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POWER EVACUATION FROM QUAID-E AZAM SOLAR PARK AT LAL-SUHANRA STEP I: DUE DILIGENCE



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POWER EVACUATION FROM QUAID-E AZAM SOLAR PARK AT LAL-SUHANRA: STEP I DUE DILIGENCE

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ACRONYMS

AEAI	Advanced Engineering Associates International
D/C	Double Circuit
ECNEC	Executive Committee of National Economic Council
EPP	Energy Policy Program
GOP	Government of Pakistan
GS	Grid Station
IDC	Interest during Construction
IFI	International Financial Institutions
kV	Kilovolts
MEPCO	Multan Electric Power Company
MW	Mega Watts
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission and Despatch Company
S/C	Single Circuit
T/L	Transmission Line
UoSC	Use of System Charges
USAID	United States Agency for International Development
USG	United States Government

I. PREFACE

USAID’s Energy Policy Program (EPP) is a multiyear initiative that increases power generation, decreases losses, and increases cost recovery in Pakistan’s power sector. The EPP works with selected energy infrastructure and the Government of Pakistan (GOP) to facilitate reform efforts with technical assistance and new technology. Activities undertaken by EPP are mostly demand driven with input from USAID and the GOP implementing partners. The “USG Energy Strategy for Pakistan” called for large, highly visible power generating projects and power plant rehabilitation programs that would make significant additions to power supply.

Advanced Engineering Associates Inc. (AEAI) is the implementing partner of EPP and is contracted under USAID contract AID-EPP-I-00-03-0004-00; Task Order No. AID-391-TO-12-0002. The three major components of EPP are:

- Monitoring and supporting Pakistani counterpart management in the implementation of approved and funded G2G projects.
- Supporting policy reform and providing advice/support to the Ministry of Water and Power (MWP), Ministry of Petroleum and Natural Resources (MPNR), Ministry of Finance (MOF), and Planning Commission (PC) in the implementation of the Power Sector Reform Program.
- Conducting due diligence for new projects being considered for USG support.

As part of EPP’s efforts, this Stage I due diligence report is intended to assist USAID’s decision to conduct further due diligence as a precursor to possible USG funding to support implementation of the 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra.

2. EXECUTIVE SUMMARY

2.1 BACKGROUND

This document acts as the first of a two-step evaluation process for the 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra in district Bahawalpur. Step 1 reviewed the existing documents for adequacy to apply selection criteria and make a recommendation to USG. The selection criteria are based on technical feasibility, cost and overall approach. USAID tasked AEA I to conduct the Step 1 due diligence and confirm the facts from NTDC and MEPCO, evaluate whether the project meets the USAID criteria described below, highlight any particular risk or concern that needs to be mitigated or addressed, and to make recommendations. EPP’s findings relating to the power evacuation from the 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra Project are summarized in the table below:

Technical Feasibility	
Will the proposed intervention actually contribute significantly to meeting Pakistan’s energy and other vital development needs, while improving the country’s energy security?	Yes, 1000 MW will significantly increase power supply, in turn improving the country’s energy security.
Does project use domestic or imported resources?	Domestic
Does the project result in energy diversification?	Yes. This would be the first renewable energy project to significantly contribute to Pakistan’s energy supply.

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Costs	
Is the cost reasonable?	EPP's conclusion is the cost is very reasonable.
Can the project's full financing be arranged in a timely fashion?	With contribution from USAID through the EPP, this project can be financed quickly.
Overall Effect	
Is the project high visibility?	Yes. This would be the largest renewable energy project in Pakistan.
Is it a high priority for Pakistan?	Yes, the project's significant contribution to the energy supply makes it a high priority.
Will the power generated and other benefits be worth the time and money?	Yes.

2.2 DETAILS

As part of the assistance to be provided by USAID under Component IV, the Government of Punjab has requested funds for NTDC and MEPCO, for the construction of Transmission lines and all associated projects to evacuate power from the 1000 MW Solar Park in to the national grid.

In order to mitigate the power shortage in the country, the Government of Punjab developed a plan to install 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra in district Bahawalpur. This mega project, covering a total area of about 11,300 acres is scheduled for completion in 2015. This will be the first mega project of renewable energy in Pakistan and will add an environment-friendly source of energy to the power system. The project execution is planned in three phases:

Phase I:	100 MW
Phase II:	300 MW
Phase III:	1000 MW

Evacuation of power from first 400 MW (Phase I & II) will be through 132 kV interconnection arrangements which will be implemented and operated by Multan Electric Power Company (MEPCO). The project originally planned at Yazman has been shifted to a new location near Suhanra Park, in order to get closer to the existing 132 kV Lal Suhanra-Bahawalpur transmission line already under construction by MEPCO and due for completion by January 2014. The shift considerably reduced the length, costs, and time required for implementation of Phase I & II of the transmission line bringing that into MEPCO's own budgetary limit. MEPCO has requested financing for construction of 40km long 132 kV Bahawalpur-Lodhran transmission line only.

Arrangements for evacuation of remaining 600 MW (Phase III) solar powers will be the responsibility of the National Transmission and Despatch Company (NTDC). NTDC will construct a 40km long 220kV Bahawalpur-Lal Suhanra transmission line along with 220kV Grid Station Lal Suhanra and allied 132 kV T/L for interconnection of the generated power to the 220 kV grid station.

The combined PC-1 covering both MEPCO & NTDC section of transmission interconnection has been approved by Secretary Water and Power and submitted to the Planning Commission. It is anticipated the project will be an agenda item for the Executive Committee of National Economic Council (ECNEC) in their December 2013 meeting.

The load flow studies for the proposed interconnection scheme have been performed and show that the scheme with the proposed network modifications will be sufficient for dispersal of the 1000 MW solar power into the national grid.

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The total cost of the transmission projects required for the power dispersal from the plant is estimated to be US \$ 38.72 million. USAID has been requested to provide the funding for the transmission projects. It is the opinion of AEAI that the requested funding costs appear to be very reasonable. The payback period is approximately 4.5 years and the economic and financial rates of return are 22.9% and 19.27% respectively. The time for implementation under USAID support is 9 months for Phase II and Phase III will take about 2 years.

The Quaid-e-Azam Solar Power Park is a high priority project of the Government of Punjab. The Quaid-e-Azam Solar Power Park will improve and enhance overall reliability, voltage profile and power supply position in the country; specifically in MEPCO area. The connection of this power plant to the national grid will facilitate dispersal of 1000 MW to the national grid and will bridge the demand supply gap to help decrease the severe load shedding problem in Pakistan. The Quaid-e-Azam Solar Power Park is highly visible and needs to be a funding priority so that the transmission project works could be completed before the commissioning of the generation plant.

3. PROJECT SUMMARY/OVERVIEW

Name of Project	Evacuation of Power from 1,000 MW Quaid-e-Azam Solar Park at Lal-Suhanra
Location	District Bahawalpur, Punjab
Sponsoring Agency	Ministry of Water and Power
Executing Authority	1. Multan Electric Power Company (MEPCO) 2. National Transmission and Despatch Company (NTDC)
Description of the Project	The project consists of three phases. Phase I & II will allow the dispersal of 400 MWs from the solar park in to the National grid through an interconnection arrangement at 132 kV level i.e. via 132 kV Lal-Suhanra-Bahawapur-Lodhran Double Circuit Transmission Line. Phase III will allow a further 600 MWs to be evacuated via (i) 220kV Lal-Suhanra-Bahawalpur twin bundle Double Circuit Transmission Line (ii) 220 kV Lal Suhanra Grid station and allied 132kV transmission lines (24 km).
Scope of the Project	Government of Punjab has requested USAID EPP to support their scope by funding all the associated transmission improvements required for phase II & III from Solar Park to National Grid.
Commencement Date	November 2013
Completion Date	September 2015
Total Estimated Cost	US\$ 36.38 Million
Mode of Financing	Seeking financing from USAID, USG, under EPP.

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4. PROJECT DESCRIPTION

Currently the country is facing severe load shedding due to power shortages and a demand supply gap. Bulk power generation is required to be added in to the National Grid to overcome the problem. In response, the Government of Punjab has planned to install 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra in district Bahawalpur in three phases.

Phase I: 100 MW

Phase II: 300 MW

Phase III: 600 MW

The power dispersal scheme for 400MWs under phase I and II will be implemented and operated by MEPCO.

Phase I consists of a 4km long 132 kV double circuit transmission line on Rail conductor for interconnection of first 100MW with the 132kV Bahawalpur-Lal Suhanra transmission line. This interconnection will only take 45 days to complete once the 2x50MW solar plant are installed and MEPCO will construct it from their own resources. The 132kV Bahawalpur-Lal Suhanra Transmission Line is under construction and is expected to be commissioned within two months.

Phase II consists of one component:

1. 132 kV transmission line from Bahawalpur New to Lodhran (40km).

MEPCO will construct the component 1 and 2 from their own resources while they are seeking financial assistance for component 3.

Phase III, to be implemented and operated by NTDC, is shown below:

1. A new 220/132kV Grid Station at Solar Park near Lal Suhanra.
2. 220kV Transmission Line from Solar Park to Bahawalpur. (40km)
3. Three 132kV Transmission Lines, for connecting individual solar projects to 220 kV Lal Suhanra Grid Station within the Solar Park. (8km each)
4. Extension at 220kV GS Bahawalpur.

NTDC is seeking financing from USAID for Phase III, under the EPP. NTDC has been entrusted by Punjab Power Development Board (PPDB), Govt. of Punjab, vide **Memo No. : PPDB/313/2013 Dated 11.09.2013** (Attached in Annex V) to prepare power evacuation scheme for this project.

The total costs for each sub-project is given in the table below:

S. No.	Description	Estimated Cost in Million PKR			
		Local	FEC	Duty	Total
1.	132 kV double circuit transmission line on Rail conductor from Bahawalpur New to Lodhran & looping In/Out of one circuit at 132 kV Baghdad-ul- Jaded Grid Station (46km)	251.84	156.88	11.76	420.48
2.	Extension at 132 kV Bahawalpur New Substation (two line bays)	1.72	15.99	1.20	18.91
3.	Extension at 132 kV Baghdad-ul-Jaded Substation (two line bays)	1.72	15.99	1.20	18.91
4.	220kV Grid Station at Lal Suhanra Solar Park with 3 x 250MVA, 220/132 kV Power T/F along with allied equipment and accessories.	94.29	877.15	65.79	1037.23
5.	220kV D/C Transmission Line on twin-bundled Rail conductor from Lal Suhanra Solar Park to 220kV GS Bahawalpur (40km)	324.19	544.94	40.87	910.00
6.	132kV D/C Transmission Line on Rail conductor from Solar Projects's site to 220kV Collector GS at Lal Suhanra (24km)	149.47	97.70	7.33	254.50
7.	Extension at 220kV GS Bahawalpur	5.70	53.00	3.98	62.68
8.	General items (residential and non-residential buildings, engineering & consultancy, transportation, security, insurance, administration, contingencies, security arrangements etc.)	239.20	70.78	0.00	309.98
9.	Interest during construction	787.45	0.00	0.00	787.45
	SUBTOTAL in Million PKR	1,855.58	1,832.43	132.13	3820.14

5. PROJECT SCOPE

Scope of work for project is as follows:

Name of Project	Scope of Work
Evacuation of Power from 1000 MW Quaid-e-Azam Solar Park At Lal-Suhanra	<p>Phase II:</p> <p>132 kV double circuit transmission line on Rail conductor from Bahawalpur New to Lodhran & looping In/Out of one circuit at 132 kV Baghdad-ul- Jaded Grid Station (46km)</p> <p>Phase III:</p> <p>220 kV Grid Station at Lal-Suhanara with 3x250MVA, 220/132kV transformers along with allied equipment and accessories.</p> <p>220 kV D/C transmission line on twin bundled Rail conductor from 220 kV Lal-Suhanra to 220kV Bahawalpur Grid Station (40km).</p> <p>Three 132 kV D/C transmission lines on Rail conductor from Solar projects sites to 220kV Grid Station at Lal-Suhanra (8 km each).</p>

Maps showing the interconnection scheme for the evacuation of Power from 1000MW Solar Park at Lal Suhanra are given in Annex I, II & III.

5.1 LOAD FLOW STUDIES

Load Flow studies have been conducted by the NTDC Planning Department to ascertain the impact of the project on the NTDC system. The load flow studies are based on the following assumptions:

- Latest load forecast
- Latest generation expansion plan
- Latest transmission expansion plans of NTDC and DISCOs
- The 132 kV and 11 kV capacitors proposed by MEPCO have been incorporated in the studies
- The system is assumed to be operating in an interconnected manner; however, some line openings have been assumed at some parts of the network as per system requirements.

In the studies, the following reinforcements have been assumed as per system requirement of MEPCO network:

1. By-passing of existing 132 kV S/C from Bahawalpur old to Lodhran at the following substations:
 - a. Baghdad-ul-Jaded substation
 - b. Lodhran substation.
2. Capacitor Bank of 36 MVAR proposed at 132 kV Hasilpur substation in year 2015.

The following line openings have been proposed in MEPCO network during Phase-I for reliable operation during the time when solar power is available;

1. Hasilpur – Chishtian T/L

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The above lines should be switched on when solar generation is not available. The following line openings have been proposed in MEPCO network during Phase-II for reliable operation during the time when solar power is available;

1. Kahrora Pakka – Mailsi T/L
2. Hasilpur – Ludden T/L

The above lines should be switched on when solar generation is not available.

The following line openings have been proposed in MEPCO network during Phase-III for reliable operation during the time when solar power is available;

1. Hasilpur – Chistian-New T/L
2. Hasilpur – Ludden T/L
3. Bahawalpur-Old – Miranpur T/L
4. Lodhran – P.Gain T/L
5. Kahrora Pakka – Mailsi T/L

The above lines should be switched on when solar generation is not available.

5.2 PEAK LOAD AUGUST - SEPTEMBER 2014

A load flow study for peak load condition of August - September 2014 under normal system condition has been performed and is available at NTDC in their PC1 document. According to the load flow study, power from these solar power projects can be evacuated to the 132 kV system of MEPCO under normal and contingency condition without any transmission constraint. Therefore, the loading of the transmission lines and transformers as well as system voltage profile will remain within limits.

5.3 PEAK LOAD AUGUST - SEPTEMBER 2015

A load flow study for the peak load condition of August - September 2015 under normal system condition is available at NTDC in their PC1 document. In Phase-3, the power from the additional twelve solar power projects (50 MW each) with a total gross capacity of 600 MW from Quaid-e-Azam solar park has been evacuated through the 132 kV lines to the 220/132 kV grid station within solar park and then from 220 kV grid station to Bahawalpur 220 kV grid station through 220 kV D/C transmission line.

The load flow study found that power from these solar power projects can be evacuated to the National Grid under normal and contingency conditions without any transmission constraints.

5.4 CONCLUSIONS

The power from the solar park can be evacuated to the system through the proposed interconnection schemes in Phase-1, Phase-2 and Phase-3. The necessary network rearrangements and reinforcements in MEPCO network as mentioned in the study assumptions are required for the reliable dispersal of 1000 MW (gross capacity) from the solar power projects in the Quaid-e-Azam Solar Park at Lal-Suhanra.

Estimated period for implementation of Phase II and Phase III are 9 months and 24 months respectively. The schedule for project execution for the two phases is shown below.

Figure 1: Schedule of Execution for Phase II

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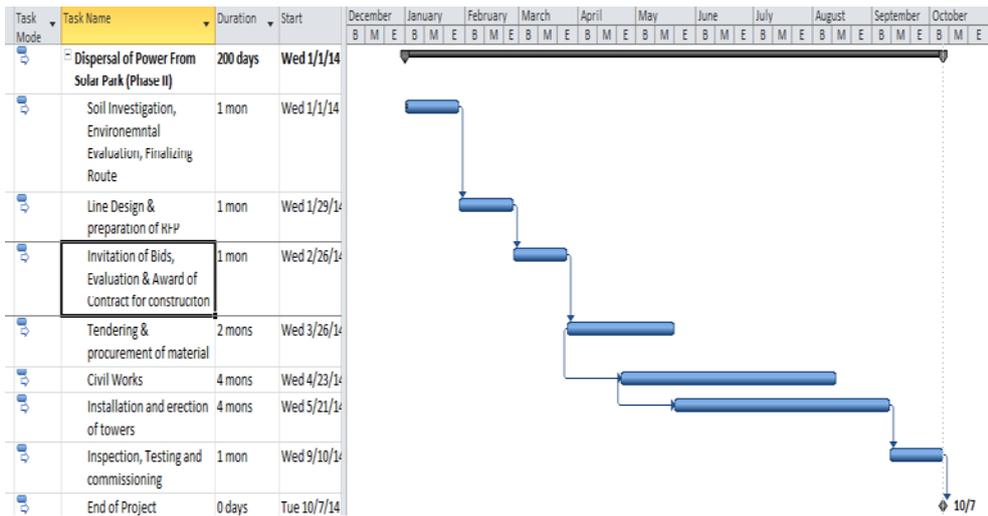
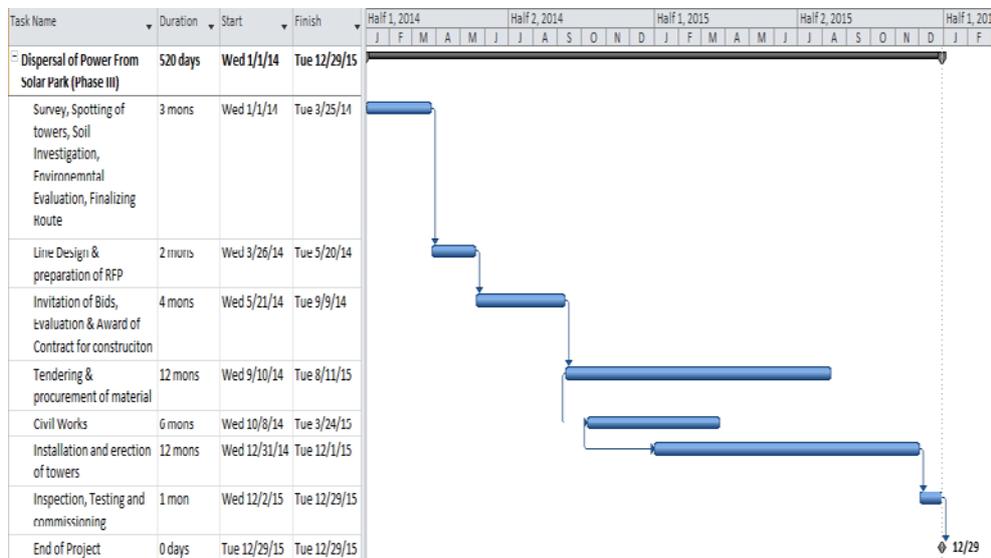


Figure 2: Schedule of Execution for Phase III



6. COST AND BENEFITS

The projects would cost approximately US \$ 36.38 million, as detailed below:

S. No.	Description	Total Cost in Million Rs.			
		Local	FEC	Duty	Total
Cost Calculation of Phase II					
132 kV D/C T/L Bahawalpur New to Lodhran with In/Out at 132 kV Baghdad-ul-Jaded GS (46km)					
1.	Right of way procurement and clearing	2.00	0.00	0.00	2.00
2.	Steel Towers	89.77	0.00	0.00	89.77
3.	Conductor	0.00	122.81	9.21	132.02
4.	Overhead Ground Wire (OPGW)	0.00	16.56	1.24	17.80
5.	Insulator Strings	11.58	0.00	0.00	11.58
6.	Insulator Hardware, Grounding Material, Stringing & Construction equipment and accessories	0.00	17.51	1.31	18.82
7.	Civil Works @ 25%	67.50	0.00	0.00	67.50
8.	Erection @ 30%	81.00	0.00	0.00	81.00
Extension at 132 kV Substations					
1.	Extension at 132 kV Bahawalpur New Substation (Two line bays consisting circuit breakers, isolators, CTs, PTs, LAs, Control & protection equipment, other allied equipment and civil works @ 10%)	1.72	15.99	1.20	18.91
2.	Extension at 132 kV Baghdad-ul-Jaded Substation (Two line bays consisting circuit breakers, isolators, CTs, PTs, LAs, Control & protection equipment, other allied equipment and civil works @ 10%)	1.72	15.99	1.20	18.91
Cost Calculation of Phase III					
Cost Calculation of 220kV Lal Suhanra GS					
220 kV Equipment					
1.	Land (to be provided by the Govt. of Punjab)	0.00	0.00	0.00	0.00
2.	Two 220 kV line bays and three T/F bays with three 250MVA T/Fs consisting circuit breakers, isolators, CTs, PTs, LAs, control & protection and other allied equipment	0.00	727.05	54.53	781.58
132 kV Equipment					
1.	Six 132 kV line bays and one T/F bay with 6.3MVA Aux. T/Fs, circuit breakers, isolators, CTs, PTs, LAs, control & protection equipment and other allied equipment	0.00	150.10	11.26	161.36
2.	Civil works and erection @ 10%	94.29	0.00	0.00	94.29
	SUBTOTAL in million PKR	99.99	930.15	69.77	1099.91
Extension at 220 kV Bahawalpur					
1.	220 kV Equipment including: 2 line bays with 3, 250MVA T/Fs	0.00	53.00	3.98	56.98
2.	Civil works and erection @ 10%	5.70	0.00	0.00	5.70
	SUBTOTAL in million PKR	5.70	53.00	3.98	62.67
220 kV D/C T/L from Lal Suhanra Solar Park to 220 kV Bahawalpur GS (40 km)					
1.	Right of Way Procurement and Clearing	2.00	0.00	0.00	2.00
2.	Steel Towers	0.00	174.14	13.06	187.20
3.	Conductor	0.00	230.63	17.30	247.93

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S. No.	Description	Total Cost in Million Rs.			
		Local	FEC	Duty	Total
4.	Overhead Ground Wire (OPGW)	0.00	10.93	0.82	11.75
5.	Insulator Strings	0.00	32.80	2.46	35.26
6.	Insulator Hardware, Grounding Material, Stringing & Construction equipment and accessories	0.00	25.36	1.90	27.26
7.	Spare Parts including T&P	0.00	71.08	5.33	76.41
8.	Civil Works @ 25%	146.45	0.00	0.00	146.45
9.	Erection @ 30%	175.74	0.00	0.00	175.74
	SUBTOTAL in million PKR	324.19	544.94	40.87	910.00
132 kV D/C T/L from Solar Power Project Sites to 220 kV Collector GS at Lal Suhanra (24 km)					
1.	Right of way procurement and Clearing	2.55	0.00	0.00	2.55
2.	Steel Towers	50.58	0.00	0.00	50.58
3.	Conductor	0.00	78.48	5.89	84.37
4.	Overhead Ground Wire (OPGW)	0.00	9.32	0.70	10.02
5.	Insulator Strings	6.53	0.00	0.00	6.53
6.	Insulator Hardware, Grounding Material, Stringing & Construction equipment and accessories	0.00	9.90	0.74	10.64
7.	Civil Works @ 25%	41.17	0.00	0.00	41.17
8.	Erection @ 30%	48.64	0.00	0.00	48.64
	SUBTOTAL in million PKR	149.47	97.70	7.33	254.50
General					
1.	Non-residential buildings	28.50	0.00	0.00	28.50
2.	Office furniture & equipment	5.00	0.00	0.00	5.00
3.	Transportation and vehicles	14.90	0.00	0.00	14.90
4.	Residential colony	56.35	0.00	0.00	56.35
5.	Engineering & Consultancy @ 2%	15.93	31.46	0.00	47.39
6.	Administration & supervision @ 2%	47.39	0.00	0.00	47.39
7.	Contingencies @ 2.5%	19.92	39.32	0.00	59.24
8.	Security arrangements @ 1%	23.69	0.00	0.00	23.69
9.	Inland transportation and handling charges etc. @ 1%	15.73	0.00	0.00	15.73
10.	Insurance @ 0.5% of equipment cost	7.86	0.00	0.00	7.86
11.	L/C opening charges @ 0.25% of equipment cost	3.93	0.00	0.00	3.93
	SUBTOTAL in million PKR	239.20	70.78	0.00	310.29
	Interest during construction	787.45	0.00	0.00	787.45
Grand Total in Million PKR					3,820.14
Grand Total in Million US \$					36.38

The source of the quoted cost of equipment has been prepared on the basis of recent contracts awarded by NTDC for with an exchange rate of: 1 US\$ = Rs. 105

6.1 PAYBACK:

The following assumptions have been made:

1. NTDC's use of system charges to the tune of Rs. 102.45 per kW per month as determined by NEPRA have been used for NTDC revenue/benefit purposes.
2. Total transmission losses are assumed to be 20%
3. The industrial load is 20% of total load
4. The economic benefit due to industrial users is 200 Rs./kWh

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5. Cost of project \$36.38 million USD
6. Cost for installing solar power plant = 2.5 million USD/MW
7. Loading factor of solar power plant = 0.25

NTDC payback per annum = 1200 million Rs.

No. of households benefitting from 1000 MW = 1.67 million

Benefit to economy = 70,080 million Rs. per annum

6.2 ECONOMIC BENEFITS ASSOCIATED WITH TRANSMISSION

Economic Benefits associated with Transmission = 1,051.12 million Rs./annum

6.3 INTERNAL RATES OF RETURN

1. The analysis is based on constant values (i.e. UoSC) as well as operations and management costs during the project's useful economic life. Variation in power and energy cost, taxes, and duties etc. imposed by the GOP will be treated as pass through items.
2. NTDCL Use of System Charge to the tune of Rs 102.45 per kW per month as determined by NEPRA has been used for NTDC revenue/benefit purposes.
3. The project's useful economic life is assumed to be 40 years.
4. The interest rate of 14% for local cost and 17% for foreign exchange components have been used for IDC/Amortization purposes.
5. Nominal Discount rates of 10% & 12% have been used for Net Present Value calculations.
6. Solar Park losses of 14 % and transmission losses @ 3% have been used for arriving at the net power.
7. If the project is delayed, then the cost of the project will escalate by 6.5% each year.

Based on the above assumptions, the Base Case Financial and Economic analysis have been carried out and detailed calculations are given in the table below:

	Results of		
	Financial (IFRR)	Economic (IERR)	Sensitivity Analysis
Internal Rate of Return	19.27%	22.90%	18.14%
Net Present Value	3121.93	23681.19	2903.46
Benefit to Cost Ratio	1.82	5.80	1.72
Payback Period (years)	4.63	3.56	4.00

6.4 SOCIAL BENEFITS

The country's energy demand continuously increases due to the momentum of economic activities in the agricultural sector and increased manufacturing. Fast urbanization increased the household demand for electricity where households are using a greater number of electrical appliances. With the

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development of the Solar Power Plant, tube well electrification, which provides additional water for irrigation and thereby increasing crop areas and production, creates additional demand for electricity. Additional social benefits include:

- Increased electricity availability will provide an incentive for the establishment of new industries and create employment opportunities throughout Pakistan.
- Providing a basic electricity infrastructure in rural areas deter large scale migration of rural labor force to urban centers.
- The requirements of power demand for accelerated villages/ rural electrification program will be adequately met.

In the overall analysis, the improvement in ecological environments coupled with higher production will bring about substantial economic gains for the people living in the project area.

6.5 ENVIRONMENT AND RESETTLEMENT

The project involves the construction of transmission lines. Detailed environmental impact assessment studies will be carried out by USAID EPP during the design phase of the project.

During construction, maximum efforts will be made to mitigate the possible environmental hazards. Efforts include:

- The work on the project will be carried out in a manner so that the impact is minimal on natural landscape, forests, crops, wild life, livestock, both private and public buildings, archaeological centers and buildings of historical significance.
- Effective coordination will be maintained with the concerned local authorities to ensure that the route of new transmission line will be selected to have minimum environmental impact on urban and rural areas.
- The construction equipment used on this project will have acceptable noise limits.
- Adequate safety standards will be followed to minimize the hazards, to human life and property.
- NTDC's design and protective specifications provide for reliable safety by specifying suitable clearances for transmission lines.
- Proper occupational health safety practices will be adopted in the installation and maintenance of the project facilities.
- An initial environmental examination report will be provided by MEPCO and NTDC.
- Environmental Mitigation and Monitoring plan (EMMP) and IEE can be undertaken by EPP if so desired by USAID.

7. STATUS, RECOMMENDATIONS, AND RISKS

7.1 STATUS

The Solar Park is expected to be commissioned by December 2015 and is a top priority project of the Government of Punjab. The site for the Solar Park was changed from Yazman to Lal Suhanra keeping in view its close proximity to the under construction 132 kV Lal Suhanra - Bahawalpur D/C transmission line, in turn decreasing the transmission project cost. The generation plant is planned for implementation as per following schedule:

AEAI

Step 1 Due Diligence: Evacuation of Power From 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra
November 2013

- 100 MW by March 2014
- 300 MW by November/December 2014
- 600 MW December 2015

The site covering a total area of 11,300 acres for the generating plant has been finalized (Annex IV) and the land surfacing works have been started for the residential complex of the project. The main access road for transportation (9km) has been leveled to a great extent. For soil investigation works, the consultants ECS have sub-contracted M/s AJK and the work is in progress.

The progress of the three phases under the power dispersal project is at the following stages:

1. Phase I (100 MW)
 - a. The Purchase Order for the required material has been issued by MEPCO under its own resources.
 - b. Exact location of terminal points has yet not been intimated to MEPCO.
 - c. No funds are requested from USAID for this phase.
 - d. The 132 kV T/Line from 132 kV GS Lal Suhanra to Bahawalpur is already under construction by MEPCO is near completion and is expected to be commissioned by January 2014.
 - e. The 132 kV GS Lal Suhanra will be commissioned by January 2014.
2. Phase II (300 MW)
 - a. Tenders for procurement of material have been invited and will be opened on 11/11/2013; however, the contract award will be made on receipt of required funds
 - b. The line profile of 31 km of the 132 kV Bahawalpur New – Lodhran T/Line has been submitted to Chief Engineer (Design) NTDC Lahore for scrutiny and approval
 - c. Seeking financing for phase II
3. Phase III (600 MW)
 - a. The PC-1 (also containing MEPCO part of works) has been approved by Secretary Water & Power and sent to the planning commission. Approval by ECNEC is expected in its meeting proposed in early December 2013.
 - b. No financing is available.

7.2 RECOMMENDATIONS

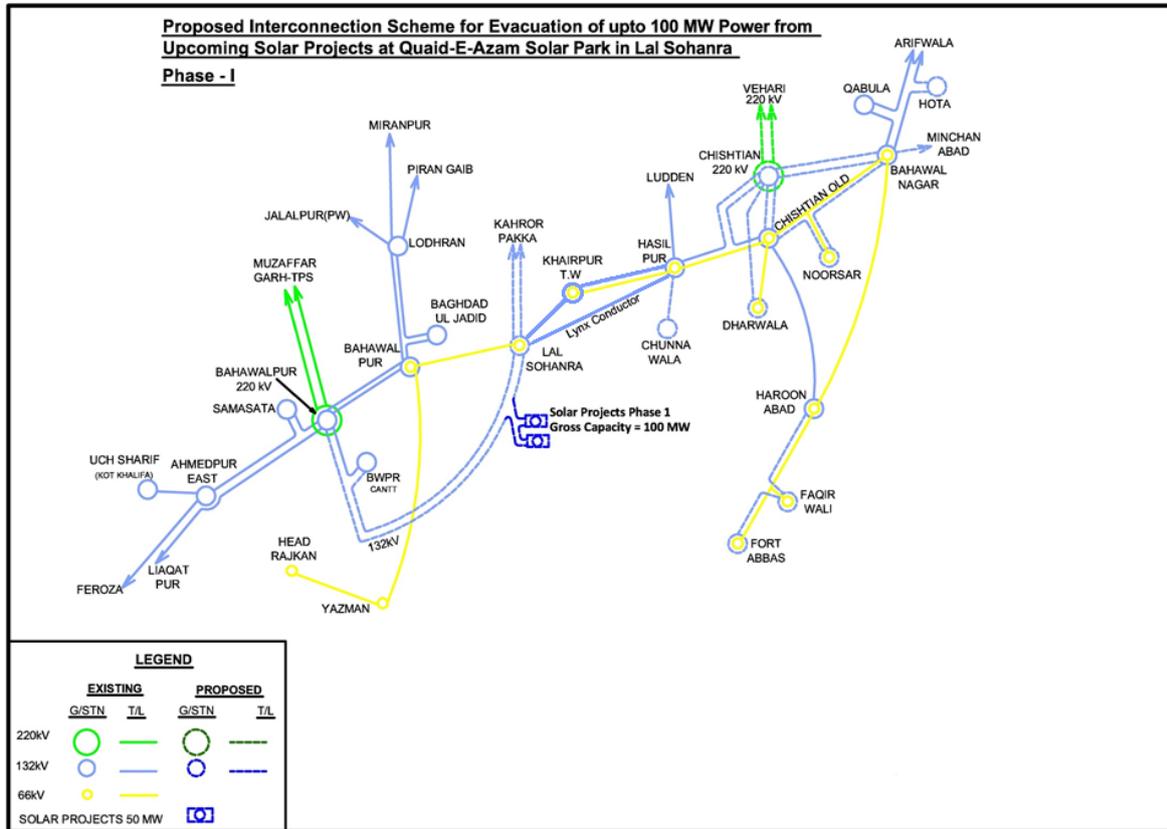
The associated transmission lines for all power generation projects are required to be commissioned 3 months before the commissioning of the power plant. This project is of high visibility and will ensure availability of 1000 MW of power to the people of Pakistan.

7.3 RISKS AND ISSUES

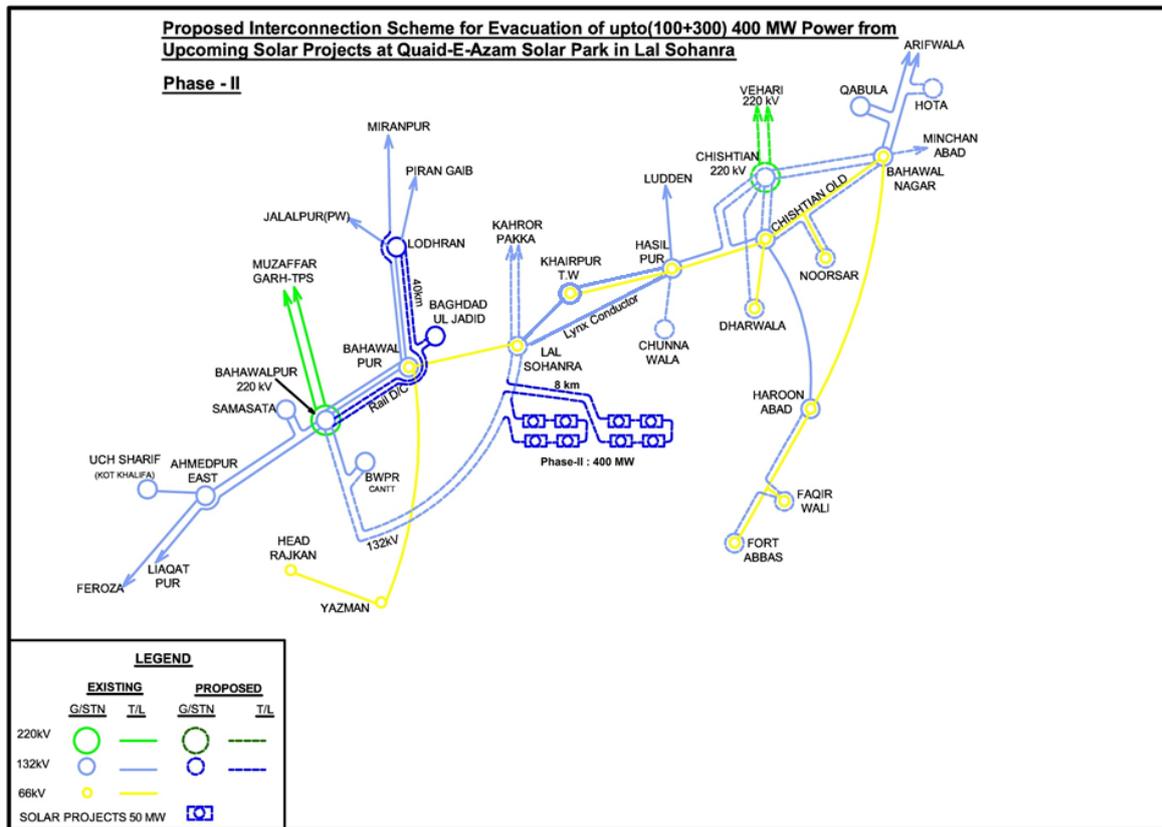
The success of this project is linked with the progress of implementation schedule of the proposed Generation Plant at Lal Suhanra.

8. ANNEXES

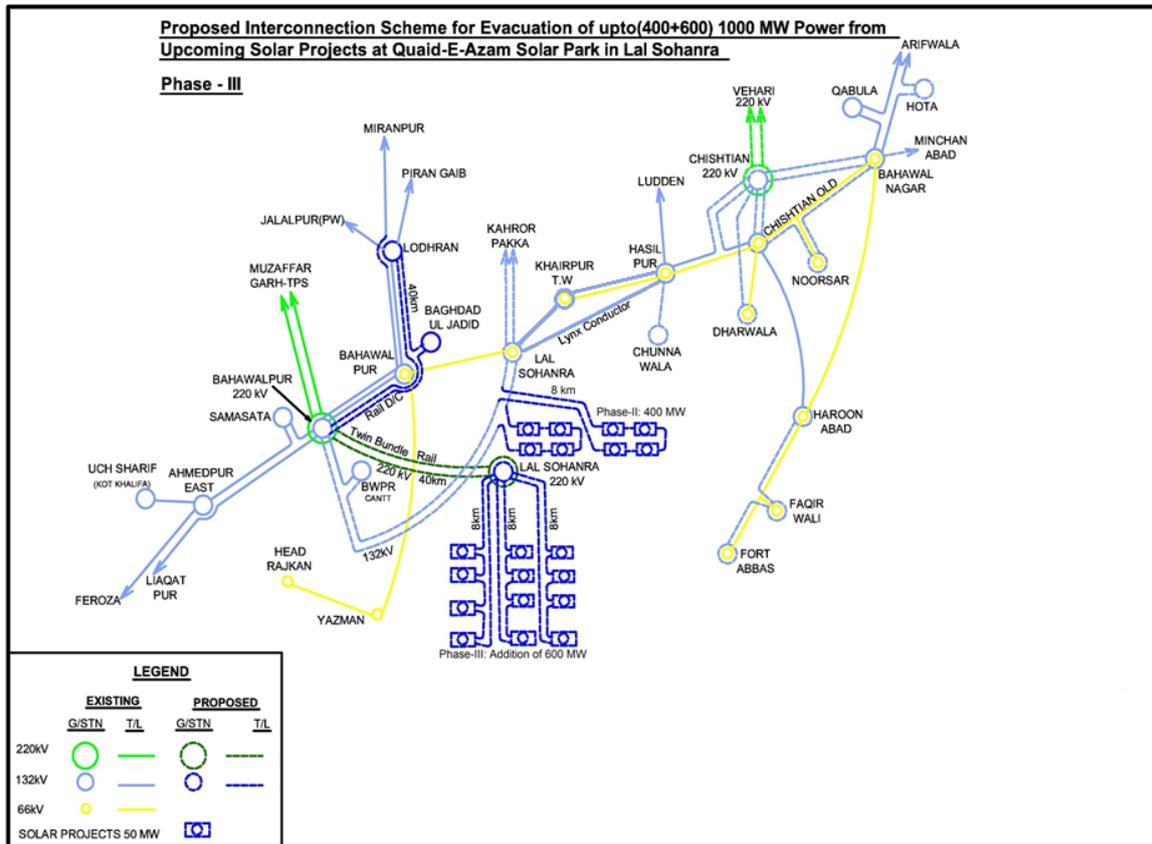
8.1 ANNEX I: PHASE I - EVACUATION OF 100 MW



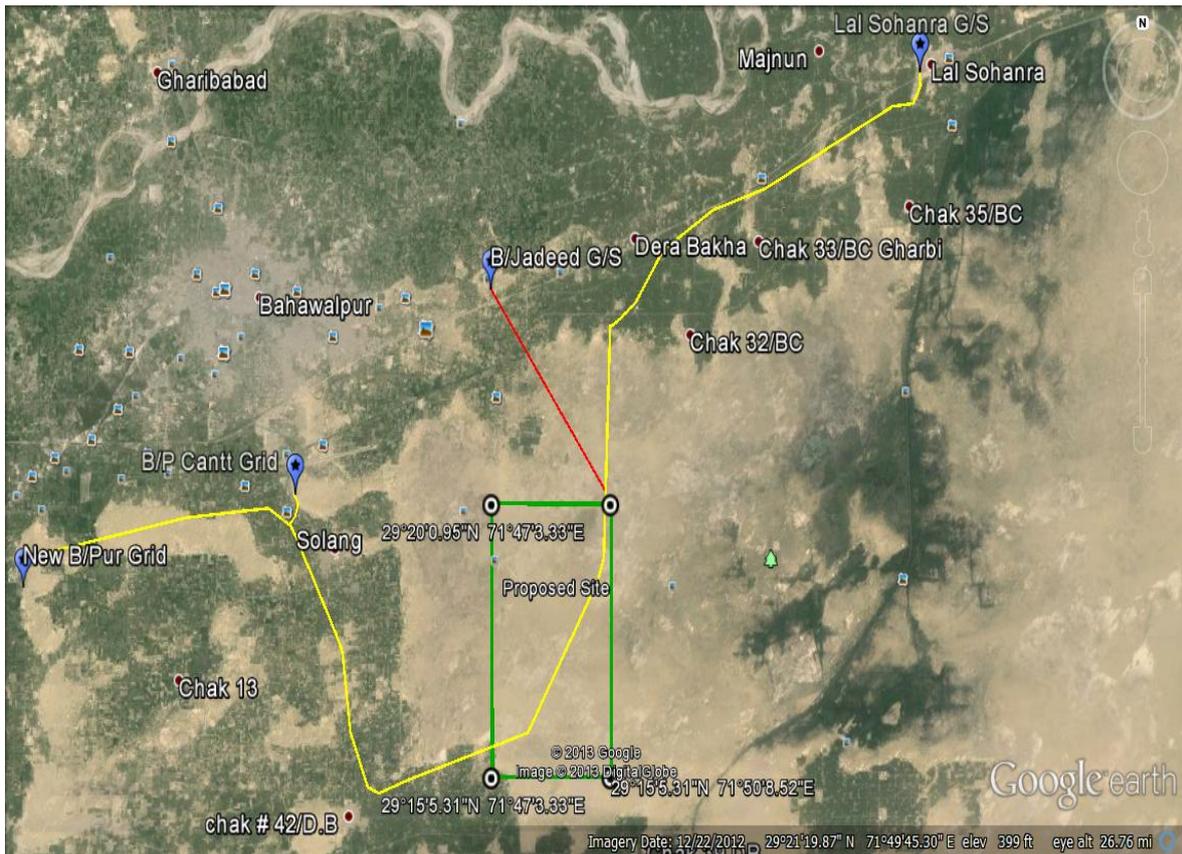
8.2 ANNEX II: PHASE I & II - EVACUATION OF 400 MW



8.3 ANNEX III: PHASE I, II & III - EVACUATION OF 1000 MW



8.4 ANNEX IV: SITE FOR SOLAR PARK AND LAL SUHANRA – BAHAWALPUR 132 KV TRANSMISSION LINE



AEAI

Step 1 Due Diligence: Evacuation of Power From 1000 MW Quaid-e-Azam Solar Power Plant at Lal Suhanra
November 2013

8.5 ANNEX V: PPDB MEMO NO. PPDB/313/2013

redacted

Energy Policy Program

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