

QUETTA ELECTRIC SUPPLY COMPANY



INITIAL ENVIRONMENTAL EXAMINATION

(Final)

FOR

AUGMENTATION & EXTENSION OF POWER TRANSFORMER SUBPROJECTS

POWER DISTRIBUTION ENHANCEMENT PROJECT (TRANCHE-IV)

**UNDER
ASIAN DEVELOPMENT BANK FINANCING**

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(FINAL)

Prepared By

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Abbreviations

ADB	Asian Development Bank
COI	Corridor of Influence
CSP	Country Strategy Program
DGS	Distribution Grid Substation
DISCO	Distribution Company
DX	Distribution transformer
DXL	Distribution network transmission line
DIZ	Direct Impact Zone
EA	Environment Assessment
EARF	Environment Assessment Review Framework
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
GDP	Gross Domestic Product
GOP	Government of Pakistan
GIS	Gas Insulated Switchgear
QESCO	Quetta Electricity Supply Company
Leq	Equivalent Sound Pressure Level
MPL	Maximum Permissible Level
NEQS	National Environmental Quality Standards
NGO	Non Governmental Organization
PC	Public Consultation
BEPA	Baluchistan Environmental Protection Agency
PEPAct	Pakistan Environment Protection Act 1997 (as regulated)
PPMS	Project Performance Monitoring System
PWD	Public Works Directives
REA	Rapid Environmental Assessment
SEA	Sectoral Environmental Assessment
SEL	Instantaneous Sound Pressure Level
SIA	Social Impact Assessment
S-P	Sub-project
SR	Sensitive Receiver
TOR	Terms of Reference
Kanal	$272 \text{ ft}^2 = 1 \text{ Marla}$. $20 \text{ Marla} = 1 \text{ Kanal}$

1 INTRODUCTION

1.1 OVERVIEW

1. This document is the Initial Environmental Examination for the Tranche-IV extension and augmentation sub-projects of Quetta Electricity Supply Company (QESCO). This IEE was prepared under the Asian Development Bank (ADB) Power Distribution and Enhancement Multi – Tranche Finance Facility (PDEMFF). The substation and distribution line are taken to be one project.

2. Government of the Islamic Republic of Pakistan (GoP) has requested ADB to provide the PDEMFF to facilitate investments in power distribution and development of networks of independent distribution companies (DISCOs) that distribute power to end user consumers. The funding from ADB is expected to be released in stages (tranches). The Power Distribution Enhancement (PDE) Investment Program is part of the GoP long term energy security strategy. The proposed ADB intervention will finance new investments in PDE and assist capacity building of sector related agencies. The investment program will cover necessary PDE development activities in secondary transmission / distribution networks of DISCOs and the Tranche-IV loan is expected to be approved by ADB in 2013. The PDEMFF activities include extension (additional transformers) and augmentation (replacement of transformers with higher capacity), distribution line extensions, new and replacement distribution lines, additional sub-stations, transformer protection and other non-network activities.

3. This IEE presents the results and conclusions of environmental assessment for the eighteen (18) extensions and augmentations sub- projects proposed by QESCO. PEPCO has been nominated by Ministry of Water and Power (MOWP) to act as the Executing Agency (EA) with each DISCO (QESCO) 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, monitoring implementation activities; that includes submission of environmental assessments for all sub- projects in all tranches of the PDEMFF under ADB operating procedures. An IEE has been carried out to fulfill the requirements of ADB Safeguards Policy Statement 2009.

¹ Initial project classification was carried out in 2013 and the Category is C. Most of the construction impacts will take place with only local impacts and there are no potential significant environmental impacts associated with the T4 (Tranche-IV) sub-project construction. Initial environmental reconnaissance and REA carried out by consultants under ADB guidelines in May 2007 indicated that all the T4 sub-projects will be Category C.

¹ ADB Safeguards Policy Statement 2009¹ Category A projects that are deemed by ADB's chief compliance officer to be environmentally sensitive for the purposes of (i) the 120 day rule, and (ii) the environmental management plan requirement could involve projects that are near or in environmentally sensitive areas. At this stage, no component of the T4 sub-projects under consideration is actually within a critical area and therefore the MFF tranche as a whole is Category C.

1.2 REQUIREMENTS FOR ENVIRONMENTAL ASSESSMENT

4. Under the MFF loan procedures of ADB, implementation of safeguards is to be achieved by environmental assessment of every sub-project to be undertaken following ADB Safeguards Policy Statement 2009. Power distribution enhancement and development type projects, that are limited to expansion of already developed facilities, have typically been classified as Category C. Each sub-project as been subject to environmental assessment after categorization and the focus was on the most significant issues.

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

6. Projects that have more adverse environmental impact (**Schedule-II**) are required to submit an environmental impact assessment (EIA) to the respective provincial Environmental Protection Agency (EPA, Figure 1.1). Distribution lines and sub-stations are included under energy projects and IEE is required for distribution lines of 11kv and less and large distribution projects (**Schedule-I**). EIA is required by GoP for all projects involving transmission / distribution lines of 11kv and above and for grid sub – stations (**Schedule-II**).

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

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

9. In response to the FEA submitted by NTDC to the Pakistan EPA, it has been clarified that all proponents must follow section 12 of the Pakistan Environmental Protection Act for all projects and furthermore that, only for extension & augmentation projects by following the FEA, the required procedures under section 12 would be completed (Refer to Figure 1.1). Pakistan EPA has also assumed that all proponents will consult with the relevant provincial EPA as (BEPA) and follow their advice.

1.3 SCOPE OF THE IEE STUDY AND PERSONNEL

10. This IEE study has included field reconnaissance for all 18 of the sub- projects of extension and augmentations of the existing DGSs under the jurisdictions of QESCO the surveys taking place in June - July 2013. The Study Area for each subproject was the sub-station and immediate

environs. The areas inside the sub-stations for improvement works were identified and the sensitive receivers immediately adjacent to the sub-stations were recorded, including any irrigation facilities, water supply, habitable structures, schools, health facilities, hospitals, religious places and sites of heritage or archaeological importance and critical areas within about 50m of the edge of the sub-station boundary walls. Some of the sites could not be visit because of the remoteness and security concerns as most to them are located in the far flank areas of Baluchistan province. However the basic information about the proposed DGS was collected from the QESCO officials with the staff of the concern DGS.

11. The field studies were undertaken by a core study team with experience of environmental assessment for power projects in Pakistan Mr. Atif Raza Environmental specialist and his team of International environmental Consultant SMEC, facility management consultant for ADB'S (PDEIP) with coordination of Deputy Manager (E&S) Assistant Manager (Environment) & Assistant Manager (Social Impact) of Environmental & Social Safeguard Unit QESCO along with the field surveys teams. The study team also benefited from technical support and other important information on the impacts of the proposed power works briefed by the QESCO technical staff dealing with engineering, power transmission, socio-economic, re-settlement and institutional aspects.

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

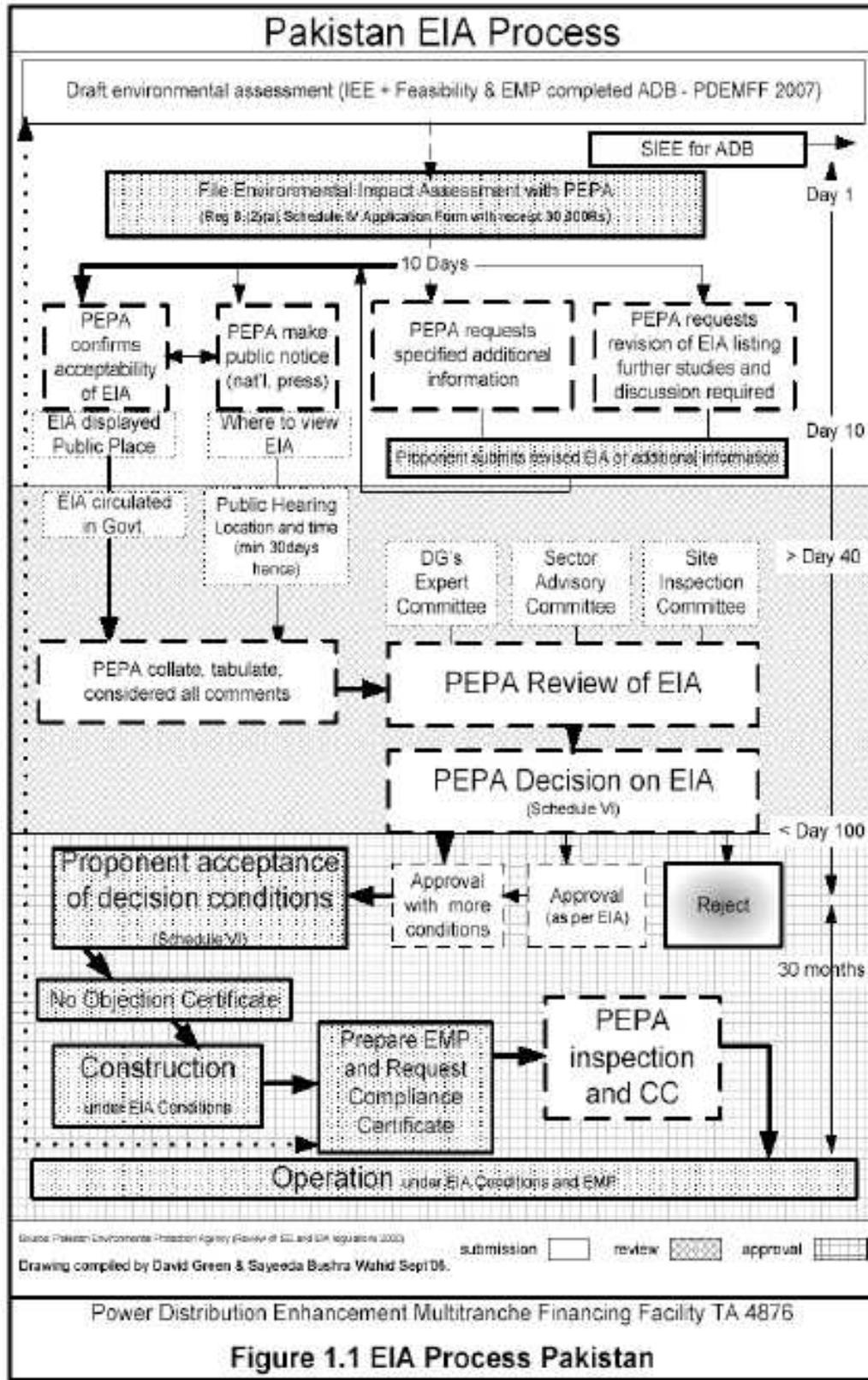


Figure 1.1 EIA Process Pakistan

Figure 1.1: EIA Process Map

13. All the extension and augmentation projects covered in this IEE will only involve work within the boundary of an existing sub-station to either, (i) replace an existing transformer with one of a higher capacity (augmentation) or (ii) add a transformer (extension). Therefore, in these projects that involve work within an existing sub-station to improve the network performance the sole

stakeholder is QESCO. The requirement for public consultation (PC) can be seen to be satisfied by consultation with QESCO who are clearly in support of their own project. Therefore under ADB requirements, the need for environmental assessment process to include meaningful public consultation during the completion of the final IEE can be seen to be satisfied by the support of QESCO for their own projects already carried out in the Tranche–I can be considered.

1.4 POLICY AND STATUTORY REQUIREMENTS IN PAKISTAN

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

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

1.5 NATIONAL ENVIRONMENTAL QUALITY STANDARDS

16. The PEPA covers the improper disposal of all solid and liquid waste and specific limitations are placed on wastes and emissions from particular industries. The National Environmental Quality (Protection and Quality Regulations 1990, 1996, 2000 and 2010) identifies the specific industrial sources for control and an Environmental Protection License is required to discharge waste to the environment under controlled conditions. Where the project contractors require cement, concrete or granite based products for power improvement the materials must be obtained from facilities having a relevant and current Environmental Protection License.

1.6 SOLID WASTE MANAGEMENT

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

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

transformers will be retained, stockpiled and reused.

1.7 STRUCTURE OF REPORT

19. This report reviews information on existing environmental attributes of the areas around the study area. Geological, hydrological and ecological features, air quality, noise, water quality, soils, social and economic aspects and cultural resources are included. The report predicts the probable impacts on the environment due to the proposed project enhancement and expansion. This IEE also proposes various environmental mitigation measures under the cover of Environmental Management Plan. Details of all background environmental quality, environmental impact / pollutant generating activities, pollution sources, pollution control equipment, predicted environmental quality and related aspects have been provided in this report. References are presented as footnotes throughout the text. Following this introduction the report follows ADB guidelines and includes:

- Description of Sub-Project
- Description of Environmental and Social Conditions
- Assessment of Environmental Impacts and Mitigation Measures
- Mitigation measures for identified impacts
- Environmental Management Plan (EMP)
- Environmental Monitoring Plan
- Public Consultation
- Findings, Recommendations and Conclusions

2 DESCRIPTION OF THE PROJECT

2.1 TYPE OF PROJECT

20. The sub-projects in this IEE are all improvements to the equipment that support the power distribution network at eighteen (18 Nos.) existing distribution grid sub-stations (DGS) that have been prioritized by QESCO & decided to be included in the PDEMFF Tranche-IV. The proposed works will all be within existing boundary of DGS.

21. The sub – projects Tranche-IV include ten extension and eight augmentation subprojects (Table 2.1). The environmental assessments that have been carried out follow *ADB Safeguards Policy Statement 2009* and GoP's Environmental Assessment Regulations and Guidelines.

Table 2.1: QESCO Tranche-IV Sub-Projects

	Project Name	Type of Project	Brief Description	Land & Resettlement Status
A. Extension & Augmentation of Power Transformer Sub-Project.				
Q1	132KV Alizai	Extension	1 x 26 MVA P/T	Within the Boundary of Existing G/S.
Q2	132KV Chaman	Augmentation	1 x 40 MVA P/T	-do-
Q3	132KV Hurranzai	Extension	1 x 13 MVA P/T	-do-
Q4	132KV Baghbana	Augmentation	1 x 40 MVA P/T	-do-
Q5	132KV Darwaza	Extension	1 x 13 MVA P/T	-do-
Q6	132KV Gidder	Augmentation	1 x 40 MVA P/T	-do-
Q7	132KV Kallat	Augmentation	1 x 40 MVA P/T	-do-
Q8	132KV Kanak	Extension	1 x 26 MVA P/T	-do-
Q9	132KV Khanozai	Extension	1 x 40 MVA P/T	-do-
Q10	132KV Pishin	Augmentation.	1 x 40 MVA P/T	-do-
Q11	132KV Loralai	Extension	1 x 26 MVA P/T	-do-
Q12	132KV Quetta City	Augmentation.	1 x 40 MVA P/T	-do-
Q13	132KV Kuchlak	Extension	1 x 26 MVA P/T	-do-
Q14	132KV Sariab	Augmentation.	1 x 40 MVA P/T	-do-
Q15	132KV Mriabad	Extension	1 x 26 MVA P/T	-do-
Q16	132KV Panjpai	Augmentation.	1 x 26 MVA P/T	-do-
Q17	132KV kingri	Extension	1 x 13 MVA P/T	-do-
Q18	132KV Barkhan	Extension	1 x 13 MVA P/T	-do-

2.2 CATEGORIZATION OF THE PROJECT

22. Categorization is based on the most environmentally sensitive component of the sub – project and therefore the Eighteen (18 Nos.) subprojects at the existing DGS are categorized as a Category C. Tranche-IV is also Category C under ADB requirements, as the grid station site does

not have any environmentally sensitive receptor.

23. At this stage, the methods to install or replace the transformers are fairly well defined. There are few if any potentially significant environmental features and the works will all be within the eighteen (18 Nos.) existing DGS and will not encroach on any land outside the sub-stations. There is no foreseeable significant disturbance outside the substations and waste disposal should not be a significant consideration if routine environmental management procedures and engineering controls are implemented thoroughly.

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

2.3 NEED FOR THE PROJECT

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

26. The Tranche-IV sub-projects will contribute to the improvement of the overall performance of the power distribution sector, improving distribution efficiency, broadly widening access to power to drive economic opportunities. The beneficiaries of the sub-projects will be general public, companies, and government and non-government agencies in Pakistan that use power distribution services directly and indirectly. Communities indirectly served by the sub-projects will benefit from improved, secure faster distribution services. Power users will benefit in terms of secure power and improved power safety and potentially increased productivity.

2.4 LOCATION AND SCALE OF PROJECT

27. The project areas are located throughout Baluchistan some distance from human habitations. The Project Proponent (QESCO) plans to have the T4 completed by end to late 2018. The project is part of proposal submitted by PEPCO to ADB. The details for the implementation of the extensions and augmentation sub-projects are in development. The all extension and augmentation sub-projects will be within the boundary of eighteen (18 Nos.) existing DGS (**Appendix-II**) and will not encroach on any land outside the sub-stations.

28. The extension and augmentation projects are spread out around sites within the QESCO jurisdiction (Figure 2.1). The extension sub-projects will involve the delivery and connection of an additional transformer in line with other transformers within the ample available space in an existing

DGS.

29. The augmentation sub-projects will replace an existing transformer in an existing DGS with a transformer of a higher capacity (augmentation). The transformer that is replaced will not be wasted but will be removed and transferred to at another QESCO facility (DGS) where it will be reconditioned, stored and eventually transferred to another DGS to be reused. The Project Proponent (QESCO) plans to have the Tranche-IV completed by December 2018. The details for the implementation of the 18 Nos. extensions and augmentation sub-projects are in feasibility stage.

2.5 DECOMMISSIONING AND DISPOSAL OF MATERIALS

30. Decommissioning and disposal of discarded material from the project will be recycled and reused within the PEPCO system. No waste will be generated that can be classified as hazardous and requiring special disposal. In addition, in case any old transformers are to be replaced, they are not going to be disposed off or discarded and would be recycled and reused within the PEPCO system. As a policy, WAPDA has stopped using transformers that contain PCBs since 1969.

2.6 QESCO SUB-PROJECTS

31. The 18 Nos. subprojects are in the 7 districts of urban and Rural Baluchistan and in the fringes areas of cities of i.e Quetta, Pishin, Qila Abdullah, Mastung, Loralai, Musakhel, Barkhan Districts of Baluchistan Province. The areas surrounding the relevant DGS are described in next section. Photographs of the DGS are presented in **Appendix-I**. The extension and augmentation projects are spread out around sites within the QESCO jurisdiction (**Appendix-II**). The tranche 4 implementation schedule is presented as follows.

TIME SCHEDULE - TRANCHE 4 - DISTRIBUTION ENHANCEMENT PROGRAM																																						
	Responsibility		Year 2013				Year 2014				Year 2015				Year 2016				Year 2017				Year 2018				Year 2019				Year 2020							
	1	2	I	II	III	IV																																
Loan Processing																																						
Loan negotiation	ADB	EAD																																				
Tranche 4 Approval	ADB	EAD																																				
Loan Effectivity	EAD	ADB																																				
Bidding Documents																																						
Bidding Documents Preparation	PEPCO	DISCOs																																				
Evaluation	PEPCO	DISCOs																																				
Contract Awards	PEPCO	DISCOs																																				
Construction																																						
Delivery of equipment	Contractor																																					
Construction & Installation	Contractor																																					
Testing & Commissioning	Contractor																																					
Loan Closing	ADB	PEPCO																																				

32. The detail brief of each DGS include in the scope of work are represented in following;

2.7 POWER TRANSFORMER SUB-PROJECTS

33. **Alizai Substation (Extension):** The DGS is located about 75km from the Quetta city. The extension sub-project will extend an existing transformer with another higher capacity 26 MVA in an existing DGS. The Project Proponent (QESCO) plans to have the sub project completed by mid to late 2018. The extension subproject will be located entirely within the existing substation that is located at Alizai. Based on the field visit and discussions with the staff of QESCO, the extension will

have no severe environmental impacts. There is good road access. The staff of QESCO was in favor of the project and wants its early implementation. The Environmental & Social team is also in favor of the project.

34. Chaman Grid Station (Augmentation): The sub-project will be augmented by installing a higher capacity 40 MVA transformer in an existing DGS existing. The grid station is about 120km from Quetta city. The road access is fairly good. The total number of staff is 12 however the shortage of staff was mentioned as problem. While interviewing the staff at the DGS, they are in favor of the project and wanted its early implementation as most of the transformers are over loaded. QESCO plans to have the sub project completed by mid to late 2018. The IEE (Environmental & Social) team is of the opinion that there will be no impacts of the environment because of this project.

35. Hurramazai Substation (Extension): The DGS is located 75km from Quetta. QESCO plans the Extension of, 13 MVA at the DGS. The proposed extension is entirely within the existing DGS and hence will not affect the environment and will have no environmental impacts. Yard has the potential of expansion and an extra foundation for transformer is available. The staff complained about shortage of drinking water. There is good road access to the sub station.

36. Baghbana Substation (Augmentation): The DGS is located 303km from Quetta on the Quetta - Karachi road. QESCO plans the Augmentation of 40 MVA at the DGS. The proposed augmentation is entirely within the existing DGS and hence will not affect the environment and will have no environmental impacts. Yard has the potential of expansion and an extra foundation for transformer is also available. There is good road access to the sub station.

37. Darwaza Substation (Extension): The DGS is located about 32km from the Quetta city. The extension sub-project will extend an existing transformer with one higher capacity 13 MVA in an existing DGS. The Project Proponent (QESCO) plans to have the sub project completed by mid to late 2018. The extension subproject will be located entirely within the existing substation that is located at Darwaza Mastung Based on the field visit and discussions with the staff of QESCO, the extension will have no environmental impacts. There is good road access. The staff of QESCO is in favor of the project and wants its early implementation. The IEE team is also in favor of the project.

38. Gidder Substation (Augmentation): The DSS is located 255km south west of Surab in the Kalat district. The augmentation sub-project will replace an existing transformer with one with a 40 MVA higher capacity in an existing DGS. The project Proponent (QESCO) plans to have the sub project completed by mid to late 2018. The augmentation subproject will be located entirely within the existing substation that is located at Gidder. Based on the discussions with the staff of QESCO, the augmentation will have no environmental impacts. There is good road access. The staff of QESCO was in favor of the project and was its early implementation.

39. Kalat Substation (Augmentation): The DSS is located 140km from Quetta city in the Kalat district. The augmentation sub-project will replace the sub station transformer by a new high capacity 40 MVA power transformer. Based on the discussions with the staff of QESCO, the

augmentation will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team visits this site and its remote location. The IEE team is of the opinion that there will be no impacts of the environment because of this project. Shortage of staff was mentioned as a problem.

40. Kanak Substation (Extension): The extension sub-project will extend an existing transformer with one with a high capacity 26 MVA in an existing DGS. Kanak sub station is located in Mastung district on Quetta – Noshki road about 55 km from Quetta city. The road access is fairly good. Based on the discussions with the staff of QESCO, the extension will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team is of the opinion that there will be no considerable impacts of the environment because of this project. Lack of drinking water and shortage of staff are the problems mentioned by the staff of sub station.

41. Khanozai Substation (Extension): Khanozai sub station is located at the Quetta – Muslim Bagh road and is 80km away from Quetta. The road access is fine. There is a plan of extension transformer with one of a higher capacity in an existing DGS. The yard has the potential of extension at the sub station. Field visits and discussions with the staff of the sub station reveal that there will be no considerable environmental impacts because of the proposed project; sub station has a nice location.

42. Pishin Substation (Augmentation): The augmentation sub-project will replace an existing transformer one with a higher capacity 40 MVA in an existing DGS. Pishin sub station is located in Pishin district on Quetta–Chaman road about 55km from Quetta city. The road access is fairly good. Based on the discussions with the staff of QESCO, the augmentation will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team is of the opinion that there will be no impacts of the environment because of this project. Shortage of staff and lack of drinking water was mentioned as problems by the staff of sub station.

43. Loralai Substation (Extension): The extension sub-project will extend an existing transformer with one with a higher capacity 26 MVA in an existing DGS. Loralai Grid Station is 265km from Quetta city on Quetta - Loralai road. Based on the discussions with the staff of QESCO, the augmentation will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team visited the site and of its remote location in the tribal belt of Baluchistan. The IEE team is of the opinion that there will be no impacts of the environment because of this project.

44. Quetta City Grid Station (Augmentation): Located in the Kili Alam Khan of Quetta city, the sub project area is 5km away from the Quetta city. QESCO proposes an augmentation of 1X40 MVA power transformers. The sub station yard has the potential of extension. The proposed project will have no negative environmental impacts. Based on the discussions with the staff of QESCO, the augmentation will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation.

45. **Kuchlak Substation (Extension):** The extension sub-project is located at Quetta-Chaman road that is 25 km away from Quetta city. The sub project will extend an existing transformer with one with a higher capacity 26 MVA in an existing DGS. The yard has the potential of extension. Based on the discussions with the staff of QESCO, the extension will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team visited the and team has opinion that there will be no impacts of the environment because of this project.

46. **Sariab Substation (Augmentation):** The augmentation sub-project will replace an existing transformer with one with a higher capacity 40 MVA in an existing DGS. The yard has the potential of extension. Based on the discussions with the staff of QESCO, the augmentation will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team is of the opinion that there will be no impacts of the environment because of this project.

47. **Mariabad Grid Station (Extension):** The extension sub-project will extend an existing transformer with one with a higher capacity 26 MVA in an existing DGS. The yard has the potential of extension. Based on the discussions with the staff of QESCO, the extension will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team is of the opinion that there will be no impacts of the environment because of this project.

48. **Punjpai Substation (Augmentation):** The augmentation sub-project is located Panjpai and 80 km away from Quetta city. The sub project will replace an existing transformer with one with a higher capacity 26 MVA in an existing DGS from Khuzdar. Based on the discussions with the staff of QESCO, the augmentation will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team visited the site main and of the opinion that there will be no impacts of the environment because of this project. Shortage of staff was mentioned as problems by the staff of sub station.

49. **Kingri Substation (Extension):** The extension sub-project is located at Kingri in Musakhel district that is 400 km away from Quetta city. The sub project will extend an existing transformer with one with a higher capacity 13 MVA in an existing sub station. Based on the discussions with the staff of QESCO, the extension will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team is of the opinion that there will be no impacts of the environment because of this project. Shortage of staff was mentioned as problems by the staff of sub station

50. **Barkhan Substation (Extension):** The extension sub-project is located in Barkhan district that is 500 km away from Quetta city. The sub project will extend an existing transformer with one of 13 MVA in an existing sub station. Based on the discussions with the staff of QESCO, the extension will have no environmental impacts. The staff of QESCO was in favor of the project and was its early implementation. The IEE team was unable to visit these site main because of its remote location and insecurity because of its location in the tribal belt of Baluchistan. The IEE team is of the opinion that there will be no impacts of the environment because of this project.

3 DESCRIPTION OF THE ENVIRONMENT

3.1 SUB-PROJECT AREAS

51. There is no sensitive receiver near the existing DGS. Sewerage, drinking water supply, drainage and shortage of staff was the main concerns of the staff at the all these DGS. All the staff and people contacted during the survey were in favor of the project and recommending its early implementation.

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

53. In all DGS there is plenty of room for the construction of the extension and augmentation projects (**Appendix 2**). Access in all cases will be via the main entrance that joins the nearest main road.

3.2 PHYSICAL RESOURCES

3.2.1 Topography, Geography, Geology, and Soils

54. The area of the QESCO jurisdiction is in the province of Baluchistan while the subprojects are located in Quetta, Pishin, Qila Abdullah, Mastung, Loralai, Barkhan, Musakhel and Kalat *districts*. The topography of the whole area is relatively flat with the land sloping gently in a northeast-southwest direction and a surface gradient of about 0.25 m per km.

55. Quetta district lies between 30° - 03' and 30° -27' N and 66° - 44' and 67° - 18' E. The total geographical area of Quetta district is 2653 Km². The general character of the district is mountainous. The hill ranges are fairly uniform in character consisting of long central ridges from which frequent spurs descend. These spurs are intersected by innumerable gorges and torrent beds. They vary in elevation from about 1,254 to 3,500 meters. The Mashlakh, the Chiltan, the Murdar and Zarghoon are the important mountain ranges in the district. Quetta lies in the active seismic region, therefore earthquakes occur from time to time. The worst earthquake occurred in May, 1935, when a large part of Quetta was destroyed and 60,000 people died. As recent as February 1997 a seven earthquakes (7.1 on rector scale hit Baluchistan).

56. There is no perennial river in the district. The Quetta Lora comes out near Sariab and traverses the western side of the Quetta valley. This Lora carries rain and waste water near Baleli and continues northward through the Kuchlak valley. Water of Quetta Lora is used for irrigation in villages like Khazi Samungli and Nohsar.

57. Physiographically, the soils of Quetta district may be described by four main units' i.e. (1) Piedmont plains (very deep and well-drained soil) (2) Piedmont basins (4) Salinity and Alkalinity (3) Gravelly piedmont fans and aprons bordering the mountains and loess plains. Each

physiographic unit is different in parent material.

58. **Minerals Resources:** There is limited information available regarding the major mineral resources of the target project area. However, the major minerals of the district Quetta is coal, limestone and building stone. The coal mining activity has been in operation at Sorange for the past hundred years. Only male labor is involved in its production and marketing. It is marketed through middle men (commission agents) who transport it to the Sindh and Punjab where it is mostly used in Brick kilns. Private sector is actively involved in the mining sector. According to the Geological Survey of Pakistan (GSP), the district has bright potential for coal production. What is needed is a comprehensive survey.

59. Also new technology and safety measures should be applied in the mining sector. However, its exploitation is becoming more difficult and expensive, as the base of coal reserve is horizontal and narrow. Similarly there is also scope for limestone which is mostly used in the cement industry.

3.2.2 Climate and Hydrology

60. The climate of the proposed project is generally dry. Fairly arid climate prevails in the area. The area is situated at an altitude of 1,700 meter. Therefore, the weather is extremely dry. The winter is very cold and the minimum temperature ranges between -15 to -7 degrees Celsius.

61. Summer is relatively mild and the maximum temperature ranges between 32 to 35 degrees Celsius; July is generally the hottest month. The project area lies outside the range of the monsoon currents and the rainfall is scanty and irregular. The average annual rainfall for Quetta city is 226 mm, whereas in the Hanna area, the average is about 312 mm. In the spring and summer seasons there is very little rainfall. The heaviest rainfall and snowfall occurs in January and February. There is no weather center for Kanak, however, the data of Quetta City could be taken as a reference for the project areas.

62. According to the information supplied by the Meteorological Department, the average total annual mean rainfall in the year 1999 has been 308.2 mm, ranging from 143.2 mm in the month of June to 68.5 mm in the month of March.

63. Climate will have little bearing on the minor environmental impacts from the construction of these sub-projects.

3.2.3 Groundwater and Water Supply

64. The ground water situation is mentioned in the REIs of every proposed site but generally for the province, the quality of ground water varies from place to place. In district Quetta, the quality of ground water varies from place to place. In most of the places water is of good quality while in Balali, Mehtarzai, Samalani and Mallahzai the quality of water is very poor (saline / brackish) and not potable. The chemical quality of water can be established by chemical analysis. The World Health Organization (W.H.O) has set some standard parameters such as the quantity of calcium, magnesium, sodium sulphate and nitrate etc., to differentiate potable water from non-potable. According to the P.H.E.D authorities, the water found in most of the rural areas entirely satisfies the

criteria laid down by W.H.O. Water provided by MES is filtered and chlorinated. There have been some studies indicating that there is potential for exploiting water in the district valley, but due to very low water table it will be very expensive to utilize that water in future. The underground potential needs to be charged and this could be done through construction of Delay Action Dams and plantation on a massive scale.

65. Most of QESCO staff at the proposed sites was complaining about the non availability of potable piped water supply in the grid stations as well as staff colonies. In outlying areas the local population is generally reliant on supply from tube wells, as well as occasional open wells and hand pumps. There should be no impact on these sources of water by the construction of the extension and augmentation sub-projects.

3.2.3 Surface Water Rivers and Surface Drainage

66. There is no river near the subprojects. The sub-project DGS have all the natural soils within the sub-station covered but the cobblestones allow surface water to drain away from some areas to the underlying soil. In other areas brick and concrete channels divert rain water to surface drains.

3.2.5 Air Quality

67. Air quality in the most of the sub-project area appears fairly good based on observation during the study period although areas nearer the busy main roads are clearly impacted by vehicle fumes and dust. It is unlikely that large powered mechanical equipment will be needed for the extension and augmentation projects other than delivery Lorries and lifting cranes. There may also be neighboring domestic sources of air pollution, such as emissions from wood and kerosene burning stoves as well as small diesel standby generators in some households. Other industrial sources are very few and limited to occasional factories. The major source of atmospheric pollution for the operational phase will be from vehicles on nearby roads and any industrial facilities nearby. Such emissions will be very well dissipated in the open terrain. 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 appeared very good during the study period. Air quality measurements in major urban centers, carried out by Pak-EPA, revealed that CO, SO₂ and NO levels were in excess of the acceptable levels in some areas but the average levels were found below WHO standards. Air quality testing by DISCOs (average values are: TSP 1.09 mg/m³, CO 634 ppb, SO₂ 24.34 ppb, NO₂ 23.73 ppb) through various consultants has revealed that most sub stations have NO₂, CO₂ and CO values below international standards although TSP levels at some locations was higher than international standards.

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

3.2.6 Noise and Vibration

69. Noise from vehicles and other powered mechanical equipment is intermittent in most urban areas. There are also the occasional calls to prayer from the PA systems at the local religious locations and there are other occasion disturbances typical of the urban setting. However the proposed power extension and augmentation projects should not be noisy or create vibration nuisance. DISCOs have carried out noise level measurements at various sub stations and transmission line locations within the system .These analyzed to calculate Leq values have resulted in Leq values much below the 85 dBA limit prescribed under the NEQs established by the EPA or the 75 dBA used by DISCOs/NTDC/PEPCO in the equipment specifications . Typical values were: average 46.21 dBA; high 63.14 dBA; and low 34.35 dBA.

3.3 ECOLOGICAL RESOURCES

70. There are no significant ecological resources, aquatic biological resources in the urban areas near the sub-projects. No protected or religious trees have been identified in the sub-stations.

71. In some cases the sub stations could be a positive factor in providing habitats to some birds as the gardens maintained in these substations play a role in the local ecology. Some gardens are fairly large and many species of flora, including large trees are present but these would not be affected by the extension and augmentation sub-projects in Tranche 4.

72. None of the extension and augmentation sub-projects in Tranche 4 is near any area devoted area to the preservation of biodiversity through dedication as a national parks and wildlife sanctuary. There are no protected areas near the sites of the proposed sites in Tranche 4.

73. The names of the major forests in Quetta are Karkhasa (4048 Ha), Takatu south (2894 Ha) and Hazargunji forest (2202 Ha). Major forests in Urak are Spin Karez (7260 Ha), Tagha Tarkhar (6125 Ha) and Zarghun central. Artemisia is used for medicine purpose. The salt vegetation found in Ghaza and Karak is a source of salts for the livestock. Shkarai, Andropogo and Artemisia are also used by the animals. Pistachia which is found in the Zarghoon hills is eaten by small ruminants. Some of the vegetation like camelarom (ZOZ), Juniper and Pistachio trees are used for fuel purpose.

3.4 ECONOMIC DEVELOPMENT

3.4.1 Industries, Agriculture and Tourism

74. Quetta City is the biggest trade centre in Province, which exports and imports a variety of different goods not only with other parts of the country but also with Iran. Its major industrial trade includes electrical goods, rubber products, bicycles, food products, beverages, handicrafts, leather shoes, printing and chemicals, photo and cinematic goods, as well as agriculture products and dried fruits.

75. There are thousands of industrial and commercial businesses in the vicinity of the Tranche 4 extension and augmentation sub-projects reliant on the efficient distribution of electrical power. There are also agricultural businesses on the fringes of the urban areas.

76. The area of Tranche 4 produces a handsome quantity of fruits and vegetables. The marketing of fruits and vegetables is not restricted to the province, but in many cases crosses the provincial boundaries. It is estimated that 60-70% of the fruit production is marketed and consumed in other provinces. The market infrastructures, regulation, marketing costs, directly affect the prices received by the growers for their produce. There are numerous intermediaries operating at various stages of marketing, some more active than others.

3.4.2 Transportation

77. The Quetta airport is a major international and domestic entry point to the Province and the railways and major roads all radiate out from Quetta. Longer haul journeys are made by public bus and mini bus. Trucks are used to transmission freight over longer routes across the study area and goods between market centers. Farm tractors are available in some areas and are used to convey local produce to market as well as for agricultural purposes. The air, rail and road transport systems are all reliant to some extent on electrical power and thus the majority of the local population is reliant on the power network for transportation. The important linking roads are:

- i) Quetta - Yaru - Maizai - Chaman - Kandhar Road (Afghanistan).
- ii) Quetta - Killa Abdullah - Gulistan Road.
- iii) Quetta - Sibi Road.
- iv) Quetta - Zhob via Muslim Bagh Road.
- v) Quetta - Kalat - Khuzdar - Karachi Road.
- vi) Quetta - Taftan - Zahidan Road.
- vii) Quetta via Ziarat - Loralai - Dera Ghazi Khan Road.

78. The presence of roads has benefited the residents of other provinces as well. The road construction has had a stimulating effect on different sectors of the economy like agriculture, industry and transport. Further roads have reduced the traffic pressure on the railway. Thus consumers, producers and intermediaries have benefited from the spread effects of road development.

79. The construction, rehabilitation and maintenance of roads in the district are handled by different organizations. These organizations include: National Highway Authority, C&W Department, Cantonment Board, Municipal Corporation, Quetta Development Authority and District Council.

80. The main source of transportation is road in all of the target districts. There is a good network of metaled and un-metaled roads in these areas.

3.4.3 Power Sources

81. The transmission lines for electrical power in the QESCO run in a complex grid (Figure 2.1). Electricity is the most important source of energy in the district. Economic growth increases the demand for power supply. To gauge the economic development of a country, the criterion of per capita energy consumption is a good indicator. Electricity has multi-dimensional uses. It is used in the agricultural sector to run tube-wells. In the industrial sector it is vital for running machinery, and for households it facilitates life to a great extent. For households electricity is not only a source of light, but also a source of power for a range of appliances. Electricity is also produced locally but is produced at Guddu. There are seven grid stations and one power house in the district.

3.5 SOCIAL AND CULTURAL RESOURCES

3.5.1 Population and Communities

82. There are many newly developing urban localities where families from middle and upper classes of society from all religions and castes are taking up residence and these are all demanding better provision of electrical power from the network.

83. This sub-project will not require relocation or resettlement. There are many important cultural or archeological sites in Baluchistan but there are no cultural and archeological sites located in the vicinity of any of the Tranche 4 extension and augmentation sub-projects.

84. The Quetta district is ethnically diverse. A colorful culture can be seen in the district. The district is multilingual in the sense that there are five major ethnic groups, and each group has its own cultural values. They are Pashtoons, Balochs, Brahuis, Hazaras and Punjabis. Some other minor ethnic groups like Urdu speaking Mehajirs and Sindhis are also living in the city. The mode of living differs from group to group. In the urban area except Kachi Abadis, the way of living is somewhat modern especially among the wealthier people. In the rural area, the style of living is more traditional.

85. The major sources of income of the residents are trade, transport, government jobs, agriculture and mining. The informal sector is also playing a very significant role in generating income. Like in other urban centers, in Quetta city a large number of shops, street vendors, small garages (auto repair shops) and tailoring shops can be observed.

86. Food habits among the major ethnic groups are almost identical; they take meals twice a day along with a light breakfast. Meat is the main item of the meal and wheat is the staple food. However, food habits of Punjabi and Urdu speaking (Mehajir) are different. Their meals usually contain mutton, vegetables, pulses flavored and cooked with chillies. Tea is normally offered in the houses to guests. In summer lassi (a yoghurt drink) is widely used as refreshment.

87. In fact, the pattern of food habits is changing. Fruit, sweets and confectioneries have become part of the food, especially in the urban area of the district. Regional food specialties, that attract the tourists, are sajji, roast and Kabuli pulaow.

88. Women's dress can be categorized into two types, traditional and modern. shalwar- kameez and shawl or chaddar are used by the majority of women. Most women observe purdah (veil or chaddar), when they come to the bazaar. Baluchi and Afghan embroidery is also traditionally used on the dress of women and children. Modern dresses are worn by working women and educated girls, which is essentially the same, but excludes the chaddar.

3.5.2 Education and Literacy

89. Education is a key instrument to lift a society out of poverty. The relationship between education and economic development is well recognized. Investment in education is essential for the future and betterment of the present generation. It is sad and unfortunate that successive governments, bureaucrats, and politicians have never given due attention to this issue. The

expenditure on education has never exceeded 2% of GNP. The irony of this is that even this meager amount was never spent on education. It was often diverted towards other sectors like defense. As a result, the literacy rate has been around 36% in Pakistan and far lower in Baluchistan.

90. In Quetta District, there are 30 mosque schools for boys, while there are 232 primary boys' schools and 127 primary girls schools run by government. The number of privately run primary schools is 78. The number of government middle schools is 51, of them 29 are for boys and 22 are for girls. The most important observation is that the number of middle schools is far too low. There are 38 government and 40 private High Schools in the district. The proportion of girls' High school within the total number was 44.7%.

91. In addition to the primary schooling, Middle school further provides three years of schooling. High schools are those schools where education is provided up to 10th class.

92. In district Quetta, government controlled primary, middle and high schools are Urdu medium. Only private schools are mostly English medium. There is one technical school, one polytechnic institute and one agriculture college in the district. There are many English language centers in the city. Over the last few years, they have grown like mushrooms in and around the city. Similarly there are many computer training centers operating in the city both in public and private capacity. There are many private driving schools including one by the public department (specifically for police personnel). Baluchistan University is also located in Quetta.

3.5.3 Health Facilities

93. The people of the project area have access to good curative and preventive health facility. There are 5 government hospitals working in the district. They provide treatment facilities to men and women. However, there is no separate government hospital for ladies. Moreover, there are hospitals run by various organizations for their staff members and their families, like Railway, WAPDA, Cantonment Board, Combined Military Hospital (CMH) etc. They also provide treatment facilities to general public. There are at least 30 private hospitals in Quetta. The treatment cost of private hospitals is much higher than that of the government controlled hospitals. Moreover, its medicines are comparatively cheaper. People also visit Hakeems who treat them with traditional oriental herbs and shrubs. As far as family planning services are concerned, they are being provided in all D.H.O offices and in the civil hospital. There is a growing awareness and public approval in favor of family planning. This may be due to the electronic media campaign and the demonstration effect witnessed by the society.

94. It is worth mentioning that patients from outside the district and even from Afghanistan visit Quetta for treatment. One reason is the proximity of Quetta to Afghanistan

3.5.4 Culture Heritage and Community structure

95. Generally the people are illiterate and earn living by forming as tenants on land owned by landlords. However some people are in government services and labors. A large portion of population is serving abroad. Some people are engaged in trade, commerce and transportation.

96. The traditional handicrafts of the province include embroidery work on coats, shoes, caps, leather and women's and children's shalwar and kameez. Embroidery work is carried out by women and girls as traditional activity in every house. In case they sell their work, they sell it to middlemen, but sometimes it is bought by NGOs which sell it through exhibitions.

4 SCREENING POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 PROJECT LOCATION

97. The Tranche-IV extension and augmentation sub-projects will involve expansion of existing installed facilities within existing sub-stations (DGS) and therefore Sensitive Receivers (SR) are set well back from the power equipment outside the DGS boundaries. In the case, many of the extension and augmentation sub-projects there are some Sensitive Receivers (SR) within a few meters of the DGS boundary walls. These SRs are in the form of residential buildings, some schools and shops in the surrounding villages.

98. The location and scale of the works are very important in predicting the environmental impacts. This process of impact prediction is the core of the IEE process and it is critical that the recommendations and mitigation measures are carried out with reference to the conditions on the ground in the affected areas in the spirit of the environmental assessments process.

99. In this section the potential environmental impacts are reviewed. If impacts are predicted to be significant enough to exceed accepted environmental standards, mitigation is proposed in order to reduce residual impact to acceptable levels and achieve the expected outcomes of the project being implemented. Therefore, it is essential that a proper analysis is carried out during the project planning period. In this regard, the impact prediction plays a vital role as these predictions are used for developing mitigation measures and any alternative options, if appropriate. When the detailed designs are completed the impacts and mitigation measures will need to be further reviewed to take account of how the contracts are set up and in the light of any fine tuning of the sub – projects.

100. The Environmental Management Plan (EMP) (**Section 5 and EMP Matrix Table 5.1**) has been compiled based on the data / information and would be reviewed in due course at project inception and through construction in order to feed-back and provide revised mitigation for any significant unpredicted impacts. The analysis primarily the key environmental issues are likely to arise from sub-project implementation, to prescribe mitigation measures to be integrated in the project design, to design monitoring and evaluation schedules to be implemented during sub-project construction and operation, and to estimate costs required for implementing sub-project mitigation measures. The EMP, if required may be reviewed before the construction phase / activity is initiated, to take account of any subsequent changes and fine tuning of the proposals.

4.2 GENERAL APPROACH TO MITIGATION

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

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

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

4.3 PREVENTION OF GROUND CONTAMINATION

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

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

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

4.4 CULTURAL HERITAGE, TEMPLES, RELIGIOUS SITES, SOCIAL INFRASTRUCTURE

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

107. The clinic / hospitals are all well separated from the boundary walls of the sub-project DGS

and there will be sufficient buffer distance between the works and the SR such that no major significant impact would be expected from the works. However, public consultation should also be undertaken.

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

4.5 POTENTIAL ENVIRONMENTAL IMPACTS IN CONSTRUCTION PHASE

4.5.1 Encroachment, Landscape and Physical Disfiguration

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

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

4.5.2 Cut, Fill and Waste Disposal

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

112. Mitigation measures must focus on the minimization of impacts. If surplus materials arise from the removal of the existing surfaces these can be used elsewhere on the sub-projects before additional soil rock, gravel or sand extraction is considered. The use of this immediately available material will minimize the need for additional rock based materials extraction. The extraction of raw materials should be minimized by the re-use onsite for landscaping of all rock and soil based materials extracted for excavation of foundations etc. If offsite disposal of surplus materials is necessary, this must also be negotiated through QESCO / local authority approvals prior to the commencement of construction.

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

impacts at source in the first place. The QESCOs Site Engineer / Construction Supervising Consultant (Engineer) shall be responsible to update the cut and fill estimates and create Materials Master Plan to facilitate materials exchange between the different contracts in the Tranche-IV sub-projects to provide an overall balance for materials and minimize impacts on local resources.

4.5.3 Trees, Ecology & Protected Areas

114. Surveys have been made at all sub-project locations and whereas trees are present in some sub-stations but no tree in the grid yard area, there should not be any need for disturbance of trees in the Tranche-IV extension and augmentation sub-projects.

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

116. At this stage no areas require removal of woodland. However if specimen trees of religious plantations are affected the owners should be given the resources and opportunity to reinstate the woodland long term and a plantation compensation plan should be drawn up to replant the woodland / trees. In the event that the land is not suitable for plantation then other areas should be identified to replace the cut trees and sufficient areas should be identified to allow plantation of trees at a rate of say 3:1. The replacement 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.

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

4.5.4 Hydrology, Sedimentation, Soil Erosion

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

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

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

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

excessive dust. Therefore, dust control from works at this scale should be easy to achieve at little extra cost. In order to avoid complaints of dust nuisances, the following mitigation measures should be carried out as a matter of good housekeeping:

- Dust suppression facilities (back pack water sprayer) shall be available where earth and cement works are required.
- Areas of construction (especially where the works are within 20m of the SRs) shall be maintained damp by watering the construction area.
- Construction materials (sand, gravel, and rocks) and spoil materials will be transported in 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 & tuned and not emit dark or smoky emissions in excess of the limits described in the NEQS of GoP.

121. The need for large stockpiles should be minimized by careful planning of the supply of materials from controlled sources. If large stockpiles (>25m³) are necessary they should be enclosed with side barriers and covered with tarpaulins when not in use and at the end of the working day to enclose dust.

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

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

4.5.6 Noise, Vibration and Blasting

124. It is anticipated that powered mechanical equipment and some local labour 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 contractor for subproject should be requested by the construction supervision consultants (engineer) to provide evidence and certification that all equipment to be used for construction is fitted with the necessary air pollution and noise dampening devices to meet NEQS requirements.

Table 4.1 National Environmental Quality Standards for Noise

S No.	Category of Area/Zone	Effective from 1 st July, 2010				Effective from 1 st July, 2012	
		Limit in dB(A) Leq*					
		Day time	Night time	Day time	Night time		
1.	Residential are (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:

- i. Day time hours: 6 .00 am to 10.00 pm
- ii. Night Time hours: 10.00 pm to 6.00 am
- iii. 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 and courts.
- iv. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.
- v. dB(A) Leq: time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

125. Noise will be monitored at a distance of 100m from the boundary wall of any residential unit and should follow the NEQS 45dB (A)Leq. It is recommended that no construction should be allowed during night time (10PM to 6PM). Any noise equipment should be located within DGS or as far from SRs as possible to prevent nuisance to dwellings and other structures from operation. However, if the noise still exceeds NEQS then noise barriers will be installed around the equipment to reduce the effects of the noise.

126. 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 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.

4.5.7 Sanitation, Solid Waste Disposal, Communicable Diseases

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

128. In order to maintain proper sanitation around construction sites, the workforce will be allowed to use the flush toilets installed in the sub- station control house buildings & facilities. Vectors such as mosquitoes should not be a significant consideration bearing in mind the type and scale of works for the Tranche-IV extension and augmentation sub- projects.

4.6 POTENTIAL ENVIRONMENTAL IMPACTS IN THE OPERATIONAL PHASE

4.6.1 Air Pollution and Noise from the Enhanced Operations

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

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

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

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

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

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

4.7 Enhancement

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

5 INSTITUTIONAL REQUIREMENTS & ENVIRONMENTAL MANAGEMENT PLAN

135. In this section, the mitigation measures that are required, for Tranche-IV extension and augmentation sub-projects, to reduce residual impact to acceptable levels and achieve the expected outcomes of the project, are discussed. The Environmental Management Plan is based on the type, extent and duration of the identified environmental impacts for Tranche-IV extension and augmentation sub-projects. The EMP has been prepared following best practice and by reference to the ADB Environmental Assessment Guidelines 2011.

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

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

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

139. In order to facilitate the implementation of the EMP, during the preparation for the construction phase the QESCO 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. QESCO will need to make provision to engage trained environmental management staff and these staff should audit the effectiveness and review mitigation measures as the sub-projects are rolled out. QESCO 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.

140. The effective implementation of the EMP will be audited as part of the ADB Mid Term Review Mission of Loan Conditions and the Executing Agency must prepare for this at the inception stage.

141. The details of EMP given in the **Appendix-III** are for the Tranche-IV extension and augmentation sub-projects. The EMP matrix will be different for the more complicated sub-station and Transmission line projects that involve impacts to land outside the existing sub-stations and for which separate dedicated IEEs and EMPs should be prepared.

142. The impacts have been classified into those relevant to the Design / Preparation Stage, Construction Stage and Operational & Maintenance Stage. The matrix provides details of the mitigation measures recommended for each of the identified impacts, time span of the implementation of mitigation measures, an analysis of the associated costs and the responsibility of the institution. The institutional responsibility has been specified for the purpose of the implementation and the supervision. The matrix is supplemented with a monitoring plan for the performance indicators. An estimation of the associated costs for the monitoring is given with the plan. The EMP has been prepared following best practice and the ADB Environmental Assessment Guidelines 2011.

143. Presently, the QESCO Environmental & Social Safeguard (E&SS) Unit has one Environmental and one Social Impact expert under the supervision of a Deputy Manager Environmental and Social Safeguard (E&SS). The QESCO has shown much commitment to developing in-house environmental and social capability.

144. The Environmental staff specialist shall be:

- Working in the PMU with QESCO to ensure all statutory environmental submissions under PEP Act and other environmentally related legislation are thoroughly implemented;
- Working in the PMU with QESCO to ensure all environmental requirements and mitigation measures from the environmental assessment of sub-projects are included in the contract prequalification and bidding documents;
- Working with QESCO to execute any additional IEE and IEE requirements needed due to fine tuning of the sub-projects and that environmental performance targets are included in the contracts prior to project commencement;
- Working in the PMU with QESCO to ensure all environmental requirements and mitigation measures from the IEEs and IEEs and environmental performance criteria are incorporated in the sub- project contracts or variations and that the EMP is effectively implemented;
- Working with Management (consultants), Supervising Consultant and Contractors to manage and monitor the implementation of the project EMP.

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

- **Contractors:** responsible for carrying out the contractual obligations, implementing all EMP measures required to mitigate environmental impacts during construction; and
- **Other government agencies:** such as regional like BEPA 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.

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

147. The Monitoring Plan (**Appendix-III**) was designed based on the project cycle. During the pre-construction period, the monitoring activities will focus on:

- i. Checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included; and
- ii. Checking that the contract documents references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time. Where detailed design is required (e.g. for power distribution lines and avoidance of other resources) the inclusion and checking of designs must be carried out.

148. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, and some performance indicators will be monitored to record the sub-projects environmental performance and to guide any remedial action to address unexpected impacts.

149. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts. The potential to use local community group's contacts for monitoring should be explored as part of the activities in setting up the Environmental and Social Unit which should have regular meetings with the NGOs & APPs as a matter of good practice and to discuss matters of mutual concern.

150. At this stage, due to the modest scale of the new power distribution projects and by generally keeping to non-sensitive and non-critical areas the construction and operational impacts will be manageable. No insurmountable impacts are predicted providing that the EMP is implemented to its full extent and required in the contract documents. However, experience suggests that some

contractors may not be familiar with this approach or may be reluctant to carry out some measures. In order that the contractors are fully aware of the implications of the EMP and to ensure compliance, it is recommended that environmental measures be coasted separately in the tender documentation and that payment milestones are linked to environmental performance, *vis a vis* the carrying out of the EMP.

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

Table 5.1: Environmental Management Plan of Tranche-IV

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
DESIGN STAGE						
1. Flora and Fauna	To minimize damage to flora and fauna	1. Ensure that minimal flora is damaged 2. Ensure that fauna especially bird nesting's are not damaged	Before the commencement of construction activities/during design stage	Flora and Fauna sensitive locations	ES SMEC	ES QESCO
2. Hydrological Impacts	To minimize hydrological and drainage impacts during constructions.	1. Hydrological flow in areas where it is sensitive, such as water courses or bridges and culverts. 2. Design of adequate major and minor culverts facilities will be completed	Before the commencement of construction activities/during design stage	If lines or substation are relocated near water courses, culverts or bridges in the design stage reports	ES QESCO with the ES SMEC (Design Consultant)	ES QESCO
3. Noise barriers	Ensure cumulative noise impacts are acceptable in construction and operational phase.	1. Conduct detailed acoustic assessment for all residential, school, (other sensitive structures) within 50m of DGS and line. 2. If noise at sensitive receiver exceeds the permissible limit, the construction activities should be mitigated, monitored and controlled. 3. If noise at sensitive receiver exceeds the permissible limit, the design to include acoustic mitigation (noise barrier or relocation of noisy equipment) and monitoring.	1. During detailed design stage. No later than pre-qualification or tender negotiations. 2. Include acoustic specification in the contract.	Noise sensitive locations identified in the IEE/EIA/EMP or as required / approved by PEPA.	ES QESCO with the ES SMEC (Design Consultant)	ES QESCO and ES SMEC
4. Waste disposal	Ensure adequate disposal options for all waste including transformer oil, residually contaminated soils, scrap metal.	1. 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". 2. Include in contracts for unit rates for re-measurement for disposal. 3. Designate disposal sites in the contract and cost unit disposal rates accordingly.	1. Prior to detailed design stage no later than pre-qualification or tender negotiations 2. Include in contract.	QESCO ESU. Locations approved by EPA and QESCO and local waste disposal authorities.	ES QESCO with the ES SMEC (Design Consultant)	ES QESCO with the ES SMEC
5. Temporary drainage and erosion control	Include mitigation in preliminary designs for erosion control and temporary drainage.	1. Identify locations where drainage or irrigation crossing RoW may be affected by works. 2. Include protection works in contract as a payment milestone(s).	During designing stage no later than pre-qualification or tender negotiations.	Locations based on drainage or irrigation crossing RoW near DGS.	ES QESCO with the ES SMEC	ES QESCO with the ES SMEC
6. 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. Include preparation of EMP review and method statement WM plan, TD and EC Plan in contract as a payment milestone(s).	During tender preparation. No later than pre-qualification or tender negotiations In bidding documents as evaluation criteria.	Noise sensitive locations identified in the IEE/EIA/EMP or as required / approved by PEPA.	ES QESCO with the ES SMEC	ES QESCO with the ES SMEC

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
		Require environmental accident checklist and a list of controlled chemicals / substances to be included in the contractor's work method statement and tender documentation.				
CONSTRUCTION STAGE						
1. 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.	<ol style="list-style-type: none"> 1. Consideration of weather conditions when particular construction activities are undertaken. 2. Limitations on excavation depths in use of recharge areas for material exploitation or spoil disposal. 3. Use of landscaping as an integrated component of construction activity as an erosion control measure. 4. Minimizing the removal of vegetative cover as much as possible and providing for its restoration where construction sites have been cleared of such areas. 	<p>Prepare a thorough drainage management plan to be approved by CSC one month prior to a commencement of construction</p> <p>Proper timetable prepared in consideration with the climatic conditions of the area, the different construction activities mentioned here to be guided.</p>	<ol style="list-style-type: none"> 1. Locations of each construction activity to be listed by the CSC engineer. 2. Special locations are identified on the site by the contractor to minimize disturbances. 3. A list of locations of irrigation channels / drains to be compiled and included in the contract. 	ES Contractor	ES SMEC and ES QESCO
2. Orientation for Contractor, and Workers	To ensure that the CSC contractor and workers understand and have the capacity to ensure the environmental requirements and implementation of mitigation measures.	<ol style="list-style-type: none"> 1. QESCO ESU environmental specialist to monitor and progress all environmental statutory and recommended obligations. 2. Conduct special briefing for managers and / or on-site training for the contractors and workers on the environmental requirement of the project. Record attendance and achievement test for contractors site agents. 3. Agreement on critical areas to be considered and necessary mitigation measures, among all parties who are involved in project activities. 4. Continuous progress review and refresher sessions to be followed. 	<p>Induction course for all site agents and above including all relevant QESCO staff / new project staff before commencement of work.</p> <p>At early stages of construction for all construction employees as far as reasonably practicable.</p>	All staff members in all categories. Monthly induction and six month refresher course as necessary until contractor complies.	QESCO ES, Contractor and ES SMEC	ES QESCO with the ES SMEC .
3. Water quality	To prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are	<p>Compile temporary drainage management plan one month before commencement of works.</p> <ol style="list-style-type: none"> 1. Proper installation of temporary drainage and erosion control before works within 50m of water bodies. 			<ol style="list-style-type: none"> 1.ES Contractor 2. Contractor has to check water quality 	

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
	managed effectively. Ensure adverse impacts on water quality caused by construction activities are minimized.	<ol style="list-style-type: none"> 2. Proper maintenance and management construction of TD and EC measures, including training of operators and other workers to avoid pollution of water bodies by the considerate operation of construction machinery and equipment. 3. Storage of lubricants, fuels and other hydrocarbons in self-contained dedicated enclosures >50m away from water bodies. 4. Proper disposal of solid waste from construction activities. 5. Cover the construction material and spoil stockpiles with a suitable material to reduce material loss and sedimentation and avoid stockpiling near to water bodies. 6. Topsoil stripped material shall not be stored where natural drainage will be disrupted. 7. Borrow sites (if required) should not be close to sources of drinking water. 	1 month prior to construction.	<ol style="list-style-type: none"> 1. 50m from water bodies 2. Relevant locations to be determined in the detailed project design. 	and report to QESCO.	ES SMEC and ES QESCO review results
4. Air quality	To minimize dust effectively and avoid complaints due to the airborne particulate matter released to the atmosphere.	<p>CONTROL ALL DUSTY MATERIALS AT SOURCE.</p> <ol style="list-style-type: none"> 1. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations. (Relevant regulations are in the Motor vehicles fitness rules and Road Act). 2. Stockpiled soil and sand shall be slightly wetted before loading, particularly in windy conditions. 3. Fuel-efficient and well-maintained haulage trucks shall be employed to minimize exhaust emissions. 4. Vehicles transporting soil, sand and other construction materials shall be covered. Limitations to speeds of such vehicles necessary. Transport through densely populated area should be avoided. 5. To plan to minimize the dust within the vicinity of orchards and fruit farms. 6. Spraying of bare areas with water. 7. Concrete plants. to be controlled in line with statutory requirements should not be close to sensitive receptors. 	During all construction.	<ol style="list-style-type: none"> 1. Construction sites within 100m of sensitive receivers. 2. A list of locations to be included in contract and other sensitive areas identified by the CSC along the ROW during works. 	<p>Contractor should maintain acceptable standard.</p> <p>ES SMEC to supervise activities.</p>	QESCO ES / ES SMEC
5. Ground Vibration	To minimize ground vibrations during construction.	<ol style="list-style-type: none"> 1. Review requirements for piling and use of powered mechanical equipment within 100m of SRs. 2. Review conditions of buildings and conduct public consultation with SRs to establish less sensitive time for works involving piling and schedule works accordingly. 3. Non-percussive piling methods to be used wherever practicable. 4. Percussive piling shall be conducted in daylight hours. 	1 month prior to construction.	<ol style="list-style-type: none"> 1. Construction sites within 100m of sensitive receivers. 2. A list of locations to be included in contract and other sensitive areas 	<p>Contractor should maintain the acceptable standards</p> <p>ES SMEC to supervise relevant activities.</p>	QESCO ES / SMEC ES

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
		5. Hammer- type percussive pile driving operations shall not be allowed at night time.		identified by the CSC along the ROW during works.		
6. Noise	To minimize noise increases during construction.	<ol style="list-style-type: none"> 1. Review requirements for use of powered mechanical equipment within 100m of SRs. 2. Conduct public consultation with SRs to establish less sensitive time for works and schedule works accordingly. 3. All heavy equipment and machinery shall be fitted in full compliance with the national and local regulations and with effective silencing apparatus to minimize noise. 4. Heavy equipment shall be operated only in daylight hours. 5. Construction equipment, which generates excessive noise, shall be enclosed or fitted with effective silencing apparatus to minimize noise. 7. Well-maintained haulage trucks will be used with speed controls. 8. Contractor shall take adequate measures to minimize noise nuisance in the vicinity of construction sites by way of adopting available acoustic methods. 	1 month prior to construction.	<ol style="list-style-type: none"> 1. Construction sites within 100m of sensitive receivers. 2. A list of locations to be included in contract and other sensitive areas identified by the CSC along the ROW during works. 	<p>Contractor should maintain the acceptable standards</p> <p>ES SMEC to supervise relevant activities.</p>	QESCO ES / SMEC
7. Soil Erosion / Surface Run-off	<p>Prevent adverse water quality impacts due to negligence and ensure unavoidable impacts are managed effectively.</p> <p>To minimize soil erosion due to the construction activities of towers, stringing of conductors and creation of access tracks for project vehicles.</p>	<p>SCHEDULE WORKS IN SENSITIVE AREAS (e.g. NEAR RIVERS) FOR DRY SEASON</p> <ol style="list-style-type: none"> 1. In the short-term, temporary drainage and erosion control plan to be presented with tender. Temporary drainage and erosion control plan one month before commencement of works to protect all areas susceptible to erosion. (Permanent drainage works shall be in the final design). 2. Installation of TD and EC before works construction within 50m of water bodies. 3. Clearing of green surface cover to be minimized during site preparation. 5. Meaningful water quality monitoring up and downstream at any tower site during construction within a river or stream bed. Rapid reporting and feedback to CSC. 5. Back-fill should be compacted properly in accordance with QESCO design standards and graded to original contours where possible. 6. Cut areas should be treated against flow acceleration while filled areas should be carefully designed to avoid improper drainage. 7. Stockpiles should not be formed within such distances behind excavated or natural slopes that would reduce the 	1 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.	<ol style="list-style-type: none"> 1. Locations based on history of flooding problems indicated by local authorities. 2. A list of sensitive areas during construction to be prepared by the detail design consultant in consideration with the cut and fill, land reclamation, borrow areas etc. 3. Locations of all rivers, streams, culverts, irrigation channels, roads and roads. 	ES Contractor and ES SMEC	QESCO ES / SMEC ES

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
		stability of the slopes or cause slippage. 8. Measures shall be taken to prevent ponds of surface water and scouring of slopes. Newly eroded channels shall be backfilled and restored to natural contours. 9. Contractor should arrange to monitor and adjust working and adopt suitable measures to minimize soil erosion during the construction period. Contractor's TD and EC plan should be endorsed and monitored but CSC after consulting with concerned authorities. 10. Replanting trees to be done before the site is vacated and handed back to QESCO with appropriate trees (other vegetation cover as appropriate) to ensure interception of rainwater and the deceleration of surface run-off.				
8. Exploitation, Handling, Transportation and Storage of Construction materials	To minimize disruption and contamination of the surroundings, minimize and or avoid adverse environmental impacts arising out of construction material exploitation, handling, transportation and storage by using sources that comply with EPA license conditions	(consider also for future trances if civil works) 1. Use only EPA licensed sites for raw materials in order to minimize adverse environmental impacts. 2. Measures to be taken in line with any EPA license conditions, recommendations and approval to be applied to the subproject activities using the licensed source including: Conditions that apply for selecting sites for material exploitation. Conditions that apply to timing and use of roads for material transport. Conditions that apply for maintenance of vehicles used in material transport or construction. Conditions that apply for selection of sites for material storage. Conditions that apply for aggregate production. Conditions that apply for handling hazardous or dangerous materials such as oil, lubricants and toxic chemicals.	Month prior to starting of works. Update monthly.	1. List of borrow areas to be prepared with tender stage contractors method statement and updated one month prior to construction. 2. List of routes of transport of construction material is to be prepared for the contract and agreed one month prior to construction. 3. Map of locations of storage is prepared by the contractor.	ES Contractor and SMEC to agree format of reporting	QESCO ES / SMEC ES
9. Decommission and Waste Management	Minimize the impacts from the disposal of construction waste.	1. Waste management plan to be submitted to the CSC and approved by QESCO ESU one month prior to starting of works. WMP shall estimate the amounts and types of construction and decommissioning waste to be generated by the project. 2. Investigate ways and means of reusing/recycling decommissioned material from the project within PEPCO	One month prior to starting of works. Update monthly	1. Dumping: A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the	1. Contractor 2. SMEC ES and QESCO ESU should supervise and take action to ensure that contractor's complete relevant activities	QESCO/ ES SMEC

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
		without any residual environmental impact. 3 Identifying potential safe disposal sites close to the project, or those designated sites in the contract. 4 Investigating the environmental conditions of the disposal sites and recommendation of most suitable and safest sites. 5. Piling up of loose material should be done in segregated areas to arrest washing out of soil. Debris shall not be left where it may be carried by water to downstream flood plains, dams, lagoons or other water bodies. 6. Used oil and lubricants shall be recovered and reused or removed from the site in full compliance with the national and local regulations. 7. Oily wastes must not be burned. Disposal location to be agreed with local authorities/EPA. 8. Waste breaker insulating oil to be recycled, reconditioned, or reused at DISCO's facility. 9. Machinery should be properly maintained to minimize oil spill during the construction. 10. Machinery should be maintained in a dedicated area over drip trays to avoid soil contamination from residual oil spill during maintenance. 11 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.	One month prior to starting of works. Update monthly	contract stage for agreement A list of temporary stockpiling areas and more permanent dumping areas to be prepared at the contract stage for agreement (in WM Plan)	according to EIA / IEE / EMP requirement & NEQS.	
10. 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.	1. Identify location of work camps in consultation with local authorities. The location shall be subject to approval by the QESCO. If possible, camps shall not be located near settlements or near drinking water supply intakes. 2. Cutting of trees shall not be permitted and removal of vegetation shall be minimized. 3. 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. 4. 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 permission. 5. The Contractor shall organize and maintain a waste separation, collection and transport system.	UPDATE Once a month	Location Map is prepared by the Contractor.	Contractor	QESCO ESU / CSC

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
		<p>6. The Contractor shall document that all liquid and solid hazardous and non-hazardous waste are separated, collected and disposed of according to the given requirements and regulations.</p> <p>7. At the conclusion of the project, all debris and waste shall be removed. All temporary structures, including office buildings, shelters and toilets shall be removed.</p> <p>8 Exposed areas shall be planted with suitable vegetation.</p> <p>9. QESCO and Construction Supervising Consultant shall inspect and report that the camp has been vacated and restored to pre-project conditions.</p>				
<p>11. Loss of Trees and Vegetation Cover of the Areas for Towers and Temporary Work-space</p>	<p>To avoid negative impacts due to removing of landmark, sentinel and specimen trees as well as green vegetation and surface cover.</p>	<p>Tree location and condition survey to be completed one month before tender.</p> <p>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.</p> <p>Clearing of green surface vegetation cover for construction, borrow of soil for development, cutting trees and other important vegetation during construction should be minimized by careful alignment. Written technical Justification for tree felling included in tree survey.</p> <p>At completion all debris and waste shall be removed and not burned.</p> <p>The contractor's staff and labour 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 works timber.</p> <p>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.</p> <p>The contractor will plant three (3) suitable new trees outside the 30 meter corridor of the transmission line in lieu of one (1) tree removed.</p> <p>Landscaping and road verges to be re-installed on completion. Compensatory planting of trees/shrubs/ornamental plants (at a rate of 3:1) in line with best international practice.</p> <p>After work completion all temporary structures, including office buildings, shelters and toilets shall be removed.</p>	<p>Route design and site identification (1 & 2) during design stage and other matters during construction of relevant activities</p>	<p>Tree survey to be completed one month before tender at relevant Locations with a Map to be compiled prior to tender by the design consultant / QESCO ESU during detailed design and CSC to update as necessary.</p>	<p>SMEC ES and ES Contractor</p>	<p>QESCO ES / SMEC ES</p>
<p>12. Safety Precautions</p>	<p>To ensure safety of</p>	<p>Providing induction safety training for all staff adequate</p>	<p>Prior to commencement and</p>	<p>Location to be</p>	<p>ES Contractor</p>	<p>ES QESCO/</p>

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
for the Workers	workers	warning signs in health and safety matters, and require the workers to use the provided safety equipment. Providing workers with skull guard or hard hat and hard toe shoes.	during construction	identified by the CSC with contractor.		ES S/MEC
13. Traffic Condition	Minimize disturbance of vehicular traffic and pedestrians during haulage of construction materials and equipment.	Submit temporary haul and access routes plan one month prior to start of works. Routes in vicinity of schools and hospitals to be avoided.	Prior to and throughout the construction.	The most important locations to be identified and listed. Relevant plans of the Contractor on traffic arrangements to be made available.	ES Contractor	QESCO ESU / CSC
14. Social Impacts	To ensure minimum impacts from construction labour force. on public health.	Potential for spread of vector borne and communicable diseases from labour camps shall be avoided (worker awareness orientation and appropriate sanitation should be maintained). 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.	Complaints of public to be solved as soon as possible	All subprojects all tranches	ES Contractor ES QESCO	ES QESCO
15. Institutional Strengthening and Capacity Building	To ensure that QESCO officials are trained to understand and to appreciate EMP	Capacity building activities were taken by Environmental Officer in Tranche 1. Environmental Management Unit (EMU) was setup with in QESCO under Chief Engineer Development in Tranche 1. Development of strengthening plan for the EMU should be taken up with resources.	Initiate preconstruction and continue beyond project completion.	Awareness training for all management and senior staff in QESCO at senior engineer and above in PMU and related units.	QESCO ESU	QESCO & ADB
OPERATIONAL STAGE						
1. Air Quality	Minimize air quality impacts	No significant Impacts Tranche 1. Monitor designs and plans for all future tranches.	Operational phase	all subprojects in future tranches	ES QESCO	QESCO ESU
2.Noise	Minimize noise impacts	No significant Impacts Tranche 1. Acoustic designs checking and plan for all future tranches.	Operational phase	all subprojects in future tranches	ES QESCO	QESCO ESU
3. Waste disposal	Minimize improper waste disposal	Continue waste management arrangements in operational phase of all subprojects and QESCO activities.	Operational phase	all subprojects in future tranches	ES QESCO	QESCO ESU
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	ES QESCO	QESCO ESU
4.Land slides and soil erosion	Avoid landslips and loss of productive land	No significant Impacts in Tranche 1. Review designs checking and plan for all future tranches.	Operational phase	all subprojects in future tranches	ES QESCO	QESCO ESU

Environmental concern	Objectives	Mitigation Measures recommended	Timing to implement MM	Locations to implement MM	Responsibility for Implementation.	Responsibility for Monitoring
5. Water quality	Minimize water quality impacts	No significant Impacts in Tranche 1. Review designs checking and plan for all future tranches.	Operational phase	all subprojects in future tranches	ES QESCO	QESCO ESU
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	ES QESCO	QESCO ESU
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 DXLs..	Operational phase	all subprojects in future tranches	ES QESCO	QESCO ESU

ADB = Asian Development Bank, AP = affected people, DDS = detailed design stage, EIA = Environmental Impact Assessment, EMP= environmental management action plan, BEPA= Baluchistan Environmental Protection Agency, = Environmental and Social Implementation, GSS = Grid Substation, IOL = Inventory of Losses, LAC = Land Acquisition Collector, LARP = land acquisition and resettlement plan, MM = mitigating measure, NGO = nongovernment organization, PCB = Polychlorinated Biphenyls, PEPA = Pakistan Environmental Protection Act 1997 (as regulated and amended), REA = Rapid Environmental Assessment, ROW = right of way, RRP = Report and Recommendation of the President, SF6 = sulfur hexafluoride, SR = sensitive receiver, TD = temporary drainage, VDC = Voluntary District Committee, WB = World Bank.

Notes:

Based on EIA/IEE reports to be revised at DDS, RAP, SIA and other engineering considerations may change.

6 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

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

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

6.1 GRIEVANCE REDRESSAL MECHANISM

154. In order to receive and facilitate the resolution of affected peoples' concerns, complaints, and grievances about the project's environmental performance an Environmental Grievance Redress Mechanism (GRM) will be established the project. The mechanism will be used for addressing any complaints that arise during the implementation of projects. In addition, the GRM will include a proactive component whereby at the commencement of construction of each project (prior to mobilization) the community will be formally advised of project implementation details by Environment Specialist of DISCO, Environment Specialist of SMEC, the design and supervision consultant (DSC) and Environmental Specialist of the contractor (designs, scheduled activities, access constraints etc) so that all necessary project information is communicated effectively to the community and their immediate concerns can be addressed. This proactive approach with communities will be pursued throughout the implementation of each project.

155. 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.

6.2 REDRESS COMMITTEE, FOCAL POINTS, COMPLAINTS REPORTING, RECORDING AND MONITORING

156. The Grievance Redress Mechanism, which will be established at each project level is described below.

157. EA will facilitate the establishment of a Grievance Redress Committee (GRC) and Grievance Focal Points (GFPs) at project location prior to the Contractor's mobilization to site. The functions of the GRC and GFPs are to address concerns and grievances of the local communities and affected parties as necessary.

158. The GRC will comprise representatives from local authorities, affected parties, and other well-reputed persons as mutually agreed with the local authorities and affected persons. It will also comprise the Contractor's Environmental Specialist, SMEC's Environmental Specialist and PIU Safeguards/Environmental specialist. 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 Grievance Redress Mechanism (GRM).

159. EA will assist affected communities/villages identify local representatives to act as Grievance Focal Points (GFP) for each community/village.

160. 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.

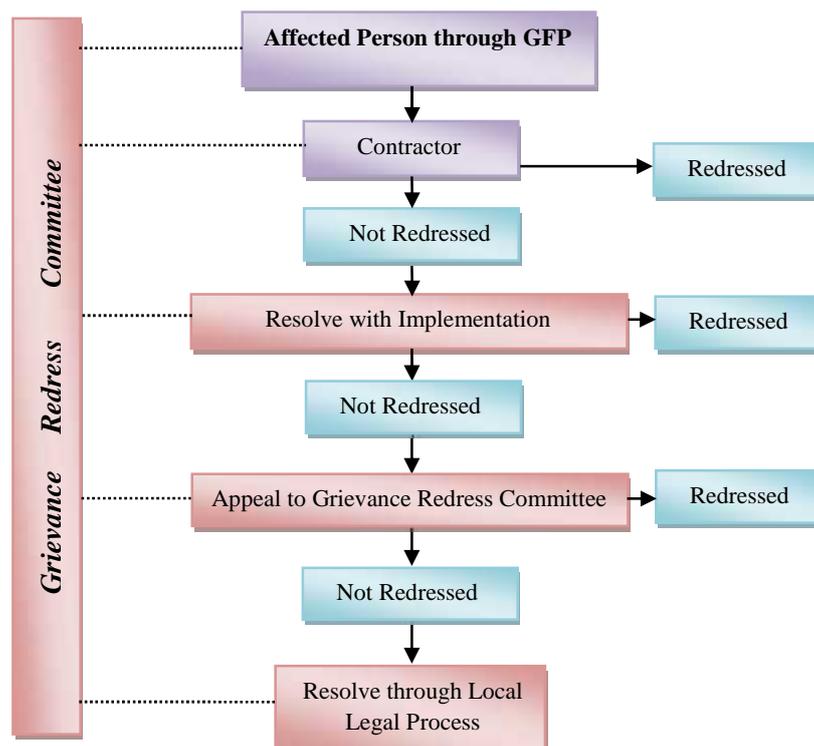
161. A pre-mobilization public consultation meeting will be convened by the EA Environment Specialist and attended by GFPs, contractor, DSC, PIU representative and other interested parties (e.g. District level representatives, NGOs). The objectives of the meeting will be as follows:

- (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) Identification of members of the Grievance Redress Committee (GRC)
- (v) Elicit and address the immediate concerns of the community based on information provided above.

162. Following the pre-mobilization public consultation meeting, environmental complaints associated with the construction activity will be routinely handled through the GRM as explained below and shown on **Figure 6.1**:

- (i) Individuals will lodge their environmental complaint/grievance with their respective community's nominated GFP.
- (ii) The GFP will bring the individual's complaint to the attention of the Contractor.
- (iii) The Contractor will record the complaint in the onsite Environmental Complaints Register (ECR) in the presence of the GFP.
- (iv) The GFP will discuss the complaint with the Contractor and have it resolved;
- (v) If the Contractor does not resolve the complaint within one week, then the GFP will bring the complaint to the attention of the DSC's Environmental Specialist. The DSC's Environment Specialist will then be responsible for coordinating with the Contractor in solving the issue.
- (vi) If the Complaint is not resolved within 2 weeks the GFP will present the complaint to the Grievance Redress Committee (GRC).
- (vii) The GRC will have to resolve the complaint within a period of 2 weeks and the resolved complaint will have to be communicated back to the community. The Contractor will then record the complaint as resolved and closed in the Environmental Complaints Register.
- (viii) Should the complaint not be resolved through the GRC, the issue will be adjudicated through local legal processes.
- (ix) In parallel to the ECR placed with the Contractor, each GFP will maintain a record of the complaints received and will follow up on their rapid resolution.
- (x) 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 6.1 Grievance Redress Mechanism



7 FINDINGS RECOMMENDATIONS AND CONCLUSIONS

7.1 FINDINGS AND RECOMMENDATIONS

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

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

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

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

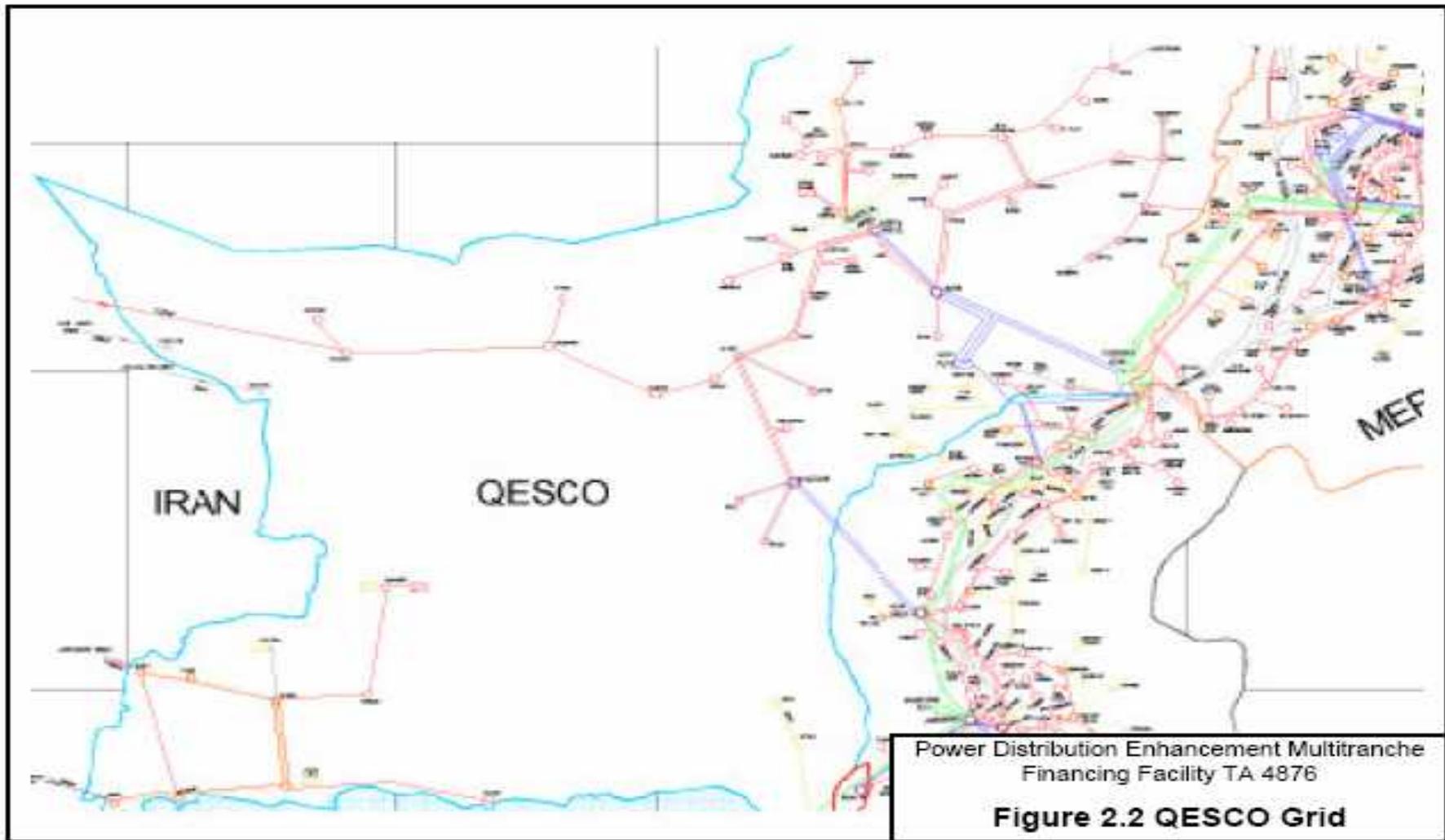
167. During the commissioning phase waste disposal monitoring should ensure that statutory requirements have been met. Monitoring activities during project operation will focus on periodic recording environmental performance and proposing remedial actions to address any unexpected impacts.

7.2 CONCLUSION

168. There are no insurmountable environmental impacts for the Tranche-IV extension and augmentation sub-projects that are feasible and sustainable options from the power distribution, engineering, environmental, and socioeconomic points of view.

169. Implementation of the EMP is required and the environmental impacts associated with the sub-project need to be properly mitigated, and the existing institutional arrangements are available. Additional human and financial resources will be required by the QESCO to complete the designs and incorporate the recommendations effectively and efficiently in the contract documents, which should be linked to payment milestones. The proposed mitigation and management plans are practicable but require additional resources.

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



Appendix-II: Photographs of the DGS Locations

Photograph 1: Subproject Sariab Grid



Photograph 2: Subproject Quetta Grid



Photograph 3: Subproject Gidder



Photograph 4: Subproject Kalat



Appendix-III: Environmental Monitoring Plan of Tranche-IV

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

Summary of EMP Cost for Implementation Tranche IV Sub-projects

Activities	Description	Estimated Cost	
		Pak. Rs.	US \$
Staffing, audit and monitoring	1 person for 3 years		
Monitoring activities	As detailed under EMP		
Mitigation measures	As prescribed under EMP and IEE		
Transport	1 dedicated vehicle 3 years		
Contingency	Contingency		
	Total		

1 US\$ = 00 Pak. Rupees

Appendix-IV: REA Checklist

Instructions:

- i. The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.
- ii. This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- iii. Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures

Country/Project Title	Pakistan / Power Distribution Enhancement Investment Program-Tranche-IV
Sector/Division	Power Distribution/QESCO
Subproject Type and Name	Name: 132 kV Kuchlak Type: Extension

Screening Questions	Yes	No	Remarks
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?		0	
Cultural heritage site		0	
Protected Area		0	
Wetland		0	
Mangrove		0	
Estuarine		0	
Buffer zone of protected area		0	
Special area for protecting biodiversity		0	
B. Potential Environmental Impacts			
Will the Project cause...			
Encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?		0	
Encroachment on precious ecosystem (e.g. sensitive or protected areas)?		0	

Screening Questions	Yes	No	Remarks
Alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?		0	
Damage to sensitive coastal/marine habitats by construction of submarine cables?		0	
Deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?		0	
Increased local air pollution due to rock crushing, cutting and filling?		0	
Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		0	
Chemical pollution resulting from chemical clearing of vegetation for construction site?		0	
Noise and vibration due to blasting and other civil works?		0	
Dislocation or involuntary resettlement of people?		0	
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		0	
Social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?		0	
Hazardous driving conditions where construction interferes with pre-existing roads?		0	
Creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?		0	
Dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?		0	
Environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?		0	
Facilitation of access to protected areas in case corridors traverse protected areas?		0	
Disturbances (e.g. noise and chemical pollutants) if herbicides are used to control		0	

Screening Questions	Yes	No	Remarks
vegetative height?			
Large population influx during project construction and operation that cause increased burden on social infrastructure and services (such as water supply and sanitation systems)?		0	
Social conflicts if workers from other regions or countries are hired?		0	
Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		0	
Risks to community safety associated with maintenance of lines and related facilities?		0	
Community health hazards due to electromagnetic fields, land subsidence, lowered groundwater table, and salinization?		0	
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		0	
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and lines) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		0	

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunamis or volcanic eruption and climate changes (see Appendix I)?	0		Earthquakes
Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?		0	
Are there any demographic or socio-economic aspects of the Project area that are already		0	

vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?			
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?		0	