3 Trees, Ecology and Protected Areas

149. At this stage, no data is available to be required for removal of trees along with the transmission line route / corridor. However some trees are present in the Tamman grid station, which will not be affected during the grid yard

works. Tree location and condition survey to be done before start of the work. Use of higher towers to be preferred to avoid trees cutting. The route for the distribution line should be selected so as to prevent the loss or damage to any orchard trees or other trees. If unavoidable, the Compensatory planting of three (3) suitable new trees in lieu of one (1) tree removed, in line with the consultation of local IESCO authorities.

150. As per the project location and route map, no plantation of religious significance is affected by the construction work. However; during the execution phase, if any 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.

151. There are no Reserved or Protected Forests or trees near the transmission line alignment. The proposed 132 kV feeding transmission line subproject line will require the installation of towers, which will not affect many trees as per route disclosed by GSC Directorate of IESCO. However, in case of removal of any tree on private or forest land during the works, permission should be sought from IESCO and Forest Department

152. If for some unforeseen reason or change of alignment, any trees with religious significance or other trees need to be removed, permission should be obtained from the forest authority / the owner after justification by IESCO. Trees shall be planted to replace the lost trees with three trees planted to replace every cut tree (3:1) or more as agreed with the authority. The replacement ratio 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.

153. A requirement shall be inserted in the contracts that no trees are to be cut on the site of GS & feeding transmission line subproject without the permission from the IESCO, who may permit the removal of trees if unavoidable on safety / technical / engineering grounds and to the satisfaction of the forest authority / the owner.

6.3.4 Hydrology, Sedimentation, Soil Erosion

154. The drainage streams en-route of the subproject should not be impeded by the works. The scale of the works does not warrant hydrological monitoring.

6.3.5 Air Pollution from Earthworks and Transport

155. The material (cement, sand and aggregate) requirement of a typical 132 KV substation (about 150 cu m) and a 132 KV Transmission Tower (4.8 cu m, or 40 bags of cement per tower) are not large. In transmission line construction, sand and aggregate are delivered directly to the tower location from the quarry / source; there is no intermediate or bulk storage of these materials. Similarly construction materials for the substation are stored within the substation site and scheduled as per the work progress (which is also staggered built in phases over), which means that at any given point in time the amount of construction material stored is not significant. The quantities of construction material required for a typical substation or transmission tower are not so large that they potentially represent a traffic hazard , these requirements are time dispersed in case of sub stations and time and space dispersed in case of transmission lines . The contractor will

be, however, required to provide a traffic management plan before commencement of work at site, where required. Field observations indicate that ambient air quality is generally acceptable and that emissions from traffic and other powered mechanical equipment in the area are rapidly dispersed. There will be a few items of powered mechanical equipment to be used in the construction of the distribution line works that may give rise to gaseous emissions. However these should be well dissipated.

156. Earthworks will contribute to increasing dust, and the foundation earthworks for the transformers and the line poles will generate dust. The following mitigation measures are needed:

- Dust suppression facilities (water sprayers / hosepipe) shall be available where earth and cement works are required.
- Areas of construction (especially where the works are within 50m of the sensitive receivers) shall be maintained damp by watering the construction area.
- Construction materials (sand, gravel, and rocks) and spoil materials will be transported trucks covered with tarpaulins.
- Storage piles will be at least 30m downwind of the nearest human settlements
- All vehicles (e.g., trucks, equipment, and other vehicles that support construction works) shall be well maintained and not emit dark, smoky or other emissions in excess of the limits described in the NEQS.
- The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources. Stockpiles should not be located within 50m of schools, hospitals or other public amenities such as wells and pumps and should be covered with tarpaulins when not in use and at the end of the working day to enclose dust.

6.3.6 Noise & Vibration.

157. It is anticipated that powered mechanical equipment and some local labor with hand tool methods will be used to construct the subproject works. No blasting is anticipated. Powered mechanical equipment can generate significant noise and vibration. The cumulative effects from several machines can be significant. To minimize such impacts, the equipment to be used for construction shall be fitted with the necessary air pollution and noise dampening devices to meet NEQs requirements.

158. A criterion of 70dB (A) Leq (within transmission line ROW) has been used for assessment in previous IEE studies. Any noisy equipment within transmission line ROW should be located as far from sensitive receivers as possible to prevent nuisances to dwellings and other structures from operation.

159. Noise from construction of the power distribution lines and improvements to substations is not covered under any regulations however in order to keep in line with best international practice it is recommended that no construction should be allowed during nighttime (9 PM to 6 AM) and less than 70dB(A) Leq should be the criterion at other times during the day measured from the source in line with World Bank/IFC standards; not the 75 dB(A) as NEQs of Pakistan 2010.

160. Vibration from construction of piles to support pads may be required for some tower construction and may be a significant impact but this should be of short duration. Where vibration could become a major consideration (within say 100m of schools, religious premises, hospitals or residences) a building condition survey should take place prior to construction. The physical effect of piling should be assessed prior to construction and measures should be discussed with the local population as well as timing of the works to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations. At nearby schools, the contractor shall discuss with the school principals the agreed time for operating these machines and completely avoid machine use near schools during examination times, if such a need arises.

6.3.7 Sanitation, Solid Waste Disposal, Communicable Diseases

161. The main issues of concern are uncontrolled or unmanaged disposal of solid and liquid wastes into natural drains, improper disposal of storm water and black water and open defecation by construction workers.

162. In order to maintain proper sanitation around construction sites, access to the nearby grid station lavatories should be allowed, provision of temporary toilets should be made. Construction worker camps will not be necessary, based on the scale of the works needed. If for some unforeseen reason a larger workforce is needed, no construction camp should be located in settlement areas or near sensitive water resources and portable lavatories or at least pit latrines should be provided.

163. Wherever water is allowed to accumulate, in temporary drainage facilities, due to improper storm water management, or improper disposal of wastewater generated from the site, it can offer a breeding site for mosquitoes and other insects. Vectors such as mosquitoes may be encountered if open water is allowed to accumulate at the subproject site. Temporary and permanent drainage facilities should therefore be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water.

6.4 Potential Environmental Impacts in Operational Phase.

6.4.1 Air Pollution and Noise from the Enhanced Operations

164. The subproject works will extend the power distribution lines but no houses, mosques or schools will be close to the new transmission line in the operational phase. There should be no source of atmospheric pollution from the subproject. In the operational phase any nearby industrial facilities with fuel powered mechanical equipment will be the main polluters. All such emissions will be very well dissipated in the open terrain and there will be no cumulative effect from the subproject.

165. There are no national noise standards in Pakistan for power distribution noise emissions that would apply in the operational stages. A criterion of 70Db (A) Leq has been used for assessment in previous IEE studies. It is recommended that a check be made on the likely acoustical performance based on maker's specifications of the installed equipment at the detailed design stage.

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

166. Control measures will be needed for oily residues such as transformer oil and lubricants in the case of accidental or unexpected release. 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 grid station maintenance yards for recycling (dehydrating) oil from breakers. However the areas upon which these recycling facilities are located have no dedicated drainage which can capture run-off. Oily residues and fuel and any contaminated soil residues should be captured at source. Refueling and maintenance should take place in dedicated areas away from surface water resources. Contaminated residues and waste oily residues should be disposed at a site agreed with the local authority.

167. IESCO already prohibits use of PCBs in new power transformers, there is however a need to prepare an inventory of any PCB carrying equipment in the system and all such equipment to be replaced. In case of spills, emergency measures need to be taken by the persons specially trained and wearing protective clothes. Oil absorptive materials are a useful tool and need to be spread over the spill. All equipment and surfaces exposed to the spill need to be washed with solvent. This IEE is related to the conversion of a substation (from 66 kV to 132 kV) and PEPCO/DISCOs have already banned the use of any equipment that uses PCB.

6.4.3 Electro Magnetic Fields:

168. Electric overhead lines are considered a source of power frequency, electric and magnetic fields, which may have a perceived health effect.

169. Exposure to electric and magnetic fields caused by transmission lines has been studied since the late 1970s. These fields occur whenever electricity is used. A magnetic field is created when electric current flows through any device including the electric wiring in a home. Every day we are exposed to many sources of EMF from vacuum cleaners, microwaves, computers, and fluorescent lights.

170. The research to date has uncovered only weak and inconsistent associations between exposures and human health. To date the research has not been able to establish a cause and effect relationship between exposure to magnetic fields and human disease, nor a plausible biological mechanism by which exposure to EMF could cause disease. The magnetic fields produced by electricity do not have the energy necessary to break chemical bonds and cause DNA mutations.

171. Magnetic fields can be measured with a gauss meter. The magnitude of the magnetic field is related to current flow, not line voltage. A 69 kV line can have a higher magnetic field than a 345 kV line. Furthermore, the magnetic fields quickly dissipate with distance from the transmission line.

172. The strength of both electric and magnetic fields is a function of the voltage, distance from the conductors to the ground and the lateral distance from the line to the receptor. However, the EMF decrease very rapidly with distance from source and there should be no potential health risks for people living outside the 30 m (98 ft.) wide way leave corridor.

173. The International Commission on Non-Ionizing Radiation Protection (ICNIRP), a non-governmental organization formally recognized by the World Health Organization, has set guidelines exposure limits for public and occupational exposure to EMF for ac systems, as indicated in the following table:

Frequency / Field	Public Exposure		Occupational Exposure	
	Electric Field (V/m)	Magnetic Field (mG)	Electric Field (V/m)	Magnetic Field (mG)
50 Hz	5,000	1,000	10,000	5,0000
60 Hz	4,150	830	8,300	4,150

174. A common method to reduce EMF is to bring the lines closer together. This causes the fields created by each of the three conductors to interfere with each other and produce a reduced total magnetic field. Magnetic fields generated by double-circuit lines are less than those generated by single-circuit lines because the magnetic fields interact and produce a lower total magnetic field. In addition, double circuit poles are often taller resulting in less of a magnetic field at ground level.

175. It is concluded that no part of the transmission lines passes through any residential area and the transmission line will consist of double circuit poles which are taller resulting less of a magnetic field. Electric and magnetic fields do induce voltage and currents in the human body but even directly beneath a high voltage transmission line, the induced currents are too small compared to the threshold for producing electrical effects in the human body. The World Health Organization (WHO) has also concluded that the evidence from scientific research does not confirm the existence of any health consequences from exposure to low level of EMF. Every day human body is exposed to various sources of EMF and the induced levels of currents are too small to produce health effects.

176. The level of electric and magnetic fields of the grid stations and transmission lines measured by Ministry of Health New Zealand is provided below. This also holds good for the current project, as the equipment used is that of international standard in line with IEC specifications.

Table 6.1: Electric and Magnetic Field Levels.

Component	Distance	Electric Field (Kv/m)	Magnetic Field (mG)
Transmission Line	Beneath Line	0.3 – 3	5 – 50
	40 meter away	0.01 – 0.1	1 – 10
Grid Station	Inside	0.1	1
Switch Yard	At 300 mm	0.02 – 0.1	10 – 30
	1 – 2 meters	0.01 – 0.03	1

Source: Electric and Magnetic Field and your health Ministry of Health New Zealand 2013.

6.4.4 Human Health and Safety:

177. Occupational Health and Safety impacts include, among others, exposure to physical hazards from use of heavy equipment and cranes; trip and fall hazards; exposure to dust and noise; falling objects; work in confined spaces; exposure to hazardous materials; and exposure to electrical hazards from the use of tools and machinery. In addition the local communities particularly the nearby school and mosque will be subject to disturbance due to construction phase noise impacts and traffic issues.

178. Human health and safety hazards specific to grids and power transmission operations primarily include live Electric and magnetic fields (EMF) and hazard of electrocution.

179. The occupational health and safety issues could be mitigated in accordance to national and international standards of working environment and following the safety rules. The contractors will be bound to follow the IESCO safety code. The contractor will appoint an HSE officer who will orient the construction crew on health and safety issues and will conduct regular monitoring as per EMP requirements.

180. The EMF impacts have been discussed in section 6.4.3 above and considering that there is enough barrier i.e boundary wall and space between the grid station and the sensitive receiver's i.e school and mosque. Wall; hence, the impact is none to negligible.

181. The electrocution accidents and fires could lead to losses in lives and properties. However, it is believed that the design, construction and operation procedures expected to be followed by the IESCO, in accordance to national regulations will provide sufficient safety precautions. Any such accidents, if occur will be due to unforeseen factors that could not be considered in risk estimation at the moment.

182. In order to reduce and eliminate the adverse impacts on human health and safety following extra measures are suggested:

    a) Coordinate and inform locals especially the nearby sensitive receptors about the peak time and hours for construction activities. In the way, it will be ensured that key ceremonies, exam times, or other significant events are impacted upon as little as possible
    b) To ensure safety of school going children entry and exit points to works sites should be controlled and heavy Trucks should be assisted by traffic controllers and by limiting the speed.
    c) The contractor and IESCO will bound to follow the safety standards and to provide minimum clearance level in accordance with WAPDA/NTDC specifications to avoid the EMF and electrocution impacts.
    d) Complaints Mechanism as per grievance redress mechanism will be adopted so that any complaints are redressed in amicable and respectful way.
    e) Erection of safety signs within and outside the grid station warning people of the danger of the equipment and prohibiting any un-authorized entry into the grid station.

183. DISCOs have also established a safety unit, which among other tasks, investigates all accidents. Frequency of accidents, on average is about 1 per DISCO per year (based on last 4 years record). About 60 % of these are non-fatal. Most accidents occur due to staff and supervision negligence. Detailed report of each accident is prepared for record.

6.4.5 Enhancement

184. Environmental enhancements are not a major consideration within the site of Tamman Grid Station & feeding 132 kV Double Circuit Transmission Line, Tranche IV savings sub-project. 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. Other opportunities for enhancements can be assessed prior to construction and proposed enhancements should be discussed with the local population to serve as a vehicle for further public consultation at the implementation stage and to assist in public relations. Trees removed for construction purposes should be replaced as compensation in line with best practice at ratio of three replaced for one removed however additional trees should be planted as enhancements where there is space along the transmission line.

7. ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

185. In this section, the mitigation measures that are required for the Conversion of 66 kV Tamman Grid Station & feeding 132 kV Double Circuit Transmission Line, Tranche IV savings sub-project, 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 the under study tranche IV savings sub-project. The EMP has been prepared following best practice and by reference to the Asian Development Bank (ADB) Safeguard Policy Statement (2009).

186. It is important that the recommendations and mitigation measures are carried out according to the spirit of the environmental examination process and in line with the guidelines. The EMP matrix is presented as **Appendix – I**. The impact prediction (Section 6) has played a vital role in reconfirming typical mitigation measures and in identifying any different approaches based on the feasibility and detailed design assumptions and any alternatives available at this stage.

187. Prior to implementation and construction of the subprojects the EMP shall be amended and reviewed by the IESCO, if required after detailed designs are complete. Such a review shall be based on reconfirmation and additional information on the assumptions made at this feasibility stage on positioning, alignment, location scale and expected operating conditions of the subprojects. For example, in this case if there are any additional transmission lines or extension of the substation 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 subproject by subproject basis.

188. The IEE and EMP plan must be reviewed by the project management and approved by the PEPA before any construction activity is initiated. This is also an ADB requirement in order to take account of any sub-sequent 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, a full extent of the environmental requirements of the project (IEE/EIA and EMP) are included in the bidding documents. Professional experience indicates that past environmental performance of contractors and their awareness of environmentally responsible procurement should also be used as indicator criteria for the prequalification of contractors.

189. In order to facilitate the implementation of the EMP, during the preparation for the construction phase the IESCO 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. IESCO's Environment and Social Safeguard section should audit the effectiveness and review mitigation measures as the subprojects are rolled out. The effective implementation of the EMP will be audited as part of the midterm review of loan conditions and the executing agency must prepare for this at the inception stage.

190. The details of EMP given in the **Appendix – I** are for the Conversion of 66 kV Tamman Grid Station & construction of feeding 132 KV Double Circuit Transmission Line, Tranche IV savings sub-project. The EMP matrix will have much in common for many other future substation and line projects that have a similar scale of works and types of location but will be different from more complicated substation and line projects that involve impacts to land outside the existing substations and for lines traversing more sensitive land. In all cases separate dedicated IEEs must be prepared.

191. The impacts have been classified into those relevant to the design/pre-construction 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 (**Appendix – II**) 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 Asian Development Bank (ADB) Safeguard Policy Statement (2009).

192. The Monitoring Plan (**Appendix – II**) is designed based on the project cycle. During the preconstruction 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 subprojects environmental performance and to guide any remedial action to address unexpected impacts.

193. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts.

194. 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 as 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 quoted separately in the tender documentation and that payment milestones are linked to environmental performance, Vis a Vis carrying out of the EMP.

195. 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 IESCO (the IA) must be prepared to guide the design engineers and contractors on the environmental aspects.

8. INSTITUTIONAL ARRANGEMENTS & REQUIREMENTS

196. In this section, the institutional arrangement that are required for the implementation of EMP during the Conversion of 66 kV Tamman Grid Station & construction of feeding 132 kV Double Circuit Transmission Line, Tranche IV savings sub-project are discussed.

197. In order to facilitate the implementation of the EMP, during the preparation for the construction phase IESCO must prepare the 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. IESCO's Environment and Social Safeguard section should audit the effectiveness and review mitigation measures as the subprojects are rolled out. The effective implementation of the EMP will be audited as part of the midterm review of loan conditions and the executing agency must prepare for this at the inception stage.

198. The EMP 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 (**Appendix – II**) 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 Asian Development Bank (ADB) Safeguard Policy Statement (2009).

8.1 Management Approach

199. Prior to implementation of the subproject the IESCO needs to comply with several environmental requirements, such as submitting and EIA/IEE to PEPA and obtaining clearance /No Objection Certificate under PEP Act (guidelines and regulations 2000) and any other permissions required from other authorities. IESCO 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. For this project IESCO has already obtained NOC from EPA.

200. In IESCO/DISCOs the development projects are executed through Project Management Unit (PMU) under the Chief Engineer (Development). The PMU has four sections namely i) Project Finance, ii) Procurement iii) Planning, Scheduling & Coordination (PS&C) and iv) Environment & Social Safeguard (E&SS). The Chief Engineer (Development) PMU, IESCO will be therefore responsible for the company's compliance with the IEE and EMP through the E&SS section throughout the project.

201. The E&SS unit will provide overall supervision and advisory services during the construction phase of the project. The E&SS unit will supervise the IESCO's environmental monitors and will also advise GSC, T&G Division and other IESCO departments on environmental and social matters during

the project. The E&SS unit will also be responsible for implementation of mitigation measures through the contractor.

202. Currently, the environment and social safeguard (E&SS) section/ unit of PMU has one Assistant Manager (Environment) and one Assistant Manager (Social) working under Deputy Manager (Environment & Social) in the Environment and Social Safeguard (E&SS) section of Project Management Unit (PMU). IESCO E&SS is fully functional and is having a very good level of awareness and will be responsible for addressing environmental concerns for all subprojects. 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 subprojects effectively. Specific areas for immediate attention are in EMP auditing, environmentally responsible procurement, air, water and noise pollution management and ecological impact mitigation to provide independent quality control and oversight of the EMP implementation.

203. It is also recommended that IESCO Board allow direct reporting to Board level from the in-house E&SS section. If the E&SS requires resources for larger subprojects then environmental specialist consultants could be appointed through the project implementation unit to address all environmental aspects in the detailed design. It is recommended that the Project Director (GSC) should liaison directly with the E&SS to address all environmental aspects in the detailed design and contracting stages.

204. Overall implementation of the EMP will become IESCO's responsibility. IESCO and other parties to be involved in implementing the EMP are as follows:

205. **IESCO:** The overall responsibility for compliance with the environmental management plan rests with the project proponents (IESCO).

206. **IESCO Board:** The IESCO Board of Directors will be responsible to ensure that sufficient timely resources are allocated to process the environmental examinations and to monitor implementation of all construction and operational mitigation measures required to mitigate environmental impacts.

207. **Environmental and Social Safeguard (E&SS) Section** / **Unit:** The E&SS unit will provide overall supervision and advisory services during the construction phase of the project and will be responsible to audit the implementation of mitigation measures by the contractors/ GSC staff.

208. **Contractors:** The contractor(s) will be responsible for the construction activities of the project. They will be responsible for carrying out the contractual obligations, complete implementation of the EMP and the mitigation measures detailed in the EMP and IEE. The contractors will also ensure that the project is not put out of compliance with the ADB policies through their actions. The contractor(s) will also be subjected to certain liabilities under the environmental laws of the country, and under its contract with IESCO.

209. **GSC Directorate:** The GSC directorate of IESCO will monitor the contractors and ensure implementation of the EMP.

210. Other essential features of the institutional arrangement proposed for the project are:
    - IESCO will appoint concerned SDOs as Environmental and Social Officers (ESOs) for overseeing and monitoring the entire implementation of the EMP.
    - The EMP as well as environmental management requirements and specifications will be included in all contracts of IESCO and its contractors/consultants.
    - Each contractor will be required to appoint a dedicated field Environmental and Social Officer / HSE Officer at the project site.
    - All activities related to project will be defined located and in documented form.
    - IESCO, through the E&SS unit, will cooperate with regulatory agencies (such as the Pak-EPA) and other stakeholders who may want to send their own teams to monitor the project activities and IESCO will facilitate them during their visits.

211. **Facility Management Consultants (FMC):** M/S SMEC has been hired by PEPCO and they have mobilized since 2009. They are performing the job as external monitoring and evaluation consultants. They independently monitor and evaluate the implementation of EMP and LARPs of all Tranches / Subprojects of all the DISCOs and report directly to ADB with copy to the respective DISCOs.

212. **Other government agencies:** Other government agencies such as the PAK – EPA / Punjab – EPA 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.

213. Considering that contractor and IESCO GSC staff will be involved in implementing the EMP, training and orientations sessions should be conducted by E&SS unit. DISCOs E&SS units also needs to share the monitoring reports on the implementation of the EMP in each DISCO and to share lessons learned in the implementation and to achieve a consistent approach on remedial actions, if unexpected environmental impacts occur.

214. 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 IESCO (the IA) must be prepared to guide the design engineers and contractors on the environmental aspects.

215. The organization of EMP planning, implementation and monitoring is depicted below in **Figure 8.1**

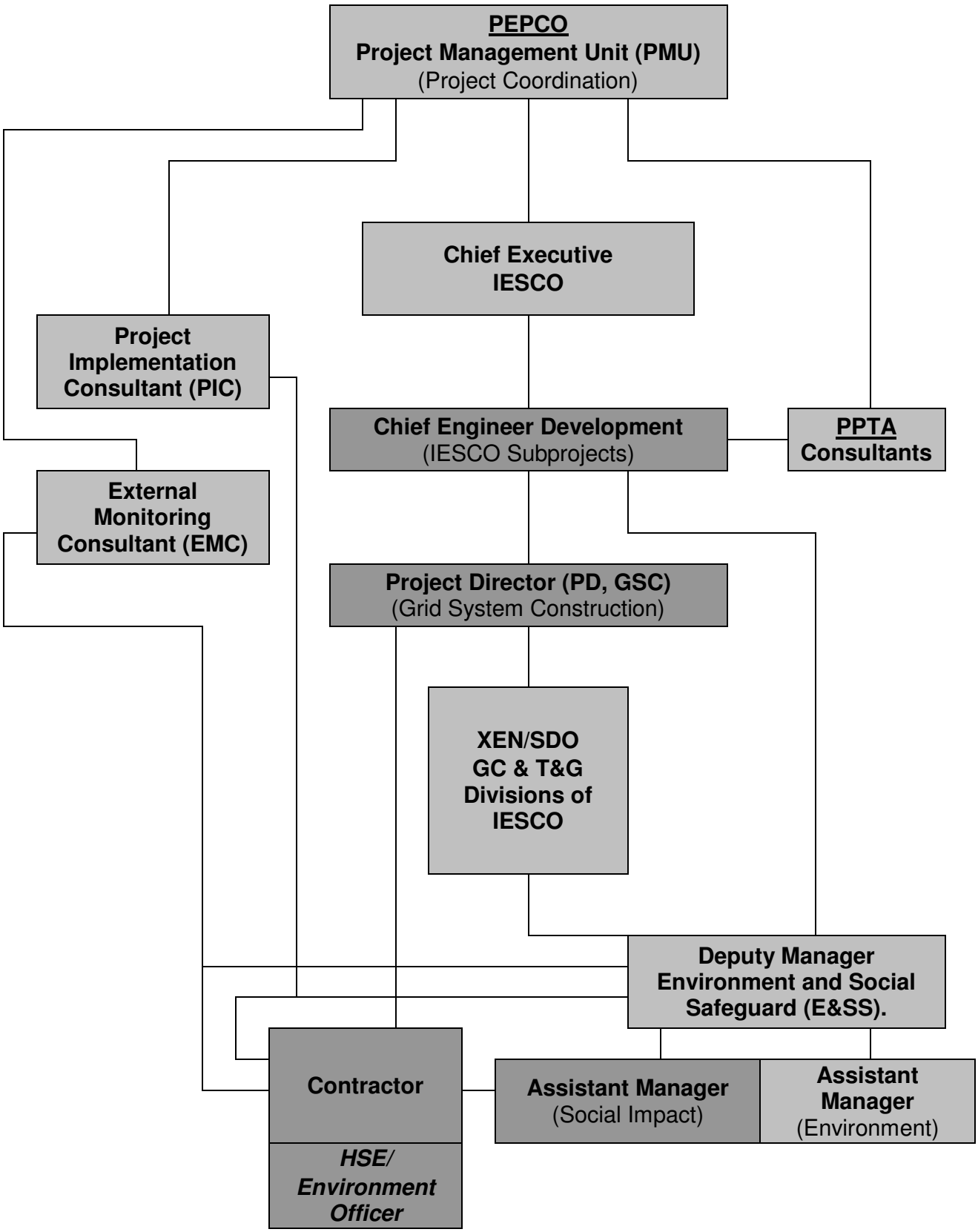


Figure 8.1: Organization Structure for EMP Planning, Implementation and Monitoring

9. GRIEVANCE REDRESSAL MECHANISM

9.1 Background of GRM

216. In order to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance a Grievance Redress Mechanism (GRM) has been established for the project. The mechanism is being used for addressing any complaints that arise during the implementation of projects.

217. The GRM will address affected people's concerns and complaints proactively and promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism will not impede access to the Country's judicial or administrative remedies.

218. An attempt has been made during the present IEE to identify all potential impacts of the proposed project, to identify all Project Affected Persons (PAPs), to provide mitigation measures to address the potential impacts, and to chart out a mechanism to implement these mitigation measures (including payment of compensation).

219. However during the project implementation, the stakeholders (mostly the communities in the vicinity of the project sites/transmission line routes) may still have some grievances with respect to the project activities, their impacts, compensation and other mitigation measures. The key reasons of these grievances are listed below:
    - PAPs not enlisted,
    - Losses (such as damaged crops) not identified correctly,
    - Compensation inadequate or inappropriate,
    - Dispute about ownership,
    - Delay in disbursement of compensation,
    - Improper distribution of compensation in case of joint ownership.

220. In order to address the above eventualities, the Grievance Redress Mechanism (GRM) has been devised. The main objective of the GRM will be to provide a mechanism to mediate conflict and cut down on lengthy litigation, which often delays the infrastructure projects such as the present project. It will also facilitate people who might have objections or concerns about their assistance, a public forum to raise their objections and through conflict resolution, address these issues adequately. The main functions of the GRM will be as follows:
    - Provide a mechanism to the PAPs on problems arising as a result of project activities,
    - Record the grievance of the PAPs, categorize and prioritize the grievances that need to be resolved, and
    - Report to the aggrieved parties about the developments regarding their grievances and the decision of the project authorities.

221. Under the GRM, the concerned SDO and contractor of the site will maintain the Complaint Register (CR) at the sites to document all complaints

received from the local communities. The information recorded in the Register will include date of the complaint, particulars of the complainant, description of the grievance, actions to be taken, the person responsible to take the action, follow up requirements and the target date for the implementation of the mitigation measure. The register will also record the actual measures taken to mitigate these concerns. The CR will be reviewed by E&SS unit and ADM mission members during the meetings at the site. The progress on the remedial actions will also be reviewed during the meetings.

222. As soon as a complaint is received, the HSE/Environmental Officer of the contractor will determine the remedial action. If required, consultations will also be undertaken with the contractor's site managers and GSC's PD. The proposed remedial action will be documented in the CR, with complete details (by whom and by when). The proposed remedial action will be shared with the complainant. Similarly, the actual action taken will also be documented in the register and shared with the complainant. Complaints beyond the control of HSE/Environmental Officer will be referred to Project Director (GSC) for resolution and subsequently to Chief Engineer (Development) if not resolved.

223. To address and resolve the un-attended complaints & issues of Project Affected Persons (PAPs), IESCO has also constituted a high powered Grievance Redress Committee (GRC) inline with ADB Social Safeguard Policy. The committee members are as follow:

i.	Project Director (GSC/ C&O)	Convener
ii.	Deputy Manager (E&SS)	Member
iii.	Assistant Manager (Social Impact)	Member
iv.	Environment and Social Officer	Member
v.	Contractor Representative	Member
vi.	Community Representative	Member

9.2 GRM Process, Complaints Reporting, Recording and Monitoring

224. IESCO has facilitated the establishment of a Grievance Redress Committee (GRC) as enlisted above. In-addition the local notables / or nominated members by community will form/ work as Grievance Focal Persons (GFPs) at project site. The functions of the GRC and GFPs are to address concerns and grievances of the local communities and affected parties as necessary.

225. The GRC can be expanded to include other well-reputed persons as mutually agreed with the local authorities and affected persons. The role of the GRC is to address the Project related grievances of the affected parties that are unable to be resolved satisfactorily through the initial stages of the GRM.

226. IESCO will assist affected communities/villages to identify local representatives to act as Grievance Focal Persons (GFP) for each community/village. GFPs are designated personnel from within the community who will be responsible for i) acting as community representatives in formal meetings between the project team (contractor, DSC, PIU) and the local community he/she represents and ii) communicating community members' grievances and concerns to the contractor during project implementation. The number of GFPs to be

identified for each project will depend on the number and distribution of affected communities.

227. If necessary, a pre-mobilization public consultation meeting will be held by IESCO i.e SDO of concerned work / Environment Specialist of PMU and attended by community representatives, GFPs, contractor, and other interested parties (e.g. District level representatives, NGOs). The objectives of the meeting will be as follows:
    (i) Introduction of key personnel of each stakeholder including roles and responsibilities;
    (ii) Presentation of project information of immediate concern to the communities by the contractor (timing and location of specific construction activities, design issues, access constraints etc.) This will include a brief summary of the EMP - its purpose and implementation arrangements;
    (iii) Establishment and clarification of the GRM to be implemented during project implementation including routine (proactive) public relations activities proposed by the project team (contractor, DSC, PIU) to ensure communities are continually advised of project progress and associated constraints throughout project implementation;
    (iv) Elicit and address the immediate concerns of the community based on information provided above.

228. Following the public consultation meeting and after the contractor's mobilization, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below and shown on **Figure 9.1**.
    (i) Individuals will lodge/bring their complaint/grievance directly through their respective GFP to the attention of the Contractor.
    (ii) The Contractor will record the complaint in the onsite Complaints Register (CR) in the presence of the complainant/ GFP.
    (iii) The complainant /GFP will discuss the complaint with the Contractor and have it resolved. The contractor if require will discuss the issue with SDO concerned for amicable resolution.
    (iv) If the Contractor does not resolve the complaint within two weeks, then the complainant or GFP will bring the complaint to the attention of the Project Director (GSC) or Assistant Manager of E&SS PMU and they will then be responsible for coordinating with the Contractor in solving the issue.
    (v) If the Complaint is not resolved in further 3 weeks the GFP will present the complaint to the GRC.
    (vi) The GRC will have to resolve the complaint within a period of 3 weeks and the resolved complaint will have to be communicated back to the complainant/GFP. The Contractor will then record the complaint as resolved and closed in the Complaints Register.
    (vii) Should the complaint not be resolved through the GRC, the issue will be adjudicated through local legal processes.
    (viii) In parallel to the CR placed with the Contractor, each GFP will maintain a record of the complaints received and will follow up on their rapid resolution.
    (ix) EA will also keep track of the status of all complaints through the Monthly Environmental Monitoring Report submitted by the

Contractor to the DSC and will ensure that they are resolved in a timely manner.

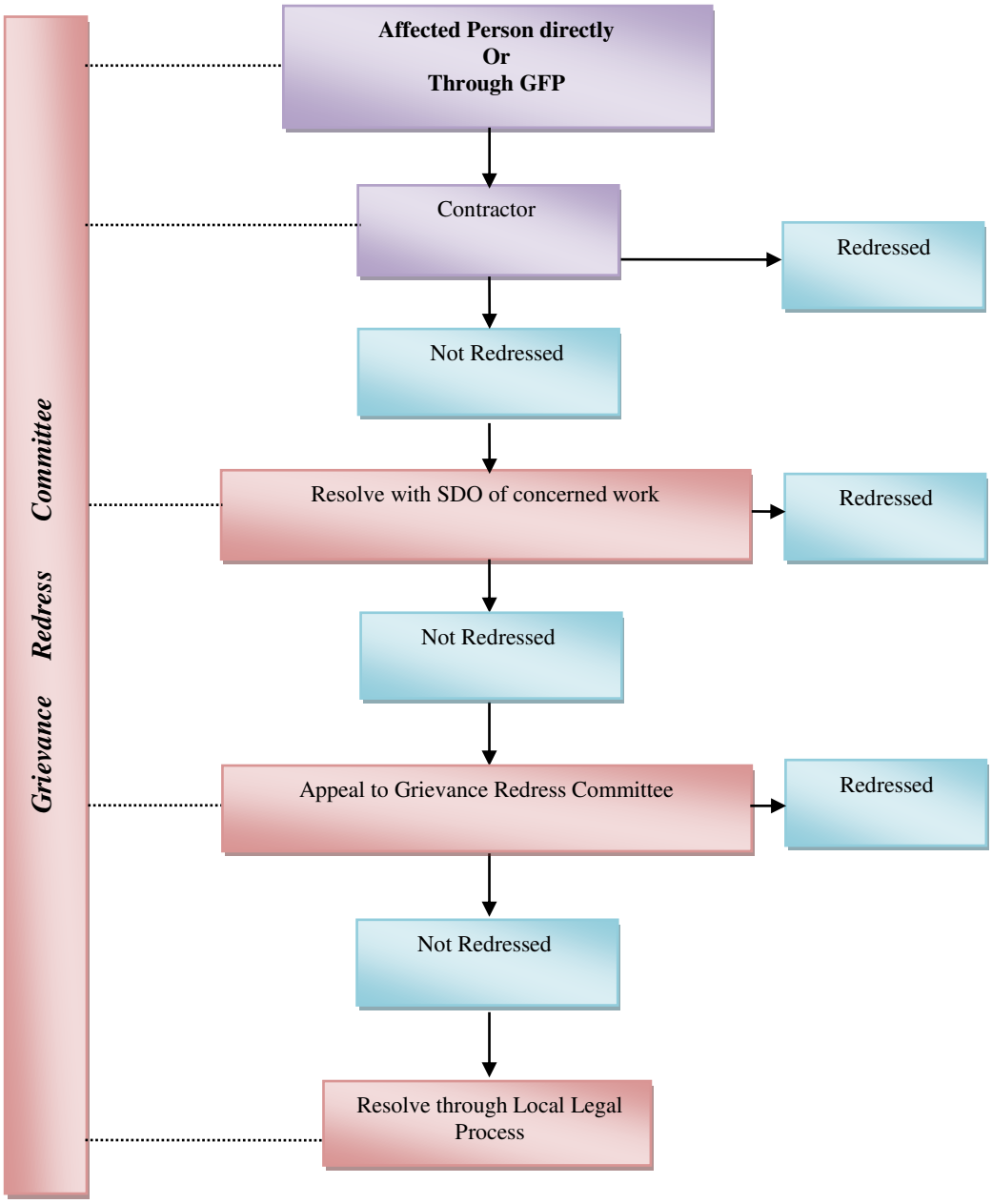


Figure 9.1: Grievance Redress Mechanisms

10. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

10.1 Approach to Public Consultation:

229. The public consultation (PC) process with various stakeholders 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 stage 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 and its equipment.

230. It is expected that this process will continue through all stages of the subproject in order to accommodate stakeholders' aspirations and to orient the stakeholders positively towards the project implementation and where possible to harness cooperation over access issues in order to facilitate timely completion.

10.2 Public Consultation Process:

231. The public consultation process has commenced in the initial feasibility stages (prior to construction) in order to disclose the project information to the stakeholders and record feedback regarding the proposed project and preferences.

232. Public consultations (PC) were carried out in February 2009 and once again during Dec. 2016/Jan2017 for preparation of this IEE report in line with EPA and ADB requirements. Meaningful consultations will be once again carried out before and during the execution of work. Under ADB requirements the Environmental Examination process must include meaningful public consultation during the completion of the draft IEE. In this IEE the PC process included verbal disclosure of the sub-project works as a vehicle for discussion. Consultations were conducted with local stakeholders along the site of Tamman grid station & feeding 132 KV double circuit transmission line tower site.

233. The stakeholders involved in the process were the population likely to be impacted along the route of the proposed power lines; the village leaders and staff of the subproject management. IESCO will carry out public consultation with stakeholders during project execution.

234. The level of engagement varied from stakeholder to stakeholder with some registering no major comment but it is noted that none registered any outright opposition to the subproject.

235. The disclosure of the enhancement project in advance and subsequent consultation with stakeholders has advantages in the environmental examination and mitigation of impacts. Public consultation can also provide a conduit for the improvement of the project implementation to better serve the stakeholders.

236. The environmental examination process under the Pakistan Environmental Protection Act only requires the disclosure to the public after the statutory IEE / EIA has been accepted by the relevant EPA to be in strict adherence to the rules. In this IEE the consultation process was performed to satisfy the ADB requirements. The locations of consultation and people consulted are listed in the full table of public consultation (male & female) presented in **Appendix – III**.

10.3 Results of Public Consultation:

237. The consultations identified some potential environmental and social impacts and perceptions of the affected communities. The 40 Nos. participants' responses during the public consultation (**Appendix – III**). The community generally supports the construction of the TL. The local poor people predominantly requested for unskilled and semi-skilled jobs on priority basis with the contractors during implementation of the project. No land acquisition and resettlement is involved in this subproject. However, compensation will be paid to the concerned parties / owners of land under the towers and where the loss of some trees and for damage to crops is expected.

238. The major concern of the people was that of load shedding which needs to curbed at the earliest. Some of them also demanded employment of local community persons during the erection / installation period. Majority of the beneficiary communities were found aware the importance of the project in term of stable electric supply in the area. Almost all of the participants expected a positive impact of the sub-project in terms of improved voltage and reduced load shedding in the area. The communities requested for provision of unskilled to semi-skilled jobs during the construction and operation of the project activities.

239. The local communities' responses (awareness, perceptions and preferences) to project and its resettlement related matters are summarized as follows:

No.	Issues Raised/Concerns expressed/ Suggestions & Requests	Proposed Measure	Action Taken / Proposed
1.	Crop and tree compensation should be fair and timely	Compensation should be paid adequately and timely.	IESCO should pay compensation of crops and trees fairly and timely at least 15 days before civil works.
2.	Local skilled and unskilled labor should be used wherever possible	Skilled and unskilled labor should be preferred from the area.	IESCO should employ Skilled and unskilled labor from the area.
3.	Design of the line should not be changed, but if necessary at any stage houses and structures should be avoided	Construction work should be completed in time.	IESCO should complete all work timely.
4.	Load shedding is more in villages and affects all spheres of life including schools.	Load shedding to be reduced.	Measures to be taken by higher-ups.

5.	Line should not pass over the houses	Line should be avoided to pass over the houses.	IESCO should avoid distribution lines to pass over the houses.
6.	Crop and tree compensation should be fair and timely	Compensation should be paid adequately and timely.	IESCO should pay compensation of crops and trees fairly and timely at least 15 days before civil works.

240. IESCO has also planned to carry out Public consultation (PC) with all affected persons during the preparation of crops/ trees compensation inventory. This will be more meaningful consultation as it will involve the real affected persons (APs)/ community.

241. On the basis of the consultations so far, it appears that the project will have no insurmountable environmental and social impacts but IESCO will have to make sure that compensation and assistance amounts are assessed justly and that skilled and unskilled employment should be preferentially given to the AP as far as is reasonably practicable.

11. CONCLUSIONS & RECOMMENDATION

11.1 Findings and Recommendations.

242. This study was carried out at the planning stage of the subproject. Primary and secondary data 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 subproject, and recommended suitable mitigation measures.

243. IESCO has already obtained NOC / clearance for the project under the Pakistan Environmental Protection Act (1997). The environmental impacts from the sub-project will mostly take place during the construction stage. There are also some noise impacts and waste management issues for the 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 transmission tower 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 6) of this IEE report.

244. IESCO must complete an EMP that is acceptable to EPA and agreed by the contractor duly signed in the contract agreement. The information provided in this report can form the basis of any further submission to EPA as required in future.

245. No land acquisition and physical displacement/resettlement are involved. However, some crop/trees will be involved. Provisions shall be made in the short RP, based on the proposed alignments as the detailed designs are worked out and to minimize adverse impacts and maximize benefits. The short resettlement plan may be needed to:

(i) Examine and assess the overall social and poverty profile of the project area on the basis of the primary and secondary data sources and preparation of a socio-economic profile of the project districts.

(ii) Have consultations with relevant officials from the government and other relevant officials, including consultation with affected communities to assess responses to the project and ascertain the nature and scope of local participation in project planning and implementation.

(iii) Identify, analyze and, where appropriate, quantify the potential resettlement impacts (minimal) of the proposed Project on the area and the population.

246. Baseline monitoring activities should be carried out to establish the baseline of parameters for checking during the construction stage. The monitoring schedule (**Appendix – II**) recommends monitoring (as per contract agreement) at the site location. The results should be integrated with the contract documentation to establish performance action thresholds, pollution limits and contingency plans for the contractor's performance.

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

11.2 Summary and Conclusions:

248. The Conversion of 66 kV Tamman Grid Station & construction of feeding 132 kV Double Circuit Transmission Line, Tranche-IV savings sub-project is a feasible and sustainable option from the power transmission, engineering, environmental, and socioeconomic points of view. Implementation of the EMP is required and the environmental impacts associated with the subproject need to be properly mitigated through the existing institutional arrangements. Additional human and financial resources will be required by IESCO to complete the designs and incorporate the recommendations effectively and efficiently in the contract documents, linked to payment milestones. The proposed mitigation and management plans are practicable.

249. This IEE, including the EMP, should be used as a basis for an environmental compliance program and be included as Appendices to the contract. The EMP shall be reviewed at the execution stage. 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 subproject should be properly carried out and reported where required as part of the project performance report.

APPENDICES

APPENDIX – I

SUMMARY ENVIRONMENTAL MANAGEMENT PLAN (Matrix)

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
DESIGN STAGE						
1. Contract Clauses	Ensure requirements and recommendations of environmental assessment are included in the contracts.	Include EMP Matrix in tender documentation and make contractors responsible to implement mitigation measures by reference to EIA/IEE in contract.	During tender preparation. No later than pre-qualification or tender negotiations In bidding documents as evaluation criteria.	Sensitive receptors identified in the IEE/EIA/EMP or as required / approved by Pak EPA.	E&SS, IESCO.	E&SS, IESCO.
2. Procurement	Ensure environmentally responsible procurement.	Require in procurement specifications that transformers, transformer oil and other equipment are to be free from PCB and other petroleum fractions that may be injurious to environment or equipment. Require new switchgear to be free from CFCs in procurement specifications. SF6 gas insulated equipment to be effectively leak free with nominal SF6 top up less than 1% per year.	During tender preparation. No later than pre-qualification or tender negotiations.	Tender negotiations.	Procurement section IESCO.	E&SS, IESCO.
3. Waste Disposal	Ensure adequate disposal options for all waste including transformer oil, residually contaminated soils, and scrap metal.	Create waste management policy and plan to identify sufficient locations for, storage and reuse of transformers and recycling of breaker oils and disposal of transformer oil, residually contaminated soils and scrap metal “cradle to grave”.	Prior to detailed design stage no later than pre-qualification or tender negotiations. Include in contract.	IESCO E&SS. Locations approved by EPA and IESCO and local waste disposal authorities.	E&SS, IESCO.	IESCO E&SS and GSC.
4. Prevent Spills & Contamination.	To prevent spills, contamination of soil, groundwater	Design of adequate secondary containment facilities in substations to include concrete bases with bunding to prevent contamination from a major catastrophic	During design stage. Before tender prequalification.	All new and upgraded substations and where new	TSW & GSC IESCO.	E&SS, IESCO.

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
	and surface water.	failure and residual contamination from installation, maintenance and decommissioning.		transformers. Where augmentation of transformers requires significant civil works that can accommodate required improvements.		
		Review design of existing transformer and oil treatment location to aim to improve secondary containment facilities, concrete bases and bounding if retrofitting is technically feasible and will provide benefits at reasonable cost.				
		Design all transformers to be located over bunds to comply with best international practice so that transformer oil and other residual contamination does not run to ground and can be captured for controlled disposal. (Commence designs especially in new substations).				
		Integrate proposals with waste management policy and plan to identify sufficient locations for, storage and disposal of transformer oil and residual contaminated surface water or soil "cradle to grave".				
		Include in contracts, unit rates for construction of bunds and new style drainage requirements.				
5. Hydrological Impacts	To minimize hydrological and drainage impacts during construction.	Design of adequate major and minor culverts facilities to be integrated in design to avoid effects on hydrological flow in areas where it is sensitive, such as water courses or bridges and culverts.	During design stage. Before the commencement of construction activities	If Transmission lines or substation are relocated near water courses, culverts or bridges in the design stage reports.	TSW & GSC IESCO.	E&SS, IESCO.
6. Temporary Drainage and Erosion Control	Include mitigation in preliminary designs for erosion control and temporary drainage.	Identify locations where drainage or irrigation crossing ROW may be affected by works.	During designing stage no later than pre-qualification or tender negotiations.	Locations based on drainage or irrigation crossing Transmission lines ROW near GS.	TSW & GSC IESCO.	E&SS, IESCO.
		Include protection works in contract as a payment milestone(s).				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
7. Noise	Ensure cumulative noise impacts are acceptable in construction and operational phase.	If noise at sensitive receiver exceeds the permissible limit, the construction activities should be mitigated, monitored and controlled. If noise at sensitive receiver will exceeds the permissible limit in operational phase the design to include acoustic mitigation (noise barrier or relocation of noisy equipment) and monitoring.	During detailed design stage. No later than pre-qualification or tender negotiations Include acoustic specification in the contract.	Noise sensitive locations identified in the IEE/EIA/EMP or as required / approved by Pak EPA nearby Transmission lines or substations.	GSC IESCO.	E&SS, IESCO.
8. Loss of Trees and Vegetation Cover of the Areas	Ensure the compensatory tree plantation.	Tree location and condition survey to be done before start of the work. Use of higher towers to be preferred to avoid trees cutting. The route for the distribution line should be selected so as to prevent the loss or damage to any orchard trees or other trees.	During execution phase.	Transmission Line & Grid Station.	GSC IESCO.	E&SS, IESCO.
9. Social Impacts	To ensure that the adverse impacts due to constructing lines over private land, property acquisition and resettlement are mitigated according to the LARP.	The route for the distribution line should be selected so as to prevent the loss or damage to any orchard trees or other trees. Use of higher towers to be preferred to avoid trees cutting. Acquisition of lands completed to minimize the uncertainty of people. Completed implementation of LARP and LARCs to provide compensation and assistance to the APs. All the payments / entitlements are paid according to the Entitlement Matrix, prepared according to the LARP. All the impacts identified by the IEE /EIA are incorporated in to the project as well as the LARP and relevant entitlements included into the Entitlement Matrix.	Commence as early as possible and complete one month before the construction of the GSS and all the included structures, the APs to be given sufficient time with compensation money and to resettle satisfactorily.	Affected Families of Transmission lines ROW will be compensated by IESCO through the concerned District Revenue Department and Land Acquisition Collectors.	LACs & GSC IESCO.	E&SS, IESCO & SMEC E&SS.
CONSTRUCTION STAGE						

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
1. Preparation of SSEMP	To ensure the proper implementation EMP at Site.	Prepare the Site Specific Environmental Management Plan for the grid station sites.	Before start of the work and when the crew mobilized to the site.	Grid Station sites.	Contractor	E&SS, IESCO & SMEC.
2. Hydrology And Drainage Aspects.	To ensure the proper implementation of any requirements mentioned in EPA conditions of approval letter in relation to hydrology of the project.	Consideration of weather conditions when particular construction activities are undertaken. Limitations on excavation depths in use of recharge areas for material exploitation or spoil disposal. Use of landscaping as an integrated component of construction activity as an erosion control measure. Minimizing the removal of vegetative cover as much as possible and providing for it s restoration where construction sites have been cleared of such areas.	Prepare a thorough drainage management plan to be approved by GSC one month prior to a commencement of construction Proper timetable prepared in consideration with the climatic conditions of the area, the different construction activities mentioned here to be guided.	Locations of each construction activity of Transmission lines or substation to be listed by the GSC engineer. Special locations should be identified on the site of Transmission lines or substation by the contractor and E&SS, IESCO to minimize disturbances. A list of locations of irrigation channels / drains to be compiled and included in the contract. Transmission Line & Grid Station	Contractor supervised by GSC or to actively supervise and enforce.	E&SS, IESCO SMEC E&SS.
3. Orientation for Contractor, and Workers.	To ensure that the GSC contractor and workers understand and have the capacity to ensure the Environmental	IESCO (Environmental & Social Unit (E&SS) environmental specialist to monitor and progress all environmental statutory and recommended obligations. Conduct special briefing for managers and / or on-site training for the contractors and workers on the environmental requirement	Induction course for all site agents and above including all relevant IESCO staff / new project staff before commencement of	All staff members in all categories. Monthly induction and six month refresher course as necessary until contractor complies.	IESCO E&SS, Contractor and the GSC and record details.	E&SS, IESCO SMEC E&SS.

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
	requirements and implementation of mitigation measures.	of the subproject. Record attendance and achievement test for contractors site agents.	work.			
		Continuous progress review and refresher sessions to be followed.	At early stages of construction for all construction employees as far as reasonably practicable.			
4. Water Quality.	To prevent adverse water quality impacts due to negligence and ensure that unavoidable impacts are managed effectively. Ensure adverse impacts on water quality caused by construction activities are minimized.	Compile temporary drainage management plan one month before commencement of works, if required.	During all construction.	50m from water bodies nearby Transmission lines or substation. Relevant locations to be determined in the detailed project design.	Contractor (IESCO E&SS & GSC to enforce). Contractor shall conduct water quality tests as per the contract and report to IESCO. GSC supervises implementation activities.	E&SS, IESCO and SMEC E&SS.
		The NEQS applicable to wastewater discharged from the construction site will be enforced				
		The Contractor is required to maintain close liaison with local communities to ensure that any potential conflicts related to common resource utilization like potable water for project purposes are resolved quickly.				
		Existing water pipelines will be fully protected by the contractor. In case, where construction activities may harm the water supply system, contractor in consultation with communities will relocate / replace the damaged pipelines.				
		Proper installation of temporary drainage and erosion control before works within 50m of water bodies, where required.				
		Workers to avoid pollution of water bodies by the considerate operation of construction machinery and equipment.				
		Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures >50m away from water bodies.				
		Proper disposal of solid waste from				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		construction activities.				
		Cover the construction material and spoil stockpiles with a suitable material to reduce material loss and sedimentation and avoid stockpiling near to water bodies.				
		Topsoil stripped material shall not be stored where natural drainage will be disrupted.				
		Borrow sites (if required) should not be close to sources of drinking water.				
5. Air Quality.	To minimize dust effectively and avoid complaints due to the airborne particulate matter released to the atmosphere.	Control all dusty materials at source.	During all construction.	Construction sites of Transmission lines or substation within 100m of sensitive receivers. A list of locations of Transmission lines or substation to be included in contract and other sensitive areas identified by the GSC along the ROW during works.	Contractor shall conduct air quality tests as per the contract and report to IESCO. Contractor should maintain acceptable standard, GSC to supervise activities.	E&SS, IESCO and SMEC E&SS.
		Contractor must provide and ensure that the labor wears PPEs (masks)				
		Contractor will set up a system to monitor the air quality. The system will cover protocols for sampling and analysis, assessment of air quality at sensitive locations and reporting.				
		The NEQS applicable to gaseous emissions generated by the construction vehicles, equipment, and machinery will be enforced during the construction of works.				
		All heavy equipment and machinery shall be in compliance with the national and local regulations. (Relevant regulations are in the Motor vehicles fitness rules and Highway Act).				
		Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions.				
		Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions.				
		Vehicles transporting soil, sand and other construction materials shall be covered with tarpaulin to avoid dust pollution. Limitations				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		to speeds of such vehicles is necessary.				
		Transport through densely populated area should be avoided.				
		Plan to minimize the dust within the vicinity of orchards and fruit farms.				
		Spraying of bare areas with water.				
		Concrete plants to be controlled in line with statutory requirements should not be close to sensitive receptors.				
6. Ground Vibration.	To minimize ground vibrations during construction.	Review requirements for piling and use of powered mechanical equipment within 100m of SRs.	During all construction.	Construction of Transmission lines or substation sites within 100m of sensitive receivers. A list of locations of Transmission lines or substation to be included in contract and other sensitive areas identified by the GSC along the ROW during works.	Contractor should maintain the acceptable standards. GSC to supervise relevant activities.	E&SS, IESCO and E&SS, SMEC.
		Conduct public consultation with SRs to establish less sensitive time for works involving piling and schedule works accordingly.				
		Non-percussive piling methods to be used wherever practicable.				
		Percussive piling shall be conducted in daylight hours.				
		Hammer - type percussive pile driving operations shall not be allowed at night time.				
7. Noise.	To minimize noise levels during construction.	Review requirements for use of powered mechanical equipment within 100m of SRs.	During all construction.	Construction sites of Transmission lines or substation within 100m of sensitive receivers. A list of locations of Transmission lines or substation to be included in contract and other sensitive	Contractor shall record noise levels as per the contract and maintain the acceptable standards. GSC to supervise relevant activities.	E&SS, IESCO and E&SS SMEC.
		Contractor must provide and ensure that the labor wears PPEs (ear plugs, ear muffs etc.) to avoid loss/ damage to hearing.				
		In case where schools and hospitals are located within COI, construction activities shall be carried during off hours where possible.				
		Contractor shall ensure to enforce noise levels below the standards as prescribed in				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		the NEQS.		areas identified by the GSC along the ROW during works.		
		Conduct public consultation with SRs to establish less sensitive time for works and schedule works accordingly.				
		All heavy equipment and machinery shall be in compliance with the national and local regulations and with effective silencing apparatus to minimize noise.				
		Heavy equipment shall be operated only in daylight hours.				
		Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise.				
		Well-maintained haulage trucks will be used with speed controls.				
		Contractor shall take adequate measures to minimize noise nuisance in the vicinity of construction sites by way of adopting available acoustic methods.				
8. Soil Erosion / Surface Run – off.	To minimize soil erosion due to the construction activities of towers, stringing of conductors and creation of access tracks for project vehicles.	Schedule works in sensitive areas (e.g. near rivers) for dry season.	Month prior to construction because the area can be subject to unseasonal heavy rain. Plan before and during construction (cut and fill, land reclamation etc.) while considering the climatic conditions.	Transmission lines or substation locations based on history of flooding problems indicated by local authorities. A list of sensitive areas nearby Transmission lines or substation during construction to be prepared by the detail design consultant in consideration with	Contractor and GSC.	E&SS, IESCO and E&SS SMEC.
		Installation of TD and EC before works construction within 50m of water bodies.				
		Clearing of green surface cover to be minimized during site preparation.				
		Meaningful water quality monitoring up and downstream at any tower site during construction within a river or stream bed. Rapid reporting and feedback to GSC.				
		Back-fill should be compacted properly in accordance with IESCO design standards and graded to original contours where possible.				
		Cut areas should be treated against flow				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		acceleration while filled areas should be carefully designed to avoid improper drainage.		the cut and fill, land reclamation, borrow areas etc. Locations of all rivers, streams, culverts, irrigation channels, roads and highways nearby Transmission lines or substation.		
		Stockpiles should not be formed within such distances behind excavated or natural slopes that would reduce the stability of the slopes or cause slippage.				
		Measures shall be taken to prevent ponds of surface water and scouring of slopes.				
		Contractor should arrange to monitor and adjust working and adopt suitable measures to minimize soil erosion during the construction period.				
		Replant trees before the site is vacated and handed back to IESCO with appropriate trees (other vegetation cover as appropriate) to ensure interception of rainwater and the deceleration of surface run-off.				
9. Exploitation, Handling, Transportation and Storage of Construction Materials.	To minimize disruption and contamination of the surroundings, minimize and or avoid adverse environmental impacts arising from construction material exploitation, handling, transportation and storage by using sources that comply with EPA license	Use only appropriate sites for raw materials in order to minimize adverse environmental impacts.	Month prior to starting of works. Update monthly.	List of borrow areas to be prepared at tender stage contractors method statement and updated one month prior to construction. List of routes of transport of construction material is to be prepared for the contract and agreed one month prior to	Contractor and GSC to agree format of reporting.	E&SS, IESCO and E&SS SMEC.
		Material shall be appropriately secured to ensure safe passage to the destinations during transportation.				
		Materials shall not be loaded to a higher level than the side and tail boards and shall be covered with a good quality tarpaulin.				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
	conditions.	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 downstream flood plains and water bodies.		construction. Map of locations of storage is prepared by the contractor.		
		Machinery should be properly maintained to minimize oil spill.				
10. Construction Waste Disposal.	Minimize the impacts from the disposal of construction waste.	Waste management plan to be prepared by the contractor and the GSC and approved by IESCO E&SS	One month prior to starting of works. Update monthly One month prior to starting of works. Update monthly	A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for agreement (in Waste Management Plan). All Transmission line or substation sites.	Contractor, GSC and IESCO E&SS should supervise and take action to ensure that contractors complete relevant activities according to EIA / IEE / EMP requirement & NEQS.	E&SS, IESCO and E&SS SMEC.
		Estimating the amounts and types of construction waste to be generated by the subproject.				
		Investigating whether the waste can be reused in the project or by other interested parties without any residual environmental impact.				
		Identifying potential safe disposal sites close to the subproject.				
		Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites.				
		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 downstream flood plains, dams, lagoons or other water bodies.				
		Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations.				
		Oily wastes must not be burned. Disposal location to be agreed with local authorities.				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		Waste breaker insulating oil to be recycled, reconditioned, or reused at IESCO's facility.				
		Machinery should be properly maintained to minimize oil spill during the construction.				
		Machinery should be maintained in a dedicated area over drip trays to avoid soil contamination from residual oil spill during maintenance.				
		Solid waste should be disposed at an approved solid waste facility and not by open burning which is illegal and contrary to good environmental practice.				
11. Work Camp Operation and Location (if required).	To ensure that the operation of work camps does not adversely affect the surrounding environment and residents in the area.	Identify location of work camps in consultation with IESCO authorities. If possible, camps shall not be located near settlements or near drinking water supply intakes.	One month prior to starting of works Update Once a month	Location Map is prepared by the Contractor of Transmission lines or substation.	Contractor supervised by GSC or to actively supervise and enforce.	E&SS, IESCO and E&SS SMEC.
		Contractor will warn the staff strictly not to involve in any un-ethical activities and to respect the local norms and cultural restrictions particularly with reference to women				
		Complaints of the people regarding construction and labor must be taken seriously by the Contractor.				
		Drinking water should meet the NEQS and WHO Guidelines.				
		In case of same water source, contractor will note the water collection timings by community (particularly women) and will use the off time for water collection to meet campsite requirements. It is preferable that water should be collected after sunset, by the contractor from such water sources. Similarly, contractor will obey the local norms to minimize the issues related with				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		privacy of the women.				
		The contractor will ensure that the mobility of the local communities, particularly women and children, and their livestock is not hindered by the construction activities.				
		Cutting of trees shall not b permitted and removal of vegetation shall be minimized.				
		Water and sanitary facilities (at least pit latrines) shall be provided for employees. Worker camp and latrine sites to be backfilled and marked upon vacation of the sites.				
		Solid waste and sewage shall be managed according to the national and local regulations. As a rule, solid waste must not be dumped, buried or burned at or near the project site, but shall be disposed of to the nearest sanitary landfill or site having complied with the necessary permits of local authority.				
		The Contractor shall organize and maintain a waste segregation, collection and transport system.				
		At the end of the project, all debris and waste shall be removed.				
		All temporary structures, including office buildings, shelters and toilets shall be removed.				
		Exposed areas shall be planted with suitable vegetation.				
		IESCO and Construction Supervising Consultant shall inspect and report that the camp has been vacated and restored to pre-project conditions.				
12. Flora / Loss of Trees and	To avoid negative impacts due to	Clearing of green surface vegetation cover for construction, borrow of soil for	Route design and site identification during	Tree survey to be completed one	Contractor supervised by	E&SS, IESCO and E&SS

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
Vegetation Cover of the Areas for Towers and Temporary Work-space.	removing of landmark, sentinel and specimen trees as well as green vegetation and surface cover.	development, cutting trees and other important vegetation during construction should be minimized by careful alignment.	design stage and other matters during construction of relevant activities	month before tender at relevant Locations with a Map to be compiled prior to tender by the design consultant / IESCO E&SS during detailed design and GSC to update as necessary. All Transmission lines or substation sites.	GSC or to actively supervise and enforce.	SMEC.
		Written technical Justification for tree felling included in tree survey.				
		At completion of subproject, all debris and waste shall be removed and not burned.				
		The contractor's staff and labor will be strictly directed not to damage any vegetation such as trees or bushes outside immediate work areas.				
		Trees shall not be cut for fuel or timber works.				
		Land holders will be paid compensation for their standing trees in accordance with prevailing market rates (LARP).				
		The land holders will be allowed to salvage the wood of the affected trees.				
		Compensatory planting of three (3) suitable new trees outside the 30 meter corridor of the transmission line in lieu of one (1) tree removed, in line with best international practice.				
		Landscaping and road verges to be re-installed on completion.				
		After work completion, all temporary structures, including office buildings, shelters and toilets shall be removed.				
13. Fauna	To ensure the protection of animals and their habitat	Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor will strictly warn his labor accordingly.	During construction and operation phase	All subprojects all tranches.	Contractor supervised by E&SS, IESCO	E&SS, IESCO and E&SS SMEC.
		The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, wastes				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		of the camps will be properly disposed off to prevent the chances of eating by wild animals, which may become hazardous to them.				
		Staff working on the project should be given clear orders, not to shoot, snare or trap any bird.				
		Construction of cage box on conductors and place colorful/fluorescent tape on the Towers to prevent birds accidently hitting the TL and leading to injuries and death.				
14. Safety Precautions for the Workers.	To ensure safety of workers.	Providing induction safety training for all staff adequate warning signs in health and safety matters, and require the workers to use the provided personal protective equipment (PPE).	Prior to commencement and during construction	Subproject site and camp site of Transmission lines or substations.	Contractor supervised by GSC or to actively supervise and enforce.	E&SS, IESCO and E&SS SMEC.
		Contractor will ensure the provision of firefighting equipment at the campsite and working place.				
		Potential for spread of vector borne and communicable diseases from labor camps shall be avoided (worker awareness orientation and appropriate sanitation should be maintained).				
		Contractor will ensure the provision of first aid kits at the campsite and working place.				
15. Traffic Condition.	Minimize disturbance of vehicular traffic and pedestrians during haulage of construction materials and equipment.	Use of already existing access routes.	Prior to and throughout the construction.	The most important locations to be identified and listed. Traffic Management Plan to be prepared by the contractor. For Transmission	Contractor supervised by GSC or to actively supervise and enforce.	E&SS, IESCO and E&SS SMEC.
		Use of temporary route where required.				
		Routes in vicinity of schools and hospitals to be avoided as possible.				
		Providing and maintaining traffic management comprising; diversion warning, guiding and regulatory signage, channelizes and delineators, lightening etc.				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		Maximum allowable speed for heavy machinery on the site should not exceed than 20 km/ hr.		line or substation sites.		
16. Impact on Wetlands (if relevant).	To ensure that damage to river ecosystems and wetlands and its ecosystem is minimized during construction.	Erection of towers in the wetlands will be avoided as far as possible. However, at places where realignment of the distribution is unavoidable, towers with maximum span will be used to minimize the impacts.	Prior to and during Construction	Transmission line or substation locations should be identified on the site by the contractor and E&SS, IESCO.	Contractor supervised by GSC or to actively supervise and enforce.	E&SS, IESCO and E&SS SMEC.
		Avoid disposal of wash water, solid waste and discarded packing etc. on wetlands.				
		Piling up of loose material should be done in segregated areas to arrest washing out of soil.				
		In addition, these materials should not be tipped or stockpiled near wetlands.				
		Residual concrete from works should not be dumped close to wetlands.				
		Avoid temporary structures or stockpiling within banks of river and on wetlands.				
		Special measures will be adopted to minimize impacts on the wild birds, such as avoiding construction activities during the critical periods of breeding and feeding.				
		Staff working on the project should be given clear orders, not to shoot, snare or trap any bird (mandatory).				
		Schedule construction for April to July and September to November to avoid the monsoons and periods of mass migration of birds from Central Asia to the plains of Sindh and their return journey (December to March) or in vicinity of the migratory bird routes.				
		Contractor will prevent the workers from hunting and fishing for water birds and fish				

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
		resources etc.				
		Construction activities confined to small areas to minimize impacts and encourage migratory birds to settle as normal.				
17. Social Impacts.	To ensure minimum impacts from construction labor force on public health.	Potential for spread of vector borne and communicable diseases from labor camps shall be avoided.	Complaints of public to be solved as soon as possible	All subprojects all tranches.	Contractor supervised by GSC or to actively supervise and enforce.	E&SS, IESCO and E&SS SMEC.
		Contractor will warn the staff strictly not to involve in any un-ethical activities and to respect the local norms and cultural restrictions particularly with reference to women.				
		Food and fuel to be bought by contractor at local villages to boost local income.				
		Worker orientation and appropriate sanitation awareness session should be conduct.				
		Complaints of the people on construction nuisance / damage close to ROW to be considered and responded to promptly.				
		Contractor should make alternative arrangements to avoid local community impacts.				
OPERATIONAL STAGE						
1. Air Quality.	Minimize air quality impacts.	No significant Impacts.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.
2. Noise.	Minimize noise impacts.	No significant Impacts.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.
3. Waste Disposal.	Minimize improper waste disposal.	Continue waste management arrangements in operational phase of all subprojects and IESCO activities.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.
3. Compensatory Tree Planting.	Maintain survival of trees planted.	Employ landscaping contractor to monitor, water and feed replacement saplings and replace dead specimens as necessary.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.

Environmental Concern.	Objectives.	Mitigation Measures Recommended.	Timing to Implement.	Locations to Implement.	Responsibility for Implementation.	Responsibility for Monitoring.
4. Land Slides and Soil Erosion.	Avoid landslips and loss of productive land.	No significant Impacts.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.
5. Water Quality.	Minimize water quality impacts.	No significant Impacts.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.
6 Crops and Vegetation.	Monitor impacts from maintaining tree clearance under transmission lines.	Track growth of large trees under the conductors.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.
7. Social safety Impacts.	Ensure no encroachments / construction under the transmission line. No violation of clearance spaces.	Necessary signboards with limits of height clearances to be placed all along the line. Identify and prevent any illegal encroachments under the DGLs.	Operational phase	All subprojects in future tranches.	IESCO.	E&SS, IESCO.

APPENDIX – II (A)

SUMMARY ENVIRONMENTAL MONITORING PLAN (MATRIX)

No.	Environmental Monitoring Tasks[1]	Implementation Responsibility	Implementation Schedule
DESIGN PHASE			
1.1	Audit project bidding documents to ensure IEE and EMP is included.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.2	Monitor final site selection process and final alignment selection process and its environmental compliance with EMP.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.3	Review the implementation of the Land Acquisition Plan and expropriation, including considerations concerning vulnerable groups among land-owners, farmers, and farm workers.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.4	Monitor contractor's detailed project design to ensure relevant environmental mitigation measures in EMP have been included.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.5	Monitor the thorough implementation of detailed Environmental Guidelines for Construction Works, including procurement, management, works, closing operations.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.6	Review the management plan for construction materials and waste management.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.7	Audit detailed designs of facilities and installations to ensure standard environmental safeguards/ mitigation measures (as identified in EMP) have been included.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.8	Review landscape design plan, including compensatory planting.	E&SS, IESCO.	Prior to issue of bidding documents / contract award / start of work / crew mobilization.
1.9	Monitor the performance of environmental training and briefings and of the environmental awareness of project staff and IESCO.	E&SS, IESCO.	Continuous throughout the entire project period.
CONSTRUCTION PHASE			
2.1	Monthly monitoring and quarterly reporting (or as per the contract agreement) of contractor's compliance with	E&SS, IESCO.	Continuous throughout construction period.

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

No.	Environmental Monitoring Tasks[1]	Implementation Responsibility	Implementation Schedule
	contractual environmental mitigation measures.		
2.2	Monitoring of the implementation of the Landscape Design Plan.	E&SS, IESCO.	During the last phase of construction works.
2.3	Commissioning phase monitoring of as built equipment versus environmental performance criteria.	E&SS, IESCO.	At commissioning.
OPERATION AND MAINTENANCE PHASE			
3.1	Observations during routine maintenance inspections of facilities and distribution lines ROWs.	E&SS, IESCO.	As per IESCO inspection schedules / SOPs.
3.2	Inspections will include monitoring implementation of operational mitigation measures versus environmental criteria specified in EMP, waste management and operational noise.	E&SS, IESCO.	As per IESCO inspection schedules / SOPs.
3.3	Monitoring of the implementation of the Landscape Design Plan.	E&SS, IESCO.	Twice per year for three years of operation.
3.4	Monitoring decommissioning of other plant required for installation of MFF funded components and waste disposal.	E&SS, IESCO.	During the life of the project.

LARP = Land Acquisition and Resettlement Plan. **AP** = Affected Persons. **LAC** = Local Authority Council.
TD = Temporary Drainage. **EC** = Erosion Control. **WM** = Waste Management.
GSC = Construction Supervision Consultant or Equivalent. **TXL** = Transmission Line. **GSS** = Grid substation.
NEQS = National Environmental Quality Standards

Note:
DDS = Detailed Design Stage. Based on EIA/IEE reports to be revised at DDS, RAP, SIA and other engineering considerations may change.
EIA = Environmental Impact ASSESSMENT.
EMP = Environmental Management Plan,
EPA = Environmental Protection Agency,
TD = Temporary Drainage.
EC = Erosion Control.
NGO = Non-Government Organization
ADB * = ADB checks that processes have been completed and signed off by DISCO before moving to construction stage.

APPENDIX – II (B)

MONITORING PLAN FOR PERFORMANCE INDICATORS

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
DESIGN / PRE - CONSTRUCTION STAGE								
1. Review of Environmental Monitoring Action Plan (EMAP).	Environmental Management Action Plan (EMAP) is reviewed	During detailed design (later monthly by Contractor to cover any unidentified impacts)	By completion of detailed design.	Substation & Transmission Line sites.	Contractor	Initially DISCO'S Cell / later Contractor cost	E&SS, IESCO / ADB*	E&SS staff cost.
2. Social Impacts and Resettlement.	Inventory of losses, Property acquisition, compensation and resettlement completed to RP requirements.	Completed prior to commencement of construction	Before removal of houses and structures.	APs according to RP & LAFC. Substation & Transmission Line sites.	DISCO'S Cell	DISCO'S Cell staff cost	E&SS, IESCO / ADB*	E&SS staff cost.
3. Project Disclosure.	Design changes notified	During detailed design by Contractor to cover any access roads and alignment changes, additional Villages.	Completion of detailed design.	Substation & Transmission Line sites.	Contractor	Contractor cost	E&SS, IESCO / ADB*	E&SS staff cost.
4. Environmentally Responsible Procurement. (ERP).	Contract follows ADB Guidelines on ERP. Contractual clauses include implementation of environmental mitigation measures tied with contract agreement.	Once, before Contract is signed.	Before Contract is signed.	Method Statements include resources for mitigation measures.	DISCO'S Project Cell.	Contractor cost	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.
5. Waste Disposal.	Disposal options for all waste transformer oil, residual contaminated soils, scrap metal agreed with DISCO'S and local authority.	Monthly or as required in waste management plan.	Prior to detailed design stage no later than pre-qualification or tender	Locations approved by local waste disposal authorities.	DISCO'S cell with the design consultant.	E&SS	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
			negotiations Include in contract.	Substation & Transmission Line sites.				
6. Noise and Air Quality Mitigation in design.	Design changes included in EMP & EMAP approved by MOEST.	During detailed design by Contractor.	Completion of detailed design.	As defined in EMP (supplementary) & EMAP. Substation & Transmission Line sites.	DISCO'S Cell / Contractor	Contractor cost	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.
7. Hydrological Impacts.	Temporary Drainage Management plan.	During detailed design by Contractor and monthly to cover any unidentified impacts	One month before commencement of construction	Considered locations of Substation & Transmission Line sites to be as identified in the Detailed Drainage Report.	Contractor	Contractor cost	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.
8. Temporary drainage and erosion control.	Erosion Control and Temporary Drainage completed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	All stream and river crossings and where slopes indicate erosion will be a problem nearby Substation & Transmission Line sites.	Contractor.	Contractor cost	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.
9. Planning construction	Use of land agreed with IESCO Authority.	During detailed design updated by	One month before	Locations agreed	Contractor DISCO'S Cell	Contractor cost	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
camps.		Contractor monthly to cover any unidentified impacts.	construction commences.	DISCO'S cell in consultation with community and the Contractor.	facilitates.			
10. Traffic Condition.	Temporary Pedestrian and Traffic Management Plan agreed.	During detailed design updated by Contractor monthly to cover any unidentified impacts.	One month before construction commences.	Locations agreed with DISCO'S cell in consultation with community and the Contractor.	Contractor	Contractor cost	E&SS, IESCO / ADB*	DISCO'S Cell staff cost.
11. Institutional strengthening and capacity building.	Train DISCO'S Cell officials.	Once and ongoing	As soon as practicable No later than one month before Contract award.	Throughout the project	DISCO'S Project Cell.	DISCO'S Cell staff cost	E&SS, IESCO / ADB*	ADB cost of IES & support for 1 month **US$25,000**
CONSTRUCTION STAGE								
1. Orientation for Contractor, and Workers.	Contractor agreed to provide training to professional staff and workers. Special briefing and training for Contractor completed. Periodic progress review sessions.	Once Ongoing Ongoing	Before contract is signed Before construction areas are opened up Every six months	All BOT staff members in all categories. monthly induction and six month refresher course	Contractor with E&SS assistance and record details.	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
2. Plans to control environmental	Drainage Management plan. Erosion Control & Temp. Drainage plan	Deliverable in final form to DISCO'S cell one month	One month before construction	All substation & Transmission	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
impacts.	Temp. Pedestrian & Traffic Management plan.	before construction commences for any given stretch.	commences.	Line sites.				
	Emergency Response Plan							
	Materials Management plan.							
	Waste Management plan.							
	Noise and Dust Control plan.							
	Safety Plan.							
	Agreed schedule of costs for environmental mitigation. {N.B. Forest Clearance and Compensatory Planting plan is prepared by DISCO'S cell}.							
3. Water quality.	Meaningful water quality monitoring up and downstream during construction within 100m of rivers. Rapid reporting and feedback by DISCO'S.	Once (line item when opening up construction near water bodies).	During detailed design by Contractor and update to cover any unidentified impacts.	Locations of all substation & Transmission Line sites to be provided with the detailed designs including all bridges during construction within 100m of rivers.	Independent experienced laboratory.	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
4. Water Resources.	Availability of water acceptable to community and no complaints.	Monthly	Prior to submission of progress reports.	All local water supply resources and rivers.	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
5. Spoil disposal and construction	Use of land agreed with IESCO Authority.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All substation & Transmission	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
	Waste Management Plan							

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
waste disposal.	implemented.			Line sites.				
	No open burning.							
6. Noise.	Noise mitigation measures implemented in line with guidelines for noise reduction from ISO/TR11688-1:1995(E) / NEQS.	Monthly (line item when opening up construction).	Maximum allowable noise levels are 70dB (A) L_{EQ}.	All substation & Transmission Line sites.	Contractor should maintain the accepted standards	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
7. Air quality.	Dust control plan implemented.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All substation & Transmission Line sites.	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
8. Soil Contamination.	Contractor's workforce to be instructed and trained in handling of chemicals.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All substation & Transmission Line sites..	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
9. Work Camp Location and Operation.	Use of land agreed with IESCO Authority.	Monthly (line item when opening up construction).	Prior to construction. Update monthly.	All substation & Transmission Line sites.	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
	Waste Management Plan implemented.							
	No open burning.							
10. Safety Precautions for Workers.	Emergency Response Plan / Safety Plan implemented.	Once (update monthly as necessary)	One month before construction and update quarterly.	All substation & Transmission Line sites.	Contractor.	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
11. Social Impacts.	Local labor is used as workforce.	Monthly (line item when opening up construction).	During construction. Update monthly.	All substation & Transmission Line sites.	Contractor	Contractor cost	GSC / E&SS, IESCO.	DISCO'S Cell staff cost.
	Local educated people for office work.							
	Complaints on construction nuisance damages close to ROW are responded to promptly by the Contractor.							
	Close liaison established with locals for the purposes to							

Environmental Concern	Performance Indicator (PI)	Frequency to Monitor	Timing to Check PI	Locations to Implement PI	Responsible to Implement PI	Cost of Implementation	Responsibility PI Supervision	Cost of Supervision
	monitor complaints.							
OPERATIONAL STAGE								
1. Air Quality.	Roadworthiness of vehicles Monitor NO_2 and PM10 as indicators.	Roadworthiness of vehicles on DISCO'S daily use during operations Yearly intervals for 3 years after opening for reassurance.	During operation.	All substation & Transmission Line sites.	GSO	Contractor cost	GSC, GSO / E&SS, IESCO.	DISCO'S Cell staff cost.
2. Crops and vegetation.	Follow up on Tree Clearance and Compensatory Planting Plan. Records on survival of planted trees. The compensatory planting maintained Audited report by E&SS for onsite and off-site compensatory planting.	Quarterly	Throughout project Each of three years after initial planting. Continuous for three years after project completion For four years after initial clearance of the forest.	All substation & Transmission Line sites.	GSO	E&SS	GSC, GSO / E&SS, IESCO.	DISCO'S Cell staff cost.

Note:

LAFC = Land Acquisition Compensation Fixation Committee.
DDS = DETAILED Design Stage.,
EIA = Environmental Impact Assessment.
EMP = Environnemental Management Plan
EPA = Environnemental Protection Agency.
TD = Temporary Drainage.
EC = Erosion Control.
NGO = Non-Government Organization.
ADB * = ADB checks that processes have been completed and signed off by DISCO'S before moving to construction stage.

APPENDIX – II (C)

MONITORING PLAN

1. IESCO has established the Environment and Social Safeguard Section (E&SS) in the project management unit manned by three professionals and support staff. The DISCO/IESCO's instructional arrangement with respect to social and environmental monitoring and implementation is presented as follows:

INSTITUTIONAL ARRANGEMENTS

2. The institutional arrangements of planning and management of the Power Distribution Enhancement Program (or the ADB-funded Power Distribution Enhancement MFF Project) are described as follows (see also **figure 8.1**):

Pakistan Electric Power Company (PEPCO)

3. The Project Management Unit (PMU), PEPCO is the focal organization based in Lahore responsible for the Power Distribution Enhancement Program, for keeping liaison with the Government of Pakistan and Asian Development Bank (ADB) on behalf of all the DISCOs, and taking care of disbursement of funds (including ADB loan) and technical assistance through Consultants, and coordination of the Program planning and management activities of the DISCOs.

Distribution Companies (DISCOs)

4. The DISCOs included in the ADB-funded MFF Project (the Program) are:
   (i) PESCO: Peshawar Electric Supply Company, Peshawar, Khyber Phakhtun-khwah;
   (ii) IESCO: Islamabad Electric Supply Company, Islamabad;
   (iii) GEPCO: Gujranwala Electric Power Company, Gujranwala, Punjab;
   (iv) LESCO: Lahore Electric Supply Company, Lahore, Punjab;
   (v) FESCO: Faisalabad Electric Supply Company, Faisalabad, Punjab;
   (vi) MEPCO: Multan Electric Power Company, Multan, Punjab;
   (vii) QESCO: Quetta Electric Supply Company, Quetta, Baluchistan; and,
   (viii) HESCO: Hyderabad Electric Supply Company, Hyderabad, Sindh.

Technical Assistance (Consultants)

5. PMU, PEPCO provides technical assistance to all the eight DISCOs through the following Consultants, based in Lahore:
   (1) PPTA: Project Preparation Technical Assistance was hired by PEPCO in 2007 and since then it has so far assisted the DISCOs in preparing Tranche 1, 2, 3 & 4 Subprojects. The PPTA Resettlement Experts have thus far assisted the DISCOs in the preparation of LARPs and DDRs for the Subprojects included in Tranches 1 and 2.
   (2) PIC: Project Implementation Consultant is hired and mobilized by PEPCO since 2009, to provide technical assistance to DISCOs in updating and implementation of the approved Subprojects. The PIC Resettlement Experts will assist the DISCOs in updating, revision and implementation of the LARPs and DDRs.
   (3) EMC: External Monitoring and Evaluation Consultant (FMC, SMEC) is hired and mobilized by PEPCO since 2009, to independently

monitor and evaluate the implementation of approved LARPs of all Tranches / Subprojects of all the DISCOs, and report directly to ADB with copy to the respective DISCOs.

Distribution Companies (DISCOs)

6. DISCO as the implementing agency (IA) bears the overall responsibility for the preparation, implementation and financing of all tasks set out in this IEE, as well as inter-agency coordination required for the implementation of the Subprojects. As such, it takes care of the preparation/updating and implementation of the IEEs, short RPs and DDRs, and internal monitoring and evaluation activities. Institutionally, IESCO has three functional directorates, namely, Technical Services Wing (TSW), Project Management Unit (PMU) and Grid System Construction (GSC).

Technical Services Wing (TSW)

7. The TSW is responsible for identification of projects, preparation of PC-1s, load flow studies and feeder analysis. This directorate is also responsible for approval of designs of grid stations and transmission lines.

Project Management Unit (PMU)/ Office of Chief Engineer Development

8. The PMU, Office of Chief Engineer Development (CED), is responsible for the overall planning, management and coordination of the approved Subprojects. The PMU is also responsible to maintain close liaison with all stakeholders including government agencies, Ministry of Water & Power (MoWP), Ministry of Planning Development & Reforms, Economic Affair Division (EAD) of Ministry of Finance, PEPCO, EPA's, ADB and contractors' for approval and smooth execution of development projects. The CED is currently being assisted by the PPTA Consultants in preparing the identified subprojects in line with the ADB Policies, and obtaining approval from the donor ADB. Its major functions include keeping regular liaison with ADB and relevant departments of the federal, provincial and district governments, preparation, updating and implementation of the EMPs and short RPs and the related monitoring and evaluation activities.

9. The PMU contains a specially created cell to take care of the safeguards related activities, namely, the Environment and Social Safeguard Section (E&SS), headed by a Deputy Manager (E&SS), and assisted by two Assistant Managers, Environment and Social Impact, respectively. The Assistant Manager (Environment) is responsible for the preparation/updating, implementation and internal monitoring of the subproject IEE.

10. To support the E&SS, to carry out its responsibilities, Project Implementation Consultant (IC) are hired by PEPCO who also have environmental and social experts to assist IESCO in revising and updating the IEE as and when required, and then in implementation of the EMP and IEE.

Grid System Construction (GSC) Directorate

11. The Grid System Construction (GSC) Directorate is responsible for implementing the approved Subprojects, including construction/improvement of grid stations and transmission lines. This office is headed by the Project Director (GSC). The PD GSC through its sub-

divisional officers will take care of field execution of EMP by the contractor. The GSC directorate is provided technical assistance by the environment and social experts of E&SS PMU and PIC teams.

Responsibility for Internal and External Monitoring

12. The implementation of EMP will be subjected to both internal and external monitoring. Internal monitoring will be conducted by the environmental expert of E&SS unit PMU, assisted by GSC's field team. The external monitoring responsibilities will be carried out by External Monitoring Consultant (FMC, SMEC) engaged by PMU, PEPCO.

Environmental Monitoring

13. The environment monitoring relates to identified environmental issues of design, construction and commissioning phases of the sub-projects according to the relevant reports already prepared and approved by DISCO'S/ADB.

(A) Design Phase

14. Monitor final site selection process and final alignment selection process and its environmental compliance with EMP. Review the implementation of the land acquisition plan and expropriation, including considerations concerning vulnerable groups among land-owners, farmers, and farm workers. Monitor contractor's detailed project design to ensure relevant environmental mitigation measures in EMP have been included. Monitor the detailed environmental guidelines for construction works, including procurement, management, works, closing operations etc in the light of IEE and EMP. Review the management plan for mineral construction materials and waste management. Audit detailed designs of facilities and installations to ensure standard environmental safeguards/ mitigation measures (as identified in EMP) have been included.

15. Review landscape design plan, including compensatory planting. Monitor the performance of environmental training and briefings for the creation of environmental awareness of project staff and DISCO'S.

(B) Construction Phase

16. Regular monitoring and reporting of contractor's compliance with contractual ENVIRONMENTAL mitigation measures in light of IEE and EMP. Monitoring of the implementation of the landscape design plan.

(C) Operation and Maintenance Phase

17. The operation phase will include monitoring of routine maintenance of facilities and transmission line in light of mitigation measures specified in this IEE and EMP and monitoring of the implementation of the landscape design plan.

Project Monitoring Activities during the Project Cycle:

18. The Activities at various stages of the project cycle have been summarized and presented in Table below:

Table A - 1: Monitoring Program for Tranche IV Saving Subproject

	Monitoring Parameter	Monitoring Locations	Timing	Responsibility
DESIGN PHASE				
1.	Audit project bidding documents to ensure IEE and EMP is included.	-	Prior to issue of biding documents.	DISCO'S through PIC
2.	Monitor that the selection process and final alignment selection process and its environmental compliance with EMP.	-	Prior to DISCO'S approval of contractor's detail alignment survey.	DISCO'S with the assistance of and external environmental consultants.
3.	Monitor contractor's detail project design to ensure relevant environmental mitigation measures in EMP have been included.	-	Prior to approval of contractor's detail alignment survey.	DISCO'S with the assistance of project implementation unit.
4.	Monitor through implementation of detail environmental guidelines for construction works including procurement management, works and closing operation.	-	Prior to DISCO'S approval of contractor's detail design.	DISCO'S with the assistance of PIC
5.	Review the mineral, construction materials and waste management.	-	Prior approval of contractor's detail design.	DISCO'S with the assistance PIC
6.	Audit detail design of facilities and installation to ensure standard.	-	Prior to approval of contractor's detail design.	DISCO'S with the assistance of project implementation unit.
CONSTRUCTION PHASE				
1	Observation of soil erosion.	Construction sites, campsites.	During routine monitoring.	PMU
2	Water quality.	At wells and surface water bodies near grid station and construction campsites.	Before mobilization.	Contractor/PMU
		Selected local wells.	Monthly or as per contract agreement.	Contractor/PMU
		Selected locations at nearby surface water bodies.	Monthly or as per contract agreement.	Contractor/PMU
3	Water consumption.	Construction sites, campsite	Daily.	Contractor/PMU
4	Checks for any damage to water course, groundwater wells.	Construction sites.	During routine monitoring.	PMU
5	Ambient air quality.	Construction sites, campsites.	Before mobilization	Contractor/PMU
		Construction sites, campsites.	Once every two months or as per contract agreement.	Contractor/PMU
6	Checks for exhaust emissions	Construction sites,	During routine monitoring.	Contractor/PMU

	Monitoring Parameter	Monitoring Locations	Timing	Responsibility
	Checks for dust emissions.	campsites.		
		Construction sites, campsites, project roads.	During routine monitoring.	Contractor/PMU
7	Noise.	At nearby communities.	During the construction activities causing noise.	Contractor/PMU
8	Public concerns.	At nearby communities.	Throughout the field activities.	PMU
OPERATIONAL PHASE				
1	Compensatory tree planting.	Selected sites for plantation of trees.	After construction phase.	E&SS – IESCO.
2	Crops and vegetation.	Land under the transmission line.	During routine maintenance.	E&SS – IESCO.
3	Social safety Impacts.	Population along transmission line.	During routine maintenance.	E&SS – IESCO.

Complete record of sampling and analysis should be maintained and documented.
PMU = Project Monitoring Unit,
DISCO'S = Distribution Companies

Summary of Estimated Costs for EMP

19. The cost estimates for implementation environment management plans and environment monitoring plans of Tranche-IV savings sub-projects is reflected as that of previous tranches costs and reproduced below:

Table A - 2: Estimated Implementation Cost of EMPs for Tranche IV saving subproject

		Pak. Rs.	***US $***
Staffing, audit and monitoring	1 person for 3 years	1,800,000[1]	17,208
Monitoring activities	As detailed under EMP	7,000,000[2]	66,922
Mitigation measures	As prescribed under EMP and IEE	10,000,000[3]	95,602
Transport	1 dedicated vehicle 3 years	1,502,250[4]	14,362
Contingency	3% contingency	609,000	5,822
Total		**20,912,250**	***199,926***

I US$ = 104.60 Pak. Rupees as of 15.02.2017

[1] @ P.Rs. 50,000/month:

[2] Laboratory charges for: testing of construction materials; water quality teats; ambient air tests; emissions measurements; and noise measurements.

[3] Includes: Compensatory tree plantation under; and training of counterpart staff.

[4] @ P.Rs. 25000 per month rental charges and Rs. 550.0 per day fuel and operating cost.

APPENDIX – III

LIST OF PARTICIPANTS MET DURING PUBLIC CONSULTATION

No.	Participant's Name	Participant Profession	Address	CNIC / Contact No.	Date
1.	Mr. Mian Faiz Ahmed Tamman.	MNA.	Tamman.	–	2009
2.	Mr. Sardar Riaz.	MPA.	Tamman.	–	2009
3.	Mr. Muhammad Skandar Ali.	Nazim UC.	Tamman.	–	2009
4.	Mr. Malik Tariq.	Ex – GM WAPDA.	Tamman.	–	2009
5.	Mr. Usman khan.	IESCO's Surveyor.	Tamman.	–	2009
6.	Mr. Haji Muhammad Yaquab.	Shopkeeper .	Tamman.	–	2009
7.	Mr. Qadir Ahmed.	SDO.	Tamman.	–	2009
8.	Mr. Islam Niazi.	Grid Station Officer.	Tamman.	–	2009
9.	Mr. Muhammad Ramzan.	Shopkeeper .	Tamman.	–	2009
10.	Mr. Fayyaz Khan.	Farmer .	Tamman.	–	2009
11.	Mr. Imtiaz Khan.	Farmer.	Tamman.	–	2009
12.	Mr. Farman Ali.	Social Worker.	Tamman.	–	2009
13.	Mr. Malik Haq Nawaz.	Ex. Govt. Officer.	Tamman.	0303 – 913 9039	2017
14.	Mr. Haji Muhammad Nawaz.	Ex UC Nazim.	Tamman.	0302 – 560 3960	2017
15.	Mr. Malik Muhammad Afzal.	Ex. UC Chairman.	Tamman.	0300 – 834 0328	2017
16.	Mr. Yasir Aziz.	Chairman UC Multan.	Tamman.	0333 – 196 8368	2017
17.	Mr. Abdullah.	Ex. Councilor.	Tamman.	0301 – 588 5588	2017
18.	Mr. Allah Yar Khan.	Vice Chairman.	Tamman.	0303 – 547 7965	2017
19.	Mr. Ghazi Abdullah.	Landowner.	Tamman.	0302 – 570 2764	2017
20.	Mr. Abdul Majid.	Landowner.	Tamman.	0302 – 570 1855	2017
21.	Mr. Muhammad IjazTamman.	Landowner.	Tamman.	0300 – 980 1611	2017
22.	Mr. Mansib Khan.	Landowner.	Tamman.	0302 – 570 3159	2017
23.	Mr. Tariq Saeed.	Landowner.	Tamman.	0300 – 593 4655	2017
24.	Mr. Ghulam Jillani Multan.	Landowner.	Tamman.	0336 – 765 6183	2017
25.	Mr. Malik Wangi Khan.	Landowner.	Tamman.	0333 – 315 1094	2017
26.	Mr. Khalid Mehmood Tamman.	Landowner.	Tamman.	0333 – 282 8555	2017
27.	Mr. Muhammad Akbar Kurtian.	Social Worker.	Tamman.	0300 – 256 3104	2017
28.	Mr. Imtaz Khan Tamman.	Social Worker.	Tamman.	0300 – 448 4360	2017
29.	Mr. Akram Khan Awan.	Social Worker.	Tamman.	0302 – 570 1923	2017
30.	Mr. Liaquat Ali Khan.	Social Worker.	Tamman.	0302 – 570 5627	2017
31.	Mr. Hyat Muhammad.	Social Worker.	Tamman.	0302 – 570 4145	2017
32.	Mr. Zafar Iqbal.	Social Worker.	Tamman.	0300 – 976 3131	2017
33.	Mr. Arshad Khan.	Councilor UC Tamman.	Tamman.	0306 – 540 3045	2017
34.	Mr. Ahmed Sher.	General Councilor.	Tamman.	0300 – 569 0555	2017
35.	Mr. Saadat Ali Shah.	Social Worker.	Tamman.	0336 – 540 9917	2017
36.	Mr. Shaukat Hyat.	Social Worker.	Tamman.	0300 – 547 9534	2017
37.	Mr. Malik Fateh Khan.	Landowner.	Tamman.	0300 – 570 4190	2017
38.	Mr. Malik Muhammad Fayyaz.	Landowner.	Tamman.	0306 – 484 4085	2017
39.	Mr. Malik Muhammad Irfan	S.D.O.	Tamman.	0340 – 888 1054.	2017
40.	Mr. Muhammad Kamran Khan.	X.E.N	Talagang.	0340 – 888 1049	2017

APPENDIX – IV

PHOTOGRAPHS

Tamman Grid Station site on eisting Tamman – Mial Road.

Existing Status of Tamman Grid Station yard and allied equipments.

Existing 66 kV T/L Network from Talagang to Tamman.

Proposed site for incoming T/L from Lakarmar Grid Station.

Floral Resources in Tamman.

Faunal Resources in Tamman.

Public Consultation in Tamman Grid Station with staff (2009).

Public Consultation in Tamman town with locals (2009).

Public Consultation in Tamman town with locals (2017).

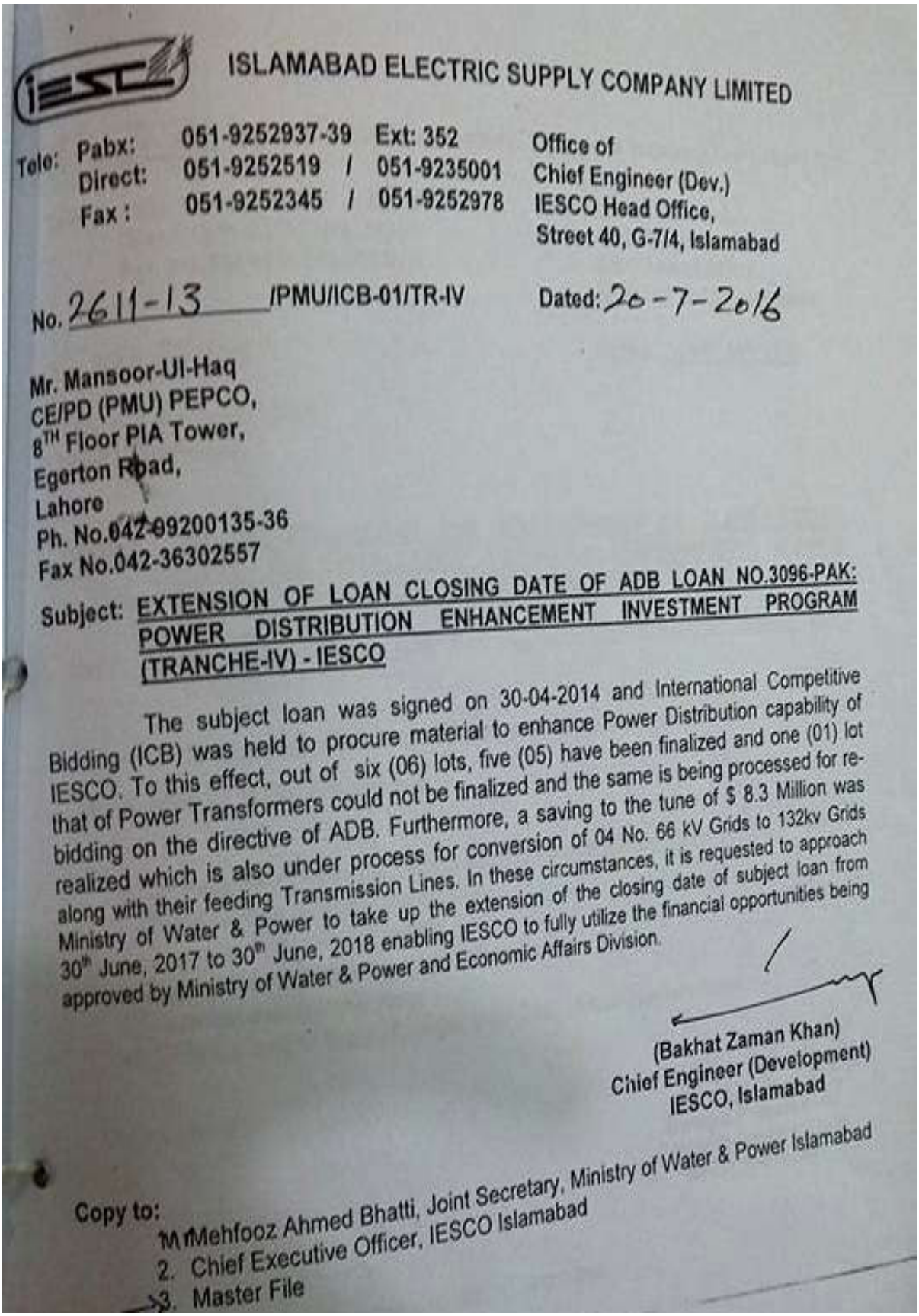
Public Consultation in Tamman town with locals (2017).

Public Consultation in Tamman town with locals (2017).

Public Consultation in Tamman town with locals (2017).

APPENDIX – V

IESCO'S REQUEST FOR EXTENSION IN LOAN CLOSING DATE



ISLAMABAD ELECTRIC SUPPLY COMPANY LIMITED

Tele: Pabx: 051-9252937-39 Ext: 352
Direct: 051-9252519 / 051-9235001
Fax: 051-9252345 / 051-9252978

Office of
Chief Engineer (Dev.)
IESCO Head Office,
Street 40, G-7/4, Islamabad

No. 2611-13 /PMU/ICB-01/TR-IV Dated: 20-7-2016

Mr. Mansoor-Ul-Haq
CE/PD (PMU) PEPCO,
8TH Floor PIA Tower,
Egerton Road,
Lahore
Ph. No.042-99200135-36
Fax No.042-36302557

Subject: EXTENSION OF LOAN CLOSING DATE OF ADB LOAN NO.3096-PAK: POWER DISTRIBUTION ENHANCEMENT INVESTMENT PROGRAM (TRANCHE-IV) - IESCO

The subject loan was signed on 30-04-2014 and International Competitive Bidding (ICB) was held to procure material to enhance Power Distribution capability of IESCO. To this effect, out of six (06) lots, five (05) have been finalized and one (01) lot that of Power Transformers could not be finalized and the same is being processed for re-bidding on the directive of ADB. Furthermore, a saving to the tune of $ 8.3 Million was realized which is also under process for conversion of 04 No. 66 kV Grids to 132kv Grids along with their feeding Transmission Lines. In these circumstances, it is requested to approach Ministry of Water & Power to take up the extension of the closing date of subject loan from 30th June, 2017 to 30th June, 2018 enabling IESCO to fully utilize the financial opportunities being approved by Ministry of Water & Power and Economic Affairs Division.

(Bakhat Zaman Khan)
Chief Engineer (Development)
IESCO, Islamabad

Copy to:
1. Mehfooz Ahmed Bhatti, Joint Secretary, Ministry of Water & Power Islamabad
2. Chief Executive Officer, IESCO Islamabad
3. Master File

APPENDIX – VI

NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS) – 2010

REGISTERED No. M - 302 / L.-7646

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, FRIDAY, NOVEMBER 26, 2010

PART II

Statutory Notifications (S. R. O.)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT

NOTIFICATIONS

Islamabad, the 18th October, 2010

S. R. O. 1062(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (I) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Ambient Air.

National Environmental Quality Standards for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air: Effective from 1st July, 2010	Concentration in Ambient Air: Effective from 1st January 2013	Method of measurement
Sulphur Dioxide (SO_2)	Annual Average*	80 µg/m³	80 µg/m³	-Ultraviolet Fluorescence method
	24 hours**	120 µg/m³	120 µg/m³	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m³	40 µg/m³	- Gas Phase Chemiluminescence
	24 hours**	40 µg/m³	40 µg/m³	

Pollutants	Time-weighted average	Concentration in Ambient Air: Effective from 1st July, 2010	Concentration in Ambient Air: Effective from 1st January 2013	Method of measurement
Oxides of Nitrogen as (NO_x)	Annual Average*	40 µg/m³	40 µg/m³	- Gas Phase Chemiluminescence
	24 hours**	80 µg/m³	80 µg/m³	
O_3	1 hour	180 µg/m³	130 µg/m³	-Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m³	360 µg/m³	- High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	24 hours**	550 µg/m³	500 µg/m³	
Respirable Particulate Matter, PM_{10}	Annual Average*	200 µg/m³	120 µg/m³	-β Ray absorption method
	24 hours**	250 µg/m³	150 µg/m³	
Respirable Particulate Matter, $PM_{2.5}$	Annual Average*	25 µg/m³	15 µg/m³	-β Ray absorption method
	24 hours**	40 µg/m³	35 µg/m³	
	1 hour	25 µg/m³	15 µg/m³	
Lead Pb	Annual Average*	1.5 µg/m³	1 µg/m³	- ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 µg/m³	1.5 µg/m³	
Carbon Monoxide (CO)	8 hours**	5 mg/m³	5 mg/m³	- Non Dispersive Infra Red (NDIR) method
	1 hour	10 mg/m³	10 mg/m³	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

** 24 hourly /8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.

S. R. O. 1063(I)/2010.— In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Standards for Drinking Water Quality.

National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Bacterial			
All water intended for drinking (e.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E. coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12 month period.	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	⟨ 5 NTU	⟨ 5 NTU	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	⟨ 5 NTU	⟨ 5 NTU	
Total hardness as $CaCO_3$	< 500 mg/l	---	
TDS	⟨ 1000	⟨ 1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	***mg/Litre***	***mg/Litre***	
Aluminium (Al) mg/l	≤ 0.2	0.2	

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Antimony (Sb)	≤ 0.005 (P)	0.02	
Arsenic (As)	≤ 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	***mg/Litre***	***mg/Litre***	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to Asian developing countries
Fluoride (F)*	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	
Nitrate (NO_3)*	≤ 50	50	
Nitrite (NO_2)*	≤ 3 (P)	3	
Selenium (Se)	0.01(P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	—	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries

* indicates priority health related inorganic constituents which need regular monitoring.

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Organic			
Pesticides mg/L		PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20- 58 may be consulted.***	Annex II
Phenolic compounds (as Phenols) mg/L		≤ 0.002	
Polynuclear aromatic hydrocarbons (as PAH) g/L		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

*** PSQCA: Pakistan Standards Quality Control Authority.

Proviso:

The existing drinking water treatment infrastructure is not adequate to comply with WHO guidelines. The Arsenic concentrations in South Punjab and in some parts of Sindh have been found high then Revised WHO guidelines. It will take some time to control arsenic through treatment process. Lead concentration in the proposed standards is higher than WHO Guidelines. As the piping system for supply of drinking water in urban centres are generally old and will take significant resources and time to get them replaced. In the recent past, Lead was completely phased out from petroleum products to cut down Lead entering into environment. These steps will enable to achieve WHO guidelines for Arsenic, Lead, Cadmium and Zinc. However, for bottled water, WHO limits for Arsenic, Lead, Cadmium and Zinc will be applicable and PSQCA Standards for all the remaining parameters.

S. R. O. 1064(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Noise.

National Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1st July, 2010		Effective from 1st July, 2012	
		Limit in dB(A) Leq *			
		Day Time	Night Time	Day Time	Night Time
1.	Residential area (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence Zone (D)	55	45	50	45

Note: 1. Day time hours: 6.00 a. m to 10.00 p. m.

2. Night time hours: 10.00 p. m. to 6.00 a.m.

3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.

4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

*dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

[No. F. I(12)/2010-11-General.]

MUHAMMAD KHALIL AWAN,
Section Officer (PEPC).

APPENDIX – VI (A)

COMPARISON OF NEQS- PAK WITH INTERNATIONAL STANDARDS (AIR QUALITY)

Pollutants	USEPA		WHO		World Bank		Pak NEQS	
	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
SO_2	24 hrs	365 ug/m^3 (140 ppb)	24 hrs	90 ug/m^3 (34 ppb)	Annual Mean	100 ug/m^3 (38 ppb)	Annual Mean	80 ug/m^3
			1 hr	350 ug/m^3	24 hrs	500 ug/m^3	24 hrs	120 ug/m^3
CO	8 hrs	35 mg/m^3 (10 ppm)	8 hrs	10 mg/m^3 (8.7 ppm)	-	-	8 hrs	5 mg/m^3
	1 hr	40 mg/m^3					1 hr	10 mg/m^3
NO_2	Annual Mean	100 ug/m^3 (53 ppb)	1 hr	190-320 ug/m^3	Annual Mean	100 ug/m^3 (50 ppb)	Annual Mean	40 ug/m^3
							24 hrs	80 ug/m^3
O_3	1 hr	235 ug/m^3	8 hrs	120 ug/m^3	-	-	1 hr	120 ug/m^3
			1 hr	200 ug/m^3				
TSP	24 hrs	260 ug/m^3	24 hrs	150-230 ug/m^3	Annual Mean	100 ug/m^3	Annual Mean	360 ug/m^3
					24 hrs	500 ug/m^3	24 hrs	500 ug/m^3
PM_{10}	24 hrs	150 ug/m^3	-	-	-	-	Annual Mean	120 ug/m^3
							24 hrs	150 ug/m^3
$PM_{2.5}$							Annual Average	15 ug/m^3
							24 hrs	35 ug/m^3
							1 hr	15 ug/m^3

APPENDIX – VI (B)

COMPARISON OF NEQS- PAK WITH INTERNATIONAL STANDARDS (NOISE LEVEL)

Category of Area /Zone	Limit in dB(A) Leq			
	NEQS		World Bank/IFC	
	Day Time	Night Time	Day Time	Night Time
Residential area (A)	55	45	55	45
Commercial area (B)	65	55	70	70
Industrial area (C)	75	65	70	70
Silence zone (D)	50	45	55	45

APPENDIX – VII

TYPICAL BUNDS FOR TRANSFORMERS