Environmental and Social Impact Assessment

Project Number: 45915
October 2011

IND: DAHANU SOLAR POWER PROJECT

Prepared by Dahanu Solar Power Private Limited

ENVIRONMENT and SOCIAL IMPACT ASSESMENT STUDY REPORT For

DAHANU 40 MW PHOTOVOLTAIC (PV) SOLAR POWER PROJECT At Dhursar Village, Pokharan Tehsil, Jaisalmer District, Rajasthan

DAHANU SOLAR POWER PRIVATE LIMITED

DHURSAR, RAJASTHAN

Reliance Power
Anil Dhirubhai Ambani Group

August, 2011

TABLE OF CONTENTS

Table of Contents

LIST OF ACRONYMS

ADA	Anil Dhirubhai Ambani
ADB	Asian Development Bank
BSI	Botanical Survey of India
CCE	Chartered Construction Engineer
CDM	Clean Development Mechanism
CEI	Chief Electric Inspector
CER	Certified Emission Reduction
CFE	Consent for Establishment
CFO	Consent for Operation
COD	Commercial Operating Date
DSPPL	Dahanu Solar Power Pvt. Ltd.
EHS	Environment Health & Safety
EIA	Environment Impact Assessment
EPA	Environment Protection Act
EPFI	Equator Principles Financial Institutions
ESIA	Environmental and Social Impact Assessment
ESMC	Environment & Social Management Cell
FPRE	Fire Protection Research Foundation
GHG	Green House Gas
GRM	Grievance Redressal Mechanism
GoI	Government of India
IFC	International Finance Corporation's
IGNP	Indira Gandhi Nahar Pariyojna
LA	Land Acquisition
MNRE	Ministry of New and Renewable Energy

MoEF	Ministry of Environment & Forest
PV	Photo Voltaic
RPCB	Rajasthan Pollution Control Board
RPO	Renewable Purchase Obligation
RREC	Rajasthan Renewable Energy Corporation
SEIAA	State Environment Impact Assessment Authority
SERC	State Electricity Regulatory Commissions
SPCB	State Pollution Control Board
SPV	Solar Photo Voltaic
UMPPs	Ultra Mega Power Projects
ZSI	Zoological Survey of India

EXECUTIVE SUMMARY

INTRODUCTION

Reliance Power is a public, limited liability company incorporated under the Companies Act, 1956 in India. Reliance Power is a well-capitalized, listed group company of Reliance ADA Group, established to develop, construct and operate power projects, domestically and internationally.

Reliance power currently is executing two Solar and one Wind projects. Reliance ADA group already has close to 100 MW of Wind capacity operational mainly in Tamil Nadu, Gujarat, Karnataka & Maharashtra. Currently, Reliance power is developing 200 MW of Wind power at Vashpet, Maharashtra. In Solar, Reliance power is also developing a Concentrated Solar power project in Rajasthan whose expected date of commissioning is May 2013.

Dahanu Solar Power Pvt. Ltd. (DSPPL) a 100% subsidiary of Reliance Power Limited is planning to set up Solar PV Power Project of the capacity of 40 MW (in first phase), at Village- Dhursar, Tehsil Pokhran, Jaisalmer District of the state of Rajasthan, India. DSPPL has signed a PPA with Reliance Infrastructure Ltd, Mumbai for a 40 MW Solar PV Power Plant herein referred to as "The Project" and required to commission the plant by March 2012.

Project at a Glance

S. No	Particulars	Descriptions
1.	Project site	Village- Dhursar
2.	Tehsil	Pokaran
3.	District Name	Jaisalmer
4.	Name of the State	Rajasthan
5.	Latitude:	26^0 45' 46.37" N
6.	Longitude:	72^0 00' 50.81'' E
7.	Road Accessibility:	Non-Asphalt Motor able road is attached to the Site. Motor able Asphalt road is 5KM away from the site. NH-114 is 10 KM from the site.
8.	Nearest airport:	Jodhpur – 170 KM
9.	Nearest Town:	Pokaran – Teshil head quarter – 25KM.
10.	Nearest City:	Jaisalmer – 180KM, Jodhpur – 170KM
11.	Land available:	140 Hec.
12.	Water Requirement:	0.146 MLD
13.	Daily Global Solar Irradiance	5.65 kWh/m^2
14.	Daily Diffuse Solar Irradiance	2.01 kWh/m^2
15.	Annual Global Solar Irradiance	2063 kWh/m^2

16.	Annual Diffuse Solar Irradiance Land availability (Hectares) Type of system	732 kWh/m^2 140 Fixed tilt (20 degree)
17.	Type of PV modules	Thin Film
18.	Proposed capacity	40 MW
19.	Capacity of each module proposed	80 Wp / any other compatible size
20.	Model of solar PV module	FS-377
21.	Total number of PV Modules	534000
22.	Inverter Model	Power One PVI 500 TL
23.	Annual electricity supplied to grid	7,38,04,200.0 kWh
24.	Plant load factor (%)-First Year	21.06 %
25.	Project Cost	Rs 683 Cr.

Benefits due to Proposed Project

The proposed Project brings in multifold advantages. Not only does it produce clean, pollution free energy, it also has the capacity to provide employment to the people living in and around that area. It has the capacity of turning Rajasthan which is a harsh, barren land into a clean energy producing hub which will be emulated by the other states of India.

OBJECTIVE OF THE ESIA STUDY

The objective of Environmental and Social Impact Assessment (ESIA) is to prepare a document based on anticipated Environmental Impact due to setting up of 40MW Photo voltaic based Solar Power Project and to applicable local and national regulations.

The proposal is for PV based Solar power project and there are no potentially significant adverse and irreversible social and environmental impacts. Therefore, according to the findings of the environmental and social impact assessment study conducted with respect to the establishment of the Project and a review of the broad Equator Principles criteria and requirements for the classification of Category 'A', 'B' & 'C' projects has indicated that the Dhursar Solar Power Project is more closely aligned **to 'Category B'** project due to limited adverse social or environmental impacts and these are limited to site-specific, largely reversible and readily addressed through mitigation measures.

LEGAL POLICIES & INSTITUTIONAL FRAMEWORK

The Solar Photovoltaic Power Projects are not covered under the ambit of EIA Notification, 2006 and hence, no environmental clearance is required. Hence, it does not require preparation of Environmental Impact Assessment Report and pursuing Environmental Clearance from Central Government or State Level Environmental Impact Assessment Authority. Further, Rajasthan State Pollution Control Board has included PV Projects under "Green category" for consent to establish/operate mechanism.

The environmental regulations, legislations and policy guidelines and control for the proposed project are governed by various Government agencies. The principal environmental regulatory agency in India is Ministry of Environment and Forest (MoEF), Delhi. The important legislations governing the proposed Project are given below:

The key environmental legislations pertaining to the proposed operations include:

- The Water (Prevention and Control of Pollution) Act, 1974;
- The Air (Prevention and Control of Pollution) Act, 1981;

- The Environment Protection Act, 1986, Rules there under (with amendments);
- Land Acquisition Act
- Aravalli ESA Notification, 1992 and its Amendments
- Batteries (Management and Handling) Rules, 2001
- Indian Labour Laws
- National Environmental Appellate Authority Act 1997
- Wildlife Protection Act 1980
- National Policy on Resettlement and Rehabilitation of Project Affected families 2007
- Electricity Act 2003

Besides this, the project shall meet the National Ambient Air Quality Standards (NAAQS), Ambient Noise Standards and Effluent Discharge Standards set by CPCB.

PROJECT DESCRIPTION

Land

The land requirement for the Project is 140 ha. The break-up of land requirement is given below:

Area Break-up Details

Particulars	Area in Ha
PV module area	102
Balance of plant	18
Open area	20
Total	**140**

Water

The water requirement for the project is very less. The main consumption of the water is for solar module cleaning purpose. The water requirement is 0.146 MLD.

No. of Solar module	5,34,000
Area of individual module	0.72Sq.mtr
Water required to clean each module	5 litres
Number of cycles per year	20No.s
Total water requirement	53,400m^3 / year
Total water required in MLD	0.146MLD

WASTE WATER TREATMENT AND DISPOSAL SYSTEM

DSPPL has planned to use the wiping method for cleaning PV modules instead of sprinkle system. This will not only substantially reduce the water requirement of the Project, but also the water discharge from the project. Since the water is used for PV module cleaning purpose, the drain water collected after cleaning the solar modules would be passed through a sump with a baffle wall to arrest the suspended solids if any. Water runoff / discharge from the panels is likely to be absorbed into the arid ground below the panels, and no drainage canal is required. The discharge water does not include any chemical or hazardous material and hence no treatment is required.

POWER EVACUATION

The power generated from the proposed solar power plant shall be evacuated through 220KV transmission line to 220kV Dechu Sub-Station of RRVPNL. The power generated from the proposed solar PV power plant at LT level shall be stepped up first to 33 kV level through suitably rated transformers & then to 220 kV level through 33/220 kV step-up transformers. The power from the PV project shall be evacuated through proposed 220 kV transmission line to Dechu substation.

BASELINE ENVIRONMENT

The proposed Solar PV project is proposed near Dhursar village in Pokaran Tehsil of Jaisalmer District, Rajasthan, is in western part of Rajasthan which falls under 'Hot and Dry' Climatic Zone1 of the country. An area within 2 km around the project can be considered as influence zone and hence it has been taken as study area to understand even setting in the vicinity of the proposed project. However, as the environmental setting is arrived based on secondary data, all available data has been used for the purpose of Environmental understanding.

There are no water bodies or perennial river near project area. No forest area is near project site. The sparse distribution of xerophytic vegetation is observed near the study area. There is no any wildlife sanctuary within 25 km of project area. The Desert National Park is at distance of 75 km from the proposed project site.

ENVIRONMENTAL & SOCIAL IMPACT & MANAGEMENT PLAN

The ESMP has been designed within the framework of requirement under Indian legislation and ADB Safeguard Policy Statement (2009) on environmental and socio-economic aspects for construction and operation phases of the proposed project. It has also been designed to comply with IFC Performance Standards for other lenders to the project.

The transmission lines for the proposed project are also covered. The mitigation measures to be adopted for the implementation of the proposed project include the following:

- Environmental Management Plan;
- Rainwater Harvesting;
- Clean Development Mechanism;
- Occupational Health and Safety;
- Labour Working Conditions;
- Construction Labour Management;
- Environmental Action and Monitoring Plan;
- Community Development Plan;
- Public Consultation and Information Disclosure Plan;
- Grievance Redressal Mechanism;
- Disaster Management Plan
- Resettlement Plan[1]

[1] If and when screening of tower locations show there are involuntary resettlement impacts. Resettlement Plan to be prepared following the SPS and the Resettlement Framework

CHAPTER 1. INTRODUCTION

1.1 INTRODUCTION

Reliance Power is a public, limited liability company incorporated under the Companies Act, 1956 in India. Reliance Power is a well-capitalized, listed group company of Reliance ADA Group, established to develop, construct and operate power projects, domestically and internationally.
Reliance Power, on its own and through its subsidiaries, is currently developing 17 medium and large sized power projects with an aggregate generation capacity of about 37,000 MW. These power projects are planned to be diverse in geographic location, fuel type, fuel source and off-take and each project is planned to be strategically located near an available fuel supply source or load centre.

The Company has the unique distinction of securing three out of the four Ultra Mega Power Projects (UMPPs) awarded by the GoI on the basis of tariff-based competitive bidding, located at Sasan in Madhya Pradesh, Krishnapatnam in Andhra Pradesh and Tilaiya in Jharkhand. The Company proposes to set up gas, coal, wind, solar and hydro based power generation projects. Reliance Power is currently developing a number of medium and large sized power projects with a combined planned installed capacity of about 37,000 MW, one of the largest portfolios of power generation assets under development in India. The projects are planned to be diverse in geographic location, fuel type, fuel source and off-take, and each project is planned to be strategically located near an available fuel supply source or load center. The identified project sites are located in Western India, Northern India, North-eastern India, Southern India and Eastern India. They include seven coal-fired projects (25,560 MW), to be fueled by reserves from captive mines and supplies from India and abroad, gas-fired projects (8,033 MW), and seven hydroelectric projects (4,620 MW), six of them in Arunachal Pradesh and one in Uttarakhand. It intends to sell the power generated by these projects under a combination of long-term and short term PPAs to state-owned and private distribution companies and industrial consumers.

Reliance power currently is executing two Solar projects and one Wind project. Reliance ADA group already has close to 100 MW of Wind capacity operational mainly in Tamil Nadu, Gujarat, Karnataka & Maharashtra. Currently, Reliance power is developing 200 MW of Wind power at Vashpet, Maharashtra. In Solar, Reliance power is also developing a Concentrated Solar power project in Rajasthan whose expected date of commissioning is May 2013.

Dahanu Solar Power Pvt. Ltd. (DSPPL) a 100% subsidiary of Reliance Power Limited is planning to set up Solar PV Power Project of the capacity of 40 MW (in first phase), at Village- Dhursar, Tehsil Pokhran, Jaisalmer District of the state of Rajasthan, India. DSPPL has signed a PPA with Reliance Infrastructure Ltd, Mumbai for a 40 MW Solar PV Power Plant herein referred to as “The Project” and required to commission the plant by March 2012.

1.2 PROJECT COMPANY - DAHANU SOLAR POWER PRIVATE LIMITED

DSPPL (Dahanu Solar Power Private Ltd) was incorporated on 8th September 2010.

Project at a Glance

S. No	Particulars	Descriptions
26.	Project site	Village- Dhursar
27.	Tehsil	Pokaran
28.	District Name	Jaisalmer
29.	Name of the State	Rajasthan
30.	Latitude:	260 45’ 46.37” N
31.	Longitude:	720 00’ 50.81’’ E
32.	Road Accessibility:	Non-Asphalt Motor able road is attached to the Site. Motor able Asphalt road is 5KM away from the site. NH-114 is 10 KM from the site.
33.	Nearest airport:	Jodhpur – 170 KM
34.	Nearest Town:	Pokaran – Teshil head quarter – 25KM.
35.	Nearest City:	Jaisalmer – 180KM, Jodhpur – 170KM
36.	Land available:	140 Hec.
37.	Water Requirement:	0.146 MLD
38.	Daily Global Solar Irradiance	5.65 kWh/m^2
39.	Daily Diffuse Solar Irradiance	2.01 kWh/m^2
40.	Annual Global Solar Irradiance	2063 kWh/m^2
41.	Annual Diffuse Solar Irradiance Land availability (Hectares) Type of system	732 kWh/m^2 140 Fixed tilt (20 degree)
42.	Type of PV modules	Thin Film
43.	Proposed capacity	40 MW
44.	Capacity of each module proposed	80 Wp / any other compatible size
45.	Model of solar PV module	FS-377
46.	Total number of PV Modules	534000 (In Series - 15 modules)
		55556 strings (In Parallel)
47.	Project module area required	360003 m2
48.	Inverter model	Power One PVI 500 TL
49.	Annual electricity supplied to grid	7,38,04,200.0 kWh
50.	Plant load factor (%)-First Year	21.06 %
51.	Project Cost	Rs 683 Cr.

1.3 PROJECT STATUS

Project clearances/approvals

Sl.No.	Permits & Approval	Status	Completion date
1	Approval from RREC (Rajasthan Renewable Energy Corporation)	Received	
2	Power Purchase Agreement	Signed	28.03.2011
3	Approval from RVPNL(Rajasthan Vidyut Prasaran Nigam Ltd) for evacuation permission	Received	
4	Consent to Establish from	Under process	Expected to receive

Sl.No.	Permits & Approval	Status	Completion date
	RSPCB		by Sep 2011
5	Water Commitment for construction and operation phases	The amount of water required for the Project is insignificant. DSPPL will source water through tankers for cleaning and will also use water from the rainwater harvesting pond	
6	Approval from local authority / DC to construction of power plant (Layout approval)	Under Process	Expected to receive by Sep 2011.
7	Substation drawing approval from the Electricity Department (Chief Electric Inspector)	At the time of COD	
8	Independent civil construction (Chartered construction engineer) approval for any plant building construction		Dec 2011
9	Permission for lying of power evacuation line and No Objection Certificate from Energy Department		Oct 2011

1.4 KEY FEATURES OF SITE

- Following are key features of proposed 40MW Solar PV Project:
- The location falls under the 'Hot and Dry' climatic zone of India and comprises extreme weather conditions of hot desert.
- The project location comprises well accessibility as the motorable asphalt road is 5 km away from the site.
- There are no shading elements like mountains, large sand dunes, trees available on the site. Entire area is shadow free.
- NH-114 is located on 10 km from selected project location; however NH-15 passes from okaran.
- Nearest Airport is Jodhpur which is about 170 km from the projected location.
- Nearest City to the site is Pokaran 25 km, Jaisalmer 140 km.
- Pokaran is the nearest railway station from the location.
- Soil condition at site is hard sandy and surface is almost flat; hence limited land work is needed to make land flat as per the requirements of solar PV power plant.
- Dechu (220 kV) is the nearest grid substation for power evacuation.

1.5 PROJECT JUSTIFICATION

Government of India has announced Jawaharlal Nehru National Solar Mission which envisages setting up of Solar Power Projects of 20,000MW capacity by 2022. State Regulatory Commissions have specified a percentage of the total purchases to be made from non-conventional energy sources. The solar potential which is unexplored so far is of the order of lakhs of MW keeping in view the solar insolation value in North-West Rajasthan (Thar desert) and availability of waste land. In addition to meet the RPO obligation, the solar projects would also increase the energy security for the state.

Solar power also has the inherent quality that the power is produced when it is most needed and is the only form of despatchable Renewable energy. Rajasthan particularly, with vast availability of waste land and receiving highest solar insolation and it is believed that if 5% of Thar desert is covered with Solar collectors, it is sufficient to drive the country's present energy demand.

In view of above, the 40 MW Solar Thermal Power Project at Dhursar in Jaisalmer District, Rajasthan is justified.

As the ever-increasing demand for energy continues to squeeze fossil fuel reserves, India is looking at fossil fuel-rich countries around the world. Consequently, India has emerged as a major importer of energy and this has seriously sensitized the Government of India to look for meeting the energy requirements by lowering the demand-supply gap and strategically developing energy security of the country, concerned over the erosion of fossil fuel reserves.

Electricity consumption in India has more than doubled in the last decade, outpacing economic growth. Despite capacity additions, electricity demand continues to outstrip power generating capacity, compelling the Central Government to release the National Electricity Policy, 2005, enact Electricity Act, 2003 and spell Vision 2020. The said Act and the Vision 2020, while giving due importance to electricity generation through conventional sources, have recognized the need to increase power generation through non-conventional sources too. India too realized additional advantages of curbing worldwide pollution and formulated strategies to explore the potential of all renewable energy resources like hydro, wind and solar along with biomass.

Benefits due to Proposed Project

The proposed Project brings in multifold advantages. Not only does it produce clean, pollution free energy, it also has the capacity to provide employment to the people living in and around that area. It has the capacity of turning Rajasthan which is a harsh, barren land into a clean energy producing hub which will be emulated by the other states of India.

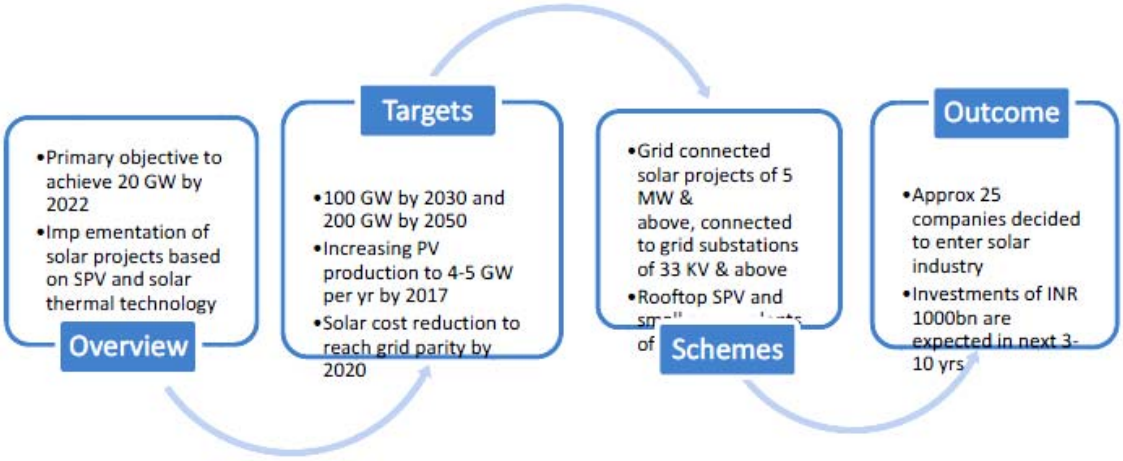
Renewable energy – Indian scenario

The Government of India created independent ministry for energy; the MNRE in the early 1980s. According to the statistics of MNRE, by 30th June 2010, the cumulative renewable energy based power generation capacity is 19,974.48 MW. Wind power (14157.10 MW) accounts for a major part of the renewable energy capacity in India.

Considering the localized potential for wind energy, solar energy is one of the best solutions to meet India's demand for low cost, off-grid solutions in the short to medium term.

A coherent and ambitious policy has been set at the national level while various incentive mechanisms were installed at state levels. In most states across the country, the State Electricity Regulatory Commission had introduced a regulation for Renewable Purchase Obligation for distribution licensees and open access consumers.

Since Solar Power is at an introductory stage of its life cycle, Government initiatives are expected to drive it until 2012. One such initiative is the Jawaharlal Nehru National Solar mission which envisages to make India a global leader in solar energy and envisages an installed solar generation capacity of 20 GW by 2020, 100 GW by 2030 and 200 GW by 2050. A snap shot is given in figure below:



Rajasthan receives maximum solar radiation intensity in India with very low average rainfall and also has unutilized low cost desert land available in abundance. In line with the Central Government policy, Rajasthan has come up with a new Solar Policy, named as, Rajasthan Solar Policy 2011. This regulation has been complemented more recently by the Jawaharlal Nehru National Solar Mission (JNNSM).

As of April 2011 the total grid connected Solar PV power generation capacity was about 37.7 MW according to MNRE. **Table 1.1** presents the recent achievement of renewable energy technologies in India by 21.03.2011.

Table 1.1: Recent Achievement of Renewable Energy Technologies in India

Energy programme/ Systems	**Achievement during March 2011**	**Total achievement during 2010-11**	**Cumulative achievement up to 31.3.2011**
GRID INTERACTIVE POWER(MW)			
Wind	872	2350	14157
Small Hydro	57	307	3042
Biomass	-	143	997
Bagasse	31	321	1667
Waste to Power	-	7	75
Solar Power(SPV)	5	27	37
Total	966	3156	19974
OFFGRID CAPTIVE POWER			
Waste to power	1	24	72
Biomass(non-bagasse) cogeneration	12	81	302
Biomass gasifiers	4	11	131
Aero generators/Hybrid systems	0.05	0.05	1
SPV systems(>1kW)	1.25	2.6	5.8
Water mills/ Micro hydel	0.17	2.2	7

(Source: www.mnre.gov.in , DPR)

Initiatives of Government of Rajasthan

For setting up of Solar Power Plants in Rajasthan for direct sale to DISCOMS of Rajasthan; The Rajasthan State will promote setting up of solar power projects for direct sale to Discoms of Rajasthan. The total capacity under this category will be distributed equally between SPV and CSP based power plants.

The total maximum capacity under this category for phase-1 (up to 2013) and phase-2 (2013-2017) would be as follows:-

- Phase-1 - (up to 2013) : Maximum Capacity to be developed 200 MW
- Phase-2 - (2013 -2017) : Maximum Capacity to be developed 400 MW (Additional)

National Tariff Policy 2006 mandates the State Electricity Regulatory Commissions (SERC) to fix a minimum percentage of energy purchase from renewable sources of energy (availability of resources & impact on retail tariff) Solar power purchase for states. To achieve this, the state of Rajasthan will promote setting up of small solar power plants connected at 11 kV grid of 1 MW capacity each for direct sale to State Discoms of Rajasthan. The total capacity under this category will be 50 MW. The selection of the projects will be through tariff based competitive bidding process.

Policy Background

Ministry of New & Renewable Energy Sources (MNRE), Government of India (GoI) has been pursuing to encourage power generation from Solar Energy and has been setting targets. A coherent and ambitious policy has been set at the national level while various incentive mechanisms were installed at state levels. In most states across the country, the state Electricity Regulatory Commission had introduced a renewable energy obligation regulation for distribution licensees and open access consumers. This regulation has been complemented more recently by the Jawaharlal Nehru National Solar Mission (**JNNSM**).

Maharashtra Renewable Purchase Obligation (RPO) target

Maharashtra Electricity Regulation Commission (MERC) in 2010 established a regulation for "Renewable Purchase Obligation, Its compliance and implementation of REC framework". Every distribution licensees, users owning captive power plants, and open access consumers in the State of Maharashtra (called "Obligated Entity") should procure electricity generated from eligible renewable energy sources at the percentages as per the following schedule:

Year	Minimum Quantum of purchase (in %) from renewable energy sources (in terms of energy equivalent in kWh)		
	Solar	Non-Solar (other RE)	Total
2010-11	0.25%	5.75%	6.0%
2011-12	0.25%	6.75%	7.0%
2012-13	0.25%	7.75%	8.0%
2013-14	0.50%	8.50%	9.0%
2014-15	0.50%	8.50%	9.0%

2015-16	0.50%	8.50%	9.0%

Provided that Distribution Licensee(s) should meet 0.1% per year of its Non-Solar (other RE) RPO obligation for the period from FY 2010-11 to FY 2012-13 and up to 0.2% of its Non-solar (other RE) RPO obligation for the period from FY 2013-14 to FY 2015-16 by way of purchase from Mini Hydro or Micro Hydro power project.

Provided further that the Distribution Licensee should include the plan for procurement of power from RE sources under its long-term power procurement plan to comply with minimum RPO target as stipulated above.

Every "Obligated Entity" may meet its RPO target by way of own generation or procurement of power from RE developer or by way of purchase from other licensee or by way of purchase of renewable energy certificate or by way of combination of any of the above options.

Provided further that procurement of RE power generated within the State by Distribution Licensee at rate other than rate approved by the State Commission directly from generator or from trader should not be considered as eligible quantum for fulfillment of renewable purchase obligation of such distribution licensee.

Reliance Infrastructure Ltd as a distribution agency needs to accommodate this RPO obligation. Hence the Power Purchase Agreement has been signed between Reliance Infrastructure Ltd & DSPPL to supply the solar power . The tariff will be as per the MERC regulated tariff from time to time.

1.6 OBJECTIVE OF THE ESIA STUDY

The objective of conducting an Initial Environmental Examination (IEE) is to meet the project's environmental assessment requirements following ADB's Safeguard Policy Statement (2009). This scope of the IEE Study being incorporated in the present ESIA report has is to assess the significant environmental impacts and suggestion of mitigation measures. The scope of this report also includes a review of DSPPL's corporate policies and operational framework for environmental management.

The document has been made to comply with the requirements of ADB's Safeguard Policy Statement (2009) as well as applicable local and national regulations. To comply with other lender's requirements, the document also addresses IFC Performance Standards which will be met by the project.

In the context of the scope of the project, the ESIA report has addressed the following, where applicable:

- Category of the project consistent with Government of India
- Baseline Environmental and Social conditions;
- Relevant host country laws, regulations, applicable treaties and agreements;
- Protection of human health, cultural properties and biodiversity including endangered species and sensitive ecosystems;
- Major hazards; Occupational health and safety; Fire prevention and life safety;
- Socio-economic impacts; Land use: Land acquisition; Involuntary resettlement;
- Impacts on indigenous peoples and communities; if applicable
- Cumulative impacts of existing, proposed and anticipated future projects;
- Efficient production, delivery and use of energy; and

- Pollution prevention and waste minimization, pollution controls (liquid effluent and air emissions) and solid and chemical waste management.
- GHG reduction potential and CDM Benefits

The IEE being addressed in the present ESIA Report comprises of baseline data on existing conditions on physical and biological environment, and social environment together with the anticipated environmental impacts and proposed mitigation measures. Observations were also being made along the proposed transmission line tower locations. Although, this is final route of transmission line, some minor changes are not ruled out till the time RoW is obtained. Field surveys were also undertaken to assess physical and biological environment. Detailed assessment of the baseline environment has been conducted for the distance up to 5 km. on either side of the proposed alignment and data collection from secondary sources has been done to support the findings of the field survey. The field studies were supported by secondary data collection, Census Data of 2001 etc.

The ESIA activities have been carried out jointly by a multi-disciplinary team of experts, including environment team, and from relevant fields in house.

All the issues such as acquisition of land, ecology, influx of people during construction and operation phase, shelter and sanitation, the equipments and machineries, environmental health and safety, occupational hazard, social and environment management and monitoring plan have been dealt in detail in the respective sections of the ESIA Report.

Therefore while categorizing this Project; the most important aspects which may impact the project in a significant manner have been described in various chapters of the ESIA document. However these are briefly enumerated below to have a quick assessment of the situation.

Table 1.2 – Overall Environmental Impact Findings

Environmental Parameter	**Level of Impact**	**Reasons**	**Mitigation Measures**
Air Impact	Low	• No atmospheric Emissions from the process.	• Use of PV based solar power technology
Water	Low	• Plant will require a very low amount of water • No effluent is envisaged to be discharged from the plant that may have impact.	• In the case of wet cleaning, the amount of water needed is insignificant. • There is no need of water if DSPPL manages to successfully implement dry cleaning of modules. • RSTEPL adjacent to PV will have rain water harvesting (RWH) pond of capacity of 0.9 million m^3. Rain water harvesting pond will hold 0.2 million m^3 of water every year. RSTEPL will not be required to take any water from the rainwater harvesting pond. • DSPPL`s water requirement will only be 53,400 m3. It will be met from RSTEPL RWH pond

Environmental Parameter	Level of Impact	Reasons	Mitigation Measures
			• DSPPL will collect the rain water in the rain harvesting pond and this water will be used for the cleaning the modules. • No effluent should be discharged.
Land	Medium	• Impact of change in land use.	• Site selection has been made in consideration of Rajasthan Land Revenue (Allotment of land for setting up of power plant based on Renewable Energy Sources) Rules, 2007 • CSR activity will be undertaken as agreed between the Company and community stakeholders.
Noise	Low	• No Sources of Noise within the project area. • As no sensitive locations in the vicinity of the project site.	• Noise barriers will be provided to neutralize the noise. • Noise level of machines shall be below 85 dB (A)
Ecosystem	Low	• As no ecologically sensitive place lies within 10 km radius from the project site	• Although there is no significant vegetation cover within the study area, plantation activities will be carried out.
Socio-economic	Low	• Total land identified for the project is Government barren land: no land or Home Steads • No land acquisition is anticipated for the transmission line tower footings but setting up towers on private land may have socioeconomic impact. Right of way for the transmission line and partial loss of privately owned lands may affect/ limit future land use and may decrease its market value • Influx of Labours	• A Resettlement Framework was adopted by the Company to mitigate involuntary resettlement impacts. • Construction labours will be housed on temporary construction camps specially developed for this purpose with all basic amenities. • CRS activities will help to improve the quality of life as well as education status of the local villagers.

The assessment of the project has been considered for both positive and negative effects. The proposed photovoltaic power project has been located as per norms of the sitting guidelines of Ministry of Environment & Forests, Govt. of India. Adoption of green power generation technology for power generation with no emissions and effluent discharge will have least impact on the ambient environment and on the host community. However, in the long term the project and related activities in the area may bring about slight change in ambient air quality of the area.

The lease of 140 ha of government land for the power plant site has no involuntary resettlement impacts or any compensation issues. Scarcity of water for agriculture and rocky barren land with

low soil fertility and low productivity make this area unsuitable for agriculture wherein industrial activity can be considered as alternate livelihood option for the host community. Thus, generation of allied employment and Income Generation Activities will improve the quality of life of the host community.

1.7 CONCLUSIONS ON CATEGORY OF PROJECT

The proposal is for PV based Solar power project and there are no potentially significant adverse and irreversible social and environmental impacts. As per ADB Criteria of financing a project, environmental categorization of projects are being done according to type, size and location of the proposed project into 4 categories-A, B, C and FI. The proposed Solar PV project falls under **'Category-B'** as per ADB's Environmental Categorization criteria. Also, a review of the broad Equator Principles criteria and requirements for the classification of Category 'A', 'B' & 'C' projects has indicated that the Dhursar Solar Power Project is more closely aligned to 'Category B' project due to limited adverse social or environmental impacts and these are limited to site-specific, largely reversible and readily addressed through mitigation measures.

1.8 METHODOLOGIES AND APPROACH OF ESIA

The Environmental and Social Impact Assessment has been conducted based on secondary data to include the following:

- Baseline information about the environmental, social, and economic conditions surrounding the project area; to determine the existing status and post project scenario in respect of these parameters;
- Identify potential impacts of the project and the characteristic, magnitude and distribution of the impacts;
- Compile information on potential mitigation measures to minimize the impact including mitigation costs; so as to incorporate the same in Environment and Social Management Plan;
- Formulate Environmental Management and Monitoring Action Plan

This ESIA report is undertaken to meet the environmental assessment requirements of Safeguard Policy Statement of ADB and the requirements of Equator Principles.

Various environment and social parameters were identified and examined as per standard methods. The detailed data for different parameters are given in the baseline chapter. The parameters considered for the study and their source of information are given in **Table 1.2**.

TABLE 1.3: ENVIRONMENTAL ATTRIBUTES AND PARAMETERS

S. No.	Attributes	Parameters	Source of Information
1.	Meteorology	Wind speed and direction, Temperature, Relative humidity and Rainfall	Surface Meteorology and Solar Energy (SMSE), NASA
2.	Ecology	Existing terrestrial and aquatic flora and fauna within 10-Km radius circle.	Secondary data was collected from the Government department.
3.	Land use	Trend of land use change for different categories	Based on Survey of India Topo-sheet and Satellite imagery
4.	Socio-Economic aspects	Socio-economic features, labour force characteristics, boom town effects	Based on secondary sources data like primary census abstracts of census of India 2001.

1.9 STRUCTURE OF REPORT

The report consists of seven chapters (including the present chapter) and the contents of the remaining chapters are briefly described in this section.

Chapter 2: Legal Policies and Institutional Framework: This chapter presents applicable legal provisions, National environmental and social (including labour) laws and policies as well as the relevant national and international standards and guidelines.

Chapter 3: Project Description: This chapter provides information related to various feature of the proposed power plant including power generation process, utilities, water and power requirement and other proposed infrastructure facilities. It also provides the glimpse of project schedule for approval and implementation.

Chapter 4: Baseline Status: This chapter brings out findings based on secondary data on physical, biological and socio economic environments, to present the baseline environmental condition of the study area. It includes the information regarding micro-meteorology, water environment, air environment, soil environment and ecological environment and the socio-economic baseline settings of the study area.

Chapter 5: Analysis of Alternatives: Alternatives considered for the proposed project are evaluated and discussed with particular emphasis on environmental considerations.

Chapter 6: Anticipated Environmental and Social Impacts and Mitigation Measures: This chapter provides details of the environmental and social impact assessment of the project as well as transmission lines during construction, operational and decommissioning phases. It expresses the impacts of the proposed project on the various components of environment. Mitigation measures are suggested along with the impact prediction. This section presents a brief outline of impact and respective management plan to address socio-economic conditions. The chapter discusses social safeguard mitigation measures, and impacts of the transmission line and mitigation measures to be undertaken.

Chapter 7: Environmental & Social Management Plan: This chapter deals with the Environmental and Social management plan incorporating recommendations to implementation of the suggested mitigation measures to minimize adverse environmental and social impacts during construction, operation and decommissioning phases.

The chapter includes management program, organization structure, training, community engagement, monitoring and reporting elements.

The chapter also includes Environment Social Action Plan and Corporate Social responsibility Plan.

Chapter 8: Grievance Redressal Mechanism: This chapter addresses the Grievance Redressal Mechanism (GRM) drawn by DSPPL which provides an effective approach for complaints and resolution of issues made by the affected community in reliable way.

Chapter 9: Public Consultation, Participation and Disclosure: This chapter addresses the requirement of Public Consultation as per EIA Notification, MoEF's Circular dated 13th May, 2011 and as per ADB's Safeguard Policy Statement (2009).

Chapter 10: Conclusions & Recommendations: This chapter consolidates the conclusions and recommendations of the ESIA Study carried out for the Solar PV Report.

CHAPTER 2. LEGAL POLICIES & INSTITUTIONAL FRAMEWORK

2.1 INTRODUCTION

The emerging environmental scenario calls for attention on conservation and judicious use of natural resources. There is a need to integrate the environmental consequences of the development activities and for planning suitable measures in order to ensure sustainable development of a region. The environmental considerations in any developmental process have become necessary for achieving sustainable development. To achieve such goals the basic principles to be adopted are:

- To enhance the quality of environment in and around the project area by adopting proper measures for conservation of natural resources;
- Prevention of adverse environmental and social impact to the maximum possible extent; and
- To mitigate the possible adverse environmental and socio-economic impact on the project-affected areas.

The proposed Project is covered under several environmental legislations. This report has been prepared with reference to the ADB`s Safeguards Policy Statement (SPS) – safeguards requirements on environment. The report has been prepared as per Safeguard Policy Statement and other laws and legislations applicable to the proposed project.

2.2 REGULATORY FRAMEWORK

This section provides a brief summary of India's relevant national environmental legislation. Ministry of Environment and Forests (MoEF) is the nodal agency for drafting the new environmental legislations and giving the Environmental Clearance (EC) to the Greenfield and Brownfield projects.

The process of Environmental Impact Assessment was made mandatory in 1994 under provisions of Environmental Protection Act, 1986. From time to time amendments have been made to the EIA Notifications. Under current EIA notification 14th Sept 2006 and its subsequent amendments, procedure has been laid down for projects or activities that require prior environmental clearance from the concerned regulatory authority.

The notification categorizes the projects as Category “A” and Category “B” based on the spatial extent of potential impacts and potential impacts on human health and natural and manmade resources. Application seeking prior environmental clearance in all cases is required to be made in the prescribed forms along with conceptual plan before commencing any construction activity or preparation of land at the site by applicant.

All projects or activities included as Category ‘A’ in the Schedule should require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF); All projects or activities included as Category ‘B’ in the Schedule will require prior environmental clearance from the State/Union territory Environment Impact Assessment Authority (SEIAA).

As per requirement of environment clearance under EIA Notification dated 14th September 2006 and subsequent amendment dated 1st December 2009. "Solar Projects" are not covered by the notification.

MoEF in its Office Memorandum No. J-11013/41/2006-IA.II (I) dated 13th May, 2011 (Copy enclosed at **Annexure-I**) stated that the Solar Photovoltaic Power Projects are not covered under the ambit of EIA Notification, 2006 and hence, no environmental clearance is required. Hence, the Solar Power PV Projects does not require preparation of Environmental Impact Assessment Report and pursuing Environmental Clearance from Central Government or State Level Environmental Impact Assessment Authority.

Rajasthan Pollution Control Board (RPCB) is responsible for implementing environmental legislation and issuing the Construction and Operating permits for Greenfield and Brownfield projects with certain conditions in view of Local regulations and environmental issues within Rajasthan where the project is located. However, Rajasthan State Pollution Control Board in its Office Order dated 19.2.2009 (Copy enclosed at **Annexure-II**) has identified grid interactive Solar Photovoltaic power plants under "other category" of industrial units. Further, RSPCB office in its office order dated 21.12.2010 does not include solar power projects in Red or Orange Category and hence are covered in "Green category" for consent to establish/operate mechanism. Hence, Consent to Establish for the proposed project should be obtained from Rajasthan State Pollution Control Board. Application for the same should be submitted by September 2011. The consent to Establish and Operate should also be obtained

Apart from the above, other relevant national and local statutory regulations that are to be followed by proposed project are summarized below. Brief details of the same are given in subsequent sections.

2.3 DETAILED FRAMEWORK PROCESS OF ADB'S ENVIRONMENTAL AND SOCIAL ASSSESSMENT

2.3.1 ADB'S SAFEGUARD POLICY STATEMENT (2009)

As described in the Safeguard Policy Statement (SPS) (2009), safeguard policies are generally understood to be operational policies that seek to avoid, minimize or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process. ADB's safeguard policy framework consists of three operational policies on the environment, Indigenous Peoples and involuntary resettlement. All three safeguard policies involve a structured process of impact assessment, planning and mitigation to address adverse effects of projects throughout the project cycle.

SR1 on Environment requires that environment must be considered at all stages of the project cycle from project identification through implementation. This section provides a detailed description of the environmental assessment and review process for project loans in terms of activities that take place during the project cycle. The environmental assessment requirements depend on the environment category (either A, B, C or FI). A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse and often reversible through mitigation. A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. A proposed project is classified as category FI if it involves investment of ADB funds through a financial intermediary.

As per the SPS (2009), this project likely falls under environmental category "B". As per GOI notifications and guidelines, the project falls under Green category for consent mechanism.

SR 2 on Involuntary Resettlement requires that all impacts (physical and economic displacement) brought about by land acquisition be mitigated properly following the principle of replacement value. The objectives are to avoid involuntary resettlement wherever possible; to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons1 in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups. SR 2 discusses the objectives, scope of application, and underscores the requirements for undertaking the social impact assessment and resettlement planning process, preparing social impact assessment reports and resettlement planning documents, exploring negotiated land acquisition, disclosing information and engaging in consultations, establishing a grievance mechanism, and resettlement monitoring and reporting.

In order for the Project to meet the requirements of SR 2, a Social Safeguard Compliance Audit Report was prepared covering the acquired land for the solar power plant site though government land lease. On the other hand, transmission line land requirements will be screened and if there are involuntary resettlement impacts, a resettlement plan will be prepared following the Resettlement Framework.

SR 3 on Indigenous Peoples require that the Indigenous people are identified and if present, they should benefit from the development projects and the project should avoid or mitigate potentially adverse affects on indigenous people caused by the Project. In India, this applies to scheduled tribes (ST). As per the survey of the solar power plant site and vicinity, there are no project affected ST families. The Project area (solar power plant site) also does not fall within the "Scheduled Area" of the state (which is determined by the Sixth Schedule of the Constitution on the basis of preponderance of tribal population; compactness and reasonable size of the area; underdeveloped nature of the area; and marked disparity in economic standard of the people). DSPPL will explore to the maximum extent possible alternative project designs to avoid negative impacts on relocation of ST that will result in adverse impacts on their identity, culture, and customary livelihoods.

2.3.2 ADB's Gender and Development Policy (1998)

ADB Policy on **Gender and Development (**GAD) requires Projects to consider gender issues in all aspects of ADB operations, accompanied by efforts to encourage women's participation in the decision-making process in development activities. In this Project, the GAD policy will be taken into consideration during preparation and implementation of the Community Development/CSR Program, Community Liaison, and actions relevant to mitigating impacts of involuntary resettlement

2.3.3 ADB's Social Protection Strategy (2001)

The Social Protection Strategy requires that Projects comply with applicable labor laws, and take the following measures to comply with the core labor standards for the ADB financed portion of the Project:

a) carry out its activities consistent with the intent of ensuring legally permissible equal opportunity fair treatment and non discrimination in relation to recruitment and hiring, compensation, working conditions and terms of employment for its workers (including prohibiting any form of discrimination against women during hiring and providing equal work for equal pay for men and women engaged by the Borrower);

b) not restrict its workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment;
c) engage contractors and other providers of goods and services:
   i. who do not employ child labor or forced labor;
   ii. who have appropriate management systems that will allow them to operate in a manner which is consistent with the intent of (a) ensuring legally permissible equal opportunity and fair treatment and non discrimination for their workers, and (b) not restricting their workers from developing a legally permissible means of expressing their grievances and protecting their rights regarding working conditions and terms of employment; and whose subcontracts contain provisions which are consistent with paragraphs (i) and (ii).

The compliance with Core Labor Standards, as well as, relevant national labor laws need to be discussed adequately in Chapter 6 where construction and operation phases are detailed.

2.3.4 The IFC Performance Standards

The IFC Performance Standards apply to private sector projects and provide project participants with instruments to structure, design, construct and manage the operations of projects in an environmentally and socially acceptable manner, while providing measures to avoid or mitigate adverse environmental and social impacts resulting from the projects. These Performance Standards are intended to focus on outcomes rather than process, thereby stressing the implementation of sound environmental and social management systems that achieve desired outcomes, including the mitigation of adverse impacts.

The following Performance Standards applicable to the proposed Solar Photovoltaic Power Projects:

- Social & Environmental Assessment and Management Systems
- Labor and Working Conditions
- Community Health and Safety
- Land Acquisition and Involuntary Resettlement

Performance Standard #1: Social & Environmental Assessment and Management Systems

Objectives:

- Identify and assess environmental and social impacts in the project's area of influence.
- Avoid, minimize, mitigate or compensate for adverse impacts
- Ensure that affected communities are engaged on issues that may affect them
- Promote improved environmental and social performance through effective management systems

Requirements & Compliance

Requirements	Compliance
Conduct an Environmental and Social Impact Assessment (ESIA or EIA) of the project, appropriate to the nature of	An ESIA has been prepared by DSPPL taking into consideration the potential

the project's environmental and social risks and potential impacts, to include issues identified in Performance Standards 2 to 5	social and the environmental impacts and risks of the project as detailed in Chapter 7.
Establish Environmental and Social Management Plans commensurate with the findings of the ESIA and consultation with affected communities.	An Environmental and Social Management Plan has been prepared and incorporated in Chapter 7 of the ESIA report taking into consideration the potential social and environmental impacts or risks already identified & assessed in ESIA
Establish Action Plans where specific mitigation measures and actions are required for the project to comply with applicable laws, regulations and the requirements of these Performance Standards	An ESMP has been prepared and incorporated in Chapter 7 of the ESIA report for implementation of mitigation measures in compliance with the statutory requirements and Performance Standards
Provide organizational capacity and contractor / employee training to enable project to achieve continuous environmental and social performance	Organizational structure with roles and responsibilities of the team within the organization is defined in Chapter 7
Establish and maintain a timely process of community engagement, including a grievance mechanism, focusing on disclosure of information and consultation with local communities affected by project risks or adverse impacts that is free from external manipulation, interference or coercion to ensure relevant and understandable access to project information.	A community liaison plan has been developed as integral part of ESIA which aims to inform the community project related adverse impacts or risks The grievance redresses mechanism has been developed in ESIA
Establish procedures to monitor and measure the effectiveness of the environmental and social management program, including internal reporting of the program's effectiveness to the project's senior management, disclosure of Action Plans (including material changes to such Plans) to affected communities, and external reporting to affected communities on the results of Action Plans, commensurate with the concerns of the affected communities	System of monitoring with Periodic audits will be established

Performance Standard #2: Labour and Working Conditions

Objectives:

- Establish, maintain and improve the worker-management relationship
- Promote fair treatment and equal opportunity for workers, in compliance with national laws
- Protect workforce by addressing child labour and forced labour
- Promote safe working conditions and protect / promote the health of workers

Requirements & Compliance

Requirements	**Compliance**
Establishment of a Human Resources Policy consistent with the requirements of this Standard that informs employees of their rights under national labor and employment laws	DSPPL being a 100% subsidiary of Reliance Power Limited has framed the Corporate HR policies.
Document and communicate to all employees' conditions and terms of employment.	Being complied
Respect collective bargaining agreements with worker organizations and provide reasonable conditions and terms of employment that, at a minimum, comply with national law, and enable alternative means for worker expression of grievances where national law restricts worker organizations	Will be implemented during Operation phase.
Practice non-discrimination and equal opportunity in making employment decisions	Being followed
Provide a mechanism for workers to raise workplace concerns.	Will be implemented during Operation phase
Protect the workforce from forced labor and illegal or economically exploitative child labor	DSPPL will abide by the National legislations on child labour. The clauses are suitably incorporated in the Contractor's bidding terms
Provide workers with a safe and healthy work environment, taking into account risks inherent to the particular project sector	Suitable EHS policy with objectives as detailed in Chapter-7 will be developed

Performance Standard #4: Community Health & Safety

Objectives:

- Avoid or minimize the risks to, and impacts on, the health and safety of the local community over the project life cycle, from both routine and non-routine circumstances.
- Ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimizes risks to the community's safety and security.

Requirements & Compliance

Requirements	**Compliance**
Evaluation of risks and impacts of the project on health & safety of the affected community during the project lifecycle and establish preventive/mitigation measures to reduce/minimize the impacts. Disclosure of action plans to affected community and the government agency.	The potential occupational hazards arising from the project activities and the impacts on health & safety of the affected community have been identified and assessed in Chapter 6 of ESIA.
Design, construct, operate and decommission of Structural elements or components in accordance with good industrial practice to reduce impact on community health & safety.	An occupation health safety plan has been formulated (Chapter 7) of this report.
Minimization of impacts on the health and safety of the community caused by natural hazards that could arise from the land use changes due to project activities.	A management plan has been formulated as part of ESIA process to address the issue.
Prevent or minimize the potentials for community exposure to communicable diseases during project activities.	CSR Plan and activities is in final stage and will be finalized soon.

Performance Standard #5: Land Acquisition and Involuntary Resettlement

Objectives:

- Avoid or minimize involuntary resettlement whenever feasible by exploring alternative project designs.
- Mitigate adverse social and economic impacts by providing compensation for loss of assets at replacement cost and ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and informed participation of those affected.
- Improve or at least restore livelihoods and living standards of displaced persons.
- Improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.

Requirements & Compliance

Requirements	Compliance
Avoidance or at least minimization of involuntary resettlement by exploring alternative project designs balancing environmental, social and economic costs and benefits; and by acquiring land through negotiated Settlements.	The land for the power plant site has been allocated by Rajasthan Government. It is barren land.
Compensation and benefits for displaced person as per Performance Standard	Not Applicable. The entire land for the power plant site proposed for the project is revenue land. There are no settlements in the land proposed and there is no agricultural use. The government land for setting up proposed project has already been allocated for the project. Hence, there are no Rehabilitation and Resettlement issues involved.
Disclosure of all relevant information and consultation with affected persons and communities in decision making process related to resettlement.	N.A.
Establish a grievance mechanism to record and resolve communities' concerns and grievances about the relocation and compensation	N.A.
Resettlement planning and implementation of the displaced persons/communities.	N.A.

2.4 LEGISLATIVE FRAMEWORK

The environmental regulations, legislations and policy guidelines and control for the proposed project are governed by various Government agencies. The principal environmental regulatory agency in India is Ministry of Environment and Forest (MoEF), Delhi. The important legislations governing the proposed Project is given below:
The key legislations pertaining to the proposed operations include:

- The Water (Prevention and Control of Pollution) Act, 1974;
- The Air (Prevention and Control of Pollution) Act, 1981;
- The Environment Protection Act, 1986, Rules there under (with amendments);
- Land Acquisition Act, 1894
- Aravali ESA Notification, 1992 and its Amendments
- Batteries (Management and Handling) Rules, 2001
- Workmen's Compensation Act, 1923
- National Environmental Appellate Authority Act 1997
- Wildlife Protection Act 1980
- Indian Electricity Rules, 1956 there under (with amendments)
- National Resettlement & Rehabilitation Policy, 2007
- Right of Way and compensation under Electricity Act 2003
- Minimum Wages Act, 1948

- Child Labour (Prohibition and Regulation) Act, 1986
- The Labours Act, 1988
- The Factories Act, 1948
- Contract Labour (Regulation and Abolition) Act, 1970
- The Building and other Construction Workers Act, 1996

These key instruments and all subsequent and relevant amendments to them are discussed in detail below.

2.4.1 The Water (Prevention and Control of Pollution) Act, 1974

This Act introduced the State Pollution Control Boards (SPCB) to grant Consent for Establishment (CFE) and Consent for Operation (CFO) to the industries. The establishment or operation of any industry cannot be undertaken without the prior consent of the SPCB. While granting the consent, SPCB can stipulate conditions pertaining to the effluents arising from the process. The consent to operate is granted for a specific period (usually one year) after which the conditions attached are reviewed by the SPCB before renewal.

2.4.2 The air (prevention and control of pollution) act, 1981

This Act is very similar in scope to the Water Act, 1974. The Act stipulates the establishment of State Boards for the Prevention and Control of Air Pollution. In States where a water pollution board had already been established under the earlier Water Act, the two boards were combined to form SPCBs.

2.4.3 Environment Protection (EP) Act and Rules, 1986

EP Act was enacted to provide for the protection and improvement of environment and for matters connected there with. A decision was taken by India to protect and improve the human environment at the United Nations Conference on Human Environment held at Stockholm in June 1972. It is considered necessary to prevent the hazards to human beings, other living creatures, plants and property.

This Act is an umbrella Act and gave birth to many sub acts and rules. The EP Act call for procedural requirements for:

- Obtaining Environmental Clearance; and
- Submission of Environmental Statement.

This act was enacted with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. Under this Act, the Central Government is empowered to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare. From time to time the Central Government issues notifications under the EPA for the protection of ecologically-sensitive areas or issues guidelines for matters under the EPA.

The important environmental legislations applicable to the proposed project are given in **Table 2.1**.

TABLE 2.1- KEY ENVIRONMENT LEGISLATION

Name	Scope and Objectives	Key Areas	Operational Agencies/ Key Players
Water (Prevention and Control of Pollution) Act 1974	To provide for the prevention and control of water pollution and enhancing quality of water	Control of Sewage and industrial effluent discharges	Central and State Pollution Control Boards
Air (Prevention and Control of Pollution) Act 1981	To provide for the prevention and control of air pollution	Controls emission and air pollutants	Central and State Pollution Control Boards
Environment Protection Act 1986 Environment Protection Rules 1989	To provide for the protection and improvement of environment	An umbrella Legislation; supplements pollution laws	Central Government, nodal agencies MoEF, can delegate powers to department of environment
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 1981	To provide for the protection and improvement of the forests	A legislation to protect forests and forest products	Central Government, nodal agencies MoEF, can delegate powers to Department of Forest
Noise Pollution (Prevention & Control) Rules 2000	To control and take measures for abatement of noise and ensure that the level does not cross specified standards	Noise in urban area and around industrial sites	Central Government, nodal agencies MoEF, State governments
Hazardous Wastes (Management And Handling) Rules, 1989, 2001	To the adequate handling of hazardous materials or wastes	Hazardous waste generated from the industrial activity	Central Government, Nodal Agencies MoEF, CPCB
Public Liability Insurance Act, 1991	To provide for public liability- insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto	To provide public liability insurance during risk material handling	Central Government, Nodal Agencies MoEF, State Govt.

Land Acquisition Act

The Land Acquisition Act (LA Act) of 1894, last amended in 1984, provides for the acquisition of land for public purposes and companies in national interest and for determining the amount of compensation to be made on account of such acquisition.

The Land Acquisition Act of 1894 is summarized below:

- Land identified for the purpose of a project is placed under Section 4 of the LAA. This constitutes notification. Objections must be made within 50 days to the Collector (highest administrative officer) of the concerned District. The LAA requires 30 days for objections;
- The land is then placed under Section 6 of the LAA. This is a declaration that the Government intends to acquire the land. The Collector is directed to take steps for the acquisition, and the land is placed under Section 9. Interested parties are then invited to state their interest in the land and the price. Under Section 11, the Collector should make an award within two years of the date of publication of the declarations. Otherwise, the acquisition proceedings should lapse;
- In case of disagreement on the price awarded, within six weeks of the award the parties (under Section 18) can request the Collector to refer the matter to the Courts to make a final ruling on the amount of compensation;
- Once the land has been placed under Section 4, no further sales or transfers are allowed. However, since the time lag between Sections 4 and the others following it is about three years, land transfers are not uncommon;
- Compensation for land and improvements (such as houses, wells, trees, etc.) is paid in cash by the project authorities to the State government, which in turn compensates landowners. In the case of acquisition for coal projects, the coal companies make direct payments to landowners;
- The price to be paid for the acquisition of agricultural land is based on sale prices recorded in the District registrar's office averaged over the three years preceding notification under Section 4. The compensation is paid after the area is acquired, actual payment by the State taking about two or three years. An additional 30 percent is added to the award as well as an escalation of 12 percent per year from the date of notification to the final placement under Section 9. For delayed payments, after placement under Section 9, an additional 9 percent per annum is paid for the first year and 15 percent for subsequent years.

  The Land for the project should be allotted by Government of Rajasthan under the Rajasthan Land Revenue (Allotment of Land for setting up of Power Pant based on Renewable Energy Sources) Rules, 2007and Rajasthan Solar Policy 2011. The application for 140 Hectares of land is under process and would be allotted at 10% of DLC rate for a period of 30 Years.

2.4.4 Aravalli ESA Notification, 1992 and Its Amendments

Under Section 3(1) and 3(2)(v) of the Environment (Protection) Act, 1986 and the rule 5(3)(d) of the Environment (Protection) Rules, 1986, this Notification has restricted certain activities in specified area of the Aravalli Range which are causing environmental degradation in the region. This Notification prohibits carrying in on certain processes and operations without prior permission, in the areas specified in the Notification. This includes location of any new industry including expansion/modernization, mining operations, cutting of trees, construction of any cluster of dwelling units, farm houses, sheds, community centres, and any other activity connected with such construction including the roads, and electrification.

However, the proposed project site does not fall in the Aravalli range hence this notification is not applicable to the proposed project.

2.4.5 BATTERIES (MANAGEMENT AND HANDLING) RULES, 2001

The MOEF has issued final Batteries (M&H) Rules, 2001 and its subsequent amendments 4th May, 2010 to control the hazards associated with the backyard smelting and unauthorized reprocessing of lead acid batteries.

Manufacturers/ Assemblers/ Re-conditioners/ Importers/ Recyclers/ Auctioneers/ Users/ bulk Consumers are required to submit half yearly returns to the SPCB who have been designated as

the Prescribed Authority. The forms have been designed in such a manner as to enable easy verification of responsibilities fixed for every one under the rules.

The amendment dated 4th May 2010 clarifies " bulk consumer-means a consumer such as the Departments of Central Government like Railway Defence, Telecom, Posts and Telegraph, the Departments of State Government, the Undertakings, Boards and other agencies or companies who purchase hundred or more than hundred batteries per annum;".

The project does not envisage any storage of power and hence it is not applicable.

2.4.6 INDIAN LABOUR LAWS

All the workmen of the company are required to be governed by the relevant Indian Labour laws, which are stated below:

Workmen's Compensation Act, 1923

The Workmen's Compensation Act, 1923 is one of the important social security legislations. It aims at providing financial protection to workmen and their dependants in case of accidental injury by means of payment of compensation by the employers.

Main Provisions and Scope of the Act

Under the Act, the State Governments are empowered to appoint Commissioners for Workmen's Compensation for (i) settlement of disputed claims, (ii) disposal of cases of injuries involving death, and (iii) revision of periodical payments. Sub-section (3) of Section 2 of the Act, empowers the State Governments to extend the scope of the Act to any class of persons whose occupations are considered hazardous after giving three months notice to be published in the Official Gazette. Similarly, under Section 3(3) of the Act, the State Governments are also empowered to add any other disease to the list mentioned in Parts A and B of Schedule – II and the Central Government in case of employment specified in Part C of Schedule III of the Act.

Compensation

In case of death and Permanent total disablement, the minimum amount of compensation fixed is Rs. 80,000 and Rs. 90,000 respectively. The existing wage ceiling for computation of maximum amount of compensation is Rs. 4000. The maximum amount of compensation payable is Rs. 4.56 lakh in the case of death and Rs. 5.48 lakh in the case of permanent total disablement.

2.4.7 National Environment Appellate Authority Act 1997

The National Environment Appellate Authority (NEAA) was set up by the Ministry of Environment and Forests to address cases in which environment clearances are required in certain restricted areas. An Act to provide for the establishment of a National Environment Appellate Authority to hear appeals with respect to restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards under the Environment (Protection) Act, 1986 and for matters connected therewith or incidental thereto.

2.4.8 Wild Life (Protection) Act 1972

The Government of India enacted Wild Life (Protection) Act 1972 with the objective of effectively protecting the wild life of this country and to control poaching, smuggling and illegal trade in wildlife and its derivatives. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent. The Ministry has proposed further amendments in the law by introducing more rigid measures to strengthen the Act. The objective is to provide protection to the listed endangered flora and fauna and ecologically important protected areas.

2.4.9 National Rehabitation and Resettlement Policy 2007

The objectives of the policy are as follows:-

a. To minimize displacement and to identify non-displacing or least displacing alternatives;

b. To plan the R&R of PAFs including special needs of Tribals and vulnerable sections;

c. To provide better standard of living to PAFs; and

d. To facilitate harmonious relationship between the Requiring Body and PAFs through mutual cooperation

2.4.10 Electricity Act 2003

The Act consolidates the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive to development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalisation of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies constitution of Central Electricity Authority, Regulatory Commissions and establishment of Appellate Tribunal and for matters connected therewith or incidental thereto. Related section relevant to the implementation of the Project and in particular the transmission requirement for Right of Way, below:

a. Section 68 (1) - sanction of the Ministry of Power (MOP) is a mandatory requirement for taking up any new transmission project.

b. Section 164 –under this section (DSPPL) has all powers that the telegraph authority possesses and can erect and construct towers without actually acquiring the land.

2.4.10 Other Applicable Laws

Applicable GOI Acts	**Year**	**Objective**
Minimum Wages Act	1948	As per this act, the employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government.
Child Labour (Prohibition and Regulation) Act	1986	This Act prohibits employment of children below 14 years of age in Building and Construction Industry covering Railway.
The Labours Act	1988	The health and safety of workers employed in construction work etc.
The Factories Act	1948	Health and Safety considerations for workers
Workmen's Compensation Act	1923	This act provides for compensation in case of injury by accidents arising out of and during the course of employment.
Contract Labour (Regulation and Abolition) Act	1970	This act provides for certain welfare measures to be provided by the contractor to contract labour.

The Building and other Construction Workers Act	1996	All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. The employer is required to provide safety measures at construction work site and other welfare measures such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the Workplace etc.

There are a number of laws that are cutting across all sectors and development process of the country. Some of these are directly relevant especially during the construction stage of the proposed project and are listed below.

2.4.11 Firefighting

The Fire Protection Research Foundation (FPRF) identifies hazards affecting fire prevention services with solar panel use. Firefighters must distinguish between the type of solar power used to work efficiently in the event of a fire. Without knowledge the type of panel used, firefighters' safety may be at risk. Hazards apparent in both types include flame spread, slipping and structural collapse due to added weight.

Firefighters and other emergency-response teams require special training to work safely around solar-energy technology. The fire-related hazards of photovoltaic conversion for emergency responders are burns, electric shock, inhalation of toxic smoke, battery leakage and explosion and roof-related injuries.

- A PV system includes an electric shock hazard.
- Fires that involve solar power systems can be one of three basic types depending on the point of ignition: (1) an external exposure fire to a building equipped with a solar power system; (2) a fire originating within a structure from other than the solar power system; or (3) a fire originating in the solar power system as the point of ignition.

2.5 APPLICABLE NATIONAL ENVIRONMENT AND POLLUTION STANDARDS-CPCB, GOI

2.5.1 Ambient Air Quality Standards

The standards of the air quality are set at a level necessary for an adequate margin of safety, to protect the public health, vegetation and property. The Ambient Air Quality standards have been notified by the Ministry of Environment and Forests (vide Gazette Notification dated 16th Nov 2009). The standards are given in **Table 2.2**.

TABLE 2.2- NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	**Concentration in µg/mg^3**		
	Time	**Industrial, Residential, Rural & other areas**	**Ecologically Sensitive area (Notified by Central Govt.)**
Sulphur Dioxide (µg/m^3)	Annual Avg.* 24 hours**	50 80	20 80
Oxides of Nitrogen (µg/m^3)	Annual Avg. 24 hours	40 80	30 80
PM10 (µg/m^3)	Annual Avg. 24 hours	60 100	60 100
PM2.5 (µg/m^3)	Annual Avg. 24 hours	40 60	40 60

Pollutant	Concentration in µg/mg^3		
	Time	**Industrial, Residential, Rural & other areas**	**Ecologically Sensitive area (Notified by Central Govt.)**
Ozone (µg/m^3)	8 hours** 1 hour**	100 180	100 180
Lead (µg/m^3)	Annual Avg. 24 hours	0.50 1.00	0.5 1.00
Carbon Monoxide (mg/m^3)	8 hours 1 hour	2 4	2 4
Ammonia (NH3) (µg/m^3)	Annual Avg. 24 hours	100 400	100 400

Source: Gazette of India Notification, dated 16th Nov, 2009

* Annual Arithmetic Means of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals

** 24 hourly or 8 hourly or 01 hourly monitored values, as applicable should be complied with 98% of the time in a year. 2% of the time they may exceed the limits but not on two consecutive days of monitoring

2.5.2 Ambient Noise Standards

Ambient standards with respect to noise have been notified by the Ministry of Environment and Forests vide gazette notification dated 26th December 1989 (amended in February, 2000). It is based on the 'A' weighted equivalent noise level (Leq). The ambient noise standards are presented in Table-2.3.

TABLE 2.3- AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

Category of Area Zone	Limits in dB(A) Leq*	
	Day Time	**Night Time**
Industrial Area	75	70
Commercial Area	65	55
Residential Area	55	45
Silence Zone	50	40

Source: Pollution Control Acts Rule and Notifications issued there under by Central Pollution Control Board (Gazette Notification dated 14th Feb 2000.

Note: - 1. Day time should mean from 6.00 a.m. to 10.00 p.m.

2. Night time should mean from 10.00 p.m. to 6.00 a.m.

3. Silence zone is an area comprising not less than 100 meters around hospitals, educational institutions, courts, religious, places or any other area which is declared as such by the competent authority

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

2.5.3 Effluent Discharge Standards

For the purpose of protecting and improving the quality of the environment and preventing and abating environmental pollution, the standard for discharge of environmental pollutants from the

industries, operations and processes are stipulated under Environmental Protection Rules 1993. The general standards for discharge effluent in surface water bodies are given in **Table 2.4.**and these are applicable for the Project.

TABLE 2.4- EFFLUENT DISCHARGE STANDARDS

S No	Parameters	Unit	Standards	
			Discharge into inland surface waters	**Land for Irrigation**
1.	Colour and Odour	-	Efforts should be made to remove colour & unpleasant odour	Efforts should be made to remove colour & unpleasant odour
2.	Suspended Solids	mg/l	100	200
3.	Particle size of suspended solids	-	Should pass 850 micron IS sieve	NS
4.	pH value	-	5.5 to 9.0	5.5 to 9.0
5.	Temperature (Max)	˚C	Should not exceed 5˚C above the receiving water temperature	NS
6.	Oil and Grease (Max)	mg/l	10.0	10.0
7.	Total residual Chlorine (Max)	mg/l	1.0	NS
8.	Ammonical Nitrogen (Max)	mg/l	50.0	NS
9.	Total Kjeldah Nitrogen (Max)	mg/l	100	NS
10.	Free Ammonia (as in NH_3)	mg/l	5.0	NS
11.	Biochemical Oxygen Demand: 5 days at 20˚C Max	mg/l	30.0	100
12.	Chemical Oxygen Demand Max	mg/l	250	NS
13.	Arsenic (as As) Max	mg/l	0.2	0.2
14.	Mercury (as Hg) Max	mg/l	0.01	NS
15.	Lead (as Pb) Max	mg/l	0.1	NS
16.	Cadmium (as Cd) Max	mg/l	2.0	NS
17.	Hexavalent Chromium (as Cr^{+6}) Max	mg/l	0.1	NS
18.	Total Chromium (as Cr) Max	mg/l	2.0	NS
19.	Copper (as Cu) Max	mg/l	3.0	NS
20.	Zinc (as Zn) Max	mg/l	5.0	NS
21.	Selenium (as Sn) Max	mg/l	0.05	NS
22.	Nickel (as Ni) Max	mg/l	3.0	NS
23.	Cyanide (as Cn) Max	mg/l	0.2	0.2
24.	Fluorides (as F) Max	mg/l	2.0	NS
25.	Dissolved phosphates (as P) Max	mg/l	5.0	NS
26.	Sulphides (as S) Max	mg/l	2.0	NS
27.	Phenolic compounds (as C_6H_5OH) max	mg/l	1.0	NS
28.	Radioactive materials: á Emitters Max Â Emitters Max	µcurie /ml	 10^{-7} 10^{-7}	 10^{-7} 10^{-7}

29.	Bio-assay Test	-	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hrs in 100% effluent
30.	Manganese (as Mn)	mg/l	2.0	NS
31.	Iron (as Fe)	mg/l	3.0	NS
32.	Vanadium (as V)	mg/l	0.2	NS
33.	Nitrate Nitrogen	mg/l	10.0	NS

Source: Pollution Control Acts Rule &Notifications issued there under, page No.460-463 by Central Pollution Control Board (Gazette notification dated 19th May 2000)

2.6 ENVIRONMENT, HEALTH & SAFETY (EHS) POLICY

Well-established Corporate Occupational Health and Safety measures will be applied and strictly implemented, and all national labor laws and applicable International Labour Organization conventions on workplace conditions will be followed. Regulations related to occupational Health and Safety management will be issued and strictly enforced. All personnel will receive training in Occupational Health and Safety practices. Safety drills will be carried out periodically. Safety manuals or handbooks will be prepared as required.

The safety manual to be used during the construction period and. Environment Management System ISO 14001:2004 and occupational Health & Safety management system OHSAS 18001:2007 certification for the site should be obtained.

The company believes that good Health, Safety and Environmental performance is an integral part of efficient and profitable business management and these matters rank equally in importance with other management responsibilities and that success in these areas depends in the involvement and commitment of everyone in the organization.

As a consequence to the Company's overall commitment to preserve Health, Safety, and a Sound Environment the company has a responsibility to:

- Provide and maintain healthy and safe working conditions, equipment and systems of work for all employees.
- Ensure the protection of the health and safety of people who may be affected by its constructions.
- Prevent, or if that is not practicable, minimize and make safe releases to air, water and land of substances which could adversely affect human health or the environment.
- Reduce waste and source by careful use of materials, energy and other resources and maximize recycling opportunities.
- Set targets for improving health and safety at work and environmental protection, carry out regular assessments and report annually on performance.
- Ensure that each of its locations adopts policies and commitments which also describe the local organization and arrangements for putting them into practice.

The Company regards Health, Safety and Environmental matters as mainstream management responsibilities.

- Executive and the line managers at all levels within the company are directly responsible through the normal management structure for Health, Safety and Environmental matters in the operations under their control.

- All employees have a responsibility to take reasonable care of themselves and others while at work and to participate positively in the task of preserving workplace health and safety and a sound environment.

2.6.1 EHS (Environment, Health & Safety) POLICIES OF RELIANCE POWER

EHS System will be established as per requirements of ISO 14001:2004 and OHSAS 18001:2007. The EHS Policy is developed and implemented based on the Environment, Health & Safety risks and concerns envisaged in the engineering, procurement & construction activity of the project.

Environment, Health and Safety Policy

The Engineering, Procurement and Construction (EPC) division of Reliance Infrastructure is committed to deliver reliable, quality products and services to all its customers with proper systems and processes, thereby creating superior value for our stakeholders in Generation, Transmission, Distribution and Infrastructure Projects in Power Sector. Site specific policy as per local requirement will be formulated and implemented. In our endeavor to achieve this, they will

- Set objectives and targets in EHS systems and practices
- Maintain strict compliance of all relevant legislative, regulatory and other requirements.
- Training and development of employees for effective implementation of EHS standards.
- Effectively work with major suppliers, contractors & other associates to facilitate them to achieve highest level of performance.
- To aim and achieve “ZERO ACCIDENTS”.
- Continual Improvement of systems and processes to maximize conservation of resources and minimization of pollution, health and safety hazards.

2.7 COMPLIANCE STATUS

Dahanu Solar Power Private Limited will comply to all the conditions according to ADB and will also adhere with its own EHS policies. The detailed compliance status is described below:

General policy

Sl. No	EHS Policy	Compliance status
1.	Environment, health and safety policy is the commitment of the top management to ensure a safe, healthy working environment to all its employees, customers, community and local bodies by complying the relevant statutory Conditions	Will be complied
2.	The policy gives standing decision for prevention, control and elimination of accidents, risks, health and environmental hazards at projects and plants located at different places.	Provision explained in Chapter 7
3.	Management's concern and commitment to Environment, health and safety at design and planning level and giving importance in maintaining all facilities, processes and procedures to secure sustained safety, health and	Will be complied

	environment protection.	
4	Providing training and retraining to all level of employees on Environment, Health and safety with necessary PPE to avoid accidents and to show prompt response for any type of emergencies.	Will be complied
5.	Organizing the EHS audits by internal and external agencies for total loss control so that customer and stake holder confidence is safe guarded.	Will be complied
6.	Adopting and promoting industry the best E.H.S. practices to avert accidents and improve E, H&S performance by ensuring optimal utilization of resources.	Will be complied
7.	Organizing for collection, analysis, and presentation of data on accidents, sickness and incidents involving personal injuries or injuries to health with a view to take corrective remedial and preventive actions.	Provision explained in Chapter 7 and will be complied accordingly
8.	Co-coordinating the activities of the company and of its contractors working in the company's premises for the implementation and maintenance of safe systems of work to comply the statutory conditions with regard to the E.H.S. of the employees.	Provision explained in Chapter 7 and will be complied accordingly
9.	E.H.S. is not only a concern for the Management and it also the responsibility of every employee to follow Environment, Safety and health systems and giving maximum importance to E.H.S. Policy	Will be complied

CHAPTER 3. PROJECT DESCRIPTION

3.1 INTRODUCTION

Dahanu Solar Power Pvt. Ltd. (DSPPL) is planning to set up Solar PV Power Project of the capacity of 40 MW (in first phase), at Village- Dhursar, Tehsil Pokhran, Jaisalmer District of the state of Rajasthan, India. A PPA has already been signed with Reliance Infrastructure Limited, Mumbai. The Energy generated to satisfy this PPA is 40 MW and the Solar PV power plant is required to commission by March 2012.

3.2 PROJECT LOCATION AND ACCESS

The proposed site is located in Village- Dhursar, Pokaran Tehsil in Jaisalmer district of Rajasthan State in India. Jaisalmer is located 575 kilometres west from the state capital Jaipur.

District Jaisalmer is located within a rectangle lying between 26°.4' to 28°.23' N parallel and 69°.20' to 72°.42' E meridians. Covering the geographical area around 38,401 sq. kms, Jaisalmer is the largest district of the country. The breadth (East-West) of the district is 270 km and the length is 186 km. The district is bounded on the north by Bikaner, on the west & south-west by the Pakistani border, on the south by Barmer and Jodhpur, and on the east by Jodhpur and Bikaner Districts. The length of international border attached to district Jaisalmer is 470 km.

The District, a part of the Great Indian Thar Desert, is sandy, dry and scorched. The terrain around, within a radius of about 60 kms is stony and rocky. The area is barren, undulating. The soil here is grateful even to a little rain and turns lush green during monsoon. The underground water level is very low. Figure 3.1 presents the district map of Jaisalmer, Rajasthan indicating the proposed project site.

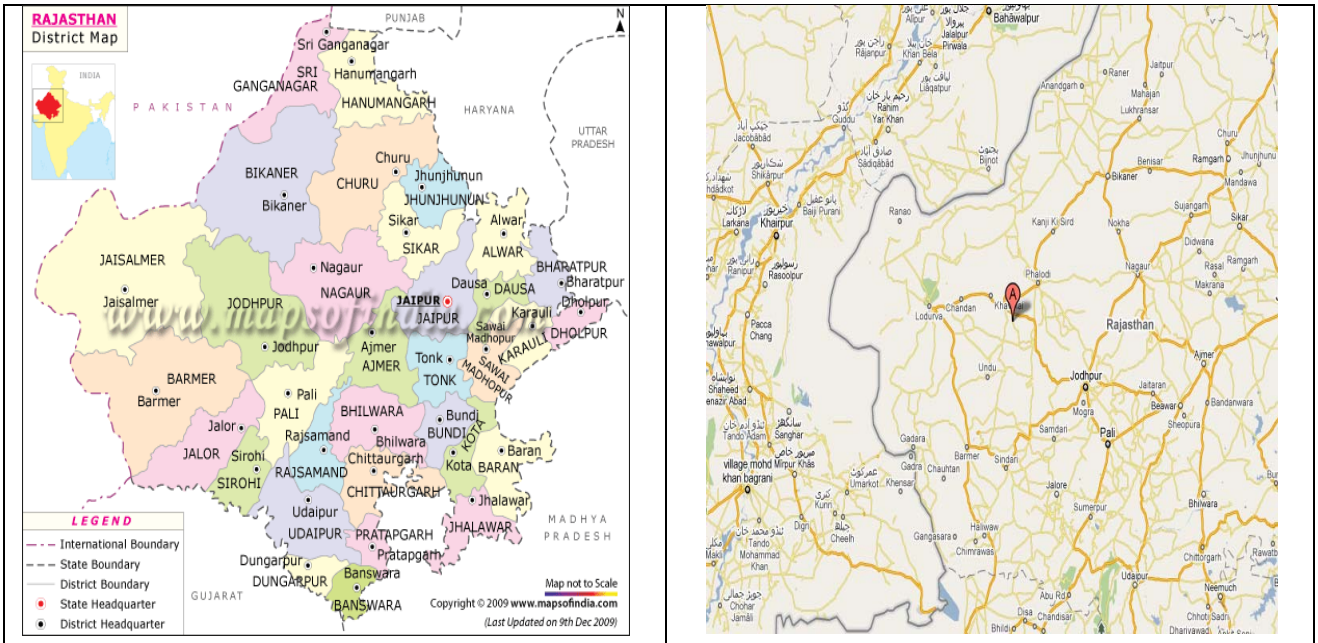


Figure 3.1 – District map of Jaisalmer, Rajasthan & Google Map indicating Project Site

3.3 PROJECT CONFIGURATION

For the first phase 40 MW Solar Power project will be developed as DSPPL has signed the PPA for 40 MW with Reliance infrastructure Limited, Mumbai and that is the reason, a 40 MW Solar Plant is being commissioned by DSPPL.

3.4 BASIC REQUIREMENTS

3.4.1 Land

The land requirement for the Project's Solar Power Plant depends upon the technology deployed i.e. Crystalline or Thin Film technology, conversion efficiency and solar radiation incident in the Project location. 140 Hectares of land is available for the Project's Solar Power Plant site which is sufficient to install 40 MW Solar PV Project. The site development work has to be carried out on proposed locations to make it suitable for installation of solar PV plant. The cost towards the acquisition of the 140 Hectares of the land has been estimated as Rs 30 lacs. Arrangements (including compensation to land owners) for the TL shall be governed by the resettlement framework.

Table 3.1- Area Break-up Details

Particulars	Area in Ha
PV module area	102
Balance of plant	18
Open area	20
Total Plant Area	140
T/L Tower footings	1.44
Transmission Line Right of Way	72.48

Table 3.2- Land Owner-ship Status

Use of Land	Private Land	Govt. Land	Forest Land	Total
Plant Area	Nil		Nil	
Total		140		140
Acquisition Status		Under Process		
Transmission Line	72.37	0.11	Nil	72.48
Acquisition/RoW status for Transmission Line	Under Process			

Note: All values are in Hectares

3.4.2 Water

The water requirement for the project is minimal. The main consumption of the water is for solar module cleaning purpose. The water requirement is 0.146 million liters per day (MLD).The water requirement has been arrived based on the following assumptions:

No. of Solar module	5,34,000
Area of individual module	0.72Sq.mtr
Water required to clean each module	5 litres
Number of cycles	20 times per year
Total water requirement	53,400 m^3/ year
Total water required in MLD	0.146 million liters per day (MLD)

As seen in the table above, the water requirement for an entire year will be 53,400 m^3. RSTEPL (Rajasthan Sun Technique Energy Pvt Ltd), a wholly owned subsidiary of Reliance Power Ltd is setting up a 100 MW Solar Thermal plant adjacent to this PV plant. In this CSP plant, RSTEPL is planning to build a rain water harvesting pond whose final details are being worked out. The rain water harvesting pond will have a capacity of 0.8 million m^3. Considering the size of this pond and the average annual rainfall data at the Dhurasar site, it has been conservatively estimated that around 0.2-0.3 million m^3 of rainwater will be collected in the pond annually. RSTEPL for its 100 MW Solar CSP project has already received water allocation from the Rajasthan PHED (Public Health and Engineering Department) pipeline which is 22 km away from the project site. All of the CSP plant`s water requirement will be met from this allocation and hence RSTEPL will not be required to take any water from the rainwater harvesting pond.

At an average, this rain water harvesting pond will hold 0.2 million m^3 of water every year whereas DSPPL`s water requirement will only be 53,400 m^3 and hence will be satisfied by this pond. DSPPL is also in the process of negotiating a suitable facility sharing with RSTEPL to use this rainwater.

Other than the above option, in the case of a contingency, DSPPL is planning to bring water through water tanker from the surrounding areas of nearby Lawan village which is 15 km away from the project site. The region surrounding Lawan village has quite a few natural catchment areas where rainwater gets filled up. This rainwater is not used for any specific purpose and only gets seeped into the ground after a few months. Considering that western Rajasthan has a population of around 13 people per sq km, the villagers in Lawan have adequate water for domestic consumption and hence DSPPL does not envisage a problem of water scarcity to those villagers due to this scheme

DSPPL will make efforts to conserve water by applying principles of “Reduce, Reuse and Recycle” during operation phase.

3.4.3 Project Cost

The project cost for the 40MW PV power plant is estimated to be Rs. 683 Crores. PV modules would share the major cost for the project, which is 37% of total project cost.

3.5 WASTE WATER TREATMENT AND DISPOSAL SYSTEM

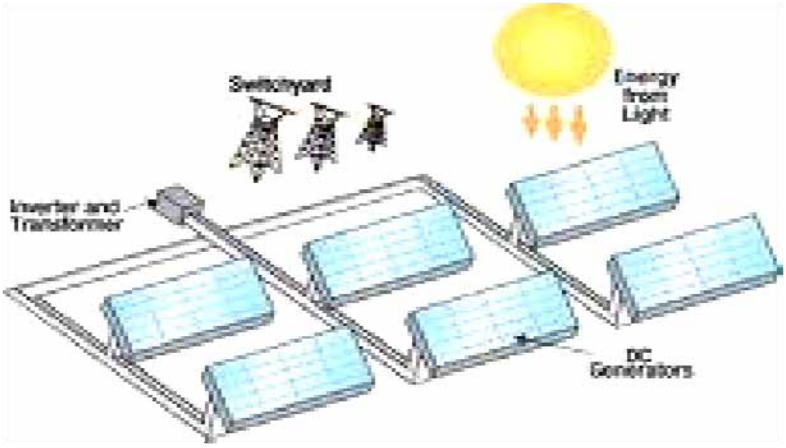
Waste Water

Wastewater is any water that is contaminated by anthropogenic / industrial processes with solids, temperature, chemicals and other impurities. The effluent management scheme would essentially involve collection, treatment and recirculation / disposal of various effluents. Since, water is used only for the cleaning purpose of solar PV modules to remove dust from it. The discharge water does not include any chemical or hazardous material.
Water runoff / discharge from the panels is likely to get evaporate or absorbed into the arid ground below the panels, and no drainage canal is required.

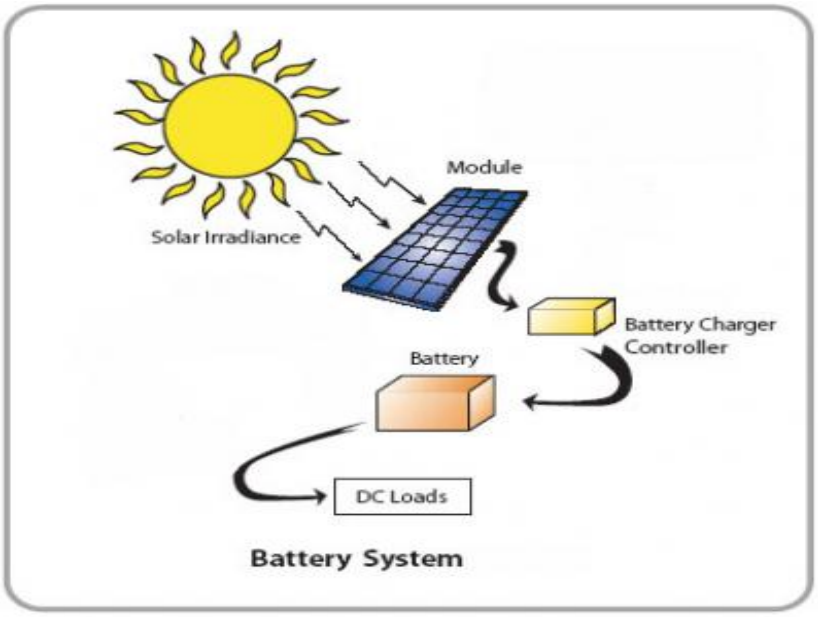
3.6 POWER EVACUATION

The power generated from the proposed solar power plant should be evacuated through 220KV transmission line to 220kV Dechu Sub-Station of RVPNL. The power generated from the proposed solar PV power plant at LT level should be stepped up first to 33 kV level through suitably rated transformers & then to 220 kV level. The power from the PV project should be evacuated through proposed 220 kV transmission line to Dechu substation. There should be construction of a 220KV single /double circuit transmission line about 30km Project site to Dechu GSS. Dechu GSS is expected to be commissioned by Feb 2012. The metering will be at Dechu GSS.

3.7 PROCESS OF POWER GENERTION



Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of cells containing a photovoltaic material. Materials presently used for photovoltaic include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide Photovoltaic is the direct conversion of light into electricity at the atomic level. Some materials exhibit a property known as the photoelectric effect that causes them to absorb photons of light and release electrons. When these free electrons are captured, an electric current result that can be used as electricity.



3.8 LAYOUT

The major considerations which have been taken into account while planning the layout of various facilities in the plant are predominantly wind directions, power evacuation corridor, etc. Layout plan is enclosed in **Figure No. 3.2.**

The 40MWp power plant should be a combination of 10 units of 4MWp power unit. Each 4MWp power unit will consist of 31 units of 131kWp PV system. Each 4MW PV system will be connected to 5 no of Inverter of 800kW each. Total 55556 strings should be planned for 40MW Solar PV Project which is located in a distributed manner throughout the plant. There should be total eight nos. of LT control Building and 2 nos. HT control Building.

Each LT Control Building consist of 1 5/3/2MVA, 33/0.415/0.415kV Transformer and 5 no of Inverter of 800kW and one LT switchboard for combining the power of five inverters. HT Control Building should consist of 1 no of 5/3/2MVA, 1 no. of 33/0.415/0.415kV Transformer, 1 no of 250kVA, 33/0.415kV Auxiliary Transformer and 33kV Metal Clad switchgear consisting of 6 nos. of O/G Feeders and 1 no of I/C Feeder. 250kVA auxiliary transformer should be fed to the auxiliary load of the HT & LT Control Buildings. HT side of 5/3/2MVA inverter transformer should be connected with the 33kV switchgear of HT Control Building through 33kV cable. The power output of the two 33kV Switchgear i.e. total 40 MW approx. should be merged together in a 33kV Main Switchgear which is located in 33kV Main Switchgear Building. The main 33kV switchgear, located at 33kV Main switchgear Building, should be connected with two nos. of 18/24/30 MVA power transformer through 33kV cable for evacuating power to proposed 220 kV switchyard through suitable rated overhead lines. Auxiliary load for 33kV Switchyard and HT Control Building should be fed from 250kVA Auxiliary transformer located at the HT Control Building

There will be 300mm separation between two strings in a row. 2mt separation should be provided between two adjacent rows. A 5mt wide continuous road connecting all the ten blocks should run across the plant. The location also facilitates routing of 33kV underground cable for exporting power without interfering with the PV array layout.

Parameter	Value
PV Module	80Wp
Module length	1.2m
Module width	0.6 m
Module area	0.72 sqm
Capacity	80 Wp
Layout for one 4MWp Block	
Total capacity	4MWp
No. of Modules	534000
Spacing between two rows	2.0 m
Space + one row of module	3.8m
Area required for one 4MW block	115610.3sqmt.
Area required for ten 4MW block(A1)	1156103sqmt.
Area of 11 control building and 5mt road across the plant (A2)	39897 sqmt.
Total Area required(A1 +A2)	1196000sqmt

Solar PV Array: Thin Film Solar PV technology has been selected for the 40 MW Solar PV Power Project. It should perform satisfactorily in relative humidity up to 100% with temperatures between -10°C and +85°C and withstand gust up to 200 km/h from back side of the panel. This is qualified to IEC 61701.

Inverter and Control: Grid interconnection of PV systems is accomplished through the inverter which converts DC power generated from PV modules to high quality AC power to the utility system at reasonable cost.

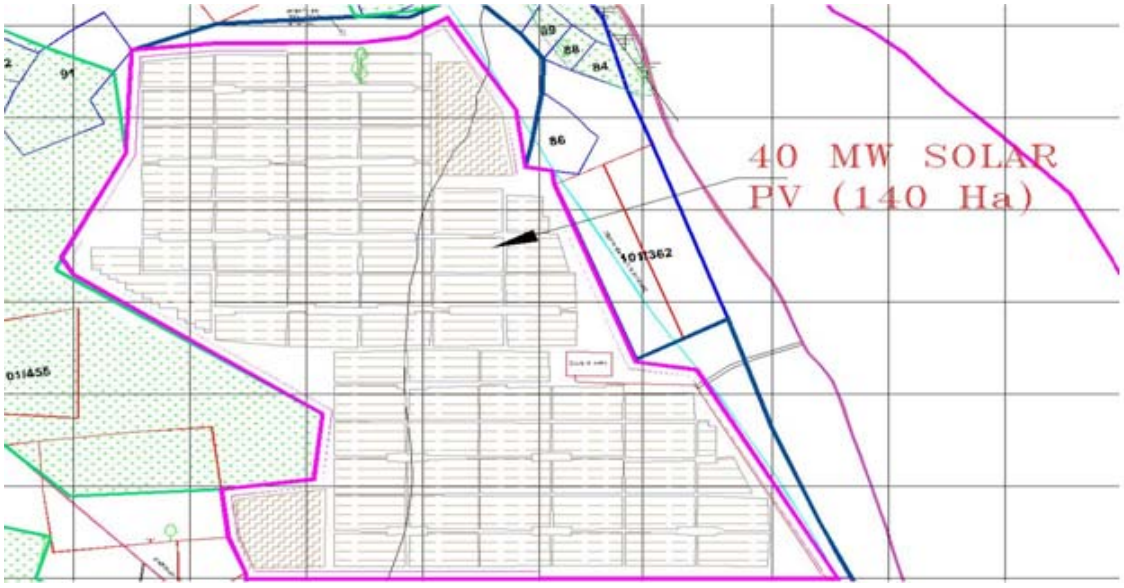


Figure No. 3.2: Layout plan of 40MW Solar PV

3.9 PLANT CONSTRUCTION & IMPLEMENTATION

Project Implementation schedule

An implementation schedule, outlining the sequence of major activities and the time required for engineering, construction, installation and commissioning of the 40MW solar PV power plant. The solar plant is expected to be commissioned and start exporting power to the grid before 31.03.2012.

S.No	Activity	Completion time
1	Award of EPC contract	July 2011
2	Site mobilization	Aug 2011
3	Basic Infrastructure building	Aug 2011
4	Detailed Engineering & Procurement	Sep 2011
5	Financial closure	Sep 2011
6	SPV module shipment	August 2011 to January 2012
7	Shipment of BoP equipment	Aug 2011 to January 2012
8	Commencement of erection	Sep 2011
9	Construction of Evacuation system	January 2012
10	Commissioning, Trial run & testing	March 2012
11	Commercial Operation	15th March 2012

Plant Operation and Maintenance

The operation of solar power plant is relatively simple and restricted to daylight hours. With automated functions of inverter and switchyard controllers, the maintenance will be mostly oriented towards better upkeep and monitoring of overall performance of the system. The solar PV system requires the least maintenance among all power generation facility due to the absence of fuel, intense heat, rotating machinery, waste disposal, etc. However, keeping the PV panels in good condition, monitoring and correcting faults in the connected equipment and cabling are still required to get maximum energy from the plant.

3.10 POWER TRANSMISSION LINE

The power generated from the proposed solar power plant should be evacuated through 220KV transmission line to 220kV Dechu Sub-Station of RVPNL.

The power generated from the proposed solar PV power plant at LT level should be stepped up first to 33 kV level through suitably rated transformers & then to 220 kV level.

The power from the PV project should be evacuated through proposed 220 kV transmission line to Dechu substation. Project Company has to construct a 220KV single /double circuit transmission line about 30km Project site to Dechu GSS. The metering will be done at 220kV Dechu GSS.

3.10.1 Power Evacuation:

DSPPL has obtained the Grid Connectivity letter for SPV and will be getting grid connectivity at 220KV Dechu GSS. The new 220/132 kV Dechu GSS is under commissioning stage and the target date of the commissioning is matching with date of commissioning of PV plant.DSPPL will construct a 220KV single /double circuit transmission line about 30km from our plant at Dhursar to Dechu GSS.

Several solar panels should be connected together through junction boxes & cables & feed power to an inverter. Inverter AC power should be stepped up for connection with the grid. For the proposed power plant, the solar panels should be suitably connected in series & parallel combinations as per the inverter requirement. The output of the modules should be taken from module terminal boxes through suitable size cable connection. Series junction boxes (as required) should be considered for each series mounting structure for taking out final output. Array junction boxes (as required) should be located suitably for paralleling various series junction box (SJB) outputs. Terminal blocks should be provided in the array junction box for paralleling +ve & -ve electrical output from different series junction boxes based on the configuration of array junction box.

Main junction boxes should be used to connect the output of array junction boxes, the output of main junction boxes working as an input for inverter. In the proposed scheme, inverters of 500kW each have been considered. The 320V Outputs of Four (4) nos. inverters are connected to the 320V LT panel. The Three winding step-up transformer of proposed rating 2500 kVA should be used to step-up the voltage to 33kV level. 33kV side of such five transformers, combining 10MW power, should feed 33kV switchgear which should be located in the HT Control Building. The power output of the two 33kV Switchgear i.e. total 40 MW approx. should be merged together in a 33kV Main Switchgear which is located in 33kV Main Switchgear Building. The main 33kV switchgear building is approximately 2kM away from each of the HT Control Building. The interconnection between the two 33kV switchgear should be through 33kV line. The Power should be evacuated by the use of 2 nos. of 18/24/30 MVA, 33/245kV Power Transformers through suitable rated overhead lines.

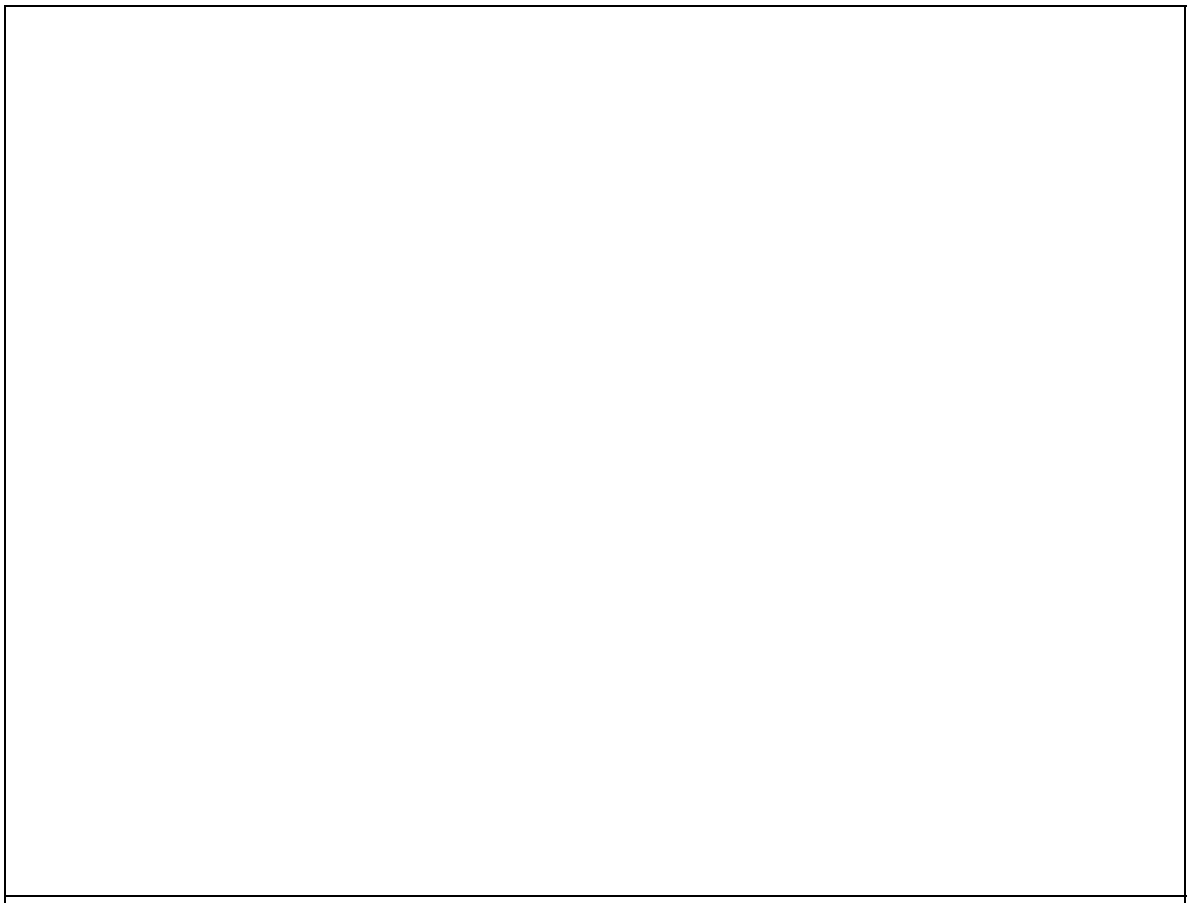


Figure No. 3.3: Schematic Drawing showing the transmission line route

3.10.2 Details of Transmission Lines

The transmission shall have total length of approximately 30200mts consisting of about 100 towers. This shall be passing through villages namely Dhursar, Lalpur, Dolhinadi ,Changsama ,Mandla ,New Nadhi, of Pokran Tahsil of Jaislmer district of Rajasthan and Village Decchu of Decchu Tehsil of Jodhpur District of Rajasthan.

The transmission corridor of 12mts on either side was identified and this is barren land all through mostly private land. The land being mostly barren and the location being dry, it is expected that the transmission line RoW will not affect people`s livelihood. Although, the transmission line route has been finalized, DSPPL does not rule out the possibility of some minor changes till DSPPL obtains the RoW permission. During the finalization, DSPPL had selected the route in such a way that no land acquisition is needed. Details are given in **Table 3.3** below.

Table 3.3: Village-wise Right of Way **of Land** to be used for Transmission

Name of The village	Dhursar	Lalpur	Dolhinadi	Changsama	Mandla	New Nadhi	Decchu
Total Land	1709.56	5685.05	4678.1	8250.47	3022.71	5961.16	893.19
Govt Land	45.61	0	0	0	0	0	0
Pvt Land	1663.95	5685.05	4678.1	8250.47	3022.71	5961.16	893.19

Table 3.3: Land Details of proposed transmission line route

Sl. No.	Angle Point		Distance between the two points (meter)	Name of the Village	Name of the Tehsil	Name of the Districts	Type of Land*	Use of Land*	Name of Crops*	No of Permanent Affected Household*	No of affected Tribal household*
1	Dhursar	AP-01	45.61	Dhursar	Pokhran	Jaisalmer	Govt Waste Land	Barren	Nil	Nil	Nil
2	Ap-01	AP-02	1663.95	Dhursar	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
3	AP-02	AP-03	1325.84	Lalpur	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
4	AP-03	AP-04	1660.25	Lalpur	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
5	AP-04	AP-05	1341.2	Lalpur	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
6	AP-05	AP-06	1357.76	Lalpur	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
7	AP-06	AP-07	1973	Dolhinadi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
8	AP-07	AP-08	2705.1	Dolhinadi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
9	AP-08	AP-09	1614.31	Changsama	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
10	AP-09	AP-10	640.93	Changsama	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
11	AP-10	AP-11	279.26	Changsama	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
12	AP-11	AP-12	2701.43	Changsama	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
13	AP-12	Ap-13	3014.54	Changsama	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
14	AP-13	AP-14	3022.71	Mandla	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
15	AP-14	AP-15	2970.29	New Nadhi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
16	AP-15	AP-16	1992.59	New Nadhi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
17	AP-16	AP-17	203.71	New Nadhi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
18	AP-17	AP-18	346.21	New Nadhi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
19	AP-18	AP-19	264.87	New Nadhi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
20	AP-19	AP-20	183.49	New Nadhi	Pokhran	Jaisalmer	Private Land	Barren	Nil	Nil	Nil
21	AP-20	AP-21	257.42	Decchu	Decchu	Jodhpur	Private Land	Barren	Nil	Nil	Nil
22	AP-21	AP-22	323.88	Decchu	Decchu	Jodhpur	Private Land	Barren	Nil	Nil	Nil
23	AP-22	AP-23	261.35	Decchu	Decchu	Jodhpur	Private Land	Barren	Nil	Nil	Nil
24	AP-23	GAN	50.54	Decchu	Decchu	Jodhpur	Private Land	Barren	Nil	Nil	Nil

**Subject to final Transmission line route*

Note: *Babul, kair and some shrubs like Bui and Beri are commonly found in this region*

3.10.3 Proposed Transmission System- Main features

The transmission towers are of self-supporting hot dip galvanized lattice steel type designed to carry the line conductors with necessary insulators, earth wires and all fittings under all loading conditions.

The tower shall be fully galvanized using mild steel or/and high tensile steel sections as specified. Bolts and nuts with spring washer are to be used for connections.
The towers are designed so as to be suitable for adding 3.0M, 6.0M, and 9.0M body extensions and +1.5M, +3.0M leg extensions for maintaining adequate ground clearances without reducing the specified factor of safety in any manner.

The provision for addition of 18/25m/31m body extension to tower types DA and DD is also kept by the Owner. For Power Line Crossing or any other obstacle, tower types DA or DD can be used with 18/25 M extensions depending, upon the merit of the prevailing site condition.

3.10.4 Route Alignment

The route alignment shall be carried out by the contractor using satellite imageries of NRSA (PAN & LISS-III merged product) and Cartosat Imagery and Survey of India topographical maps (scale 1:50000) and in addition high resolution imagery will be required for developed areas as given in the Field Quality Plan.

The alignment of the transmission line shall be optimal from the point of view of construction, maintenance, cost and minimizing damages.

3.10.5 Ground Clearance

The minimum ground clearance from the bottom conductor shall not be less than 7150mm for 220KV lines at the maximum sag conditions i.e. at 75°C and still air.

a) An allowance of 300mm shall be provided to account for errors in stringing.
b) Conductor creep shall be compensated by over tensioning the conductor at a temperature of 26°C lower than the stringing temperature for ACSR ZEBRA.

3.10.6 Clearance from Ground, Building, Trees etc.

Clearance from ground, buildings, trees and telephone lines shall be provided in conformity with the Indian Electricity Rules, 1956 as amended up to date.

3.10.7 Road Crossing

At all important road crossings, the tower shall be fitted with double suspension and tension insulator strings depending on type of tower but the ground clearance at the roads under maximum temperature and in still air shall be such that even with conductor broken in adjacent span, ground clearance of the conductor from the road surfaces will not be less than specified minimum ground clearance. At all national highways DD type towers with double tension insulator strings shall be used and crossing span will not be more than 250 meters. At all NH and SH crossings, crash barriers shall be employed for the safety of the towers.

3.10.8 Forest clearance:

During detailed engineering the forest/non forest areas involved if any shall be identified and authenticated by concerned authorities. Forest clearance as per the requirements of the state/MOE&F shall be obtained. However, preliminary survey shows that there is no forest land involved.

3.11 CLEAN DEVELOPMENT MECHANISM (CDM)

In1997, Kyoto Protocol ("Protocol") linked to United Nations' Framework Convention on Climate Change resolved to reduce the greenhouse gases (GHGs) responsible for global warming. As an effort to minimize the global warming, Protocol sets binding targets for thirty-seven industrialized countries, five per-cent below GHG emission levels prevailing in 1990, between 2008 and 2012. Protocol established three market-based mechanisms allowing developed countries to meet the emission reduction targets.

Clean Development Mechanism (CDM) is one of the three project based mechanisms formulated under the Protocol. CDM establishes a win-win situation for both developed countries as well as developing countries. It allows developing countries to implement GHG emission reduction projects in a manner they assist developed countries meeting their GHG limitation targets in a cost-effective manner.

Efforts undertaken by the developers of such projects, in developing countries, is rewarded through issuance of salable Certified Emission Reductions / Carbon Credits stimulating economic growth in a sustainable manner.

Carbon Di-Oxide (CO2), one of the six GHGs covered under the Protocol. Since fossil fuels are one of the emission sources for electricity generation, any projects that reduce CO2 emission may become CDM projects after going through scrutiny guidelines promulgated by CDM Executive Board (CDM-EB). Examples of such projects include higher efficiency electricity generation, lesser emission intensive fuels, renewable energy technologies and etc.

CDM Project cycle

CDM Project cycle comprises of two major phases, registration and operation, to generate Carbon credits. These include:

Solar PV Project

As a part of the renewable energy source Solar Power projects are eligible to generate (CERs) under the Approved Consolidated Methodology (ACM0002). Crediting period of the CERs for the projects could be a fixed 10 year crediting period or a variable crediting period of 7 years not extending beyond 3 such periods (21 years). Approach to calculate CERs required to be followed under ACM0002 is mentioned below

Baseline Information:

As per the ACM0002, Baseline Emission factor / Emission Intensity of the NEWNE grid is calculated in line with Combined Margin (CM) approach providing weightages to Operating Margin (OM) and Build Margin (BM) emission factors.

Central Electricity Authority (CEA), a statutory body incorporated under the Ministry of Power, Govt. of India, annually publishes "Baseline Carbon Dioxide Emission Database". As part of the Baseline Carbon Dioxide Emission Database, OM and BM for both NEWNE and Southern grids are disclosed publicly. For the most recent year, CEA in its publication "Baseline Carbon Dioxide Emission Database - Version 06" has released the required data. The process of calculation of CM emission factor for NEWNE grid is given below:

	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Simple OM	1.0279	1.0196	1.0085	0.9999	1.0066	0.9777
BM	0.7030	0.6725	0.6313	0.5977	0.6755	0.8123

Combined Margin emission factor:

Parameter	Unit	Value
Weighted Av. OM for last three years	tCO2/MWh	0.9941
Weight of OM	WOM	75%
BM	tCO2/MWh	0.8123
Weight of BM	WBM	25%
CM	tCO2/MWh	0.9487

Electricity Generation:

As mentioned in the document earlier, Project will operate at a load factor of 19.06% which in turn would generate 66,786 MWh (Net) as mentioned as below

Baseline Emission (BE):

Project would generate approximately 66,786 MWh of electricity and displace equivalent amount of electricity from the NEWNE grid which otherwise would have generated by the fossil fuel based power plants. According to the methodology ACM0002, Baseline Emissions of the project is the CO2 emissions avoided by the project considering the grid is emission intensive.
An annual baseline emission for the project is outlined below:

	Unit	Value
Net Electricity	MWh	66,786
CM	tCO2/MWh	0.9487
Baseline Emission	tCO2e	63,360

Emission Reduction:

Eligible CERs is the difference between Baseline Emission, Project Emission and Leakage of the Project. Project Emissions and Leakages are attributed to the onsite emissions due to the construction and operation of the project. Since the project is a renewable energy project with no on-site combustion of fossil fuel, project emissions and Leakage are considered Nil. Therefore, the annual emission reduction eligible for the project are equivalent to annual baseline emission computed above.

The annual emission reductions for the entire crediting period of 10 years are noted as below 63,360.

Outlook

In Conference of Parties (CoP) 16 held, at Cancun, Mexico, in 2010, both the developed nations and developing nations adopted Cancun Adaptation Framework. Section 83 of the Cancun Adaptation Framework undertake to maintain and build upon the existing mechanism which means the CERs issued for the project activity would continue to meet compliance requirements for the next phase of the commitment period

Several Analyst reports suggest that the prices of the CERs would be higher than the prevailing CER prices (11.95 for the week ended on June 17, 20112)

CHAPTER 4. EXISTING ENVIRONMENTAL & SOCIAL CONDITION

4.1 GENERAL

Rajasthan is located in the northwestern part of the subcontinent. 40 MW Solar PV Thermal PV project is proposed near Dhursar village in Pokaran Tehsil of Jaisalmer District, Rajasthan, is in western part of Rajasthan. In the southwestern part of the state, the land is wetter, hilly, and more fertile. The climate is variable in Rajasthan.

4.2 STUDY AREA:

An area with in 2 km around the project can be considered as influence zone and hence it has been taken as study area to understand even setting in the vicinity of the proposed project. However, as the environmental setting is arrived based on secondary data, all available data has been used for the purpose of Environmental understanding.

4.3 DATA SOURCE:

Secondary information collected from website:

1. http://jaisalmer.nic.in/,
2. http://www.rajasthan.gov.in/,
3. http://www.windrose.indianclimate.org,
4. http://www.census2011.co.in/news/384-jaisalmer-census-2011-highlights.html.
5. Survey of India toposheets no. 40N/B, 45B/1
6. Topographical map of Survey General of India,
7. Detailed Project Report
8. Site survey finding.

4.4 TOPOGRAPHY

The topography of the site is generally flat with a slope from north towards south varying from RL (+) 323 m to RL (+) 270 m necessitating different formation levels for various facilities in plant area.

4.5 GEOLOGY

The rocks exposed in the district are pre-Delhi granites, granite, gneisses, schist and Alwar, Ajabgarh and Rialto formation of Delhi group. The major part of the district is covered by quarter- hairy sediments. The pre-Delhi group of rocks comprises Mica-schists and gneisses. Occupy a major part of the western part of the district. The rocks of Delhi form super group from high relief in the north, north-east and south-eastern part of the district. The Rajalos are exposed in a small patch towards north-east of the district. The Aravalli hills and piedmont, plains contain good amount a fractures/lineaments because of multiphase tectonic movement. The lineament is generally parallel to the great boundary fruit of Rajasthan, Lineament intersection density also counted per 10 km^2.

4.6 WATER

Main Indira Gandhi Nahar is at a distance of 96 km from the project site and the Tributary Canal is at distance of 20 km from the site. The monitoring data for Surface Water Quality for the month of February, 2011. Physio-chemical characteristics of surface water are very good, conforming to drinking water standards, prescribed in IS: 10500 (Test Characteristics for Drinking Water), the water shows significant bacteriological contamination. The water requires treatment before complying with drinking water standards. The results of water quality monitoring are presented in table below:

S. No.	Parameters and Unit	Indira Gandhi Nahar near Dhursar	Tributary canal near Dhursar
1	pH	7.7	7.7
2	Temperature	25	25
3	Conductivity, µmho/cm	268	266
4	TSS, mg/l	72	58
5	TDS, mg/l	190	186
14	Sodium (Na), mg/l	23	22
15	Potassium, mg/l	3	3
16	Calcium, as $CaCO_3$ mg/l	29	29
17	Magnesium, as $CaCO_3$ mg/l	7	7

Source: Test Report : Shriram Institute for Industrial Research

4.7 SOIL

The soils of the Arid Zone are generally sandy to sandy-loam in texture. The consistency and depth vary according to the topographical features. The low-lying loams are heavier and may have a hard pan of clay, calcium carbonate ($CaCO_3$) or gypsum. The pH varies between 7 and 9.5. The soils improve in fertility from west and northwest to east and northeast. Desert soils are Regosols of windblown sand and sandy fluiratile deposits, derived from the disintegration of rock in the subjacent areas and blown in from the coastal region and the Indus Valley.

4.8 LAND USE

The proposed project site for the power plant is Government wasteland. There are few shrub thickets near the project site. There are no settlements near project site. Within the 2 Km survey area, there are some houses, some temporary huts and agricultural fields as shown in Figure 4.1. The soil is sandy which is porous comprising of more of gravel and less silt and clay content. There are some sand dunes in small area. Overall the area is plain with gentle slope.

Total area of the Rajasthan is around 342239 km^2; out of which 101454 km2 (i.e. 29.64%) is wasteland. Jaisalmer district of the state comprises most maximum wasteland which is around 38401 km^2 which is more than 75 percent of its total area.

Rajasthan state comprises maximum wasteland which is essentially desert area in the country as well as highest solar radiation. Vicinity of project area is almost sandy & barren. The vicinity map of the project site encompassing 2 km radius is given in **Figure. 4.1** & land use pattern in the project site is enclosed as **Figure 4.2.**

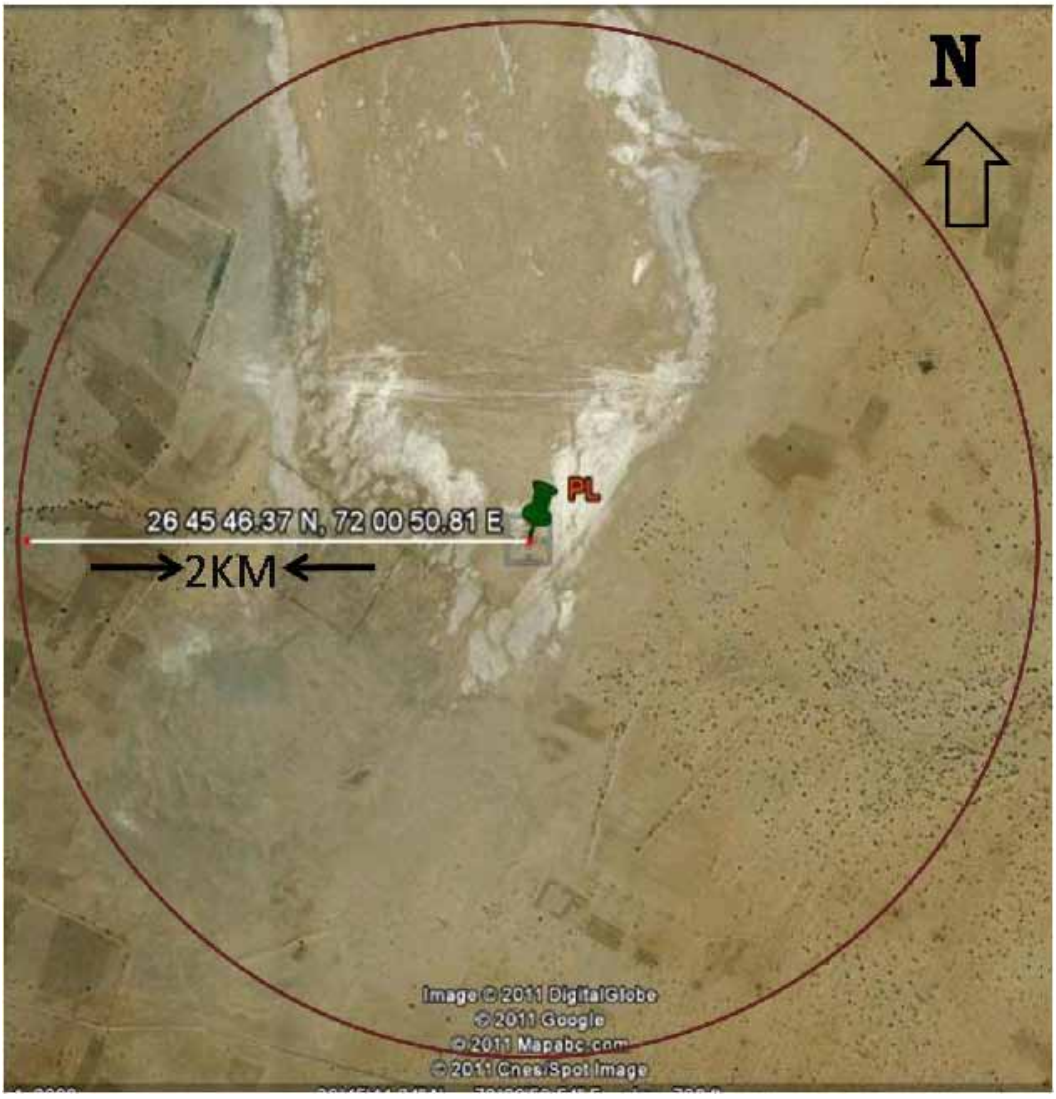


Figure No – 4.1: Vicinity map of the Project

Figure No – 4.2: Land use Pattern in the vicinity of the Project

4.9 CLIMATE

District Jaisalmer has a very dry climate with very hot summer; a cold winter and sparse rains. The climate is extremely hot during summer with maximum temperature reaching up to 49.2 degree celcious and extremely cold during winder with minimum temp. in the range of 1 degree celcious. The variation in temperature from morning to noon and the late midnight is a sudden phenomenon. The average rainfall is only 16.4 cms as against the state average of 57.51 cms.

4.10 MICRO CLIMATE

Jaisalmer is located in the 'Hot and Dry' Climatic Zone1 of the country. According to Surface Meteorology and Solar Energy (SMSE) of NASA, Jaisalmer receives daily global solar radiation from 3.31 kWh/m^2 (in December) to 6.78 kWh/m^2 (in June) over the year. The annual global solar radiation over horizontal surface has been estimated as 1883 kWh/m^2. The annual global solar radiation over inclined surface (i.e. at the latitude of the location) has been estimated as 1995 kWh/m^2. The microclimatic parameters namely ambient temperature, relative humidity, and prevailing wind speed of Jaisalmer are given in Table below for each month of the year. The rain fall data of the region of last 3 years average has also been presented in the region.

Month	Wind speed (m/s)	Air temperature (^{0}C)	Relative Humidity (%)
Jan	3.8	16.3	38.3
Feb	3.9	18.7	32.7
Mar	4.0	24.7	25.6
Apr	4.1	29.1	28.2
May	4.5	31.6	36.6
Jun	4.8	31.1	54.7
Jul	3.9	29.6	67.4
Aug	3.4	28.7	69.7
Sep	3.6	28.8	56.4
Oct	3.5	27.3	34.7
Nov	3.7	22.7	29.4
Dec	3.8	18.2	35.0

4.11 TEMPERATURE

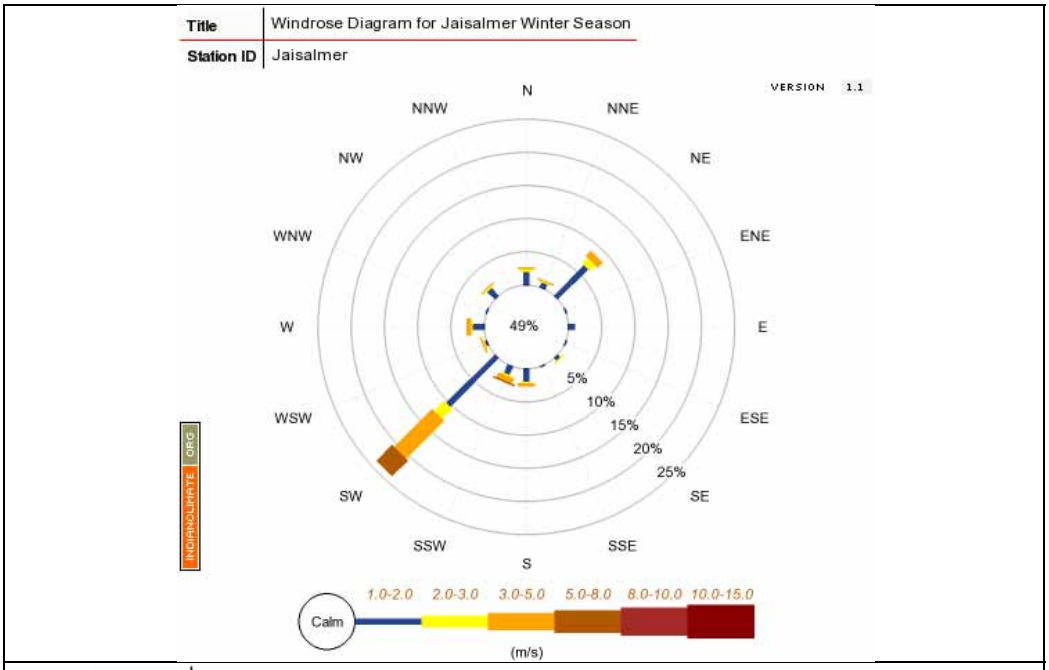
On average winter temperatures ranges from 8 to 28° C and summer temperatures range from 25 to 46° C.

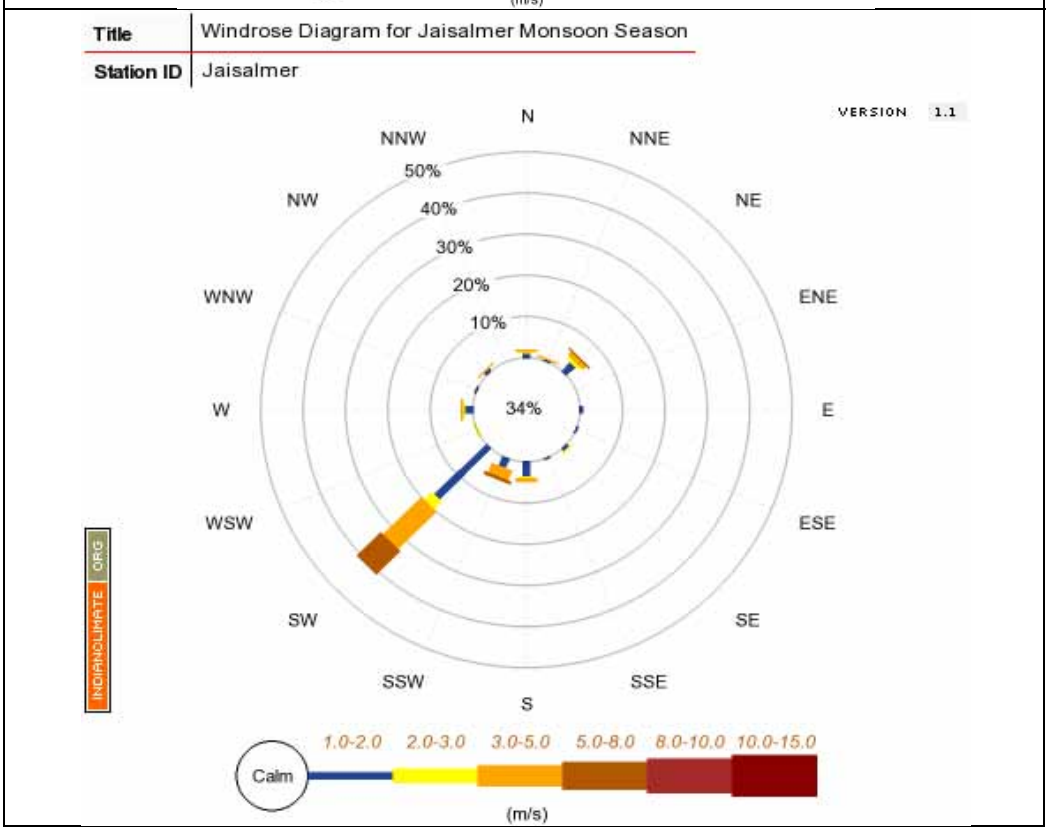
4.12 WIND SPEED

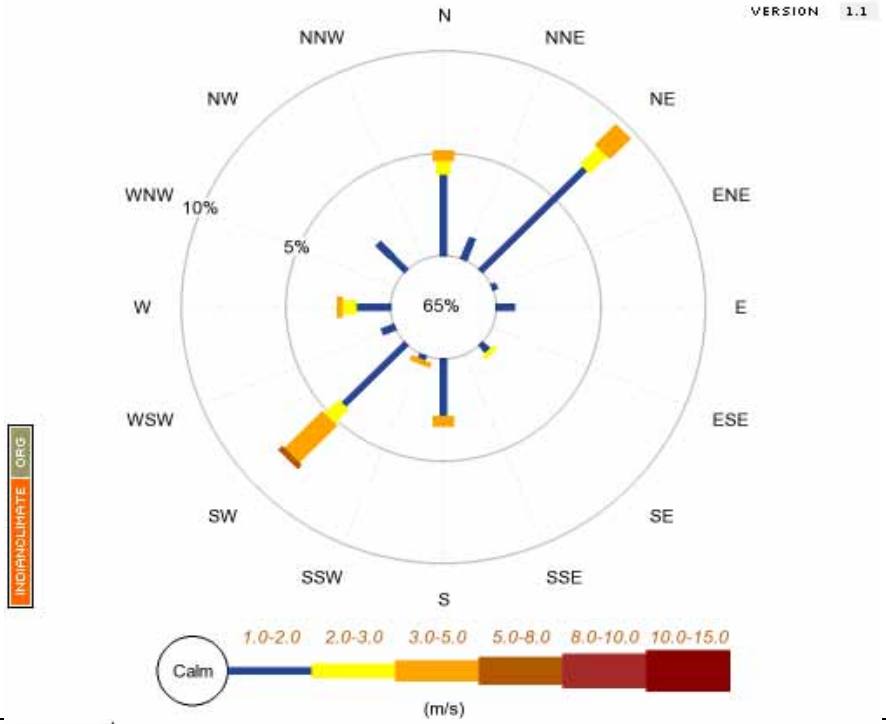
Analysis of hourly wind speed shows that the winds are generally light to moderate in this area. The annual mean wind speed varies from 1.30 to 6.30 Km/hr.

4.13 WIND PATTERN

The wind rose diagram for seasonal has been drawn on the basis of hourly wind speed and direction data. South West wind is dominant throughout the season. The seasonal wind rose diagrams are presented in Figure: 4.4.







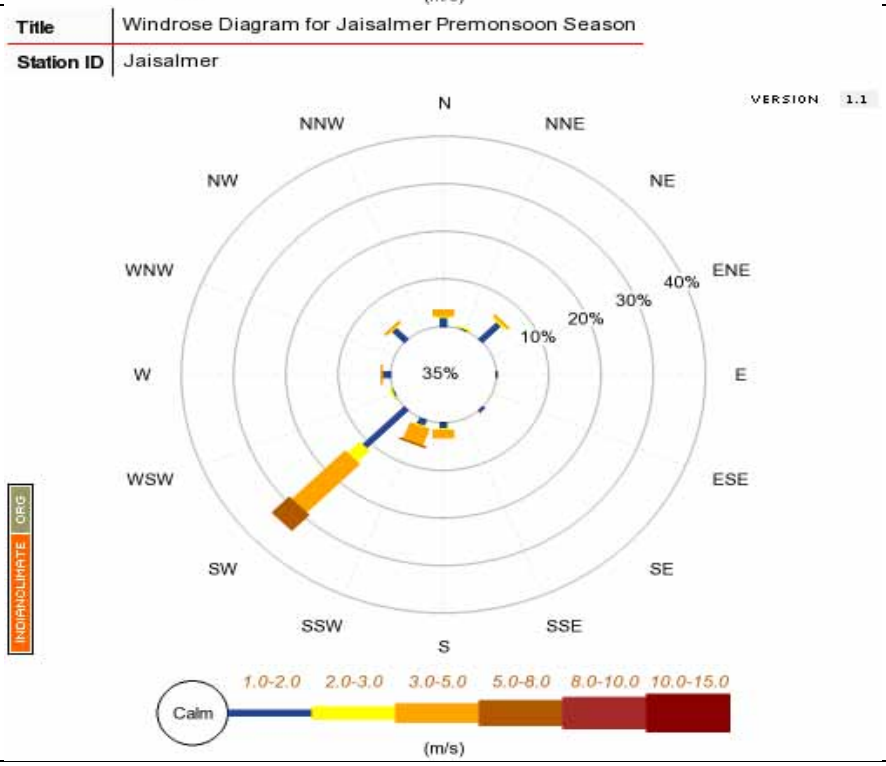


Figure No – 4.4: Wind Rose Diagram

4.14 WATER BODIES

There is no perennial river, spring, stream, rivulet near project area. The Indira Gandhi Canal is located at a distance of 96 km from the project site. The water pipeline of Govt. of Rajasthan is at a distance of 20 km. The area is arid and therefore rain is absorbed into the ground and there is no drainage per se.

4.15 TERRESTRIAL ECOLOGY

The study area falls in Thar Desert which is important from biogeographic point of view as it presents an admixture of Palaearctic and Indo-Malayan elements. The 'Thar' desert is situated in the west of the Aravali ranges and lies between 24^0 00' N and 35^0 5' N latitude and 70^0 7' and 76^0 2' E longitude. The 'Thar' desert is a biologist's paradise with respect to the types of wild animals in general and the carnivores in particular.

The area possess semi-arid climate and encompasses sand dunes, sandy plains, and together constitute an open scrub forest.

Flora

The floristic and faunal description is based on literature review and field observations. The study area shows almost plain topography. The area is poor in forest resources. The physical set-up of the area, meteorological and hydrogeological conditions, and hostile to any form of life, plant or animal has tended to make the area almost barren and desolate.

The general feature of the study area shows a sparse vegetation cover and is largely dominated by Cutch Tree (*Acacia catechu*), bushes of *Calotropis gigantea*, Khejri (*Prosopis spicigera* linn.), *Tropaeolum majus* and Chhota pilu (*Salvadora persica*). Occasionally a fine carpet of grasses, Bhrut (*Cenchrus setigerus*) and Sewan (*Elanorus hirsutus*) comes up with first shower of rains and vanishes after three months of short cycle. However, this vegetation is utilized both by cattle and men; cattle for their fodder and men for their fuel wood, thatching material, vegetable, medicines and food. The other plant species observed within the study area are given in table below:

S.No.	Scientific Name	Common Name
Trees, Shrubs and Herbs		
1.	*Acacia nilotica*	Babul
2.	*Acacia senegal*	Gum Arabic Tree
3.	*Calligonum polygonoides*	Phog
4.	*Calotropis procera*	Aak
5.	*Capparis decidua*	Kair
6.	*Citrullus colocynthis*	Gavakshi
7.	*Crotalaria burhia*	Saniya
8.	*Indigofera cordifolia*	Gokhru
9.	*Leptadenia pyrotechnica*	Khimp
10.	*Maytenus emerginatus*	Kankera
11.	*Prosopis cineraria*	Kejari
12.	*Prosopis juliflora*	Vilyati Babul

13.	*Salvadora persica*	Arak
14.	*Tecomella undulata*	Rohida
15.	*Tephrosia purpurea*	Sarphonk
16.	*Ziziphus nummularia*	Jharber
Grasses and Hedges		
1.	*Aristida adscensionis*	Sixweeks threeawn
2.	*Cenchrus bulflorus*	Bhurat
3.	*Cenchrus ciliaris Linn*	Anjana
4.	*Cyperus conglomeratus*	Flat sedges
5.	*Dactyloctenium scindicum*	Duck Grass
6.	*Desmostachya bipinnata*	Daab
7.	*Lasiurus scindicus*	Sewan grass
8.	*Pennisetum glaucum*	Pearl millet

Fauna

The study on terrestrial fauna in the study area is based on the field investigation, reports of Forest Department, Documents of University and Zoological Survey of India. Due to scanty vegetation growth in this region, not much of varied animal life is found in this State. Despite this, still a large variety of animals are found in this area. The different variety of faunal life can be categorized as (i) Primates, (ii) Carnivores, (iii) Angulate, (iv) Rodents, (v) Lagomorpha, (vi) Insectivore and (vii) Crustivore. Corresponding to its variegated topography and climate, the state has a wealth of animal life.

Mostly domestic animal like cow, sheep, buffalo and goat are reported in the study area.

List of Fauna observed in Study Area

S.No	Scientific Name	Local Name
Mammals		
1	*Presbytis entellus*	Langoor
2	*Canis aureus*	Siyaar/ Jackal
3	*Gervus unicolor*	Sambhar
4	*Herpestes odwardsitotus*	Nebla
5	*Vulpus bengalensis*	Indian Fox
6	*Canis lupus*	Wolf
7	*Pipistrellus mimus*	Indian Pygmy Pipistrell
8	*Funambulus pennanti*	Five-striped Squirrel
9	*Tatera indica*	Indian Gerbille
Reptiles		
10	*Varanus monitor*	Goh
Avifauna		
11	*Vanollus indicus*	Redwattled lapwing
12	*Himantopus himantopus*	Black winged stilt
13	*Columba livia*	Blue rock pigeon
14	*Streptopelia decaccto*	Ring dove
15	*Corvus spelendens*	House Crow

S.No	Scientific Name	Local Name
16	*Turdoides caudatus*	Common Babbler
17	*Copsychus saularjs*	Magpie Robin
18	*Passer domesticus*	House Sparrow
19	*Pavo cristatus*	Peacock
20	*Francolinus pondicarinus*	Titar
21	*Pycnonotus cafer*	Bulbul

National Parks and Wildlife Sanctuaries

There is no any wildlife sanctuary within 25km of project area. Distance of desert national park from site is at distance of 75 km.

Endangered Flora & Fauna

With reference to the list of endangered species prepared by Botanical Survey of India (BSI) and Zoological Survey of India (ZSI), Ministry of Environment and Forests, Government of India, none of the species present in the study area belonged to the endangered flora & fauna categorized under Schedule I.

The study area falls under Pokharan tehsil in Jaisalmer district which forms a part of Thar desert. Though a vivid and spectacular flora and fauna are observed in Thar desert and 41 endangered species of mammalian fauna including blackbuck, Indian Gazelle, Indian Wild Ass, Caracal (Cat) and Desert Fox have been observed in the vast stitches of Thar Desert. The terrestrial ecological findings around the project site have confirmed that none of the species recorded in the study area falls under list of endangered species as listed under Wildlife Protection Act. In addition, none of the species are on the International Union for the Conservation of Nature's (IUCN) Red List of Threatened Species under endangered category.

4.16 BASELINE SOCIO-ECONOMIC STATUS

General

The study was undertaken with respect to demography, occupational pattern, land holding, literacy rate and other important socio-economic indicators of each District to decipher the socio-economic structure of the entire project area. This chapter elaborates the socio-economic profile of the Jaisalmer districts.

Approach Adopted

Secondary Data: Socio-economic profile has been compiled from latest census data (Primary Census Abstract, 2011).

Demographic Features

General

The district has total area of 38392 sq.km. There are 3 sub-divisions, 750 inhabitated villages & 37 un-inhabitated villages. Project site is located in Pokaran tahsil.

S. No.	Item	Unit	Particulars
1.	AREA	Sq. Km.	38392
2.	Sub Divisions	No	3
3.	Tehsils	No	3
4.	Panchayat Samities	No	3
5.	Total No. of inhabited villages	No	750
6.	Total No. of uninhabited villages	No	37
7.	Total No. of Towns	No	2
8.	No. of Gramdani Villages	No.	18
9.	Length of International Border	km.	471

Highlights of Census as per 2011

A. Population

Total population of Jaisalmer is 672,008 as per latest provisional figures released by Directorate of Census Operations in Rajasthan. This shows increase of 32.22 percent in 2011 compared to figures of 2001 census. The initial figures of data shows that male and female were 363,346 and 308,662 respectively. Jaisalmer District of Rajasthan comprises an area of 39,313 sq.km. As per census 2011, density of Jaisalmer District per square km is 17 compared to 13 per sq.km of 2001.

B. Sex Ratio

Sex ratio of girls in Jaisalmer district per 1000 boys was recorded 849 i.e. an increase of 28 points from the figure of 2001 census which puts it at 821.

In 2011 census, data of Jaisalmer district regarding child under 0-6 age were also collected. There were total 130,400 children under age of 0-6 against 112,026 of 2001 census. Of total 130,400 male and female were 69,809 and 60,591 respectively. Child Sex Ratio as per census 2011 was 868 compared to 869 of census 2001. Children's proportion in total population was around 0.98 percent. This figure was around 0.90 percent as per 2001 census.

C. **Literacy**

In education sector, Jaisalmer District is having average literacy rate of 58.04 percent. Male literacy and female literacy were 73.09 and 40.23 percent respectively. In all, there were total 314,345 literates compared to 201,960 literates of 2001 census.

Occupational Pattern

Occupational pattern of the concerned districts and Rajasthan are recorded to assess skills of people. Occupational pattern also helps in identifying dominating economic activity in the area.

Table 4-1 Number of Marginal Worker by Category

Area	Cultivator	Agricultural Labour	Worker in household / industries	Others
Jaisalmer District	697,175(61.7%)	119,073(10.5%)	32618(2.9%)	280,648(24.8%)

Note: All figures indicate % with reference to total workers
Source: Primary Census Abstract 2001

The above table indicates that majority of people in rural sector are cultivators & agricultural labours which indicates dominant agricultural economy. A small section of people are engaged as workers in household industries. But in urban sector the existing scenario is completely reversed there most of the people are engaged in non-agricultural activity especially in industrial sector.

Per capita income: Per capita income reflects overall economic condition of the region or of the state. The average per capita income in rural area of District is Rs.27, 516 whereas the per capita income in urban area is Rs.56, 962 which is higher.

As per Census 2001, Demographic of Dhursar is as shown in the table below:

Village	Total Population	SC Population	ST Population
Dhursar	976	94	83

CHAPTER 5. ANALYSIS OF ALTERNATIVES

Setting up of a solar power project involves selection of environmentally and techno-economically suitable site, land characteristics, meteorology, infrastructure, grid availability, water availability, rail and road connectivity, accessibility and shading aspects etc. Before selecting the database the comprehensive review of the measured data of Indian meteorological Department (IMD) for similar and nearby locations of Dhursar village have been studied and compared.

With or Without Project

Electricity consumption in India steadily increased from 1995 to 2010, driven by high economic growth. Although India's generation and distribution capacity has grown significantly over the last decade, many parts of the country continue to suffer power shortages both in terms of unmet demand during peak periods and an overall energy shortage. Also, under the Electricity Act, 2003, the State Electricity Regulatory Commissions (SERCs) set targets for distribution companies to purchase certain percentage of their total power requirement from renewable energy sources. This target is termed as Renewable Purchase Obligation (RPO). This project will help on achieving both the demand-supply gap in energy requirement and RPO requirement.

Alternative Fuel

The only viable generating options for energy production to meet the supply-demand gap in western region are fossil fuel energy. India is already facing huge short fall in fulfilling the coal requirement for already existing thermal power plant. So, it is imperative to look for alternatives to fossil fuel based power generation to achieve long term power solution of the country.

Alternative Project Location

Before zeroing on the site location at Dhursar, Rajasthan, DSPPL had analyzed a set of probable locations on various parameters, important for success of any Solar PV plant, listed in the table shown below. We assign a number on a scale from 1 to 10 for each parameter to each probable site location. DSPPL found that each site location has its own unique advantage to offer. Some locations are near to the load centre while some comes under the highest solar insolation region in the country. After completing the process, DSPPL come to the conclusion that Dhursar site has many advantages vis-a-vis other site locations considered for the selection process. On the basis of this process, DSPPL has shortlisted Dhursar as the site location for its upcoming Solar PV plant.

Parameters	Dahanu (Maharashtra)		Ladkan (Bikaner, Rajasthan)		Dhursar (Jaisalmer, Rajasthan)	
1. Location considering PPA with R- Infra	Maharashtra	10	Bikaner, Rajasthan	8	Dhursar, Rajasthan	8
2. Land Area	600 acres	7	900 acres	8	2000 acres	10
3. GHI	1891	6	1968 (8)		2062 (9)	
4. R&R	NA (10)	10	NA	10	NA	10
5. CTU/ STU transmission line availability	2Km	9	30Km	7	38Km	5
6. Civil Works	Very high as the proposed land is on ash pond	4	High as the top soil is sandy	6	Very minimal as the sand is hard soil on the top up to 1.5m and soft rock after that	9
Grand Total	46		47		51	
Ranking	**3**		**2**		**1**	

CHAPTER 6. ANTICIPATED ENVIROMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

6.1 INTRODUCTION

The proposed project may have impact on the environment during construction & operation phases. During the construction phase, the impacts may be regarded as temporary or short-term; while long term impacts may be observed during the operation stage. Spatially the impacts have been assessed over the study area of 2 km radius of the project site.

The project has overall positive impacts by providing a competitive, cost-effective, pollution free reliable mode of Solar PV power. It will certainly meet the ever increasing Demand of Power and to bridge the Gap between Demand and Supply of Power.

6.2 POTENTIAL IMPACT GENERATION ACTIVITES

The construction and operation phase of the proposed project comprises various activities each of which may have an impact on environmental parameters. The impacts of the project are envisaged during the design and planning, during pre-construction phase, construction phase.

During the construction phase, the following activities may have impacts on environment:

- Site preparation
- Minor excavation and leveling
- Hauling of earth materials and wastes
- Cutting and drilling
- Erection of concrete and steel structures
- Road construction
- Painting and finishing
- Clean up operations
- Landscaping and afforestation

The activities can be divided into two categories, viz. sub-structural and super-structural work. Moreover, construction work will involve cutting of trenches, excavation, concreting etc. All these activities attribute to dust pollution. The super-structural work will involve steel work, concrete work, masonry work etc. and will involve operation of large construction equipment like cranes, concrete mixers, hoists, welding sets etc. There may be emission of dust and gases as well as noise pollution from these activities.

Mechanical erection work involves extensive use of mechanical equipment for storage, transportation, erection and on-site fabrication work. These activities may generate some air contaminants and noise pollution. The electrical activities are less polluting in general. Potential Impacts and Mitigation Measures (for construction and operation phase) is given in Appendix **V.**

6.3 IMPACTS DURING PLANNING AND DESIGN PHASE

The potential adverse environment impacts associated with transmission lines have been avoided or minimised through careful route selection. The alignment is sited away from major settlements, whenever possible, to account for future urban expansion. Forests areas and vegetation areas are

avoided. Alignment in this project has avoided geologically unstable areas, which can also pose foundation related problems. No land acquisition is required for placing transmission towers on private land.

6.4 IMPACTS DURING CONSTRUCTION PHASE

The environmental impact during construction phase is localized and of short term magnitude. However, as this project land shall be govt. barren land, the change in land use will be minimum.

Impact is primarily related to the civil works and some intensive impact due to erection of the equipment. The details of the activities and probable impact are brought out in table below:

TABLE 6.1: IDENTIFICATION OF ACTIVITIES & PROBABLE IMPACTS (CONSTRUCTION PHASE)

Construction Activities	Environment Attribute	Probable Impacts
Land Acquisition	Land	❖ No significant impact on land-use is expected.
	Socio-economics	❖ No Impact due to Rehabilitation & Resettlement issues is expected as govt. wasteland will be used for the power plant construction. The ROW for the transmission line is sited away from major settlements and agricultural use of the ROW will be allowed. Small parcels of privately owned land will be required for the transmission line towers.
Site clearing and Leveling (cutting, stripping, excavation, earth movement, compaction)	Air	❖ Fugitive Dust Emissions ❖ Air Emissions from construction equipment and machinery
	Water	❖ Run-off from construction area
	Land	❖ Loss of top soil
	Ecology	❖ Minimal loss of vegetation / habitat as the site is has barren land with almost no vegetation.
Transportation and Storage of Construction Material/ Equipment	Air	❖ Air Emissions from vehicles ❖ Fugitive Dust Emissions due to traffic movement
	Water	❖ Run-off from Storage Areas of construction Material
	Public Utilities	❖ Increased flow of traffic
Civil Construction Activities	Air	❖ Air Emissions from construction machinery ❖ Fugitive Dust Emissions
	Water	❖ Run-off from Construction Areas
Mech. and Elec. Erection Activities	Air	❖ Air Emissions from Machines / activities
Influx of Labour and construction of temporary houses	Socio-economics	❖ Employment opportunities shall increase ❖ Stress on infrastructure
	Land	❖ Change in land use pattern of the area
	Water	❖ Sanitary effluents from labour colonies

TABLE 6.1: IDENTIFICATION OF ACTIVITIES & PROBABLE IMPACTS (CONSTRUCTION PHASE)		
Construction Activities	**Environment Attribute**	**Probable Impacts**
Transportation and Disposal of Construction Debris	Air	❖ Air Emissions from Transport Vehicles ❖ Fugitive Dust Emissions due to Movement of Traffic ❖ Spillage and fugitive emissions of debris materials
	Water	❖ Run-off from Disposal Areas
	Soil	❖ No Conversion of land into waste land as already barren land.

6.4.1 Impact on Land use

The mobilization of construction equipment and construction materials will require space for storage and parking of construction vehicles and equipment, construction material storage yards, disposal sites, and labor camps for human resource to avoid environmental impact and public inconvenience. These locations shall comply with the local laws and regulations and need approval from authorities to utilize these facilities (access roads, telecommunication, and pipe borne water supply). The selection of temporary lands shall be made in such a way that it is atleast 500 m away from highly populated areas, water bodies, natural flow paths, agricultural lands, important ecological habitats and residential areas. The removal of trees and green cover vegetation will be minimized during preparation of access road and other facilities.

The land required for the proposed expansion project will be about 140 hectares. Use of private land for constructing towers will cause the private landowner to lose a small portion (approximately 144 sq.m.) of land. The construction activities attract a sizeable population and the influx of population is likely to be associated with construction of temporary hutments for construction work force, having an effect on land use pattern of the areas surrounding the project. However, this impact is envisaged to be insignificant due to following reasons.

- Temporary labour colonies shall be situated in the areas already acquired for the project.
- It will be only a temporary change (restricted to construction period). After construction phase, the areas acquired by labour colonies shall be reverted back similar to pre-construction stage
- Any use of private land will follow the principles in the Resettlement Framework.

Further, DSPPL shall also be in the process to improve the infrastructure of the area such as roads, schools, hospitals, etc. The project would add to the economic development of the area through allied business, which will be set-up along with the plant.

6.4.2 Impact on Soil Cover

As the construction activities for the main plant units of project would be confined in the wasteland, the impact on soil will be minimal and confined. Only cutting and filling is required during construction. The construction activities result in loss of vegetation cover (grass and shrubs) and topsoil in the plant area. No adverse impact on soil in the surrounding area is anticipated. However, in order to minimize such impacts, appropriate soil erosion control measures such as plantation activities would be undertaken by DSPPL to appease the chances of soil erosion. Completion of excavation and foundation work in limited time schedule would also reduce / minimize the chances of soil erosion

6.4.3 Impact of Solid Waste

Solid waste during the construction phase consists primarily of scrapped building materials, excess concrete and cement, rejected components and materials, packing and shipping materials (pallets, crates, Styrofoam, plastics etc.) and human waste. During the construction there will be generation of garbage, for which designated practices of solid waste disposal shall be followed. Solid waste disposal will be done as follows:

- A waste inventory of various waste generated will be prepared and periodically updated.
- The excavated material generated will be reused for site filling and leveling operation to the maximum extent possible.
- The scrap metal waste generated from erection of structures and related construction activities will be collected and stored separately in a stack yard and sold to local recyclers.
- Food waste and recyclables viz. paper, plastic, glass etc will be properly segregated and stored in designated waste bins/containers. The recyclables will be periodically sold to local recyclers while food waste will be disposed through waste handling agency.
- Hazardous waste viz. waste oil etc will be collected and stored in paved and bunded area and subsequently sold to authorized recyclers. Necessary manifest for the same will be maintained.

6.4.4 Air Impact

As the proposed project is Solar PV Project, the impact during construction of is expected to be minimal as a Greenfield Project plant.

Particulate matter in the form of dust would be the predominant pollutant affecting the air quality during the construction phase. Dust will be generated mainly during excavation, back filling and hauling operations along with transportation activities. However, a high boundary wall will prevent the dust generated due to construction activities going outside the project area.

The main source of gaseous emission during the construction phase is movement of equipment and vehicles at site. Equipment deployed during the construction phase is also likely to result in marginal increase in the levels of SO_2, NO_X, and particulate matter. The impact is reversible, marginal and temporary in nature.

6.4.5 Noise Impact

The major noise generating sources during the construction phase are vehicular traffic, construction equipment like dozer, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, vibrators etc. The operation of this equipment will generate noise ranging between 75 – 90 dB (A).

To minimize the impact on nearby communities, construction schedules have been optimized and vehicular traffic will be routed away from the nearest settlement, Dhursar village, which is approximately 5km from the power plant site. Also the noise level is substantially lower near the plant boundary due to attenuation caused over the distance. Overall, the impact of generated noise on the environment during construction period is insignificant, reversible and localized in nature.

6.4.6 Impact on Water Environment

The construction personnel would be housed in temporary settlements. These settlements would discharge considerable amount of domestic wastewater. Stagnant pools of water would increase breeding of mosquitoes and generally create insanitary conditions. Contractor will provide Soak pit with a depth of 2 meter to dispose liquid water so that such water do not form stagnant pools nor aggravate soil erosion. The main pollutants are organic components and microorganisms with the potential to cause contamination of water quality. To address potential impacts on water quality, disinfected latrines (e.g., through regular liming) will be used as main component of the sanitation system.

Construction processes include fabrication of concrete and related water usage. Wastewater from construction activities would mostly contain suspended impurities. The waste water will be arrested before discharge, to prevent solids buildup in the existing drains. Thus, the construction site wastewater would be led to sedimentation basins, allowing a hydraulic retention time of 1 ½ to 2 hours, where excess suspended solids would be settled out and relatively clear supernatant would be discharged to the plant drain. Generally, surface run-off water is not there in dry months during construction. Also, since the area is arid, there will not be any considerable surface runoff as it shall be lost due to evaporative losses. However, during monsoon, surface run-off including effluents may cause load of suspended solids.

6.4.7 Ecological Impact

The project site is mainly barren land and there are no major habitats near the site. The impact of the construction activities would be primarily confined to the project site. Since, the entire land is barren land with some xerophytic plants, shrubs. Thus, the site development works would not lead to any significant loss of important species or ecosystems.

6.4.8 IMPACTS DUE TO TRANSMISSION LINES DURING CONSTRUCTION PHASE

The project activities during construction phase will involve clearing of trees along the route alignment wherever required, excavation for installation of towers, erection of towers, civil works related to transmission line and line stringing. During the operation phase, most of the construction phase impacts will get stabilized and the impacts will be restricted only to the operation and maintenance of the project.

The impacts of the project activities on various environmental attributes are discussed in subsequent sections.

Impact on Topography

During the construction of the transmission line, the topography will change due to excavation and erection of tower, fill and cut for leveling the tower erection place. The most prominent impact on the surface topography will be due to the removing of the trees at the tower erection site if required, along the Right-of-Way (RoW). This will lead to change in the surface features only. The impact will be irreversible as the present features along the RoW will be changed due to presence of the transmission line.

No topographical changes are envisaged during the operation phase of the transmission line and the substation. The existing access routes will be utilized during the operation and maintenance of the transmission lines.

Impact on Climate

The Transmission lines area consists of barren uncultivated lands. Also, there will be few removals of trees therefore there will be no impact on the climate conditions from the transmission lines during the construction and operation phases.

Impact on Air Quality

During the construction phase, the activity would involve excavation for the tower erection, movement of vehicles carrying the construction materials along the haul road (through un-built roads, which are not maintained).

All these activities would give rise to emission of dust particles thereby affecting air quality marginally at the site. The impact will be temporary in nature and therefore is assessed as of low significance. Covering of stockpiles and sprinkling of water during excavation will reduce the dust emission to a great extent. The construction of transmission line and the substation will not have any negative impact on the air quality of the region during the operation phase.

Impact on Noise Levels

During the construction phase, the major sources of noise pollution are movement of vehicles carrying the construction material and equipment to the site. Most of the access roads along the alignment are motor able and project traffic would be negligible. The major work of the construction is expected to be carried out during the day time. Apart from vehicles bringing in materials to the nearest road, construction works for the transmission line will require minimal powered equipment. As such, noise emissions will be minor. As the predominant land use along most part of the alignment is barren and inhabitated, there will be few residential areas exposed to noise generated during the construction phase and the noise produced during the construction period will have negligible impact on residents.

During the operation phase of the project, there may be corona noise from the conductors which will be felt only up to 15 to 30 m area, hence the ambient noise level will meet the CPCB standard for residential areas : 55 dB(A) during daytime and 45 dB(A) during night time.

Impact on Surface Water Quality

There are no any major surface water bodies in the area .The construction and operation of the transmission lines will not have any major impact on the surface and ground water quality in the area.

Impact on Water Resources

Water needs during construction of the Project would be limited to sanitary water and minimal amounts of water for construction (such as spraying for dust prevention). This would be a negligible impact on water resources. Operation of the lines would not require any water.

Impact on Ground Water Quality

In Transmission line construction activity, no chemical substance or oil is used hence there is no impact on ground water quality

Impact on Ecological Resources

Since transmission line will be routed away from the inhabited areas, there will be no displacement of people or animals. It will also not cause any disturbance to the life of people, local animals and birds' movement. In transmission there is no dynamic equipment and moving machinery causing noise pollution, water and air pollution. There is no national wildlife park,

bird sanctuary, wetland in the route alignment of the proposed transmission line. Although, the route of transmission line route is finalized, some minor change in route alignment shall not be ruled out till DSPPL obtains the RoW permission for the transmission line.

None of the declared environmentally sensitive areas is located within the route alignment. It is not expected that any flora and fauna that are rare, endangered, endemic or threatened will be affected. Migratory paths of small mammals and reptiles may be affected due to construction activities. However noise, vibration and emission from construction vehicles, equipment will occur during construction and pre-construction stages in temporary manner.

The impacts related to above activities are temporary and can be mitigated through following measures:

- Strict attention on worker force regarding disturbance to surrounding habitats, flora and fauna including hunting of animals,
- Selection of approved locations for material storage yards and labour camps away from the environmental sensitive areas, and
- Avoid entering of construction waste (cement particles, rock, rubbles and waste water) and sanitary waste to the surrounding water bodies.

Impact on Terrestrial Ecology

There is no sensitive ecological area / protected forest area such as national wildlife park, bird sanctuary crossing the proposed route alignment. The removal of herbaceous vegetation from the soil and loosening of the top soil generally causes soil erosion. However, such impacts would be primarily confined to the project site during initial periods of the construction phase and would be minimized through adoption of mitigation measures like paving and surface treatment and water sprinkling.

Removal of Trees

As per the preliminary survey hardly any trees shall be removed during the line construction. The initial construction works along the alignment involving land clearance, cutting, filling, and leveling that may cause loss of vegetation. Appropriate compensation will be governed by the Resettlement Framework.

Effect on Local Road Network

Transformers, tower material, substation equipment, iron bars, concrete materials, piling equipment, will be transported through the provincial and local road network to the project site. This may impact local traffic temporarily. Appropriate maintenance all road sections, which will be utilized for the construction related activities shall be carried.

Disposal of Debris

As a result of construction related activities, spoil and debris will be generated during the construction stage. Proper disposal of the debris shall be ensured to minimize the impact on the surrounding ecology, public health and scenic beauty.

Impact on Human Environment

Project activities could impact the health and safety of the work force and of the general public, in particular, in terms of risk of accidents and exposure to electromagnetic fields along the alignment. The accidents may be caused due to electro-cutting, lightening, fires and explosions. Necessary training regarding safety aspects to the personnel working at the line will be provided by the contractor. Personal protective equipment like safety gloves, helmet, harness, Goggles, mufflers will be provided during construction period and during the maintenance work. First aid

facilities will be made available with the labor gangs and doctors called in from nearby towns when necessary. Workers are also covered by the statutory Workmen Compensation as per GoI laws by the contractor.

Socio-Economics

Construction of transmission line will generate local employment, as number of unskilled labors will be required at the time of construction activities. Local employment during this period will increase socio-economic standards.

Resettlement and Rehabilitation

For the construction of transmission line, involuntary resettlement impacts is yet to be determined as some minor changes in transmission line route shall not be ruled out till DSPPL obtains RoW permission for the transmission line. The land acquisition will not be done as far as possible. But, if DSPPL has to do it under inevitable circumstances then DSPPL will prepare a resettlement plan following the Resettlement Framework consistent with the ADB Safeguard Policy Statement

Cultural sites

There are no archaeological, historical or cultural important sites along the route alignment, hence no impact on these sites is envisaged. In the case of discovery of archaeological features during excavation/construction works, a chance find procedure to notify relevant authorities will be put in place by DSPPL.

Solid Waste Disposal

The solid waste generation will be at the location of the tower erection site which will include metal scraps, wooden packing material. Waste will be minimized and recycled wherever possible. Final waste will be collected and disposed of in compliance with applicable regulations and rules.

Liquid Waste Disposal

There will be no oil or chemical waste generated during the construction of transmission line, hence no mitigation is required.

Sanitary Waste Disposal at Construction Sites and Labour Camps

The labour camps at the site of tower erection will be temporary in nature and the human excreta will not be significant to cause contamination of ground water. Those places where most labor will be staying will be near hamlets which shall use the community services for solid waste, water and sanitation. Adequate drinking water facilities, sanitary facilities and drainage in the temporary sheds of the construction workers should be provided to avoid the surface water pollution. Provision of adequate washing and toilet facilities should be made obligatory. This should form an integral component in the planning stage before commencement of construction activity.

There shall be proper solid waste disposal procedure to enhance sanitation of workers who stay in camps. Septic tank will be used for sanitation purpose. Thus possibilities of infecting water borne diseases or vector borne diseases (Parasitic infections) will be eliminated by adopting proper solid waste disposal procedure. Unacceptable solid waste disposal practices such as open dumping of solid waste and poor sanitation facilities will lead to pollution of surrounding environment, contamination of water bodies and increase adverse impact to the aquatic; terrestrial lives and general public inhabited in the area. Surrounding of labour camps, garbage disposal sites and material storage yards provide favourable habitats for vectors of diseases such as mosquitoes, rats and flies.

Thus following measures are needed to protect and enhance the quality of environment during the construction stage:

- A better way to overcome garbage disposal as mentioned above by reducing or avoiding the need to construct labour camps, thus the selection of the majority of skilled and unskilled workers from the project area of influence will be a proper measure in this regard.
- Contractor shall provide adequate facilities, soak pits to manage liquid waste
- Provision of the solid waste disposal, sanitation and sewage facilities at all site of the construction/labour camps to avoid or minimize health hazards and environmental pollution.
- Contractor should handle and manage waste generated from the construction/labour camps without contamination to natural environment and it will reduce risk to general public who stay close to sites. Also contractor should be responsible to enhance the quality of environment.
- Adequate supply of water should be provided to the urinals, toilets and wash rooms of the workers' accommodation.

Contractor shall provide garbage bins to all workers' accommodation and construction sites, for dumping wastes regularly in a hygienic manner in the area

6.5 IMPACT DURING OPERATION PHASE

Various activities of operation and maintenance phase and their probable impacts on various sectors of environment are presented in table below.

TABLE 6.2: IDENTIFICATION OF ACTIVITIES AND PROBABLE IMPACTS (O&M)

O&M Activities	Sector	Probable Impacts
Transportation	Air	❖ Air Emissions from Vehicles ❖ Fugitive Dust Emissions due to Traffic Movement
	Public Utilities	❖ Increased flow of traffic
	Water	❖ Effluents from Oil Storage Areas
Burning of Fuel	Air	❖ No Stack emissions from solar Project
Water Treatment for various uses	Water	❖ Generation of Wastewater due to PV Cleaning Modules
Equipment Cooling	Water/ Ecology	❖ Discharge of Hot Water containing chemicals
Operation of Transformers and Switchyard	Water	❖ Generation of effluents containing oil

6.5.1 Impact on Land use

The proposed project will be set up on government wasteland. The site, after completion of its development, would consist of built structures, landscaped to give a pleasing outlook.

Following the construction phase, the temporarily modified land use pattern, such as construction of temporary tents to accommodate some construction personnel will be totally removed during the operation stage. Land released from the construction activities would be put to economic and aesthetic use to hasten recovery from adverse impacts.

6.5.2 Impact on Soil Cover

Most impacts of Solar PV project on soil are restricted to the construction phase, which will get stabilized during operation phase.

The soil conditions of the project site would be allowed to stabilize during this period after the impacts of the construction phase. The topsoil in non-built up areas would be restored and such portions of the site would be replanted with appropriate plant species to stabilize soil. The species shall be suitable for local climate and available. The concerned District Forest Officer can be consulted for selection of species and technical guidance, if required.

During operation of a project, no appreciable adverse changes in the soils are anticipated.

6.5.3 Air Impact

Plant operation would not significantly affect the air quality, as Solar project is green field project & there are no any gaseous emissions during operation phase from the proposed project.

6.5.4 Noise Impact

Work Zone Noise Levels

Protective instruments will be provided to the operators and workers working near the high noise generating machinery. As per Occupational Safety and Health Administration (OSHA) Standards, the maximum allowable noise level for the workers is 90 dB (A) for 8 hours exposure a day. Therefore, adequate protective measures in the form of ear mufflers/ear plugs to the workers working in high noise areas will be provided.

In addition, reduction in noise levels in the high noise machinery areas will be achieved by adoption of suitable preventive measures such as adding sound barriers, use of enclosures with suitable absorption material, etc.

6.5.5 Impact on Water Environment

6.5.5.1 Impact on Ground Water

No ground water due to plant operation will be drawn during operation phase for any purpose. So lowering of groundwater table will not be an issue. In addition, Rainwater Harvesting will be implemented at proposed plant to conserve storm water and help in recharge of ground water.

6.5.5.2 Impact on Surface Water

Impact due to Discharge

There shall be minimal discharge of wastewater from cleaning of Solar PV modules. The wastewater emanating from cleaning operations shall be recycled for plantation and greenbelt development around the plant. The rest of the wastewater will be deposited in rain water harvesting pond.

6.5.5.3 Terrestrial Ecology

There is no sensitive ecological area / protected forest area such as national wildlife park, bird sanctuary crossing the proposed route alignment. The removal of herbaceous vegetation from the soil and loosening of the top soil generally causes soil erosion. However, such impacts would be primarily confined to the project site during initial periods of the construction phase and would be minimized through adoption of mitigation measures like paving and surface treatment and water sprinkling.

6.5.5.4 Impacts of Transmission Lines during Operation Phase

Electric Shock

This may lead to death or injury to the workers and public in the area. This shall be minimised or

avoided by:
• Security fences around substation
• Establishment of warning signs
• Careful design using appropriate technologies to minimise hazards.

Noise Generation
Nuisance to the community around the substation site can occur during the project operation stage. Provision of appropriate noise barriers at substations shall be made in this regard.

Maintenance of Transmission Line and Substation
Possible exposure to electromagnetic interference could occur during these activities. Design of transmission line shall comply with the limits of electromagnetic interference from overhead power lines.

Oil Spillage
Contamination of water on land/nearby water bodies by the transformer oil can occur during operation due to leakage or accident. Substation transformers are normally located within secure and impervious areas with a storage capacity of 100% spare oil. Also proper drainage facilities will be constructed during the construction stage to avoid overflow or contamination with natural flow paths especially during the rainy season. DSPPL shall maintain account of the usage of oil, inbuilt technical methods and procedures for oil monitoring mechanism, and will prepare mitigation plan for any oil spillage.

Sulphur Hexa fluoride (SF_6) Leakage
SF_6 is a non-toxic greenhouse gas used as a dielectric in circuit breakers, switch gear, and other electrical equipment. Very high grade sealing system and erection methodology to keep the loss of SF_6 within 0.01% every year. SF_6 handling is part of each contracts technical specifications, and required design and routine test are done after manufacturing of the circuit breaker. SF_6 gas handling system for evacuation and storage is always used for the maintenance of the circuit breaker. SF_6 gas leakage is one of the checks in every shift of the operation. Stock SF_6 records shall be maintained in each substation. This shall allow tracking of any release of SF_6 gas to the atmosphere.

6.6 IMPACTS DURING DECOMMISSIONING PHASE

Dismantling operation however will have impact on environment due to noise and dust arising out of it. During de-installation, a specific strategy shall be adopted in order to handle the each type of item to keep the impact during the actual activity low. The decommissioning will also have social impact. The decommissioning of the power house which was a part of the local social fabric for many years will certainly create vacuum in the lives of the people directly and indirectly connected with it. The impact due to decommissioning on power, social and environmental scenario will be guided by applicable laws and guidelines. These will be addressed appropriately.

6.7 SOCIAL IMPACTS

6.7.1 Traffic Congestion

No overburden on the local transportation system is envisaged due to the proposed Project.

6.7.2 Labour Influence

6.7.2.1 Construction Phase

During construction activities, there will be a sizeable influx of population and labour colony is being constructed with basic amenities for the labourers working on the project. The peak labour population shall be 500 but on an average, there shall be 150 labourers for 6 months. This will have an effect on social fabrics of the areas surrounding the project. However, this impact is envisaged to be insignificant due to the following reasons:

- Temporary labour colonies shall be situated in the areas already acquired for the project.
- It will be only a temporary change (restricted to construction period). After construction phase, the areas acquired by labour colonies shall be reverted back similar to pre-construction stage

DSPPL has a Human Resources Policy, which specifies the terms of employment and working conditions. These include procedures for hiring and recruiting, probation, training, performance review, promotion, insurance, salary and compensation, resignation, lay-off and retrenchment, leave and vacation, and superannuation, which follow Indian labour law. All the employees will have access to the human resources policy and procedures. Labour inspections are done annually by the relevant government agency, which reviews wages, working hours, benefits, etc.

Most of the construction labor will be on contractual basis. Separate labour camps shall be made within the plant premises for the construction labors. Therefore, conflict of the migrating labor with locals, will not take place during the construction phase. Regarding monitoring of diseases corresponding to labor influx, regular health status monitoring of labors and its surrounding population will be carried out with the mobile health care facilities shall be developed and operated by DSPPL in this area. The health areas and issues that requires attention by DSPPL is as follows:

TABLE 6.3- LABOUR HEALTH MANAGEMENT

Environmental Health Areas	Influx camp followers, job seekers, family, service workers	Resettlement; relocation	Water management Including creation of new water bodies; altering existing water bodies and changes in drainage pattern	Linear features Roadways; transportation routes;	Hazardous materials control and disposal	Changes in income & expenditure consumption including food/ housing inflation
Vector Related	Increasing human parasite	Movement to different prevalence area	Creation and movement of breeding grounds	Improper drainage, temporary water pool	Creation of breeding sites with drums at household level	

Respiratory & Housing	Crowded housing, both work camps and community	Number of occupants per room; mix of occupants children/elderly / adults (different vulnerability)		Facilitating mixing/interaction of different groups		Housing inflation triggered crowding
Veterinary Medicine	Movement and migration of livestock	Movement and migration of livestock due to influx of new groups	Creation and/or movement of livestock watering locations		Inadvertent water source contamination, of streams/ rivers	
Sexually Transmitted Infections; HIV / AIDS				Facilitating movement of high risk groups into rural settings		Men with money mixing with vulnerable women
Soil, Water & sanitation	Overburdening existing services/systems; explosive food-borne epidemics	Failure to anticipate extended family influx in initial design	Changes in surface water flows/quality, potential groundwater drawdown		Releases into surface water; long-term impacts to ground water	
Food & Nutrition	Influx of extended family more mouths to feed	Shift from subsistence agriculture to peri-urban living/petty trading	Changes in crop/garden selection and planting cycle	Changes in access to gardens or local markets		Food inflation further marginalizing vulnerable groups
Accidents & Injuries	Overcrowding, falls, burns, road traffic			Road traffic, increased pedestrian activity	Unplanned releases/emissions	
Hazardous Materials Exposure	Squatter developments adjacent to industrial facilities with unplanned releases			Movement via trucks of hazardous materials across communities to project areas	Use of Project drums and containers for water and food storage; Inadequate incinerators design	

Psychosocial; Gender Issues	Cultural shock due to rapid societal change	Transformation of rural to peri urban/urban lifestyle		Greater ease of mixing social/ ethnic groups		Sudden money influx in a barter economic structure
Cultural Health Practices	Introduction of new practices and / or elimination of existing practices	Introduction of new practices and/or elimination of existing practices				Shift to western medicine
Health Services Infrastructure & Capacity	Increased visits for out and inpatient services	Increased visits for out and inpatient services if access improves		Changes in access		Attraction of additional private providers/ increase in insurance enrollment
Non-communicable; hypertension, diabetes	Changes in diet	urban living versus high intensity subsistence farming				Shift from physical activity to sedentary lifestyle

6.7.2.2 Operation Phase

The operation & maintenance staff will be accommodated in the DSPPL Township, which will be located at Polkhran Town. Therefore no impact on the local life pattern is envisaged due to operational worker of the project.

6.7.3 R&R Issue

The proposed Solar PV Project will be set-up on government barren land. Therefore there is no R & R issue for the project site.

Initial survey of the 30 km transmission line right of way (ROW) show that it will pass through 7 villages in the State of Rajasthan, namely, Dhursar, Lalpur, Dolhinadi, Changsama, Mandla, and New Nadhi of Pokran Tehsil, Jaislmer District and Decchu Village in Decchu Tehsil, Jodhpur District of Rajasthan. The ROW will generally pass through vacant government (0.11ha) and private lands (72.37ha) characterized mainly by sandy dunes, light vegetation and mostly barren land. Approximately 100 towers to be constructed will require 1.44ha with each tower requiring about 144 square meters of land. The final alignment and the exact locations of the 100 towers have not been identified yet. The preliminary survey observed that there are no houses along the initial alignment and there are hardly any trees which needs to be removed during the line construction. As per the Electricity Act of 2003, land will not be acquired for the ROW and for the tower footings. However, transmission lines may pass through private lands and towers may be erected on private lands. This may have economic impacts including partial loss of privately owned lands. It may also affect or limit future land use and potentially decrease the market value of privately owned. The ROW and tower locations will be screened for involuntary resettlement

impacts and any use or acquisition of private land will follow the principles in the Resettlement Framework

Change in Socio-economic Condition

Employment: The project will generate employment opportunities for the local population. Even indirect job opportunities will be created outside the project boundary. Many people will find employment in service sector and marketing of day-to-day needs viz. poultry and other agricultural products. The project will improve the basic infrastructure and the people of nearby villages can also use these amenities.

DSPPL is working for the employment and skills training for the locals through following steps.

- Provision in project contracts to provide priority in employment
- Training for skills up-gradation
- Encouraging labour co-operative of displaced families and giving priority to labour cooperatives of displaced families for award of miscellaneous contracts
- Reservation of shops for displaced families in employee township
- Efforts to employ educated unemployed youth

Overall there will be marginal impact on the socio-economic condition of the locality and the impact will be mostly positive.

Development of Infrastructure: The job opportunities in non-agricultural sector are likely to increase. The installation of the power plant is expected to further increase the prospects by bringing in direct and indirect employment opportunities.

As the project and consequent activities are expected to generate additional employment and income opportunities for the local population, market expansion supported by infrastructural development will foster economic growth in the area. Flow of reliable and adequate power from the proposed plant will not only enhance growth in the region, but will also bring about a change in energy consumption pattern by switching over from other sources of energy. This will ease off burden on the existing biomass.

CHAPTER 7. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

7.1 INTRODUCTION

Environmental & Social Management Plan is an implementation plan to mitigate and offset the potential adverse environmental & social impacts of the project and enhance the positive impacts. Based on the environmental baseline conditions, planned project activities and impacts assessed earlier, this section enumerates the set of measures to be adopted to minimize the adverse impacts. Process of implementing mitigation and compensatory measures, execution, agencies responsible for their implementation and indicative costs is discussed in this chapter.

The project has overall positive impacts by providing a competitive, cost-effective, pollution free reliable mode of Solar PV power. It will certainly meet the ever increasing Demand of Power and to bridge the Gap between Demand and Supply of Power.

7.2 ENVIRONMENTAL & SOCIAL MANAGEMENT PROCESS

The ESMP has been designed within the framework of requirement under Indian legislation and ADB's SPS on environmental and socio-economic aspects.

The mitigation measures to be adopted for the implementation of the proposed project include the following:

- Environmental Management Plan;
- Rainwater Harvesting
- Clean Development Mechanism;
- Occupational Health and Safety;
- Labour Working Conditions;
- Construction Labour Management;
- Environmental Action and Monitoring Plan;
- Community Development Plan;
- Public Consultation and Information Disclosure Plan;
- Grievance Redressal Mechanism;
- Disaster Management Plan

The ESMP has been prepared considering life cycle approach of the project that Dahanu Solar Power Limited will own and operate.

The Project will develop and implement following management action plans under the ESMP:

a) During Design Phase:

- Design of Clean Development Mechanism

b) During construction phase

- Construction Labour Management Plan;

- Health and Safety Management Plan (Construction Phase);

c) For implementation during the Project life cycle

ENVIRONMENT & SOCIAL MANAGEMENT CELL

DSPPL has established an Environment & Social Management Cell (ESMC) at Corporate and Site level, headed by a Project Director of Chief Engineer rank to be responsible for day-to-day implementation of the Project. DSPPL is responsible for undertaking the transmission project in accordance with the Initial Environment Examination (IEE) and implementing the Environmental and Social Management Plan as per ADB's Safeguard Policy Statement (2009). The ESMC is responsible for coordinating and implementing all environmental and social activities. During project implementation, the ESMC will be responsible for reflecting the occurrence of new and significant impacts resulting from project activities and integrating sound mitigation measures into the EMP. The ESMC includes a safeguard specialist and supporting staff, together forming the Environmental and Social Unit, appointed by DSPPL to look at right of way, environmental, social and safety issues. The ESMC will be empowered to implement safeguards planning and monitor implementation.

The safeguards specialist gives guidance to the Project Manager and his staff to adopt the environmental good practice while implementing the project. The safeguard specialist is responsible for implementing safeguard issues associated with the project through a site team composed of DSPPL site staff and contractor's staff, to be assigned by the ESMC as necessary.

The duties of the Environmental and Social Unit of the ESMC at corporate level are to:

- Monitor the implementation of mitigation measures during construction and operation phases of the project.
- Prepare suitable environmental management reports at various sites.
- Advise and coordinating field units activity towards effective environment management.
- Prepare environment health and safety manual for the operation of transmission lines/substations.
- Liasoning with the Ministry of Power, CEA, GOR and state agencies such as RSPCB, and seek their help to solve the environment related issues of the project implementation.
- Advice during project planning/design cells on environmental and social issues while route selection of the alignment at the planning/design stage to avoid negative environmental impact.
- Provide training and awareness raising on environmental and social issues related to power transmission projects to the project/contract staff.

The duties of the Environmental and Social Unit at site level are to:

- Implement the environment policy guidelines and environmental good practices at the sites.
- Advise and coordinate the contractor(s) activity towards effective environment management.
- Implement environment and safety manual.
- Carry out environmental and social survey in conjunction with project planning cell while route selection of the alignment at the planning stage to avoid negative environmental impact.
- Make the contractor staff aware of environmental and social issues so that EMP could be managed effectively.

The ESMC is responsible for processing and implementing all subproject(s). Subprojects will be monitored by qualified technical staff/experts (e.g., design and technical reports, feasibility studies, environmental and/or social assessments, and associated EMP's and budgets), who will also ensure and monitor compliance with ADB and Government safeguard requirements. Summary appraisal reports will be submitted to the ADB subsequent to obtaining the ESMC's approval and clearance(s) from the GoR during operation phase. The ESMC will prepare and submit performance monitoring reports to the ADB twice yearly. Activities to be monitored include: all planning, coordination and management activities related to the implementation of safeguard issues; the identification of corrective and preventive actions; records of health and safety matters and training activities; consultations with project affected peoples (as and when needed, particularly during the implementation); feedback, trouble shooting and project related grievances (per the project grievance redress mechanism); preparation of progress and monitoring reports as required by the ADB; and verifying the projects overall compliance with safeguard measures and its progress towards achieving the intended loan outcomes. ADB will continue to monitor project compliance with ADB safeguard plans and requirements on an on-going basis throughout the duration of the contract.

The ESMC comprises of a team of qualified and experienced environmental engineers, analytical chemists, horticulturists, safety engineers and well trained personnel for environmental monitoring. The EMC also conducts regular training programs for the other personnel in the areas of environment, air quality and water quality aspects, energy and water conservation measures, safety and health aspects etc.

The ESMC is supportedd by well equipped testing laboratory and other facilities to facilitate effective working.

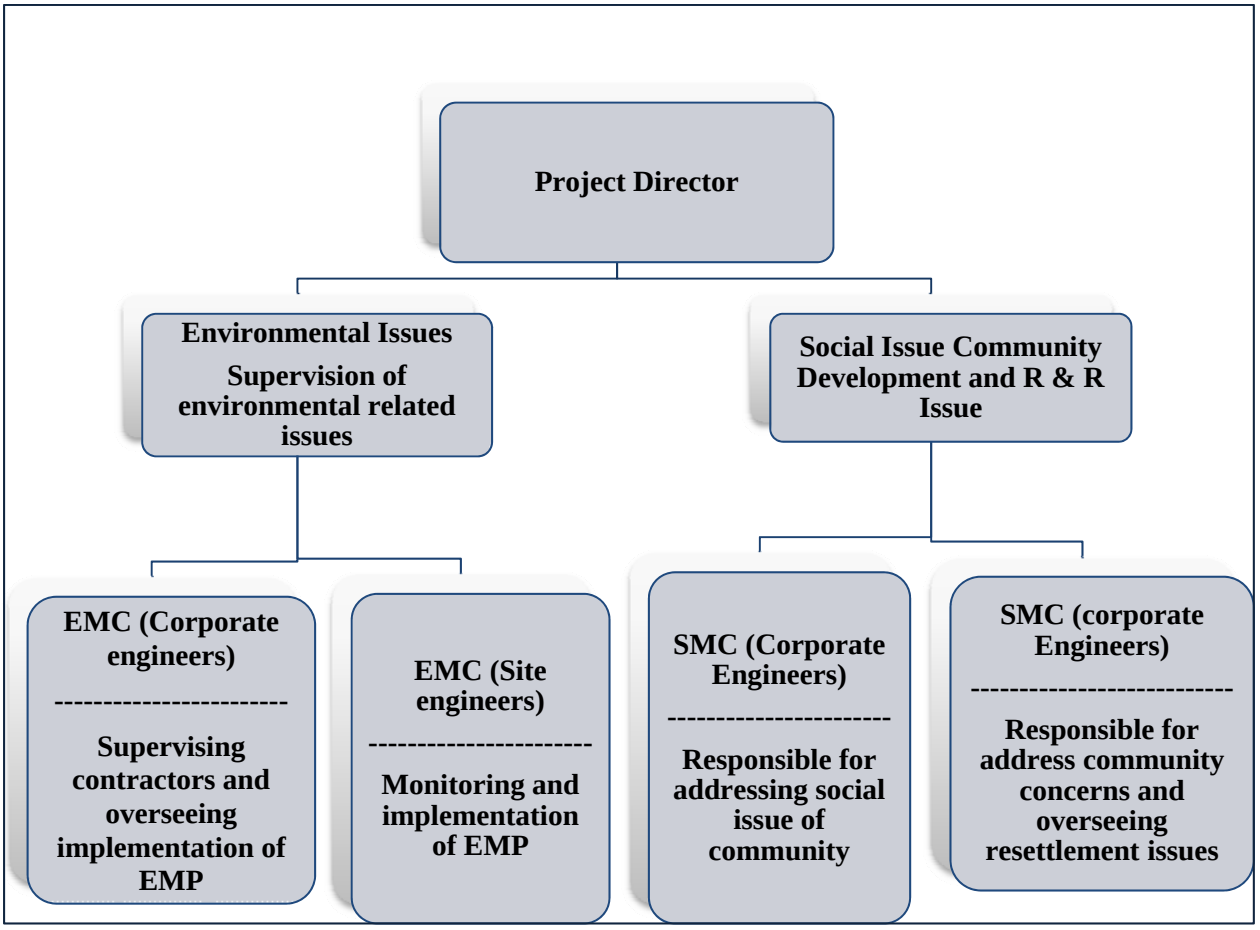
The responsibilities of the various members of the environment management cell are presented in Table 7.1.

Table 7.1:
Key Responsibilities of Environmental & Social Management Cell

S. No.	Designation	Responsibility
1.	Project Director (1 no.)	Environmental and Social policy and directions
2.	Head-Operations (1 no.)	Overall in-charge of operation of environment & social management facilities; Ensuring legal compliance by properly undertaking activities as laid down by various regulatory agencies

		from time to time and interacting with the same.
3.	General Manager (1 no.)	Secondary responsibility for environment & social management and decision making for all environmental issues including Safety and Occupational Health
4.	Social Expert (1no) & Environmental Expert (1no)	Ensure environmental monitoring and social issues related to project as per appropriate procedures

Framework of Environment & Social Management Cell



Corporate Social Responsibility Plan (Community Development Plan)

Corporate social responsibility is DSPPL's self-regulation integrated into a business model. CSR policy functions is built-in, self-regulating mechanism whereby business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. The goal of CSR is to embrace responsibility for the company's actions and encourage a positive impact through its activities on the environment, consumers, employees, communities, stakeholders and all other members of the public sphere.

Philosophy - Corporate Social Responsibility

- Being part of the Reliance Anil Dhirubhai Ambani Group, DSSPL would follow the Corporate Social Responsibility (CSR) philosophy of the group, which is derived from

the vision of the founder Late Sh Dhirubhai H Ambani that "Organizations, like individuals, depend for their survival, sustenance and growth on the support and goodwill of the communities of which they are an integral part, and must pay back this generosity in every way they can "

- In line with the group's philosophy, DSPPL's social responsibility would not be an occasional act of charity or a one-time token financial contribution to a local school, hospital or environmental NGO. It would be an ongoing year-round commitment, which would be integrated into the very core of SPL's business objectives and strategy.
- DSSPL's CSR initiatives are being designed in line with the above principles. The CSR activities are also being designed keeping in mind local requirements.
- The objective is to communicate to the local community, the nature, importance and impact of the project on the local community, the state and the country. The initiatives are being designed, to create a positive impact on the lives of the local people and improve their living conditions. Monetary and short term initiatives are kept to the minimum. Major focus is to initiate activities which are sustainable and will help to build lasting relationship with the local community. This would also help in creating inter-dependencies with local community, so that they also have a sense of responsibility towards the well-being of the project.
- The proposed action plan will serve as a preliminary framework and would be modified based on results of such initiatives and feedback from community and stakeholders.

Identifying CSR initiatives in line with local requirements

Based on site visits by DSPPL Power team and discussions with local people, following issues have been highlighted

	Area	Community Need
i.	**Health**	• Non-availability of adequate health related infrastructure; women and children are most affected • Low awareness on hygiene, sanitation and dietary issues
ii.	**Education**	• Facilities for higher secondary education are inadequate and distant • Higher education and counseling for youth missing • Technical skill building institutions far and few and have poor infrastructure
iii.	**Employment / Livelihood**	• Scope of employment for unskilled or semi skilled labourers
iv.	**Financial literacy**	• Lack of information/ about long term fiscal planning needs. Very important to prevent misuse of compensation package

Keeping in mind the above mentioned issues, DSPPL's CSR initiatives would focus on the following areas:

- Improving medical facilities in the villages around the project area.
- Improving awareness and providing sufficient training in hygiene, sanitation and proper diet
- Encouraging people to send children to school and also educate themselves through adult literacy programs

- Improving education infrastructure by providing better teaching aid and training for teaching faculty.
- Building skills among villagers as per skills requirements of the project during construction as well as during the operations phase.
- Encouraging entrepreneurial spirit among people and supporting such initiatives by conducting training programmes to acquire and enhance skills.
- Creating awareness about long term financial planning

7.3 ESMP DURING PLANNING AND DESIGN PHASE

The environmental issues during pre- construction stage generally involve land acquisition, substation location and design, location of transmission tower and transmission alignment and design. Avoiding encroachment into precious ecological areas and farmland. The Summary of ESMP is given below:

Mitigation Measure	Purpose	Failure consequence	Responsible Organization
Selection of lands adhering to local laws and regulations Construction facilities should be placed at least 500 m away from water bodies, natural flow paths, important ecological habitats and residential areas	To combat adverse impact to the existing environment	Environmental degradation	• DSPPL Management
Maintained adequate clearance, construction of retaining structures, minimise cut and fill operations adjoining to the dwellings	To avoid disturbance to the adjacent lands and the people due to cut and fill operations	Impacts on nearby dwellings	• DSPPL Management
Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and the regulation of supervision at sites	To ascertain Tower location and line alignment selection with respect to nearest dwellings	Exposure to safety related risks	• DSPPL Management
Consideration of site location to avoid water bodies or agricultural land as much as possible Careful site selection to avoid existing settlements	To ascertain Site location, line alignment selection (distance to dwelling, water and / or agricultural land) to minimize adverse impacts on environmental attributes	Environmental degradation	• DSPPL Management
Avoid encroachment by careful site and alignment selection and reconnaissance before final sitting of	To monitor the impacts on ecological environment	Floral and faunal habitats loss	• DSPPL Management

Mitigation Measure	Purpose	Failure consequence	Responsible Organization
activities. Minimize the need by using existing towers and RoW wherever possible.			

7.4 ESMP DURING CONSTRUCTION AND ERECTION PHASE

The problems envisaged during construction and erection phase can mainly be due to accident and noise. To overcome these problems, the contractors in charge of construction and erection activities have to maintain noise levels within threshold limit values and the workers should be provided with personal protective equipment.

Environment Impact and Mitigation Measure

Possible Impact	Mitigation during operation
Air Impact	• Dust suppression such as use of water sprinklers • Construction machinery shall be properly maintained to minimize exhaust emissions of CO, SPM and Hydrocarbons. • Construction activity shall be restricted to daytime as far as possible to avoid disturbance to surrounding areas.
Noise	• All noise generating equipment used during the construction shall be provided with noise control devices and properly maintained. • Wherever required, personal protective equipment such as ear plugs, earmuffs etc. shall be provided to the persons working in high noise areas
Hazardous Materials	• Hazardous materials stored at the construction site like acetylene cylinders, petroleum, spirit, diesel, lubricating oil, paints etc. shall be stored as per the statutory provisions of Manufactures, Storage and Import of Hazardous Chemicals Rules. 1989 under the Environment (Protection) Act, 1986

Possible Impact	Mitigation during operation
Safety of workers	• Security arrangements to prevent entry of unauthorized personnel and proper control of hazardous materials on site. • Training on safety for all the employees as well as contractor's labour • All the personnel shall be provided with safety appliances such as face shields, helmets, safety Goggles, safety shoes, hand gloves etc., as per the job requirement. • To ensure that the local inhabitants are not exposed to these hazards, the site shall be secured by fencing and manned at entry points.

7.5 ESMP DURING OPERATION PHASE

During operation phase of the proposed project pollution impacts are minimum. However, in order to limit within predicted impact levels and to further mitigate the impacts wherever possible on individual environment components, the following mitigation measures are recommended:

Environment Impact and Mitigation Measure

Possible Impact	Mitigation during operation
Air Impact	• No Air Pollution
Soil Quality Degradation	• No impact on soil quality
Occupational health hazard	• Periodic health check-up
Safety of workers	• Workers would be provided with hand gloves ear muffs, safety boots, safety Goggles, helmets etc. • Workers should be trained to follow safe working practices
Transmission line	• Abate pollution in all its activities and operations. It should adopt the good practices of the sector. • Take due precautions to avoid disturbance to human habitations,

	tribal areas and places of cultural significance and minimize the same wherever inevitable.

Note: DSPPL management shall have the responsibility to implement mitigation measures during operation phase

7.6 ESMP DURING DE-COMMISSIONING PHASE

This project involves a huge investment. While in Operation, the plant management will employ the best maintenance techniques and systems. These efforts result in extended life of the plant.

Similarly efforts and investment for renovation and Modernization will result in further life extension of the plant. From the present trends, the life of the plant would not be less than 35 to 40 years. However when the plant becomes unviable due to major technological changes or due to regulations, decommissioning of the plant will be undertaken. This involves a series of steps to be planned and executed. The total operation can be broadly categorized in to De-operationalization and Dismantling phases. When modules are taken out service, they shall be recycled or environmental protective measures shall be undertaken as per the advice of module supplier.

De-operationalization is a technical activity carried out by experts. Dismantling operation however will have impact on environment due to noise and dust arising out of it. For an understanding of the activity involved, the approximate quantities that are to be handled are given in Table below:

Quantities of material during Decommissioning Stage

S. No.	Description	Qty	Remarks
1	Solar PV module	5,34,000	First Solar has module collection and recycling program applicable to all Solar modules manufactured by them.
2	Other Structural steel	4000MT	
3	Concrete	1000 m^3	All the foundations are piling type hence no concrete requirement. Only control building & Inverter buildings are required concrete.
4	Mechanical Equipment	Lot	
5	Electrical equipment	Lot	Switchgears, transformers, Cables, batteries, Trays etc.
6	Electronic equipment	Lot	Control panels, Electronic hardware, PCs, Instruments etc.

In order to handle the de-installation of each type of item a specific strategy will have to be planned to keep the impact during the actual activity low. During this phase of the plant, all structures will be cleared away, all rubbish cleared, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the contractor's expenses, to the satisfaction of the engineer.

7.7 IMPACT AND MANAGEMENT PLAN AND OTHER MITIGATION PLANS

The Impact and Management Plan attached as Annexure –V. This plan summarizes the project impacts and provides the mitigation and management measures to be implemented at all phases of the project.

Solar PV Power plants, where multifarious activities are involved during construction and operation & maintenance are also associated with the problems of occupational health and safety. Occupational health needs attention both during Construction, Erection and Operation & Maintenance phases. However, the problem varies both in magnitude and variety during the above phases.

While designing appropriate plan should be developed to take steps to minimize the impacts and ensure appropriate occupational health and safety environment. The following plan is suggested to achieve the above-mentioned objective.

7.7.1 CONSTRUCTION AND ERECTION PHASE

The problems envisaged during construction and erection phase can mainly be due to accident and noise. To overcome these problems, the contractors in charge of construction and erection activities have to maintain noise levels within threshold limit values and the workers should be provided with personal protective equipment.

7.7.1.1 Air Environment

Dust generated as a result of clearing, leveling and site grading operations shall be suppressed using water sprinklers. It shall be ensured that the construction machinery using diesel driven prime movers are properly maintained to minimize exhaust emissions of CO, SPM and Hydrocarbons. Further, the construction activity shall be restricted to daytime as far as possible to avoid disturbance to surrounding areas.

7.7.1.2 Noise Environment

All noise generating equipment used during the construction phase shall be provided with noise control devices and properly maintained. Wherever required, personal protective equipment such as ear plugs, earmuffs etc. should be provided to the persons working in high noise areas, to minimize their exposure to noise.

7.7.1.3 Storage of Hazardous Materials

The hazardous materials stored at the construction site like acetylene cylinders, petroleum, spirit, diesel, lubricating oil, paints etc. shall be stored as per the statutory provisions of Manufactures, Storage and Import of Hazardous Chemicals Rules. 1989 under the Environment (Protection) Act, 1986

7.7.1.4 Safety Measures

The site shall have necessary security arrangements to prevent entry of unauthorized personnel and proper control of hazardous materials on site. All the employees as well as contractor's labour shall be trained in safety aspects related to their job, with a special emphasis on safe handling of material, safety in welding and fabrication, working at heights etc. All the personnel shall be provided with safety appliances such as face shields, helmets, safety Goggles, safety shoes, hand gloves etc., as per the job requirement.

To ensure that the local inhabitants are not exposed to these hazards, the site shall be secured by fencing and manned at entry points.

7.7.1.5 Labour Deployment and Labour Camp Management Plan

DSPPL shall draw a Labour Deployment & Welfare Management Plan for the proposed Solar PV project. The EPC Contractor and the sub contractor shall ensure the compliance of the labour welfare arrangement plan:

- Accommodation for Labour – Provision of Military Tents for accommodating outstation labours
- Accommodation for Women Labour- Separate provision of Military Tents for accommodating women labours
- Prevention from Insects/Snakes – Carbolic Acid bottles will be buried under the ground surrounding the perimeter of the Labour accommodation area to prevent them from the risk of Snakes/Insects
- Sanitation for Labour – Portable Toilets/WC will be provided for Labour. Waste water will be disposed in septic tanks/ soak pits.
- Sanitation for Women Labour- Separate Toilets/ WC will be provided for women labour. Waste water will be disposed in septic tanks/ soak pits.
- Water Arrangements – Treated Water will be made available at Site for Labour drinking purpose.
- Health arrangements - Tying up with Local Doctor for any exigencies at site. Also the doctor will make occasional visits to site for Health check-up of labour
- Strict adherence to the Labour Laws applicable in the area of work will be ensured through robust Time Office department at Site.

7.7.2 OPERATION AND MAINTENANCE PHASE

The problems envisaged during the operation and maintenance phase are accident, exposure to heat, noise, arc lights, chemicals etc. Suitable personnel protective equipments should be provided to all employees, likely to be exposed to these situations. The working personnel should be given the following personnel protective equipments:

- Industrial safety helmet
- Crash helmets
- Face shield with replacement acrylic vision
- Zero power plain Goggles with cut type filters on both ends
- Welder’s equipment for eye & face protection
- Cylindrical type ear Plugs
- Earmuffs
- Canister gas mask
- Self contained breathing apparatus
- Leather apron
- Aluminised fibreglass fix proximity suit with hood and gloves
- Safety belt/line man's safety belt
- Leather hand gloves
- Canvas cum leather hand gloves with leather palm
- Electrical safety shoes with and without steel tie
- Gum boots

In addition, medical facilities should be made available round the clock for attending any medical emergency during construction & operation phases.

7.8 WASTE MANAGEMENT PLAN

Scope & Purpose of the Plan

This Waste Management Plan identifies the wastes that are likely to be generated during the construction and operation of the proposed Plant and documents cradle to grave waste management practices to be employed for their collection, storage, treatment and/or disposal.

Specifically, the waste covered by this WMP includes the following sources:

- Construction and commissioning of plant and the associated facilities
- Operation of plant and the associated facilities throughout the project life-cycle.
- Temporary accommodation during construction phase for the workers.
- Other operations like equipment maintenance, road construction, site preparation etc.
- Operation and maintenance of infrastructures both during construction and operation phase.

WMP is intended to serve as a guideline for the project proponent & the contractor(s) to manage wastes effectively during construction and operation phase. The contractor(s) should prepare their own WMP in compliance with this WMP and implement the same during the construction phase. DSPPL should implement the WMP throughout the operational phase.

The WMP describes how wastes will be managed during the construction and operation phase of the project and how the project will:

- Minimize the potential to cause harm to human health and the environment.
- Comply with ADB`s social safeguards policy statement and with Indian Environmental Regulations.
- Reduce operational costs and any potential liabilities which may arise from waste handling operations.

This plan also ensures that every waste stream and solid waste materials from the main plant site and the associated facilities will be managed effectively.

Solid and Hazardous Waste Management

The mitigation measures with respect to waste treatment, storage, handling and disposal during both phases of the project have been discussed below:

Construction Phase

- A waste inventory of various waste generated will be prepared and periodically updated.
- The excavated material generated will be reused for site filling and leveling operation to the maximum extent possible.
- The scrap metal waste generated from erection of structures and related construction activities will be collected and stored separately in a stack yard and sold to local recyclers.

- Food waste and recyclables viz. paper, plastic, glass etc will be properly segregated and stored in designated waste bins/containers. The recyclables will be periodically sold to local recyclers while food waste will be disposed through waste handling agency.
- Hazardous waste viz. waste oil etc will be collected and stored in paved and bunded area and subsequently sold to authorized recyclers. Necessary manifest for the same will be maintained.

Operational Phase

There shall be no solid wastes likely to be generated during operation phase

Road Safety & Traffic Management Plan

The plan encompasses the addresses of community safety related impacts that may arise from the increased vehicular traffic due to movement of equipment/machineries and vehicles along the site access and approach roads particularly during construction phase. The plan will be regularly reviewed and as vehicle movement requirements are identified in detail.

During Construction Phase

The following mitigation measures will be implemented during this phase:

- Project vehicular movement will be restricted to defined access routes.
- Proper signage will be displayed at important traffic junctions along the vehicular access routes to be used by construction phase traffic. The signage will serve to prevent any diversion from designated routes and ensure proper speed limits are maintained near residential areas.
- Any road diversions and closures will be informed in advance to the project vehicles accessing the above route. Usage of horns by project vehicles will be restricted near sensitive receptors viz. schools, settlements etc.
- Traffic flows will be timed wherever practicable during period of increased commuter movement in the day.
- Temporary parking facilities should be provided within the work areas and the construction sites to avoid road congestion.
- Vehicular movement to be controlled near sensitive locations viz. schools, colleges, hospitals identified along designated vehicular transportation routes.
- Routine maintenance of project vehicles will be ensured to prevent any abnormal emissions and high noise generation.
- Adequate training on traffic and road safety operations will be imparted to the drivers of project vehicles. Road safety awareness programs will be organized in coordination with local authorities to sensitize target groups viz. school children, commuters on traffic safety rules and signages.

During Operational Phase

Since limited vehicular movement is anticipated during operational phase considering only the daily movement of project personnel any impacts arising from the same can be effectively addressed through implementation of mitigation measures as discussed during the construction phase.

7.9 TRANSMISSION LINE MANGEMENT PLAN AND POLICIES

To comply with its policy statement, to achieve its stated goal and to implement the principles enunciated for the purpose of environment and social safeguarding, the DSPPL shall adopt following strategy coupled with some of the general action points. However, the list provided in this document is only indicative and it by no means is conclusive. DSPPL shall continue to strive to adopt new and innovative methods to achieve safeguarding objectives.

Strategy for Environment Safeguarding and general action points

DSPPL shall adopt proactive route alignment approach. Preliminary route selection for transmission lines should be done by using tools such as the forest atlas, revenue papers and Survey of India maps. It should strive to move towards using modern tools like GIS/GPS for a precision in route alignment with the larger picture in view while finalizing the route.

During route alignment, all possible efforts should be made to avoid forest area or to keep it to the barest minimum. Whenever it becomes unavoidable due to the geography of the terrain or heavy cost involved in avoiding it, different alternative options should be considered to minimize the requirement of forest area.

For selection of optimum route the following criteria has been taken into consideration to the extent possible that:

a. the transmission line avoids environmentally sensitive areas, eco sensitive zones, forests, sanctuaries national parks, biosphere reserves.
b. the transmission line route impacts minimally on natural resources to accomplish this, route selection of transmission line is undertaken in close consultation with representation of the State Forest, Environment and Revenue Departments. Site specific alterations are made to avoid environmentally sensitive areas and settlements at execution stage.
c. the proposed transmission line bypasses human habitation;
d. no monuments of cultural or historical significance are affected.
e. the proposed transmission line does not adversely impact any local community assets such as playground, hospitals, schools, places of worship etc.

Right of Way (RoW) width depends on the line voltage. The transmission corridor of 12mts on either side is identified and this is barren land.

All efforts to minimize the involvement of trees falling in RoW should be made. DSSPL should minimize number of trees required to be felled even if their cost has been paid. Pruning of trees will be done wherever required instead of heavy lopping or felling.

Alternate arrangement for fuel wood, heating and cooking should be made to meet fuel wood requirement of the labour so that it does not cause damage to adjoining forests. If necessary, fuel wood supply will be done only from authorized sources.

Work force should be prohibited from disturbing the flora, fauna including hunting of animals. Wildlife hunting, poaching, unauthorized NTFP collection or tree felling by labour should be prevented by frequent checks in labour camps and by creating awareness with the help of local concerned authorities.

Strategy for Social Safeguarding and general action points

In order to ensure compliance with relevant involuntary resettlement policies, a Project-level principles have been adopted in the Resettlement Framework following the national laws and regulation on land acquisition and incorporating ADB SPS (2009) as well as NRRP (2007), The following principles will apply for this Project:

- Land acquisition, and other involuntary resettlement impacts would be avoided. Any disruption of socially sensitive areas with regard to human habitation and areas of cultural significance will be avoided.

- If unavoidable, involuntary resettlement impacts will be minimized to the extent possible.
- In the event that land is acquired or used for this Project, or if the landholding of the private landowner is reduced and will result to permanent or temporary involuntary resettlement impacts, DSPPL will prepare a resettlement plan in consultation with affected people. This resettlement plan will be submitted to ADB for review prior to any civil works being done along the transmission line right of way.
- DSPPL shall ensure that wherever losses are suffered, assistance will be provided to the affected persons to improve or at least regain their living standards as per the provisions. DSPPL will improve the standards of living of the displaced poor and other vulnerable groups, including women, to at least national minimum standards.
- Compensation for permanently or temporarily affected assets will be based on replacement rates and will be paid prior to project impacts;
- DSPPL shall conduct meaningful consultations with affected people in the issues of RoW's land acquisition, or loss of livelihood.
- Agricultural activities that may get disturbed or deferred during construction or maintenance shall be restored to the owners' satisfaction following completion of construction or maintenance activities or paid compensation in lieu.
- In case trees on private lands are felled or damaged during construction or maintenance operations, compensation shall be paid to the owner as determined by the forest/horticulture departments.
- DSPPL shall provide employment opportunities for marginalized groups in its construction activities.
- Land and assets falling along the transmission line route alignment shall be allowed to be used keeping the safety requirements in view.
- Although all efforts will be made to avoid aligning the route over any permanent residential or other structure yet if in the rarest of rare case it is not possible to do so, such structure falling below the line should be acquired and demolished. Suitable compensation, following the Resettlement Framework, should be paid and grants should be released in such cases.
- Resettlement assistance will be provided to all affected persons including non-titled persons (e.g. tenants, sharecroppers, informal agricultural users);
- Income restoration and rehabilitation will be designed and described in the resettlement plan;
- Establish a grievance redress mechanism to receive and facilitate resolution of the concerns of affected persons.
- Publicly disclose the draft resettlement plan, including documentation of the consultation process in a timely manner, in an accessible place and a form and language(s) understandable to affected persons and other stakeholders. Disclose the final resettlement plan and its updates to affected persons and other stakeholders.
- Monitor and assess resettlement outcomes, their impacts on the standard of living of affected persons, and whether the objectives of the resettlement plan have been achieved by taking into account the baseline conditions and the results of resettlement monitoring. Disclose monitoring reports

Regarding the eligibility of compensation, affected people will be provided with compensation and rehabilitation if their land is reduced, their income or livelihoods adversely affected, their houses partially or fully demolished, and other properties such as crops, trees and other facilities or access to these properties will be reduced or damaged due to the Project. Lack of legal documents of their customary rights of occupancy/titles shall not affect their eligibility for compensation. In the unlikely event of land acquisition, compensation will be paid at replacement rates. This may be a combination of the assessed value of the land by

the competent authority, plus additional assistance from DSPPL to match replacement costs. This additional assistance will include the (i) difference between the replacement value and the assessed value, if any, for lost assets (land and any ground attachment), (ii) transaction costs such as stamps/registration costs (in case of purchase of replacement land); and (iii) other cash grants and applicable resettlement assistance such as shifting allowance, compensation for loss of workdays/income due to dislocation. Female-headed households and other vulnerable households (such as ST/SC, disabled, elderly) will be eligible for further cash assistance for relocation and/or house reconstruction

Identification of Probable Impact Generating Activities and Proposed Mitigation Measures for Transmission lines

S. No.	Activity	Possible aspect of activity with potential to cause environmental impacts	Potential impacts on	Mitigation measures for reducing impacts	Remarks
1.	Acquiring right of way	Getting RoU / RoW permits	Socio-economic condition	❖ Follow standard norms and practices in acquiring RoU / RoW ❖ Adequate compensation will be provided as per norms	❖ Resettlement Framework consistent with ADB Safeguard Policy Statement will be adopted and implemented
2.	Base camp construction and operation	Consumption of water Generation of Garbage Storage of fuel Lighting	Water resources, ground water, soil, air, odour and nuisance	❖ Toilets will be constructed at the site and the sanitary wastewater will be disposed off through septic tanks. ❖ Drinking water for the workers will be procured to the site from outside. ❖ Safety precautions will be put in place	❖ While procuring water, care will be taken to avoid disturbance of prevailing water supply to locals.
3.	Preparation of minimum access roads, if required	Access road construction involving cutting of trees	Flora, air, drainage, soil	❖ Existing roads and trails will be used to the extent possible.	

		or clearing of vegetation			
4.	Clearing and grading for right of way	Cutting of trees / clearing of vegetation Vehicular emissions	Flora, air and soil environment ,surface water drainage system	❖ Wherever possible existing road / water infrastructure will be used. ❖ Control access / prevent unauthorized use of work area. ❖ The natural drains will be protected from diversions and to avoid disturbance to surface water bodies.	❖ A RoU will be acquired under the provisions of Electricity Act
5.	Transportation of equipment and workforce to site	Vehicular emissions Noise pollution	Air and noise	❖ Minimize trips to the extent possible ❖ Proper maintenance of vehicles to minimize air & noise emissions	-
6.	Excavation, Digging of pits	Soil Movement Air emissions Noise pollution	Soil, Air, noise, flora/fauna	❖ Water sprinkling will be resorted to in case of excessive dust emissions, wherever necessary. ❖ Care will be taken to bring the land to the near original condition so that, soil erosion and consequent soil import is avoided. ❖ Mufflers to be provided on equipment and motorized vehicles. ❖ PPEs to be used by operators of the heavy machineries.	Will also be carried out at base camp / dedicated yard

7.	Structural work/ Mechanical work	Air emissions Noise pollution	Air and noise	❖ Dust suppression system ❖ PPEs to be used by workers	-
8.	Use of water for construction activities	Nominal quantity of water is required for the other constructional activities.	Water Resources	❖ Water consumption will be minimized by effective water management (reuse). ❖ Proper disposal of wastewater generated, as per the disposal norms to be ensures	
9.	Crossing of Transmission line over road or water bodies using Horizontal Directional Drilling (HDD)	Construction of crossings over water / road crossing	Soil, ground water, air, flora, fauna and noise	❖ Road and river crossings will be minimized to the extent possible. ❖ Damage to river environment will be minimized by avoiding any spillage ❖ Ensure that the site is returned to its original status after construction activities are over.	One time activity
10.	Materials Management	Storage, handling and transportation of materials	Soil, human health	❖ Transport & disposal of hazardous materials (if any) shall be as per the MSIHC Rules, 2000.	Major materials being stored include: Fuels such as diesel, lubricating oils and grease
Note: The preliminary responsibility for implementation of mitigation measure is with EPC/ Transmission line contractor. DSPPL shall ensure that these are implemented and followed strictly. Since, Transmission line contractor is a turnkey contract, the cost for all above activities will be borne by Transmission Line contractor.					

7.9.1 ELECTROCUTION

The areas prone to electrocution are transformer area, switchyard area and high-tension transmission lines and towers. There should be no green belt in switchyard side. The growth of grasses and bushes should be controlled in switchyard and transformer area. Sagging in high tension wires may also take place due to high ambient temperature, dust storm or poor coupling at HT tower. This should be regularly checked to prevent any possibility of electrocution to vehicles passing on road. Person attending for faults any of the above areas

should be trained and should wear electrical resistant shoes, gloves and hamlet with cotton clothes.

7.10 HOUSE KEEPING

Better housekeeping can improve the working conditions. The following measures are recommended:

- Regular cleaning
- Avoiding accumulation and dumping of wastes and damaged equipment and items anywhere inside the plant affecting aesthetics and increasing risk of fire and other hazards.
- Keeping ventilation systems of premises in good working condition to avoid ingress of dust inside the pressurized room.
- Keeping air conditioning plants in good running conditions for control/instrumentation rooms.
- Regular watering of kaccha roads by spraying water during construction as well as operation and maintenance to avoid dust generation from vehicle movement.
- Maintaining hygienic conditions in areas like canteens, near drinking water sources and toilets.
- Developing a positive outlook in the employees for improving the working place, both in plant and office or laboratory clean and well maintained..

7.11 SAFETY & EMERGENCY PLAN

Safety of both men and material during construction and operation stages are of concern to industries. Keeping in view the safety requirements during construction and operation and maintenance phases, a safety policy will be formulated for the present Solar PV project. Separate safety rules should be prepared for each type of occupation / processes involved in the project in consultation with manufacturer / supplier of equipment and materials and regular safety inspection should be ensured by a competent person of all buildings, equipments, work places and operations.

7.11.1 Safety Organization

Organization already has a Safety Department headed by Senior Manager and having qualified and experienced supporting staff. The responsibilities of Safety Department include identification of the hazardous conditions and unsafe acts of workers and advise on corrective action, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/Statutory provisions. Safety Department has prepared.

7.11.2 Safety Awareness Among Workers/Employees

Training programmes in safety and accident prevention should be organized at all levels of employees with a view to familiarize them with the general safety rules, safety procedures in various operational activities and to update their knowledge in safety and accident prevention, industrial hygiene and emergency equipment. These training programmes should be conducted periodically in a planned manner to refresh their knowledge.

First Aid Training

First aid training programmes should also be conducted for all employees with the help of qualified medical and para-medical staff. This programme may be conducted in batches. The programme should include basic first-aid techniques and should be repeated periodically to refresh knowledge

7.12 ACCIDENT REPORTING

Whenever accidents or dangerous events occur such incidents should be reported as notified in the sections 88 and 88A of Factories Act 1948, amended from time to time and also as per the schedule 6 of the Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989.

7.13 SAFETY REVIEW CHECK LIST

A checklist is one of the very useful tools for hazard identification. A checklist will be prepared and used as a final check that nothing has been neglected.

7.14 FIRE FIGHTING ARRANGEMENT

Plant should be well equipped with fire protection systems and it has a fully fledged fire station operated by Central Industrial Security Force (Fire Wing). The fire station is headed by Asstt. Commandant and has supporting staff at various levels. The fire control room is manned in 3 shifts round the clock.

7.15 CLEAN DEVELOPMENT MECHANISM (CDM)

The Clean Development Mechanism (CDM) is one of the three mechanisms under the Kyoto Protocol (KP), 1997 that enables developing countries to assist developed countries in meeting their greenhouse gas (GHG) emission reduction targets.

Being a renewable energy source with zero (GHG) emissions, solar energy becomes eligible under various GHG reduction and climate change mitigation programs. The entire proceeds of carbon credit from approved CDM project, if any, should be retained by the generating company.

7.16 ENVIRONMENTAL MONITORING PROGRAMME (EMP)

Regular monitoring of critical environmental parameters is of immense importance to assess the status of environment during plant operation. The monitored data can serve as an indicator for any change in environmental quality due to operation of the plant with respect to baseline environmental conditions, so that suitable mitigatory steps could be taken in time to safeguard the environment.

Monitoring indicators have been developed for each of the activity considering the mitigation measures proposed. Indicators have been developed for ascertaining the environmental quality and the performance of the EMP implementation through Environmental Quality Indicators (EQI's) and Environmental Performance Indicators (EPI's) respectively which focus not only on quantifying or indexing activity-environment interactions that may potentially impact the environment but at the same time also help in comparing different components of environmental quality against previously established baseline values. Monitoring results would be documented, analyzed and reported internally to Head - HSE. Monitoring requirements (including monitoring frequency) have been presented in the following **Table 7.3**.

Table 7.3: Proposed Monitoring Requirements for the Proposed Project

A. Environmental Performance Monitoring

EPI No.	Environmental Performance Indicator (EPI)	Monitoring Parameter	Location	Period & Frequency
A.	CONSTRUCTION PHASE			
	Air emissions from vehicles and machineries	❖ CO, HC based on emission factors ❖ % of vehicles possessing valid PUCC Certificates	❖ Exhausts	Quarterly during construction phase
	Dust generated from site clearance/levelling	❖ Visual observation of dust generation	❖ Site & approach road	Daily during site preparation
	Noise emissions from vehicles and machineries	❖ Noise pressure level in dB(A) ❖ Compliance with CPCB noise limits specified for DG sets ❖ Check for valid certificates of Type Approval and also valid certificates of Conformity of Production for equipments particularly DG sets.	❖ Near noise sources (5m)	Quarterly during site preparation
	Sourcing of water	❖ Volume of water sourced and consumed	❖ Sourcing and usage areas	Daily during construction phase
	Fugitive emissions from handling and storage of raw materials	❖ Visual observation	❖ Material stockpiles	Daily during construction phase
	Community health and safety	❖ Complaints registered by the local communities ❖ No. of. Accidents	❖ Grievance Records ❖ Safety Records	Monthly during construction phase
	Occupational health and safety	❖ Health surveillance of workers ❖ Sanitation status of labor camps and canteen ❖ Potable nature of drinking water viz. coliform, pH, TSS, Residual chlorine ❖ Usage of proper PPEs ❖ Safety performance indicators viz. LTIs. Near misses, fatalities etc.	❖ Medical records ❖ Labor camp maintenance records ❖ Drinking water storage tanks ❖ Construction site	Monthly during construction phase Daily during

EPI No.	Environmental Performance Indicator (EPI)	Monitoring Parameter	Location	Period & Frequency
				construction phase
	Disposal of sewage	❖ Visual observation of leaks, overflows etc o Odour	❖ Septic tank and soak pits	Daily during construction phase
	Surface run-off discharge	❖ Visual observation of water logging due to drainage disruption ❖ CPCB Inland Water Discharge Parameters	❖ Areas abutting construction site ❖ Discharge point	One representative storm event every year
	Domestic waste generation, storage, handling and disposal	❖ Quantity of waste generated and recycled ❖ Visual observation of waste segregation and storage conditions viz. usage of labelled and covered bins, insect repellents etc. ❖ Awareness level of onsite workers	❖ Waste generating areas viz. canteen, labor camps etc ❖ Workers involved in waste handling and storage	Weekly during construction phase
	Hazardous chemicals and waste storage, handling and disposal	❖ Visual observation of chemical storage conditions viz. presence of spill kits, drip trays, fire extinguisher, display of MSDS etc ❖ Quantity of waste oil and other hazardous waste generated and recycled to registered recyclers o Awareness level of onsite workers	❖ Hazardous waste storage areas ❖ Workers involved in waste handling and storage	Weekly during construction phase
B.	o OPERATIONAL PHASE			
	Fugitive emissions	❖ Visual observation of dust generated ❖ Water sprinkling details viz. frequency and quantity.	❖ Maintenance Records	Daily during operational phase Weekly during operational phase As per supplier's manual

EPI No.	Environmental Performance Indicator (EPI)	Monitoring Parameter	Location	Period & Frequency
	Noise generated from operation	❖ Noise pressure level in dB(A) ❖ Maintenance parameter check with respect to equipment noise attenuation and control	❖ Near noise sources (5m) ❖ Noise generating equipment	Weekly during operational phase As per supplier manual
	Water sourcing and consumption	❖ Volume of water sourced and consumed	❖ Water usage areas	Daily during operational phase
	Community health and safety	❖ Complaints registered by the local communities ❖ No. of. Accidents	❖ Grievance Records ❖ Safety Records	Monthly during operational phase
	Occupational health and safety	❖ Health surveillance of workers ❖ Sanitation status of onsite office building and canteen ❖ Potable nature of drinking water viz. coliform, pH, TSS, Residual chlorine ❖ Usage of proper PPEs ❖ Safety performance indicators viz. LTIs. Near misses, fatalités etc.	❖ Medical records ❖ Office building maintenance records ❖ Drinking water storage tank ❖ Operational sites	Monthly during operational phase Daily during operational phase

B) Environmental Quality Monitoring

EQI No	Environmental Quality Indicator (EQI)	Monitoring Parameter	Location	Period & Frequency
	CONSTRUCTION PHASE			
A1	Ambient Noise quality	Measurement of Noise Pressure Level in dB(A)	Nearest receptor viz. villages, schools, ecological habitat	Monthly during construction phase
A2	Surface water Quality	Parameters as per CPCB Use-class	Drainage Channel	Quarterly during construction phase

EQI No	Environmental Quality Indicator (EQI)	Monitoring Parameter	Location	Period & Frequency
A3	Ground water quality	Depth of ground water table IS 10500 parameters		Quarterly during construction phase
B.	OPERATIONAL PHASE			
B1	Ambient Noise quality	Measurement of Noise Pressure Level in dB(A)	Nearest receptor viz. villages, schools, ecological habitat	Monthly during operational phase

7.17 BUDGETARY PROVISIONS FOR EMP IMPLEMENTATION

Adequate budgetary provision has been made by the DSSPL for execution of environmental management plan. The cost of Environmental Protection measures should be Rs 50-60 lakhs.

Table 6.3: Proposed Environmental Monitoring Programme (both during construction and operation Phases)

Area of Monitoring	**Number of Sampling Stations**	**Frequency of Sampling**	**Parameters to be Analysed**
Meteorology	One	Continuous/ Daily	Wind speed and direction, Max. and Min. Temperature, Humidity, Solar Insolation, Atm. Pressure, Rainfall
Noise	5 (two within plant premises and three outside plant premises)	Twice in a year for 24 hours	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
Water Quality	Ground Water (3 Locations)	Quarterly	pH, Temp, Cond., TSS, TDS, BOD, O&G Heavy metals
Soil	2 locations	Once in five years	Physico-chemical properties, Nutrients

7.18 SOCIAL MANAGEMENT PLAN

Resettlement Budget And Financing Plan:

DSPPL plans to procure 140 hectares of Government barren land for the project. The project would not result in physical and displacement as these lands are all barren and vacant. For any involuntary resettlement impacts resulting from the use of private land for the construction of 100 transmission

line towers which will require 1.44 hectares of land, DSPPL has adopted the Resettlement Framework. Some provisions of the RF are described below:

1. The ROW and tower locations will be screened for involuntary resettlement impacts and any use or acquisition of private land will follow the principles in the Resettlement Framework
2. Procedure for damage tree compensation is in place with standard format. For damage of trees, horticulture department circular will be used for calculation and based on assessment of Tehsildar the amount will be paid.
3. In case of land used for the establishment of transmission line towers and to be possessed by DSPPL with mutual and voluntary consent of the affected people, compensation will be paid on estimated market price as decided by the revenue department (District Collector)/ competent authority. If there is a difference between the replacement value and the price decided by the District Collector, DSPPL will pay as resettlement assistance. Any fees, taxes, and other related charges will be borne by DSPPL.
4. Although, the right of way for the transmission line and the towers will be set-up on barren land and does not involve any crop cultivation or any forest land, we have set aside a fund of INR 30, 00,000 for resettlement budget and any to meet any unanticipated impact with additional 10% compensation budget to meet any variation in cost during project implementation.
5. Additionally, the budget includes costs relating to the hiring of the staff, coordination, site visits by the expert and other logistic support for the disbursement of compensation to the APs. DSPPL will ensure that the budget outlined in the assessment should be kept ready in advance for the timely payment of compensation. A contingency of 10% additional costs has been kept as a provision to meet any variation in the cost during implementation. The tentative budget has been calculated and is given in table.

Resettlement Budget

Item	Unit Rate Rs	Amount (Rs)
A. Compensation for loss of trees	Lump sum	22,50,000
B. Provision for unanticipated impact due to construction of transmission line towers	Lump sum	7,50,000
Total (A+B)		30,00,000
Contingency (10% of the Compensation)		3,00,000
Grand Total (INR)		33,00,000

7.19 COMMUNITY DEVELOPMENT PLAN

Any company, along with active support from government, has a role to play in development of an area in which it works. In most cases, it is difficult to operate and do business without the co-operation of the local communities and other stakeholders. To build a good rapport with the local communities, it is essential to engage the local community along with the administrative machinery to develop an ongoing process of development of the villages surrounding the plant involving the kind of joint initiatives

The community development plan would initially be targeted nearby villages. But, it should be expanded to other areas. The various areas where involvement can be made are discussed below.

Health Care Facilities: DSPPL can help villagers by arranging the health care support in form of bi weekly clinics, family planning camps, eye camps, Mother – Child care camps, etc. and ambulance service. DSPPL can also support the developments of permanent health care facility in the project affected villages in consultation with the district administration. The centre should be equipped to handle primary level emergencies throughout the day and should be accessible to the villagers. It should also have the infrastructure and expertise required to handle delivery patients.

Drinking Water: At present people are dependent on the tube wells for the drinking water. Scarcity of water during summer months due the drop is water table has observed in the region. DSPPL can undertake repair work of old tube wells and sinking of new tube wells or supply of low voltage electric motors as per the needs of the villagers.

Community Centres: Generally Gram Panchayat offices or common meeting places are used by villages as community centres. DSPPL can take an initiative to develop community centres for villagers.

The primary responsibility of planning, implementing financing of the community development would rest with DSPPL. However it would ensure (through the implementing agency) that the community in these villages is involved in the planning process. The main stakeholders for the project include:

- Local communities
- The Gram Sabha
- The Land Revenue Department
- District Administration

The detailed plan for each of the community facility should be planned through a participative process. Even though DSPPL would be primarily responsible for the implementation of the plan it should be done in consultation with local administration with involvement of the local community in monitoring the construction of these assets and also operating the same.

7.20 COMMUNITY LIAISON PLAN

The community liaison plan would concentrate on the following aspects:

Communication with the Community:

DSSPL would disclose the project details to make the community aware of the important features of the project. A **Project Information Booklet** would be prepared and distributed in the project vicinity villages. This booklet should preferably be presented in vernacular language. The booklet in addition to containing the salient features of the project should have a map depicting the boundaries of the plant and its ancillary facilities. The important landmarks e.g. the settlement, schools and the roads, etc. should also be demarcated so that it becomes easy for the people in the villages to relate to the ground conditions. To ensure wide circulation of the Project Information Booklet the booklet would be made available at all the schools, Anganwadi centres, and other public facilities in the project affected village.

DSPPL has kept a provision in its project budget for implementing the Community Development and Liaison plan.

7.21 MONITORING AND REPORTING

Environmental and social key performance indicators will be developed in accordance to ADB guidelines and will be monitored at regular interval to identify changes in conditions, new issues, mitigation, successes and opportunities for improvement in consultation and disclosure. The monitoring results will be reported as required, and will be available to the public. Stakeholder perceptions will also be monitored by DSSPL Community Relations Team Representatives.

Further, DSPPL shall also take up robust CSR programme geared towards community welfare and support activities for socio-economic development of the nearby areas, to build a good rapport with the local communities by engaging the local community along with the administrative machinery to develop an ongoing process of development of the villages surrounding the plant involving the kind of joint initiatives.

DSPPL shall provide Environment and Social monitoring report in an appropriate format as shown in **Annexure III.**

CHAPTER 8. GRIEVANCE REDRESSAL MECHANISM

Environmental and social grievances will be handled in accordance to the project grievance redress mechanism. Open and transparent dialogue will be maintained with project affected persons as and when needed, in compliance with ADB safeguard policy requirements. The Grievance Redress Mechanism (GRM) for the project provides an effective approach for complaints and resolution of issues made by the affected community in reliable way. This mechanism will remain active throughout the life cycle of the project.

DSPPL shall have a standard mechanism to

(i) inform the affected people (AP) about GRM and its functions,
(ii) determine how peoples representatives in the GRM will be selected,
(iii) set the procedures and mechanisms adopted for making the complaints,
(iv) support the complainants in communicating their grievance and attending the GRM meetings and
(v) Implement compliance with a GRMs' decision, its monitoring and communication to the people.

A Grievance Redress Committee (GRC) will be formed by the end of October, 2011 to ensure APs grievances on both environmental and social concerns are adequately addressed and facilitate timely project implementation. The GRC will have representatives from APs, the Panchayat Head, a DSSPL Project Engineer (Line in Field), and a nominated District Revenue Officer. The GRC will meet as and when major grievances arise.

The main responsibilities of the GRC are to:

(i) provide support to APs on problems arising from environmental and social impacts and land/property acquisition (if any);
(ii) record AP grievances and action them within 4 weeks. The procedure for grievance redress will be done through various steps such as
   a. Minor grievances will be redressed at the site level through the concerned project engineer and contractor (7 working days),
   b. if this fails the grievance will be referred to the GRC which will take all necessary actions within 15 working days,
   c. if still unresolved, the AP will have the option to approach the appropriate court of law for redress.

The EMC will keep a record book of all grievances (concerning the environment, health, safety, labor and working conditions, land compensation, etc) brought to the attention of DSPPL staff and to the GRC.

Communication with Contractor Staff:

During the construction phase there would be an influx of people into the project area. As these people would have cultural differences with the resident population there are potential that a conflicts may arise because of issues related to the environment, safety and privacy issues of the

women in the surrounding villages, spread of various communicable diseases, nuisance caused by workers due to improper sanitation facilities, etc.

A communication should be made to all contractor staff with the 'Dos' and 'Don'ts' and requesting proper behavioural actions and discipline amenable with the local customs and traditions during their association with the project.

The Project will provide a grievance mechanism where employees may raise reasonable work place concerns. The mechanism should involve appropriate level of management involvement and address concerns promptly, using a transparent process that provides feedback to those concerns without any retribution.

As practiced in other projects, DSPPL lay special emphasis on Grievance redressal for addressing concerns/problems of employees or project affected persons

The company has prepared a framework for redressal of grievances/complaints during all phases of the project. This framework will be continuously monitored & improved as the project moves from one stage to other.

Following its policy of building and maintaining strong community relationships, DSSPL has formulated a Grievance Procedure, in order to proactively manage and appropriately address complaints/ concerns/ grievances of the community during its different phases (i.e., planning, construction and operation).

As a part of the grievance redressal, it will perform the following actions.

- Continuously collect and analyze complaint/grievance related data and
- Disseminate this information into its organizational set up
- Review and upgrade exiting plans if required;

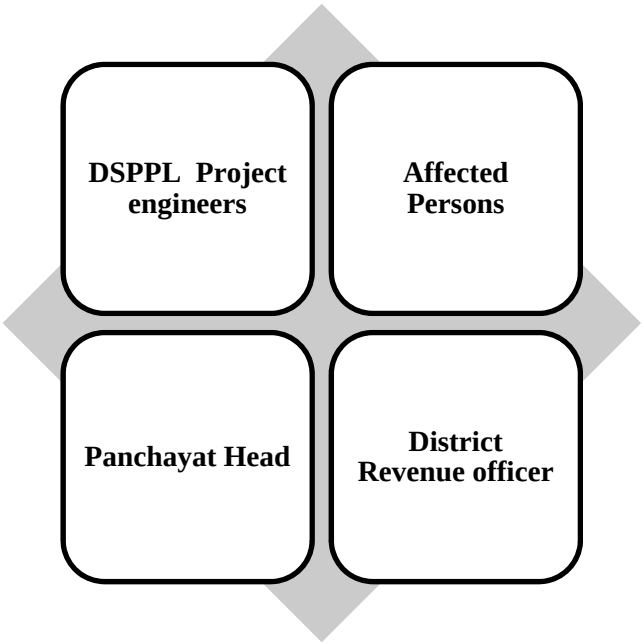
In addition, this procedure will help to improve the project social performance. This is because the number and nature of received complaints including punctuality, nature and effectiveness of grievance redressal are indicators of the manner in which the Project is implemented and the behaviour of employees and contractors.

Grievance Redress Framework

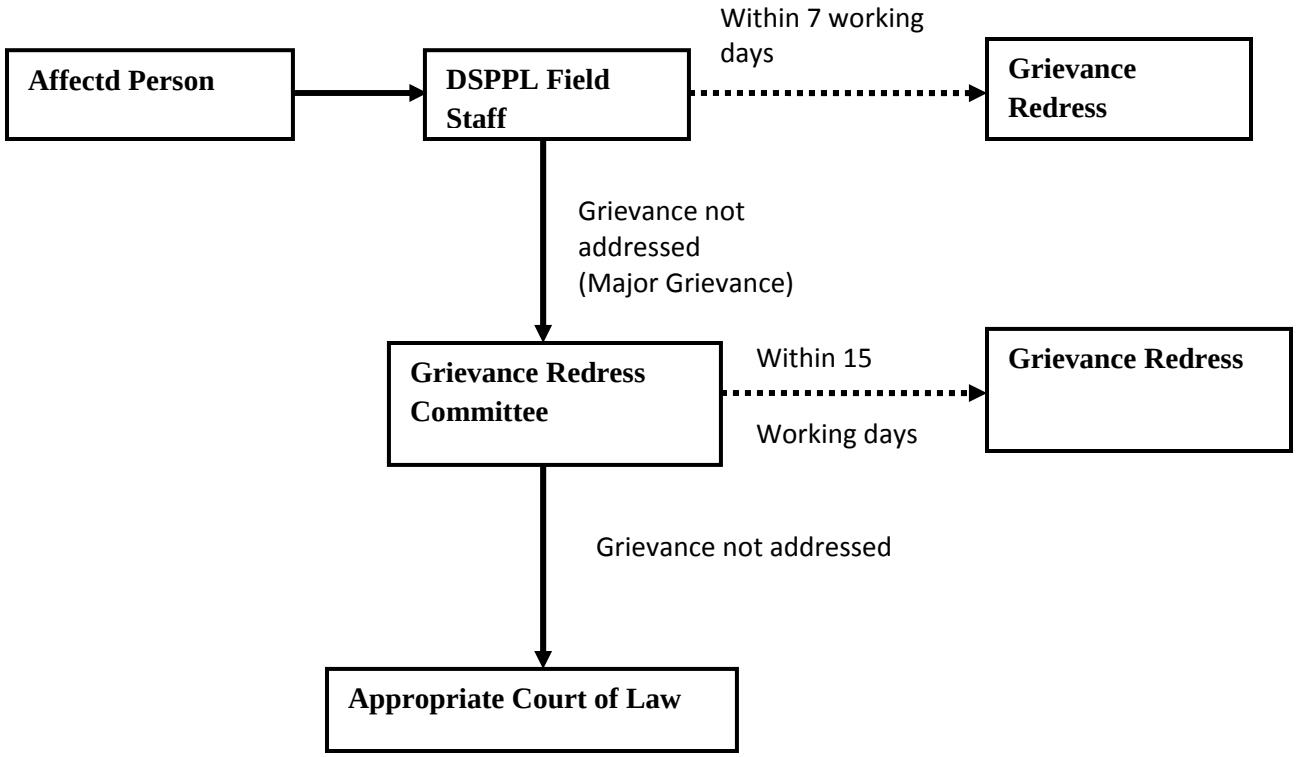
Central Government guidelines lay special emphasis on Grievance redressal for addressing concerns/problems of project affected persons or be exposed to other adverse impacts on account of the project.

The company has prepared a framework for redress of grievances / complaints during all phases of the project. This framework will continuously be reviewed and modified for improvements during the life of the project.

Framework of Grievance Redressal Mechanism Cell



Process Flow Diagram of Grievance Redressal Mechanism



CHAPTER 9. CONSULTATION, PARTICIPATION AND DISCLOSURE

INTRODUCTION

The need for public consultation and disclosure arises from the universal belief that transparency and accountability are fundamental to fulfilling any development mandate and in strengthening public involvement in the decision making process.

For all Categories "A" and "B" projects the project proponent or third party experts must have consulted with project affected communities in a structured and culturally appropriate manner. The public consultation should involve affected communities; the process must ensure their free, prior and informed consultation (FPIC) and facilitate their informed participation.

9.1 Applicable Government of India (GoI) Legislation:

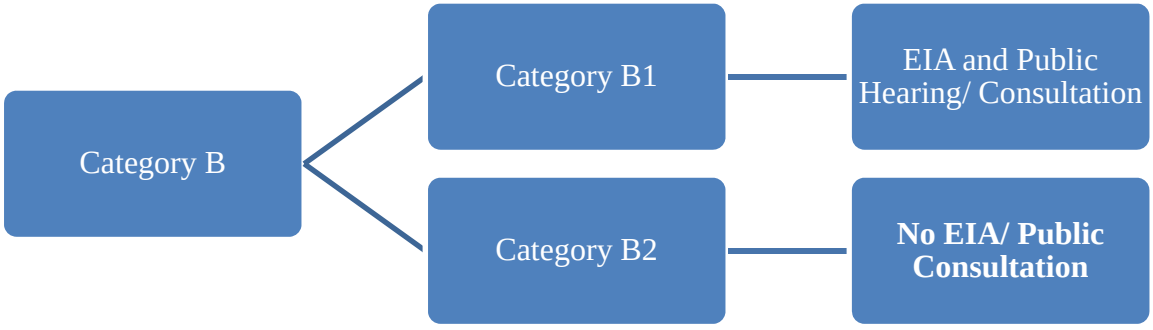
As per Government of India Environmental regulations, EIA Notification dated 14th Sept 2006 and its subsequent amendments, a procedure has been laid down for projects or activities that require prior environmental clearance from the concerned regulatory authority.

9.2 Categorization of projects and activities

I. All projects and activities are broadly categorized in to two categories - Category A and Category B, based on the spatial extent of potential impacts and potential impacts on human health and natural and man-made resources.

II. All projects or activities included as Category 'A' in the Schedule, including expansion and modernization of existing projects or activities and change in product mix, shall require prior environmental clearance from the Central Government in the Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC)

III. All projects or activities included as Category 'B' in the Schedule *will* require prior
   a. environmental clearance from the State/Union territory Environment Impact Assessment
   b. Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or
   c. Union territory level Expert Appraisal Committee (SEAC). In the absence of a duly constituted SEIAA or SEAC, a Category 'B' project shall be treated as a Category 'A' project;



Further, As per the notification no J-11013/41/2006-IA.II (I) dated 13th May, 2011 by Government of India, Ministry of Environment and Forests, that "Solar PV projects are not

covered under the ambit of EIA Notification, 2006 and no environment clearance is required for such projects under the provision thereof". Thus, none of the stages required for environmental clearance viz. Screening, Scoping, Public Consultation and Appraisal are applicable for the project.

9.3 ADB's Safeguard Policy Statement:

As per the Safeguard Policy Statement (SPS) of ADB, a Public Consultation and participation plan needs to be included in the EIA Report for all stages of the project (project design, construction and operations phase) for categories "A" and "B". Also, a documentation of meaningful consultation with affected local communities especially project affected persons needs to be carried out. The women's participation in the consultation needs to be ensured.

As per existing Government of Indian legislation, the public consultation, for the project with stake holders has been primarily conducted for Clean Development Mechanism (CDM) purpose, of the project. However, all aspects of the project have been discussed in this consultation with local stakeholders. All the necessary steps has been taken to ensure that local community should have firsthand knowledge not only about the Project, but also the environmental and social impacts and mitigation measures taken by the company. All the processes have been followed diligently during the said public consultation.

9.4 Public Consultation at the site:

Dahanu Solar Power Private Limited organized a local stakeholder consultation meeting at the venue and time mentioned below. Newspaper advertisement was published in vernacular language in Rajasthan Patrika, a daily newspaper (Jaipur, Pokaran and Jaisalmer edition) dated 29/04/2011, inviting wider participation of local community.

Date	05th May, 2011
Time	09:30:00 AM
Venue	Government Senior Primary School, Dhursar, Tehsil – Pokhran, Dist- Jaisalmer (Rajasthan)

Participants of Discussion

The venue for the consultation was a primary school located in the village closest to the Project site. 27 persons attended the consultation. Community participants included people from different walk of the society. Participants include sarpanch (Village head) of Dhursar and Lawan, NGOs, State revenue department officials, Teachers, equipment suppliers, employees and local villagers. It was attended by some prominent people of the locality as well as common villagers also.

List of attendees:

Sr No	Name of Stakeholder	Organization & Address
1	Mr. Mularam Prajapat	Sarpanch, Dhurasr & Iawan
2	Mr. Nakat Singh	Patwari, Tehsildar office, Pokhran
3	Mr. Deepak Soni	Reporter, Pokhran
4	Mr. Sera Ram	Head Master, Dhursar
5	Mr. Doulla Khan	Villager, Dhursar
6	Mr. Jetmat Ji	Teacher, Pokharan
7	Mohd. Akbar	Shopkeeper, Pokhran
8	Mr. Jumanlal	Shopkeeper, Pokhran
9	Mr. Ali Khan	Villager, Dhursar
10	Mr. Salim Khan	Villager, Dhursar
11	Mr. Umar Khan	Villager, Dhursar
12	Mr. Kanaram	Villager, Dhursar
13	Mr. Khan Mohd	Villager, Dhursar
14	Mr. Raj Mohd.	Villager, Dhursar
15	Mr. Ambalal	Villager, Lawan
16	Mr. Pannalal	Villager, Lawan
17	Mr. Jamal Khan	Villager, Lawan
18	Mr. Hari Singh	Gram Sevak, Dhursar
19	Mr. Ved Prakash	Teacher, Dhursar
20	Mr. Jamanlal	Businessman, Lawan
21	Mr. Jhoomar lal	Teacher, Dhursar
22	Mr. Sajid Khan	Villager, Pokhran
23	Mr. Chanduram	Peon, Dhursar
24	Mr. Ambalal	Teacher, Dhursar
25	Mr. Bhom Singh	Local Co-ordinator, Dhursar
26	Mr. Rishi Raychouhdhary	Representative of DSPPL
27	Mr. Pradee p Agarwal	Representative of DSPPL

Public Consultations (Field Consultation)

To make the discussion unbiased and fruitful, prominent people from local community (Sarpanch of Dhursar and Lowan) were given the authority to conduct the local stakeholders' consultation process. It was decided to conduct the consultation process in the Hindi, local vernacular language and National language of India, so that the language barrier should not prove a hindrance in taking the process to its logical conclusion. Pamplet and summary of projects were distributed among the public. The meeting started with the presentation made by DSPPL's officials about the company followed by the process of electricity generation using Solar Photovoltaic technology. Local stakeholders' were informed about the project execution, social

and environment impacts due to project especially during construction phase and utilization of local resources by DSPPL during construction phase. The local stakeholders were informed about the benefits of the project along with environment and social impact especially during construction phase.

Records of Meetings

All speakers emphasized on the need of renewable source of power generation. They also shared the observed change in weather pattern in their locality over last two decades. There was a consensus about the importance and potential of the project for the development of Dhursar and its surrounding areas. They also sought more initiatives for renewable based power projects in local area so that additional investment will result into employment of local people which will lead to increase standard of living.

During the interactive session, questions were raised by local community on various aspects such as impact of project on their economic conditions, future expansion plans of the project in the same locality, employment of local community in the project etc. which were answered satisfactory by the concerned person. Some of the issue raised by local stakeholders regarding additional economic activities, use of local resources by project company especially during construction phase is listed below. Initially, people have apprehension about their land being acquired for the project. They were informed by the representatives of DSPPL that all allotted land is government land. So, it will not result into any project related displacement. During the consultations all discussion on land acquisition were on the power plant site and did not cover the transmission line alignment. The question and answers below related to private land is only for the power plant site not the transmission line. Separate consultations will be done on land use for the transmission line as per the agreed Resettlement Framework.

The local community is aware about the fact that this is environment friendly project and will result into increased economic activity in the surrounding area. Local people will get employment in the project and successful implementation and operation of the project may result into more investment in such projects in future.

1) ***Concern:*** Is there any land purchase from the villagers? Is the project going to reduce the access of roads?

Reply: Land allotment will be carried-out under the supervision of district collector, supervised by the top officials of State. Government will provide land belonging to Govt. Only, Hence, it will not cover any private land. Hence the project activity reducing access is not applicable.

2) ***Concern:*** Can locals be preferred for the employment in the project?

Reply: As per the requirement of the project and suitability of the skilled and unskilled manpower the employment will be offered.

1) ***Concern:*** Will there be any increased economic activity in the village?

Reply: There will be increased economic activity in the vicinity of the project. Operations team of the project activity will play a pivotal for the increased economic activity.

1) ***Concern:*** When will the project activity be commissioned?

Reply: *Initial Phase of 40 MW will be commissioned by the 31/03/2012 and the second phase will be commissioned by 31/12/2012.*

2) ***Concern:*** Is there any scope for the improvement of capacity and if there is any such scope, would the company be willing to consider it in the same village?

Reply: Reliance Power, parent of the project participant is committed to invest in the renewable energy sector. Reliance Power is open to explore making further investments in Dhursar based on the opportunity available.

1) ***Concern:*** Would it be possible to improve the school infrastructure?
Reply: Project participant will study the existing infrastructure by a set of internal experts. Based on their assessment, Project participant will identify areas for improvement. Project participant has identified drinking water and sanitation as areas needing improvement in the initial study. Detailed study will be undertaken during the later stages. Identified areas needing improvement will be upgraded as allowed by local and government regulations.

2) ***Concern:*** Considering the low income levels of the villagers, would it be possible for the project participant to offer stationery, reading books and sport equipment to the students?

Reply: Project participant would offer stationery, reading books and sport equipment to all the eligible students.

Disclosure

Project information will be disseminated through the disclosure of resettlement planning documents. The summary of entitlement matrix will be disclosed at APs at DSPPL office.

Continued Consultation and Participation

The consultation process will be ongoing as necessary. The following Public Consultation measures are envisaged for the project:

- DSPPL will disclose the construction schedule on the notice board at the site location before the commencement of construction works to ensure that local population are notified and informed of said activities.
- DSPPL will involve their local representatives to inform them about the implementation of social and environmental activities
- DSPPL will inform APs through notice displayed at site location on compensation and assistance to be paid for the loss of trees
- Attempts will be made to ensure that vulnerable groups understand the process and their specific needs are taken into account

CHAPTER 10. CONCLUSION AND RECOMMENDATION

Impacts are manageable and can be managed cost effectively - Environmental impacts are likely to result from the proposed transmission system development. Careful mitigation and monitoring, specific selection criteria and review/assessment procedures for subprojects have been specified to ensure that minimal impacts take place. The detailed design would ensure inclusion of any such environmental impacts that could not be specified or identified at this stage are taken into account and mitigated where necessary. Those impacts can be reduced through the use of mitigation measures such as correction in work practices at the construction sites, or through the careful selection of sites and access routes.

The selected land is located within the government land. Thus acquisition of land will not be required from the surrounding communities. Since proposed land is covered with shrubs and weed plants, thus there is no need for removal of trees for the construction of the Solar PV project.

The proposed project will have number of positive impacts and negative impacts to the existing environment as follows:

- Significantly improvement in the economic activities in the surrounding areas due to generation of direct and indirect employment opportunities.
- There is negligible removal of trees for the transmission line, which is the main positive impact to the proposed project area. Compensatory afforestation will take place where tree removal is unavoidable.
- Environment pollution due to cut and fill operations, transportation of construction materials, disposal of debris, nuisance from dust, noise, vehicle fumes, black smoke, vibration are the short term negative impacts due to proposed project.

No reliable baseline information of water, air and noise / vibration exists with respect to transmission line and substation locations.

Proper GRM will have to be implemented by DSPPL to overcome public inconvenience during the proposed project activities. It is highly recommended to establish a tree replanting programme which would be undertaken as per the directives/requirements of the Forest Department, and financed by DSPPL where ever trees will be planted for corresponding number of trees that are cut.

. Based on the environmental and social assessment and surveys conducted for the Project, the potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the mitigation measures identified in the EMP. Adequate provisions are being made in the Project to cover the environmental mitigation and monitoring requirements, and their

associated costs. Adequate provisions are being made by DSPPL to cover the environmental mitigation and monitoring requirements, and their associated costs.

CONCLUSIONS

An environment and social analysis has been carried out looking at various criteria such as topology, air, noise, water resources and water quality, ecology, demography of the area, climate and natural habitat, community and employee health and safety etc. The impact analysis, found that due to careful consideration of environmental and social aspects during route and site selection by DSPPL, no major adverse impacts are expected. There is no adverse impact on the migration of habitat, any natural existing land resources and effect in the regular life of people. The environment and social impact associated with transmission line project is limited to the extent of construction phase and can be mitigated through a set of recommended measures and adequate provision for environment and social impacts which cover monitoring, measuring and mitigation.

ESMP has been prepared. Most impacts are expected to occur during the construction phase and are considered to be of a temporary nature. The transmission corridor was carefully selected after undergoing an options assessment. This enabled the right of way alignment to bypass villages and important water supplies and resources. The main project impacts are associated with clearing of shrub vegetation, waste management and excavation and movement of soils.

From this perspective, the project is expected to have a small "environmental footprint". No endangered or protected species of flora or fauna are reported at any of the subproject sites. Adequate provisions have been made for the environmental mitigation and monitoring of predicted impacts, along with their associated costs. Adverse impacts if noticed during implementation will be mitigated using appropriate design and management measures. The potential cumulative and residual impacts of the transmission sub-components as a whole indicate the project classifies as a category "B", in accordance with ADB's Safeguards Policy Statement 2009. The Project is not considered highly sensitive or complex.

Mitigation measures related to construction, as specified in the ESMP, will be incorporated into civil works contracts, and their implementation will be primarily the responsibility of the contractors. Hence, the proposed project has limited adverse environmental and social impact which can be mitigated following the ESMP & shall be pollution free Renewable source of Power.

Annexure-I

MoEF Notification for Exemption of Solar PV Projects from Environmental Clearance

No. J-11013/41/2006-IA.II(I)
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan,
C.G.O. Complex, Lodi Road,
New Delhi-110003.
Telefax: 24362434

Dated the 13th May, 2011

Office Memorandum

Sub: Applicability of environmental clearance for Solar Photo Voltaic (PV) Power Projects – Regarding.

A reference has been received in this Ministry seeking clarification regarding applicability of EIA Notification, 2006 in respect of Solar Photo Voltaic (PV) Power Projects. The matter has been examined.

It is clarified that the Solar PV Power Project are not covered under the ambit of EIA Notification, 2006 and no environment clearance is required for such projects under the provisions thereof.

This issues with the approval of the Competent Authority.

(Dr. S.K. Aggarwal)
Director

To

1. All the Officers of IA Division
2. Chairpersons / Member Secretaries of all the SEIAAs/SEACs
3. Chairman, CPCB
4. Chairpersons / Member Secretaries of all SPCBs / UTPCCs

Copy to:-

1. PS to MEF
2. PPS to Secretary (E&F)
3. PPS to SS(JMM)
4. Advisor (NB)
5. Website, MoEF
6. Guard File

Annexure-II

RSPCB Office Order for inclusion of Solar PV Projects under "Other" Category of Projects

राजस्थान राज्य प्रदूषण नियन्त्रण मण्डल
RAJASTHAN STATE POLLUTION CONTROL BOARD

OFFICE ORDER

In continuation of the office order No. F.14(23)Policy/RPCB/Plg/12-37 dated 3.4.08 issued in pursuance of the Notification dated 25.5.07 of the Department of Environment, Government of Rajasthan, Jaipur specifying various industrial/mining units under the red, orange and other category, under the provisions of the Air (Prevention and Control of Pollution) Rules, 1983, the solar power (Grid Interactive solar photo voltaic power plant) are also hereby added in the **"other"** category of industrial units.

Member Secretary

F.14(23)Policy/RPCB/Plg/ 3112-33 dated: 19-2-09

Copy for information and necessary action to the following:

1. P.S. to Chief Secretary, Govt. of Rajasthan, Secretariat, Jaipur
2. P.S. to Additional Chief Secretary(Environment), Govt. of Rajasthan, Jaipur
3. P.A. to Chairman, Rajasthan Pollution Control Board, Jaipur
4. P.A. to Commissioner Industries, Udyog Bhawan, Tilak Marg, C-Scheme, Jaipur.
5. P.A. to OSD and Additional Secretary (Env) Govt. of Rajasthan, Jaipur
6. Sr.P.A. to Member Secretary , Rajasthan Pollution Control Board, Jaipur
7. Sr.A.O. (H.O.O.& DDO)/ Group Incharge-I/II/III/ SWMC/PAACRajasthan Pollution Control Board, Jaipur
8. R.O. RPCBAlwar/Bhiwadi/Bikaner/Bhilwara/Jaipur(North/South) Jodhpur/Kota/Pali/ Udaipur

Environmental Engineer (Plg)

ANNEXURE-III

Suggested Outline and Scope of the Annual Environmental, Health and Safety and Social Monitoring Report

1. Brief Project Description

2. Update on the Status of the Design/Construction/Operations Activities of the Project

3. Status of Key Permits and Clearances (where applicable)
    - 3.1. Issuing body
    - 3.2. Date of issue and term of validity
    - 3.3. Terms of permit and renewal requirements
    - 3.4. Any major changes in location and design, if any
    - 3.5. Progress of the Applicable Environmental Studies during the Reporting Period

4. DSPPL and Contractors Performance on Environmental, Health and Safety Measures
    - 4.1. Environmental Performance and Compliance with Standards
        - 4.1.1. Air Emission
        - 4.1.2. Water
        - 4.1.3. Soil
        - 4.1.4. Solid and Hazardous Waste
        - 4.1.5. Flora and Fauna
        - 4.1.6. Noise
    - 4.2. Health and Safety Performance
        - 4.2.1. Training programs carried out
        - 4.2.2. Accidents and Near Misses (including incidents involving workers, staff or the community and type of assistance provided to any affected party)
        - 4.2.3. Emergency Situations and Response

5. Social Dimension Monitoring
    - 5.1. Labor and working conditions (DSPPL and Contractors) to include report on compliance with core labor standards, number and type of jobs provided to local population (data by gender)
    - 5.2. Corporate Social Responsibility Program (please include how women benefits from the program)
    - 5.3. Community Engagement (Consultation and Participation)
    - 5.4. Land Acquisition/ Use, Compensation and Involuntary Resettlement (Transmission Line)
        - 5.4.1 Information on compensation payments for land for transmission towers (attach list of private landowners, land area used by the Project, whether consent was obtained and amount of compensation paid and date the compensation was paid)
        - 5.4.2 Implementation of Resettlement Plan (if prepared)
    - 5.5. Implementation of Grievance Mechanism
        - 5.5.1. Grievances Recorded (copy of registry to be attached)
        - 5.5.2..Types of Complaints and Status of Resolution
        - 5.5.3. Effectiveness of Grievance Mechanism

6. Corrective Action Plan (Corrective Actions, Timeline and Budget) (if any)
    - 6.1 Environment, Health and Safety
    - 6.2 Social Dimension

ANNEXURE-IV

PHOTOGRAPHS AND NEWSPAPER CLIPPING OF PUBLIC CONSULTATION

जैसलमेर पत्रिका

जोधपुर . शुक्रवार . 29 अप्रेल . 2011

Dahanu Solar Power Limited

(Corporate Identity No. : U40102MH2000PTC127479)

ANNOUNCEMENT

Stakeholder Consultation Meeting

Dahanu Solar Power Private Limited is developing a Grid connected Solar Photovoltaic Power Project a Clean Development Mechanism (CDM) project at Dhursar village, Jaisalmer District, Rajasthan, India

As part of the registration process with CDM-UNFCCC Executive Board, we invite interested parties to attend a stakeholder consultation meeting, to be help.

Date : 05-05-2011, **Time** : 09.30 hrs - 11.30 hrs.
Venue : Government Senior Primary School, Village Dhursar, Tehsil Pokhran, Dist. Jaisalmer

Please call Mr. Pradeep Aggarwal on 93135 54167 latest by 15:00 hrs of 04-05-2011 for reservation/confimation or email to pradeep.aggarwal@relianceada.com

Authorized Signatory
Dhanu Solar Power Private Limited

Clipping of Newspaper advertisement published in local newspaper

Annexure – V

Potential Impacts and Proposed Mitigation Measures

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards	Institutional Responsibility	Implementation Schedule
Pre-construction						
Temporary use of land	Impact to the existing environment	Selection of lands adhering to local laws and regulations Construction facilities should be placed at least 500 m away from water bodies, natural flow paths, important ecological habitats and residential areas	water and air quality	Air quality Standards and water quality standards	DSPPL Contractor	Detailed design
Substation location and design	Noise generation Exposure to noise, Nuisance to neighboring properties	Substation designed to ensure noise will not be a nuisance.	Expected noise emissions based on substation design, noise levels	Noise control regulations, Noise levels to be specified in tender documents	DSPPL	Detailed design
	Disturbance to the adjacent lands and the people due to cut and fill operations	Maintained adequate clearance, construction of retaining structures, minimise cut and fill operations adjoining to the dwellings	Proximity to houses and other structures	Technical specification	DSPPL	Detailed design
Location of transmission towers and transmission line	Exposure to safety related risks	Setback of dwellings to overhead line route designed in accordance with	Tower location and line alignment selection with	Setback distances to nearest houses -	DSPPL	Part of tower sitting survey and detailed alignment survey and design

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
alignment and design		permitted level of power frequency and the regulation of supervision at sites.	respect to nearest dwellings			
	Impact on water bodies / land/ residences	Consideration of site location to avoid water bodies or agricultural land as much as possible Careful site selection to avoid existing settlements	Site location, line alignment selection (distance to dwelling, water and / or agricultural land)	Consultation with local authorities and land owners, water quality standards	DSPPL	Part of detailed project sitting and survey and design
Equipment specifications and design parameters	Release of chemicals and harmful gases in receptors (air, water, land)	PCBs not used in substation transformers or other project facilities or equipment.	Transformers and specifications and compliance with setback distances ("as-built" diagrams)	No PCBs. Setback distances to nearest houses	DSPPL	Detailed design
Encroachment into precious ecological areas	ecological values/	Avoid encroachment by careful site and alignment selection and reconnaissance before final sitting of activities. Minimize the need by using existing towers and RoW wherever possible.	Floral and faunal habitats loss		DSPPL	Detailed design
*En*croachment into farmland	Loss of agricultural productivity	Use existing tower footings/towers wherever possible	Tower location and line alignment	Consultation with local authorities and design engineers	DSPPL	Part of detailed alignment survey and design

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
			selection			
		Avoid sighting new towers on farmland wherever possible	Design of Implementation of Crop and tree compensation (based on affected area)			
		Farmers compensated for any permanent loss of productive land trees that need to be trimmed removed along RoW.	Statutory approvals for tree trimming /removal			
Interference with drainage patterns/Irrigation on channels	Temporary flooding hazards/loss of agricultural production	Appropriate sighting of towers to avoid channel interference	Site location and line alignment selection Slope of land near cable trenches within Solar Park	Consultation with local authorities and design engineers	DSPPL	Detailed alignment survey and design
		Appropriate provision or excess soil dug up from the cable trenches				
Explosions/Fire	Hazards to life	Design of substations to include modern fire control systems/firewalls.	Substation design compliance with fire prevention and control codes	Tender document to mention detailed specifications	DSPPL	Part of detailed substation layout and design /drawings
		Provision of firefighting equipment to be located close to transformers, power generation equipment.				
Construction						

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Removal or disturbance to other public utilities	Public inconvenience	Advance notice to the public about the time and the duration of the utility disruption	Disruption to other commercial and public activities / Public complaints	Technical specification	DSPPL	Throughout the
		Use of well trained and experienced machinery operators to reduce accidental damage to the public utilities				construction
		Restore the utilities immediately to overcome public inconvenience				period
Acquisition of cultivable lands	Loss of agricultural productivity	Avoid faming season wherever possible for the project activities.	Land area of agriculture loss	Regular monitoring compliance with regulations	DSPPL,	Throughout the construction period
		Ensure existing irrigation facilities are maintained in working condition	Usage of existing utilities		Contractor through contract provisions	
		Protect /preserve topsoil and reinstate after construction completed	Status of facilities (earthwork in m^3)			
		Repair /reinstate damaged bunds etc. after construction completed Compensation for temporary loss in agricultural production	Implementation of crop compensation (amount paid, dates, etc.)			

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Temporary outage of the electricity	DSPPL	construction period	Power disruption to houses and commercial premises of power disruption	Regular monitoring during the period of strengthening the conductors	Contractor	Throughout the
Equipment layout and installation	Noise and vibrations	Selection of construction techniques and machinery to minimise ground disturbance.	Construction techniques and machinery	Minimal ground disturbance	DSPPL,	Construction period
	SF6 leakage during storage and erection of Switchgear	Record of all substation switchgear, cylinders located within secure casings	Switchgear casings and Substation bounding	Ozone Depleting substances	DSPPL, Contractor through contract provisions	Throughout construction/erection period
Substation construction	Loss of soil	Fill for the substation foundations obtained by creating or improving local drain system.	Borrow area sighting (area of site in m^2 and estimated volume in m^3)	CPCB norms	DSPPL, Contractor through contract provisions	Construction period
	Water pollution	Minimize construction activities involving significant ground disturbance (i.e. substation land forming) during the monsoon season. Provide drains and retention ponds if required.	Water Quality (pH, BOD/COD, Suspended solids, other) during major earthworks	GOI water quality standards, Timing of major disturbance activities - prior to start of construction activities	DSPPL, Contractor through contract provisions	Construction period

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Construction schedules	Noise nuisance to neighbouring properties	Minimize construction activities undertaken during the night and local communities informed of the construction schedule.	Timing of construction (noise emissions, [dB(a)])	Construction as per Scheduled timings only	DSPPL, Contractor through contract provisions	Construction period
Provision of facilities for Construction workers	Contamination of receptors (land, water, air)	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Amenities for Workforce facilities	Presence of proper sanitation, water supply and waste	DSPPL, Contractor Through contract	Construction period
Provision of facilities for Construction workers : Labour Camp	Contamination of receptors (land, water, air)	Construction work force facilities to include: a. proper sanitation, b. water supply c. Waste and waste water disposal in soak pits.	Amenities for Workforce facilities	Presence of proper sanitation, water supply ,waste management, Health care centres	DSPPL, Contractor Through contract	Construction period

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Surplus earthwork/soil	Runoff to cause water pollution, solid waste disposal	Excess fill from tower foundation excavation to be reused on site or disposed of next to roads or around houses, in agreement with the local community or landowners. Location of soil filling site in Solar Park in consultation with DSPPL.	Location and amount (m^3) of fill disposal Soil disposal locations and volume (m^3)	Appropriate fill disposal and dispersal locations	DSPPL, Contractor through contract provisions	Construction period
Wood/ vegetation harvesting, cut and fill operations workers	Loss of vegetation and deforestation Effect on fauna	Construction workers prohibited from harvesting wood in the project area during their employment. Prevent work force from disturbing the flora, fauna including hunting of animal Proper awareness programme regarding conservation of flora, fauna including ground vegetation to all drivers, operators and other workers.	Illegal wood /vegetation harvesting (area in m^2, number of incidents reported) Habitat loss	Complaints by local people or other evidence of illegal harvesting	DSPPL, Contractor through contract provisions	Construction period

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Site clearance	Vegetation	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Vegetation marking and clearance control (area in m^2)	Clearance strictly limited to target vegetation	DSPPL, Contractor through contract provisions	Construction period
Mechanised construction	Noise, vibration and operator safety, efficient operation	Construction equipment to be well maintained.	Construction equipment - estimated noise emissions and operating schedules	Technical specifications, safety regulations,	DSPPL, Contractor through contract provisions	Construction period
	Noise, vibration, equipment wear and tear	Proper maintenance and turning off plant not in use.		Noise control regulations		
Construction of roads for accessibility	Increase in airborne dust particles	Existing roads and tracks used for construction and maintenance access to the site wherever possible	Access roads, routes (length and width of access roads)	Use of established roads wherever possible	DSPPL, Contractor through contract provisions	Construction period
	Increased land requirement for temporary accessibility	New access ways restricted to a single carriageway width.		Access restricted to single carriageway width within RoW		

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Transportation and storage of materials	Nuisance to the general public	Transport loading and unloading of construction materials should not to cause nuisance to the people by way of noise, vibration and dust Avoid storage of construction materials beside the road, around water bodies, residential or public sensitive locations Construction materials should be stored in covered areas to ensure protection from dust, emissions and such materials should be bundled in environment friendly and nuisance free manner	Water and Air Quality	CPCB Emission Standards and Water Quality standards	DSPPL	Construction period
Trimming/cutting of trees within RoW	**Fire hazards**	Trees allowed growing up to a height within the RoW by maintaining adequate clearance between the top of tree and the conductor as per the regulations.	Species-specific tree retention as approved by statutory authorities (average and maximum tree height at maturity, in metres)	Presence of target species in RoW following vegetation clearance.	DSPPL, Contractor through contract provisions	Construction period

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
	Loss of vegetation and deforestation	Trees that can survive pruning to comply should be pruned instead of cleared.	Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m^2)			
		Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies.				
Health and safety	Injury and sickness of workers and members of the public	Contract provisions specifying minimum requirements for construction camps	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)	DSPPL and ADB Health and safety standards	DSPPL (Contractor through contract provisions)	Construction period
		Contractor to prepare and implement a health and safety plan and provide workers with required PPE.				
		Contractor to arrange for health and safety awareness programmes				
Nuisance to nearby properties	Losses to neighboring nearby land uses/ values properties	Contract clauses specifying careful construction practices.	Reinstatement of land status (area affected, m^2)	Incorporating good construction management, design engineering practices. Consultation with affected parties immediately after completion of	DSPPL (Contractor through contract provisions)	Construction period
		As much as possible existing access ways will be used.				

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
				construction and after the first harvest		
		Productive land will be reinstated following completion of construction				
		Compensation will be paid for loss of production, if any.				
Operation and Maintenance Phase						
Electric shock	Death or injury to the workers and public	Security fences around substation	Proper maintenance of fences and sign boards	Periodic maintenance	DSPPL	Throughout the operation
		Establishment of warning signs	Usage of appropriate technologies (lost work days due to illness and injuries)	Number of programmes and percent of staff/ workers covered		
		Careful design using appropriate technologies to minimise hazards				
Noise generation	Nuisance to the community around the site	Provision of noise barriers near substation sites	Noise level	Noise level (db)- Once a year	DSPPL	Throughout the operation
Soil Erosion	Removal of top soil	Planting of buffer zone species suitable for arid climate.	Turbidity of water (Visual Inspection)	Visual inspection (Turbidity and sedimentation)	DSPPL	Throughout the operations

Project Activity	Potential	Mitigation Action	Parameters to	Standards	Institutional	Implementation
Maintenance of Transmission Line Substation maintenance	Exposure to electromagnetic interference Exposure to electromagnetic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines Substation design to comply with the limits of electromagnetic interference within floor area	Required ground clearance (metres) Required vibrations level, instrumentation	Ground clearance, standards on EMF Technical specifications	DSPPL	Throughout the operation

ANEEXURE -VI

Fig: Proposed Labour Camp site on Project map