Initial Environmental Examination

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India: Rajasthan Renewable Energy Transmission Investment Program (Tranche -2)

Prepared by Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPN), Government of Rajasthan

Table of Contents

Abbreviations

ADB	:	Asian Development Bank
ASEI	:	Asia Solar Energy Initiative
ASI	:	Archaeological Survey of India
CAZRI	:	Central Arid Zone Research Institute
DC or D/C	:	Double Circuit
DPR	:	Detailed Project Report
EA	:	Executing Agency
EHV	:	Extra High Voltage
EIA	:	Environmental Impact Assessment
EMoP	:	Environmental Monitoring Plan
EMP	:	Environmental Management Plan
GoI	:	Government of India
GoR	:	Government of Rajasthan
GRM	:	Grievance Redress Mechanism
GSS	:	Grid Sub Station
IA	:	Implementing Agency
IEE	:	Initial Environmental Examination
IGNP	:	Indira Gandhi Nahar Pariyojna (Indira Gandhi Canal Project)
IMD	:	India Metrological Department
JNNSM	:	Jawaharlal Nehru National Solar Mission
MOEF	:	Ministry of Environment and Forests
MOP	:	Ministry of Power
MSL	:	Mean Sea Level
NIT	:	Notice of Inviting Tender
PGCIL	:	Power Grid Corporation of India Limited
PIU	:	Project Implementing Unit
PLF	:	Plant Load Factor
Ppm	:	Parts per million
PTCC	:	Power Telecom Co-ordination Committee
R & D	:	Research and Development
Ramgarh GTPS	:	Ramgarh Gas Thermal Power Station
RE	:	Rural Electrification
RIICO	:	Rajasthan State Industrial Development and Investment Corporation
ROW	:	Right of Way
RRECL	:	Rajasthan Renewable Energy Corporation Limited
RVPN	:	Rajasthan Rajya Vidyut Prasaran Nigam Limited
RSPCB	:	Rajasthan State Pollution Control Board

Weights and Measures

1 Bigha	:	Measurement of land area (1 Bigha =1618 sq m in western Rajasthan)
1 Cusec	:	Measure of flow rate (28.317 litres per second)
1 ha. (hectare)	:	10,000 sq m
1 Giga Watt	:	1 Giga watt = 1000 Megawatt
1 km (kilometre)	:	1,000 m
1 kV	:	kilovolt (1,000 volts)
1 kW	:	kilowatt (1,000 watts)
1 kWh	:	1 kilowatt-hour = 1000 watts
1 MW	:	1000 Kilowatt

EXECUTIVE SUMMARY

1. In 2015, the government announced at the Conference of Parties (COP) 21 in Paris that it aims to increase to 40 percent the share of installed electric power capacity from non-fossil fuel- based energy resources by 2030. This includes plans to quadruple the country's renewable energy capacity to 175 GW by 2022 and revise the target of grid-connected solar power from 20 GW to 100 GW by 2022. Due to its tropical location, some regions in India benefit from solar irradiation ranging from 4–7 kilowatt-hours per square meter of area. The solar irradiation available in the western regions, particularly in the desert regions of Rajasthan, is at the higher end of this spectrum. India also has significant wind potential in its western region. These advantages have led to India's decision to invest in renewable energy particularly in the state of Rajasthan.

2. The multitranche financing facility will finance the Rajasthan Renewable Energy Transmission Investment Program to support accelerated development of long-term sustainable renewable energy sources in Rajasthan (India) in a cost-effective manner. The Project outcome is the development of reliable public sector transmission infrastructure capacity to support renewable energy development in the state of Rajasthan.

3. The proposed tranche 2 (the Project) will undertake investments in transmission network strengthening for 5 GW solar generation and wind generation to be connected by FY 2021 to FY 2022. Table below gives the list of project Tranche 2 components and summary of key environmental features of these subprojects.

Tranche 2 Components and Summary Environmental Issues

No	Sub-Project components	Key features of sub-project component	Environmental features *
A	Transmission Lines:		
1	765 kV double circuit transmission line from Korna to Ajmer (210 km)	210 km Line has no land issue - no forestland conversion/private land acquisition required.	Passes through Aravalli range area and dry Luni riverbed (which is seasonal). No sanctuary/reserve forest within 10 km vicinity of the line alignment.
2	LILO of 400 kV Raj West – Jodhpur at Korna (10 km)	10 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
3	LILO of 400 kV Akal – Jodhpur at Korna (4 km)	4 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
4	400 kV double circuit transmission line from Korna – Pokaran (115 km)	115 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
5	400 kV double circuit transmission line from Korna – Jaisalmer II (135 km)	135 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment. The route passes through the wind farm area.
6	220 kV double circuit transmission line from Sheo – Undoo (50 km)	50 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
7	LILO of 220 kV Akal – Barmer at Sheo (25 km)	25 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
8	132 kV LILO double circuit transmission line from Sheo –	5 km Line has no land issue - no forestland conversion/private land	No sanctuary/reserve forest within 10 km vicinity of the line alignment.

	Undoo (5 km)	acquisition required.	
9	132 kV LILO ouble circuit transmission line from Sheo – Jaisalmer line (5 km)	5 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
10	220 kV double circuit transmission line from Baithwasia – Khinvsar (65 km)	65 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
11	LILO 2 km D/C Jaislamer-Sheo Line (at Sangarh 132 kV GSS, Jaisalmer)	2 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
12	LILO 20 km D/C line 132 kV Tinwari-Osian Line (at Bana Ka Bas 132 kV GSS, Jodhpur	20 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
13	LILO 3 km D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner)	3 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
14	20 km 132 kV D/C line from 220 kV GSS Dechu Nathrau Jodhpur	20 km Line has no land issue - no forestland conversion/private land acquisition required.	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
15	100 km 220 kV Chhattargarh-Gajner line	100 km line has no land issue. It will cross Indira Gandhi Nahar Pariyojana and would require forest approval of 5-10 ha. for manmade strip plantation forest.	Gajner WL Sanctuary is 4 km away from the line snd existing GSS at Gajner Town. This is a very small fenced sanctuary attached to Gajner palace and city.
16	77 km 132 kV Chhattargarh to Loonkaransar line	77 km Line has no land issue – 10-15 HA forestland conversion/private land acquisition required where line crosses IGNP	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
B	Substations:		
1	765/400/220kV new substation with 3x1500 MVA transformers at Korna	This is a government land. Approximately 64 hectares of land will be required and RVPN will take it from the government revenue department through transfer.	Water body created by Government of Rajasthan (GOR)'s Irrigation department for water storage about 1 km away from site. Another seasonal waterbody about 500 m away. No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
2	400/220kV substation with 2x500 MVA transformers at Pokaran (upgrade)	This is a government land. Approximately 27.2 hectares of land will be required and RVPN will take it from the government revenue department through transfer.	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation
3	220/132kV new substation with 2x160 MVA transformers at Sheo	This is a government land. Approximately 6.4 hectares of land will be required and RVPN will take it from the government revenue department through transfer.	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
4	220/132 kV new substation at Chattargarh, Bikaner	This is a government land proposed for 220 kV extension. This is an under construction 132 kV RVPN substation in Govt land-approximately 6.4 hectares at Chhattargarh GSS.	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
5	132/33 kV new substation at	This is a government land. Approximately 3.5 hectares of land	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of

	Sangarh, Jaisalmer district	will be required. Site identified/finalise. Government land for transfer under process.	the substation.
6	132/33 kV new substations at Bana ka Bans, Jodhpur district	This is a government land. Approximately 3.6 hectares of land will be required and RVPN has initiated the process for land transfer.	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
7	132/33 kV new substation at Kitasar, Bikaner district	Approximately 3.5 hectares of land will be required. Government land.	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
8	132/33 kV new substation at Nathrau, Jodhpur district	This is a government land. Substation under construction on approx. 3.5 ha. land	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
9	Augmentation of 2x500 MVA transformers at Akal	No additional land is required. Augmentation will be done within the existing substation (approx. 28.8 ha of land) and the land belongs to RVPN.	Civil work within existing Akal grid substation. No associated environment impacts as situated inside GSS on spare designated spare bay area.
10	Augmentation of 2x500 MVA transformers at Jaisalmer II	No additional land is required. Augmentation will be done within the existing substation (approx. 29 ha of land) and the land belongs to RVPN.	Civil work within existing Jaisalmer grid substation. No associated environment impacts. Two wind power turbines are located just outside the substation boundary. No environmental impact on the substation or wind farm expected.
11	Extensions of the existing Jaisalmer, Ajmer, Undoo, Baithwasia and Khinvsar substations	No additional land is required. Augmentation will be done within the existing substation and the land belongs to RVPN. Approx 6.4 ha of land for each GSS will be required.	Civil work within existing Jaisalmer, Ajmer, Undoo, Baithwasia, Khinvsar grid substations. No associated environment impacts as situated inside GSS on spare designated spare bay area.
C	Optical Fibre Network:		
12	Stringing of Optical Ground Wires (OPGW) to connect 132kV and 220kV substations in Rajasthan	Existing lines for reconductoring proposed 220/132 kV lines. Line has no land issue as these situated in the same project area.	The proposed routes have been surveyed in the project area. None of them are within 10 km vicinity of any line alignment of any sanctuary/reserve forest.

* Refer Table 6.3 for distance from major sanctuaries and other receptors

4. Tranche 2 of Rajasthan Renewable Energy Transmission Investment Program aims to strengthen transmission network for the 5,000 MW solar generation and wind generation to be connected by FY 2021 to FY 2022, including (i) construction of new transmission lines - 400/220/132 kV, (ii) construction of new grid substations - 765/400/220/132/33 kV, (iii) augmentation of grid substations - 400/220/132/33 kV and stringing of optical ground wires to connect 132 kV and 220 kV substations. The 5 GW solar and wind parks are not associated facilities of the project since they are not solely dependent on each other. The solar and wind parks will supply power to other users such as industries, and the project substations will also evacuate power from different solar and wind parks.

5. Potential impacts are mostly temporary, predictable, and reversible, and can be mitigated through adherence to national and international standards, design criteria, and/or implementation of EMP. Substations are proposed on government land and the route of transmission lines avoided any sanctuary or protected areas and other environmentally-sensitive areas. Best available technology and best management practices are built-in to the project design.

6. All new substations will be located on government lands or those lands that are allotted to RVPN by Government of Rajasthan. All of them are identified as vacant, situated in barren and sandy area. The GSS's Akal, Bikaner, Ajmer, Jaisalmer (Bhainsra), Undoo (existing 132 kV), Sheo (existing 220 kV), Baithwasia, Khinvsar where augmentation is to be done in their existing bays, there is no need to acquire land.

7. The alignment of the proposed new transmission lines and other LILO lines runs mostly through single season cultivated lands, uncultivated lands and usually runs away from human settlements and parallel to the existing transmission lines. The total route design will be finalised after conducting detailed physical survey of the land through which the lines passes. The line routing will be done avoiding existing settlements such as cities, villages, houses, huts, buildings, and trees or any other existing settlement directly related with the livelihood of people. However, 220 kV Chhattargarh – Gajner line (one occurrence) and 132 kV Chhattargarh-Loonkaransar line (twice) will cross the tree strip plantation along the Indira Gandhi Nahar Praiyojana (IGNP) canal crossings. The manmade forest of 5-10 ha, will be traversed by the line for which the line height will be increased to avoid any cutting of plantation trees.

8. The type of crops found in the area are Bajara, Moong, Moth, Till, Gawar, Jeera, Mustard, and Groundnut. During the construction of transmission lines, the risk of crop damage is considered low provided work during cropping season is minimised. Cropping is done usually once a year due to scarcity of irrigation water and limited rainfall. However, some areas do have irrigated land that can give crops up to 2 times of the year. Compensation for the cost of crop being damaged during construction of transmission lines will be paid to the owners by RVPN as per Government of Rajasthan (GoR) regulations.

9. Hardly any trees exist in the site selected for establishing the sub-stations. However, small trees such as babool, neem, khejri etc are found along the transmission right of way (ROW) of power lines which may not necessarily be cut. Alignment of the sub-stations and route of the transmission lines will be finalised in a manner so as to avoid or minimize the cutting and removal of trees. If cutting of trees is unavoidable, then appropriate regulatory approvals from all concerned agencies should be obtained, and compensatory afforestation will need to be carried out. According to Government of India (GoI) rules, compensatory afforestation may be raised over degraded forest land twice in extent of the forest area being diverted/dereserved for a transmission line project[1].

10. Project benefits outweigh negative impacts. The negative environmental impacts are likely to be associated with land acquisition for sub-stations, construction activities of the sub-stations and power lines. The location impacts will be comparatively low due to the small forest coverage of the state and ample space available for buffer zones from wildlife habitats (in this case Desert National Park is 105 km away from Pokharan GSS and 220 kV Chhattargarh-Gajner line is about 4 km away from Gajner sanctuary). The main project activities will be construction of GSSs, erection of transmission lines spread over to a large geographical area, and power evacuation schemes in the Barmer, Bikaner, Jaisalmer and Jodhpur areas from various other solar plants in the state. These negative impacts can be mitigated in a cost-effective manner and will not be cumulative.

[1] GOI Ministry of environment forests and climate change website -source: http://moefrolko.org/rule3.htm

11. 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 construction will be mitigated using appropriate management measures in line with international guidelines (e.g., IFC/World Bank 2007[2]).

12. According to GoI EIA Notification 2009, Power transmission projects are not listed as environmental sensitive projects and hence no clearance is required from Rajasthan State Pollution Control Board (RSPCB) or Ministry of Environment, Forests & Climate Change (MoEF&CC), GoI. Clearance from Rajasthan Forest Department is required only in cases where subproject is constructed on forestland or requires cutting of forest trees.

13. For some of the transmission line and substation sub-projects, the substation specific topography survey and the transmission line route survey works will be conducted during detailed design. The data regarding soil, topography, contour, land cutting and filling required, distance from water body and distance from major roads, details of forest/non-forest, fruit/non-fruit trees can be affected, land details will be collected by EPC contractor. If any sub-project sites are changed other than those indicated here, supplementary information will be provided the concerned subproject by RVPN to ADB for prior approval.

14. Since the project does not involve activities that have significant adverse impact, an IEE has been developed as per ADB's Safeguard Policy Statement (SPS) 2009 and Environment Asssessment and Review Framework (EARF) for the Project. The EARF for the project remains the valid as is applicable to proposed Tranche 2 sub-projects. The IEE report conforms to national environmental regulations and is also consistent with ADB Operations Manual F1/BP and F1/OP (2003). Accordingly, the environmental classification for the project is "Category B" as per ADB SPS 2009.

[2] IFC/World Bank Group Environmental, Health, and Safety Guidelines (known as the "EHS Guidelines"

1.0 INTRODUCTION

1.1 Background

1. In 2015, the government announced at the Conference of Parties (COP) 21 in Paris that it aims to increase to 40 percent the share of installed electric power capacity from non-fossil fuel- based energy resources by 2030. This includes plans to quadruple the country's renewable energy capacity to 175 GW by 2022 and revise the target of grid-connected solar power from 20 GW to 100 GW by 2022. Due to its tropical location, some regions in India benefit from solar irradiation ranging from 4–7 kilowatt-hours per square meter of area. The solar irradiation available in the western regions, particularly in the desert regions of Rajasthan, is at the higher end of this spectrum. India also has significant wind potential in its western region. These advantages have led to India's decision to invest in renewable energy particularly in the state of Rajasthan.

2. The multitranche financing facility will finance the Rajasthan Renewable Energy Transmission Investment Program to support accelerated development of long-term sustainable renewable energy sources in Rajasthan (India) in a cost-effective manner. The Project outcome is the development of reliable public sector transmission infrastructure capacity to support renewable energy development in the state of Rajasthan.

3. The proposed tranche 2 (the Project) will undertake investments in transmission network strengthening for 5 GW solar generation and wind generation to be connected by FY 2021 to FY 2022.

1.2 Scope of Work and Methodology Adopted

4. The broad scope of the Environmental Assessment study is:

i) To conduct field visits to collect data relevant to the study area and also collect secondary data so as to establish the baseline environmental status of the study area;
ii) To assess the impacts on environmental attributes due to the location, design, construction and operation of the proposed project;
iii) To prepare a mitigation plan outlining the measures for protecting the environment including institutional arrangement and environmental monitoring;
iv) To identify critical environmental attributes required to be monitored subsequent to the implementation of the proposed project;
v) To carry out consultation with local people to identify the public perception of the project; and
vi) To establish the Environment Management Plan (EMP) and Environment Monitoring Plan (EMoP) for the RVPN to submit environmental monitoring reports to ADB at regular intervals.

5. The alignment of transmission lines may vary after the exact demarcation of tower locations. Accordingly, transect walks and field surveys were undertaken to assess physical and biological environment. Detailed assessment of the baseline environment has been conducted along with line route alignment and data collection from secondary source has been done to support the findings of the field survey. This report is prepared on the basis of preliminary survey, field study and consultation with the help of available secondary data of different sites, books, articles and report. The field studies were supported by data collected from secondary sources such as internet, forest atlas, published data from GoI documents, 2001 population census statistics data, as well as documents from RVPN, Rajasthan State Pollution Control Board (RSPCB), Rajasthan Renewable Energy Corporation Limited

(RREC) etc.

6. The IEE report comprises baseline data on existing condition of physical, ecological, economic, and social information, together with the anticipated environmental impacts and proposed mitigation measures. Observations were made through transect walk along the proposed transmission line locations, and the proposed premises for new sub-stations and lines from August to September 2016. Public consultations were held with the project affected communities, stakeholders, and government officers of the project area. **Annexure 7** gives details of these consultations.

2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 Indian - National, Local, Other Applicable Environmental Laws, Regulations, and Standards as applicable to the project.

2.1.1 Rajasthan State's Specific Environmental Regulatory and Policy Framework

7. As per GoI's Environment Impact Assessment (EIA) Notification 2009, Power transmission projects are not listed as environmental sensitive projects and hence no clearance is required from Rajasthan State Pollution Control Board (RSPCB) or Ministry of Environment and Forests (MoEF), GoI. Clearance from Rajasthan Forest Department is required only in cases where subproject is constructed on forestland or requires cutting of forest trees.

8. The Ministry of Environment, Forests & Climate Change (MoEF&CC), Government of India, vide its Notification No. S.O. 1533 dated 14-09-2006, reengineered the EIA process in India and also decentralized some powers and made provision to constitute the State Level Environment Impact Assessment Authority (SEIAA) and the State Level Expert Appraisal Committee (SEAC) for performing functions under the said notification. For the Rajasthan State, the SEIAA and SEAC were constituted in year 2008. In addition, the Rajasthan State Pollution Control Board's guidelines for project proponents apply to all state projects.

2.1.2 Indian Policy, Legal, and Administrative Framework

9. The major Indian acts, rules and policies which are relevant to the project activities are: The Electricity Act (1910) and its Amendments (2004) and (2007) and the Electricity Rule (1956) and its Amendments (2000); The Indian Telegraphic Act (1885) and its Amendments (2003); The Environment Protection Act (1986); The Forest Act (1980); The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013); and The National Environment Policy (2006). **Table 2.1** gives an illustrative list of acts and their applicability to the project.

Table 2.1: Indian Regulations as Applicable for the project

No	Name of Regulation	Applicability	Remark
	ENVIRONMENTAL REGULATIONS		
1	National Green Tribunal Act, 2010	Yes	
2	The Environment (Protection) Act; 1986 and Environment (Protection) Rules 1986 and amendments	Yes	Umbrella Act to the Air, Water and Noise Acts
3	The Bio-medical Waste (Management and Handling) Rules, 1998	No	
4	Coastal Regulation Zone Notification, Ministry of Environment And Forests, (Department of Environment, Forests and Wildlife), 6th January, 2011	No	
5	The Hazardous Waste (Management, Handling and Trans-boundary Movements) rules, 2009	Yes	
6	Batteries (Management and Handling) Rules, 2001 and further amendments	Yes	
7	Ozone Depleting Substances (Regulation) Rules, 2000 as amended in 2005	Yes	
8	Forests (Conservation) Act, 1980 and Rules 1981	Yes	
9	The Wildlife (Protection) Act, 1972	Yes	
10	The Biodiversity Act, 2002	No	
11	The Air (Prevention and Control of Pollution) Act, 1981 Including Rules 1982 and 1983	Yes	

No	Name of Regulation	Applicability	Remark
12	Noise Pollution (Regulation and Control) Rules, 2000 and the Noise Pollution (Regulation and Control) (Amendment) Rules, 2010	Yes	
13	The Water (Prevention and Control of Pollution), Act, 1974 including Rules, 1975 (as amended up to 1988)	Yes	
14	The Water (Prevention and Control of Pollution), Cess Act, 1977 including Rules 1978 and 1991	Yes	
15	The Indian Forest Act 1927	No	
16	The National Environmental Appellate Authority Act, 1997	No	
17	National Wetland rules GSR 252 E	No	
	REGULATIONS RELATED TO LAND AND LABOUR		
1	Building and Other Construction Workers Act 1996	Yes	Key legislations providing guidelines for onsite labour and worker management and welfare
2	Interstate Migrant Workers Act 1979	Yes	In case workers and labourers working at the project sites are migrants from other states
4	The Indian Telegraph Act, 1885	Yes	
5	Indian Treasure Trove Act, 1878 (as modified upto September 1949)	Yes	
6	The Antiquities and Art Treasures Act, 1972	Yes	
7	The Child Labour (Prohibition and Regulation) Act, 1986	Yes	
8	The Bonded Labour (Abolition) Act 1976	Yes	
9	The Trade Union Act, 1926	No	
10	Minimum Wages Act, 1948	Yes	
11	Workmen's Compensation Act, 1923	Yes	ESI Act or Workmen Compensation Act
12	The Contract Labour (Regulation & Abolition) Act, 1970 and Rules	Yes	
13	The E.P.F. and Miscellaneous Provisions act, 1952	Yes	
14	Factories Act 1948	Maybe	In-case IA more than ten full time employees during the operations phase of the project
15	ESI Act, 1948 (Employees State Insurance Act, 1948)	Yes	ESI Act or Workmen Compensation Act applicable to IA
16	Payment of Gratuity Act, 1972	Yes	
17	Provisions of the Panchayats (Extension to the Scheduled Area) Act, 1996	Maybe	
18	The Right to Information Act, 2005	Maybe	
19	Employers' Liability Act no. 24 of 1938	Yes	
	OCCUPATIONAL HEALTH AND SAFETY		
1	The Indian Factories Act, 1948 and State Rules	No	
2	The Shops and Establishment Act and State Rules	Yes	
3	The Petroleum Act, 1934 and the Petroleum Rules	No	
4	Gas Cylinder Rules and Static and Mobile Pressure Vessels (Unfired) Rules, 1981	No	
5	National Policy on HIV/AIDS and the World of Work, Ministry of Labour and Employment, GoI.	Yes	

No	Name of Regulation	Applicability	Remark
6	National Policy on Safety, Health and Environment at Work Place, Ministry of Labour and Employment, GoI	Yes	
7	Central Electricity Authority (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electrical Lines) Regulations 2008	Yes	Detailed design, maintenance procedures. Details in 2.1.4
8	CGWA Notification no.21-4/Guidelines/CGWA/2009-832 dated 14th October 2009	Yes	
9	Indian Electricity Act, 2003	Yes	

2.1.2 Relevant Environment related Acts of Government of Rajasthan

10. Some of the Government Rajasthan policies that are applicable to the sub-projects are:

Table 2.2

No.	Name of Regulation	Applicability	Remark
1	The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961. Amended by Raj. Act No. 6 of 2006	Yes	
2	The Rajasthan Land Acquisition Act, 1953, Amended by Rajasthan Act Nos. 27 of 1957, 40 of 1960, 8 & 21 of 1962, 22 of 1966, 15 of 1981 and 8 of 1987.	Yes	
3	The Rajasthan Religious Buildings and Places Act, 1954, Amended by Rajasthan Act Nos. 27 of 1957 and 8 of 1962	Yes	
4	The Rajasthan Irrigation and Drainage Act, 1954, Amended by Rajasthan Act Nos. 21 of 1960 and 8 of 1962.	Yes	
5	The Rajasthan Agricultural Lands Utilization Act, 1954, Amended by Rajasthan Act Nos. 27 of 1957, 28 of 1960 and 8 of 1962.	Yes	
6	The Rajasthan Forest Act, 1953, Amended by Rajasthan Act No.27 of 1957	Yes	
7	The Rajasthan Land Revenue Act, 2003.	Yes	

11. Apart from the above-mentioned regulations, the Government of India has also structured a number of policies that are relevant to RVPN sub-projects. The key policies have been provided in **Table 2.3**.

Table 2.3: Indian Policies related to project

No.	Name of Regulation	Applicability	Remark
ENVIRONMENT, FOREST & LAND RELATED POLICIES			
1	National Forest Policy, 1988	Yes	
2	National Environmental Policy 2006	Yes	
3	Wildlife Conservation Strategy 2002	No	

2.1.3 National Government Environment Classification

12. Under the GoI's Environment Impact Assessment (EIA) Notification 2009, the environmental classification of projects is determined by Ministry of Environment, Forest and Climate Change (MoEFCC), GoI and there are two possible outcomes:

- **Category A**: A project is classified as Category A if it is likely to have significant negative impacts and is thus one of the types of project listed in this category in the EIA Notification. Such projects require EIA, plus Environmental Clearance (EC) from MoEFCC;

- **Category B**: A project is classified as Category B if it is likely to have fewer negative impacts and is listed in this category in the EIA Notification. These projects require EC from the State Environment Impact Assessment Authority (SEIAA), who classify the project as B1 (requiring EIA) or B2 (not requiring EIA), depending on the level of potential impacts. Projects classified as B2 require no further study.

2.2 India and Multilateral Environmental Agreements (MEAs)[3]

13. India is member of almost all major Multilateral Environmental Agreements (MEAs), under four clusters, namely the following:

A. Nature conservation;
B. Hazardous material;
C. Atmospheric emissions; and
D. Marine environment.

14. There are 20 major multilateral global MEAs, to which India is a signatory. These are listed below:

A. Nature conservation

(i) Ramsar Convention on Wetlands
(ii) CITES (Convention on International Trade in Endangered Species of Fauna and Flora)
(iii) TRAFFIC (The Wildlife Trade Monitoring Network)
(iv) CMS (Convention on the Conservation of Migratory Species)
(v) CAWT (Coalition Against Wildlife Trafficking)
(vi) CBD (Convention on Biological Diversity)
(vii) ITTC (International Tropical Timber Organisation)
(viii) UNFF (United Nations Forum on Forests)
(ix) IUCN (International Union for Conservation of Nature and Natural Resources)
(x) GTF (Global Tiger Forum)

B. Hazardous material

(i) Cartagena Protocol on Biosafety
(ii) SAICM (Strategic Approach to International Chemicals Management)
(iii) Stockholm Convention on Persistent Organic Pollutants (POPs)
(iv) Basel Convention on the Control of Trans-boundary Movement of Hazardous Waste and Their Disposal
(v) Rotterdam Convention on Prior Informed Consent (PIC) for certain Hazardous Chemicals and Pesticides in International Trade

C. Atmospheric emissions

(i) UNFCCC (United Nations Framework Convention on Climate Change)
(ii) Kyoto Protocol
(iii) UNCCD (United Nations Convention to Combat Desertification)
(iv) Montreal Protocol (on Ozone Depleting Substances)

D. Marine environment

[3] Source: http://www.moef.nic.in

(i) IWC (International Whaling Commission

2.3 Technical Standards, Rules and Regulations for Indian Power Sector

15. Central Electricity Authority (CEA) is the technical agency making regulations consistent with the Electricity Act, 2003 under section 177 and carry out the provisions of the Act. The following relevant regulations are notified and published in official gazette of GoI and available on the web-site of CEA:

a. Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 – Notified on 17.3.2006
b. Central Electricity Authority (Grid Standards for Operation & Maintenance of Transmission lines) Regulations, 2010- notified on 26.06.2010.
c. Central Electricity Authority (amendment to the regulations on "Installation & Operation of meters") regulations, 2010- notified on 26.06.2010.
d. Central Electricity Authority (Measures relating to safety & Electric Supply) Regulations, 2010- notified on 24-09-2010.
e. Central Electricity Authority (Technical Standards for Construction of Electric Plants and Electric Lines) regulations, 2010-notifed on 20-08-2010
f. Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plant and Electrical Lines) Regulations, 2011-notifed on 14-02.2011.
g. Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) – Regulations 2010.
h. Central Electricity Authority (Technical Standards for connectivity to the Grid) (Amendment) Regulations, 2010.

2.4: Asian Development Bank's Safeguards Policies

2.4.1 Asian Development Bank's Environment Classification

16. The ADB's Safeguard Policy Statement (SPS), 2009 is applicable to all projects. These projects can be categorized as A, B, C or FI. Table 2.4 below provides a list of categorisation of the activities related to Environment, Safeguards, as per ADB's Safeguard Policy Statement 2009 requirements:

Table 2.4: Environment Safeguards Categorization: Definition

Category	Environment
A	A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
B	A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
C	A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed. (iv) Category FI. (paras. 65-67).
FI	A proposed project is classified as category FI (financial intermediaries) if it involves investment of ADB funds to or through a FI.

2.4.2 ADB Prohibited Investment Activities List (PIAL)

17. At an initial stage of identifying project activities, the ADB's Prohibited Investment

Activities List (described below) will apply. If the investment involves a prohibited activity, IA will not consider the investment.

18. The following type of projects do not qualify for Asian Development Bank financing:

(i) production or activities involving harmful or exploitative forms of forced labour[4] or child labour[5];'

(ii) production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phase outs or bans, such as (a) pharmaceuticals[6], pesticides, and herbicides[7],(b) ozone-depleting substances[8], (c) polychlorinated biphenyls[9] and other hazardous chemicals[10], (d) wildlife or wildlife products regulated under the Convention on International Trade in Endangered Species of Wild Fauna and Flora[11], and (e) trans-boundary trade in waste or waste products[12];

(iii) production of or trade in weapons and munitions, including paramilitary materials;

(iv) production of or trade in alcoholic beverages, excluding beer and wine[13];

(v) production of or trade in tobacco;

(vi) gambling, casinos, and equivalent enterprises;

(vii) production of or trade in radioactive materials[14], including nuclear reactors and components thereof;

(viii) production of, trade in, or use of unbonded asbestos fibers[15];

(ix) commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests; and

(x) marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.

2.4.3 ADB SPS Requirements (SR1): Environment Policy

19. ADB's SPS sets out the policy objectives, scope and triggers, and principles for the environmental safeguards. To achieve the policy objectives and deliver the policy principles, ADB carries out the actions described in the "Policy Delivery Process" (subsection "B" of the SPS). To help borrowers/clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. ADB staff, through their due diligence, review, and supervision, will ensure that borrowers/clients comply with these requirements during project preparation and implementation. These safeguard requirements are as follows:

Objectives: The objective of ADB's due diligence for the Project loan is that EA ensures the environmental soundness and sustainability of projects and to support the integration of

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[4] Forced labor means all work or services not voluntarily performed, that is, extracted from individuals under threat of force or penalty

[5] Child labor means the employment of children whose age is below the host country's statutory minimum age of employment or employment of children in contravention of International Labor Organization Convention No. 138 "Minimum Age Convention" (www.ilo.org).

[6] A list of pharmaceutical products subject to phaseouts or bans is available at http://www.who.int.

[7] A list of pesticides and herbicides subject to phaseouts or bans is available at http://www.pic.int.

[8] A list of the chemical compounds that react with and deplete stratospheric ozone resulting in the widely publicized ozone holes is listed in the Montreal Protocol, together with target reduction and phaseout dates. Information is available at http://www.unep.org/ozone/montreal.shtml.

[9] A group of highly toxic chemicals, polychlorinated biphenyls are likely to be found in oil-filled electrical transformers, capacitors, and switchgear dating from 1950 to 1985.

[10] A list of hazardous chemicals is available at http://www.pic.int.

[11] A list is available at http://www.cites.org.

[12] As defined by the Basel Convention; see http://www.basel.int.

[13] This does not apply to investee companies who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to an investee company's primary operations.

[14] This does not apply to the purchase of medical equipment, quality control (measurement) equipment, and any equipment for which ADB considers the radioactive source to be trivial and adequately shielded.

[15] This does not apply to the purchase and use of bonded asbestos cement sheeting where the asbestos content is less than 20%.

environmental considerations into the project decision-making process.
Scope and Triggers: Environmental safeguards are triggered if a project is likely to have potential environmental risks and impacts.
Policy principles:

- Use screening process for each proposed project to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.
- Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.
- Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.
- Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an environmental management plan (EMP) that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.
- Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.
- Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.
- Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.
- Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.

- Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.
- Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.
- Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation

2.4.4 Other International documents relevant to ADB's Safeguard Policy Statement, 2009

(i) World Bank Group's Environment, Health and Safety (EHS) Guidelines, 2007 which are currently under revision.
    - Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution

(ii) ADB's Environmental Safeguards: A Good Practice Sourcebook-Draft Working Document (November 2012).

(iii) ILO Core Labor Standards.

3.0 DESCRIPTION OF THE PROJECT

3.1 The Project

20. Tranche 2 of Rajasthan Renewable Energy Transmission Investment Program aims to strengthen transmission network for the 5,000 MW solar and wind generation to be connected by FY 2021 to FY 2022, including construction of 846 km new transmission lines, construction/augmentation of substations (8,240 MVA), and stringing of optical ground wires. The 5 GW solar and wind parks are not associated facilities of the project since they are not solely dependent on each other. The solar and wind parks will supply power to other users such as industries, and the project substations will also evacuate power from different solar and wind parks.

21. In 2015, the government announced at the Conference of Parties (COP) 21 in Paris that it aims to increase to 40 percent the share of installed electric power capacity from non-fossil fuel- based energy resources by 2030. This includes plans to quadruple the country's renewable energy capacity to 175 GW by 2022 and revise the target of grid-connected solar power from 20 GW to 100 GW by 2022. Due to its tropical location, some regions in India benefit from solar irradiation ranging from 4–7 kilowatt-hours per square meter of area. The solar irradiation available in the western regions, particularly in the desert regions of Rajasthan, is at the higher end of this spectrum. India also has significant wind potential in its western region. These advantages have led to India's decision to invest in renewable energy particularly in the state of Rajasthan.

22. The proposed tranche 2 (the Project) will undertake investments in transmission network strengthening for 5 GW solar generation and wind generation to be connected by FY 2021 to FY 2022.

23. An outline of project components is provided below for Tranche-2.

(i) Transmission Lines:

- 765 kV double circuit transmission line from Korna to Ajmer (210 km)
- LILO of 400 kV Raj West – Jodhpur at Korna (10 km)
- LILO of 400 kV Akal – Jodhpur at Korna (4 km)
- 400 kV double circuit transmission line from Korna – Pokaran (115 km)
- 400 kV double circuit transmission line from Korna – Jaisalmer (135 km)
- 220 kV double circuit transmission line from Sheo – Undoo (50 km)
- LILO of 220 kV Akal – Barmer at Sheo (25 km)
- 132 kV double circuit transmission line from Sheo – Undoo (5 km)
- 132 kV double circuit transmission line from Sheo – Jaisalmer (5 km)
- 220 kV double circuit transmission line from Baithwasia – Khinvsar (65 km)
- LILO 2 km D/C Jaislamer-Sheo Line (at Sangarh 132 kV GSS, Jaisalmer)
- LILO D/C line 132 kV Tinwari-Osian Line (at Bana Ka Bas 132 kV GSS, Jodhpur (20 km)
- LILO D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner (3 km)
- 132 kV D/C line from 220 kV GSS Dechu -132 kV Nathrau, Jodhpur (20 km)
- 220 kV D/C line from Chhattargarh GSS to 132 kV Gajner GSS, Bikaner (100 km)
- 132 kV D/C line from Chhattargarh to 132 kV Loonkaransar, Bikaner (77 km)

(ii) Substations:

- 765/400/220 kV new substation with 3x1500 MVA transformers at Korna.
- 400/220 kV substation with 2x500 MVA transformers at Pokaran (upgrade).
- 220/132 kV new substation with 2x160 MVA transformers at Sheo.

- 220/132 kV new substation at Chattargarh
- Augmentation of 2x500 MVA transformers at Akal substation.
- Augmentation of 2x500 MVA transformers at Jaisalmer substation.
- Extensions of the existing Jaisalmer, Ajmer, Undoo, Baithwasia and Khinvsar substations.
- 132/33 kV new substations at Sangarh, Bana Ka Bans, Kitasar and Nathrau.

(iii) Optical Fibre Network:

- Stringing of Optical Ground Wires (OPGW) to connect 132 kV and 220 kV substations in Rajasthan

3.2 Justification of the Project

24. Due to the fast emerging energy demand in the country, there is a distinct necessity for strengthening and expanding the transmission network. Rajasthan is going to be the hub of renewable energy generating facilities. To achieve the GoR target of 25000 MW and national target of 100GW solar capacity addition, GoR has signed Joint Venture Agreements/MoUs (as shown in **Table 3.1**) for development of Solar Parks and setting up of solar power projects under Rajasthan Solar Energy Policy, 2014 as per following details:

Table 3.1: List of MOUs Signed between IPPs and Government of Rajasthan (Status in Rajasthan state as per RREC letter to GOI dated 19 March 2015) as shown in Annexure 4A.2

No	Name of firm	Capacity (MW)	Agreement/MoU signed for solar Park/Solar power projects*
1	M/s IL&FS Energy Limited	5,000	Solar Park
2	M/s SunEdison Solar Power India Ltd.	5,000	Mega Solar Power Projects
3	M/s Azure Power Limited	1,000	Solar Power Projects
4	M/s Essel Infraprojects Limited	5,000	Solar Power
5	M/s Adani Enterprises Limited (AEL)	10,000	Solar Power with manufacturing units. M/s AEL have also proposed to install solar power projects of 5000MW capacity in the parks on their own
6	M/s Reliance Power Limited (RPOWER)	6,000	Solar Power with manufacturing units. M/s RPOWER have also proposed to install solar power projects of 3000MW capacity in the parks on their own
	Total	32,000	

* The wind/solar projects listed above are not associated facilities for funded project since they are not solely dependent on each other. The solar and wind parks will supply power to other users such as industries, and the project substations will also evacuate power from different solar and wind parks.

25. For implementing the aforesaid Agreements/MoUs, Rajasthan Renewable Energy Corporation (RREC), a government of Rajasthan agency, has identified the large chunks of Govt land for installation of Solar Power Plants and development of solar parks which are based on the information received from concerned District Collectors (as per **Table 3.2** shown below). Out of total 32,000 MW capacity for which Joint Venture Agreements/ MoUs have been signed following locations have been identified after discussions with prospective solar park developers and solar power producers:

Table 3.2: Locations of Proposed Solar power generation * (Status in Rajasthan state as per RREC letter to GOI dated 19 March 2015)

No.	District	Location	Area in hectare (approx.)	Capacity of Solar Park (in MW)
1	Jodhpur	Bhadla, Ph-II	1600	700
		Bhadla Ph-III	2500	1000

No.	District	Location	Area in hectare (approx.)	Capacity of Solar Park (in MW)
2	Jaisalmer (Teh: Jaisalmer)	Isaniyon Ki Dhani, Kuchhdi, Sherwa, Joga, Parewar	12000	5000
3	Jaisalmer (Teh: Fatehgarh)	Devda, Bhimsar, Rasla, NayaAchla, Achla, NayaRosla, Neharajot	6500	3000
4	Jaisalmer (Teh: Pokhran)	Nokh	2700	1000
5	Bikaner (Teh: Pugal)	Jhudkiya, Surasar, Ramsarchhota, Siyasar Panchkosa	7000	3000

* The wind/solar projects listed above are not associated facilities for funded project since they are not solely dependent on each other. The solar and wind parks will supply power to other users such as industries, and the project substations will also evacuate power from different solar and wind parks.

26. RREC has planned generation schedule for RE power of 26000 MW solar and 5000MW wind power capacity upto 2021-22 as per **Table 3.3**. Besides aforesaid proposed solar capacity of 137000 MW, sufficient government land is available to accommodate the remaining solar capacity of 12300 MW and wind capacity of 5000 MW.

Table 3.3: RE Evacuation Capacity Perspective Plan Estimates for state of Rajasthan (Status in Rajasthan state as per RREC letter to GOI dated 12 January 2015) Anenxure 4A.1

No	Year	Total RE Capacity* to be set up	Capacity Targeted to be consumed within the state (MW)	Capacity Proposed to be evacuated outside the state (MW)
1	2014-15	1000	700	300
2	2015-16	2500	1000	1500
3	2016-17	4500	1000	3500
4	2017-18	4620	1000	3620
5	2018-19	2620	1000	3620
6	2019-20	4850	1000	3850
7	2020-21	4900	1400	3500
8	2021-22	5000	1500	3500
9	TOTAL	31990	8660	23390

* The wind/solar projects listed above are not associated facilities for funded project since they are not solely dependent on each other. The solar and wind parks will supply power to other users such as industries, and the project substations will also evacuate power from different solar and wind parks.

Future wind/solar power plants anticipated in Rajasthan

Table 3.4 gives the list of additional wind and solar power generation anticipated to be operational in various districts of Rajasthan: Several of them are interconnected using the transmission system proposed in Tranche 2 but none of them are associated facitlites to the project. The wind/solar projects listed below are not associated facilities for funded project since they are not solely dependent on each other. The solar and wind parks will supply power to other users such as industries, and the project substations will also evacuate power from different solar and wind parks.

Table 3:4 Future wind/solar power plants anticipated in Jodhpur/Bikaner/Barmer/Jalsalmer/Pratapgarh/Banswara area-(Status in Rajasthan state as per RREC letter to GOI dated 12 January 2015) Annexure 4A.1

No	Year	District	RE Source		Capacity targeted in state (MW)
			Solar	Wind	
1	2014-15	Jaisalmer/Barmer	200	400	600
		Jodhpur/Bikaner	300		300
		Pratapgarh/Banswara		100	100

No	Year	District	RE Source		Capacity targeted in state (MW)
			Solar	Wind	
		Total			1000
2	2015-16	Jaisalmer/Barmer	1000	400	1400
		Jodhpur/Bikaner	1000		1000
		Pratapgarh/Banswara		100	100
		Total	2000	500	2500
3	2016-17	Jaisalmer/Barmer	2000	400	2400
		Jodhpur/Bikaner	2000		2000
		Pratapgarh/Banswara		100	100
		Total	4000	500	4500
4	2017-18	Jaisalmer/Barmer	2000	500	2500
		Jodhpur/Bikaner	2000		2000
		Pratapgarh/Banswara		120	120
		Total	4000	620	3620
5	2018-19	Jaisalmer/Barmer	2000	500	2500
		Jodhpur/Bikaner	2000		2000
		Pratapgarh/Banswara		120	120
		Total	4000	620	4620
6	2019-20	Jaisalmer/Barmer	2000	600	2600
		Jodhpur/Bikaner	2000		2000
		Pratapgarh/Banswara		250	250
		Total	4000	850	4850
7	2020-21	Jaisalmer/Barmer	2000	600	2600
		Jodhpur/Bikaner	2000		2000
		Pratapgarh/Banswara		300	300
		Total	4000	900	4900
8	2021-22	Jaisalmer/Barmer	2000	700	2700
		Jodhpur/Bikaner	2000		2000
		Pratapgarh/Banswara		300	300
		Total	4000	1000	5000
		Total	26500	5490	31990

Source: New Transmission system for Evacuation of generation from new solar and wind powerplants in western and south eastern Rajasthan,

27. The list of solar and wind parks in the area is attached as **Annexure 4A.3**.

28. This will lead to improved reliability of supply and the operational flexibility of North grid Transmission network. Under the adopted standards, the forecast loading of each grid sub-station is compared with the firm capacity and the necessary transformer augmentations as well as construction of new sub-stations. It is a standard adopted by RVPN that, loading of each transformer should not exceed 100% of its capacity under single transformer outage conditions.

3.3 Location

29. **Table 3.5** provide lists of Figures attached the the section. For example, **Figure 3.1** provides the detailed power map of Rajasthan. **Figure 3.2** provides the location of ADB's funded tranche 2 transmission sub-projects.

Table 3.5: List of figures for Tranche 2

TRANCHE 2 SUB-PROJECTS		Figures
1	Power Map of Rajasthan	Figure 3.1
2	Location of Tranche 2 components in Rajasthan state	Figure 3.2
3	Map of Korna GSS and LILO lines	Figure 3.3
4	Map of Korna GSS with 2 circuits LILO lines	Figure 3.4
5	Photograph of Korna GSS	Figure 3.5
6	Route Map of 765 kV line from Korna GSS-Ajmer GSS (PG)	Figure 3.6
7	Photograph of Bay at 765 Ajmer GSS (Powergrid)	Figure 3.7
8	Route Map of 400 kV from Korna GSS to Pokharan GSS	Figure 3.8
9	Photograph of Pokharan GSS	Figure 3.9
10	Route Map of 400 kV from Korna GSS to Jaisalmer II	Figure 3.10
11	Photograph of bay at connecting bay at Jaisalmer II GSS	Figure 3.11
12	Route Map of 220 kV Baithwasia to Khinvsar GSS	Figure 3.12
13	Photograph proposed 220 kV bay at Undoo GSS	Figure 3.13
14	Photograph of proposed 220 kV Sheo GSS	Figure 3.14
15	Photograph of 132 kV Kitasar GSS	Figure 3.15
16	Proposed 220 kV Chhattargarh GSS and land for GSS	Figure 3.16
17	Bay for 132 kV D/C Chattargarh Loonkaransar at Loonkaransar	Figure 3.17
18	Land for bay for 132 kV bay for 220 kV Chhattargarh Gajner at Gajner GSS	Figure 3.18
19	Route Map of 132 kV Chhatargarh to Loonkarasar	Figure 3.19
20	Route Map of 220 kV Chattargarh to Gajner line	Figure 3.20
21	A-132 kV bay Nathrau GSS, B. 132 kV Dechu – Nathrau line	Figure 3.21 A/B
22	A. 132 kV Sangarh GSS. B. 132 kV LILO line to Sangarh GSS	Figure 3.22 A/B
23	A. Bana Ka Bans GSS. B. LILO tower at Jaatipur	Figure 3.23 A/B

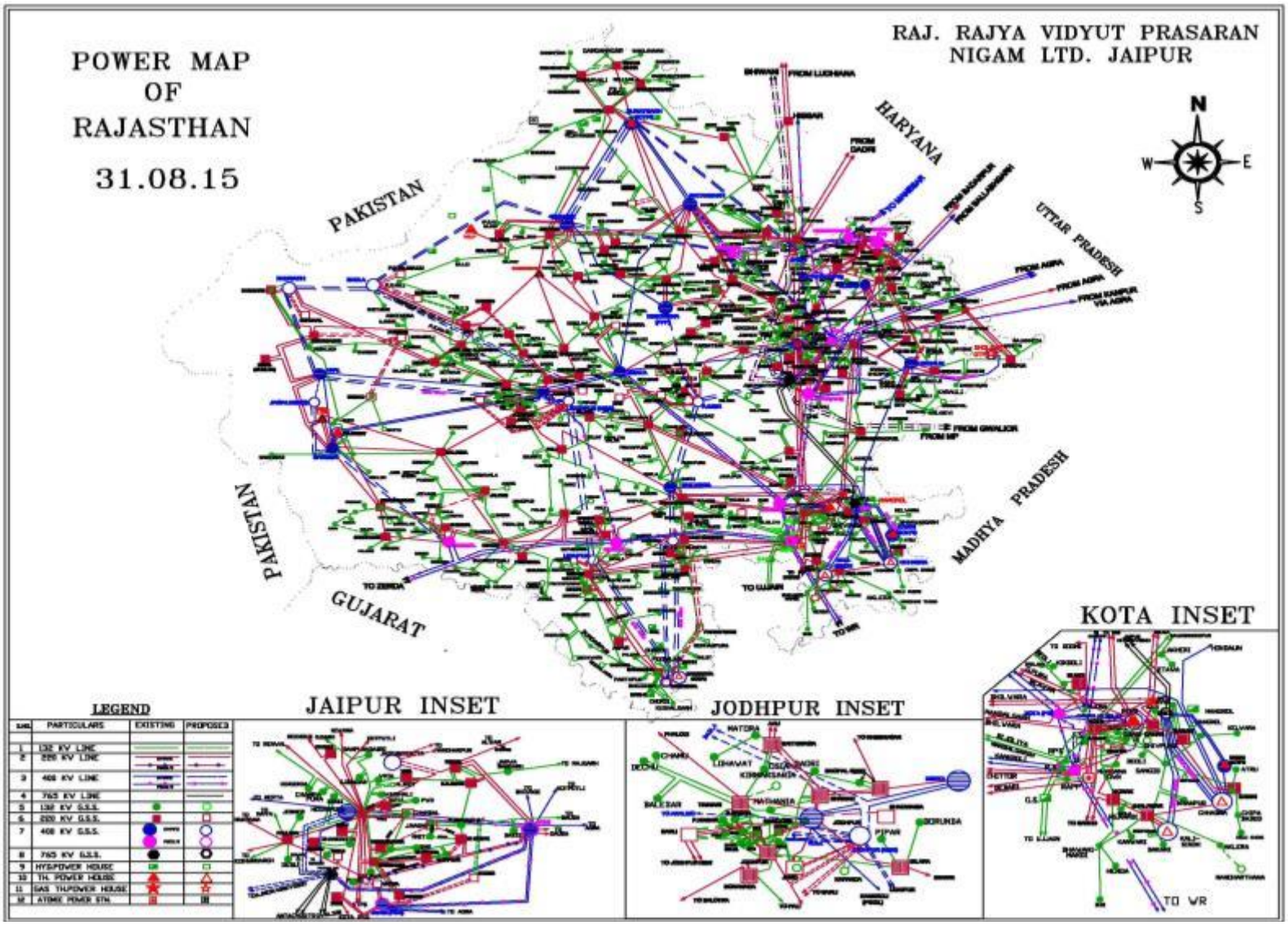


Figure 3.1: Power Map of Rajasthan

Figure 3.2: Location of Tranche 2 components in Rajasthan state
(List of Villages attached in Section 6) (Original documents available with RVPN with relevant details)

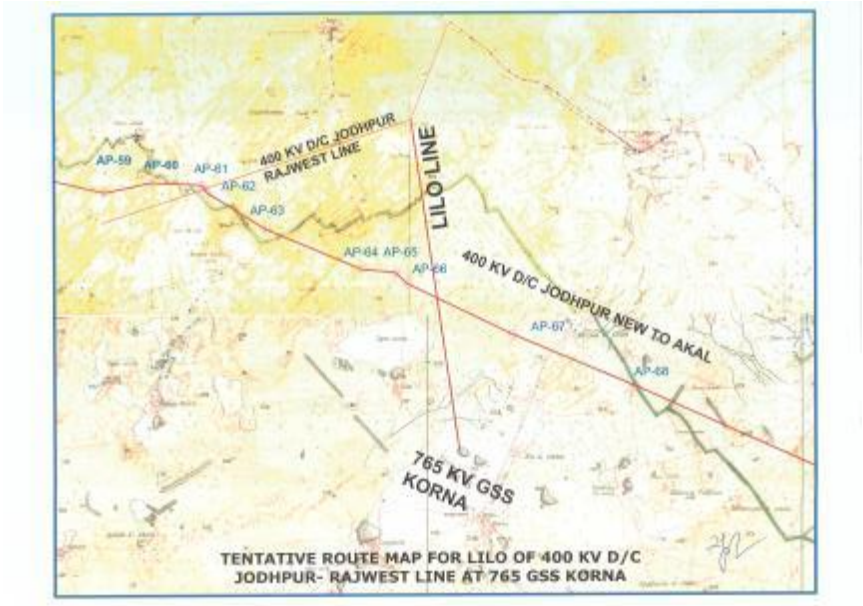


Figure 3.3: Map of Korna GSS along with LILO lines
(List of Villages attached in Section 6) (Original documents available with RVPN with relevant details)

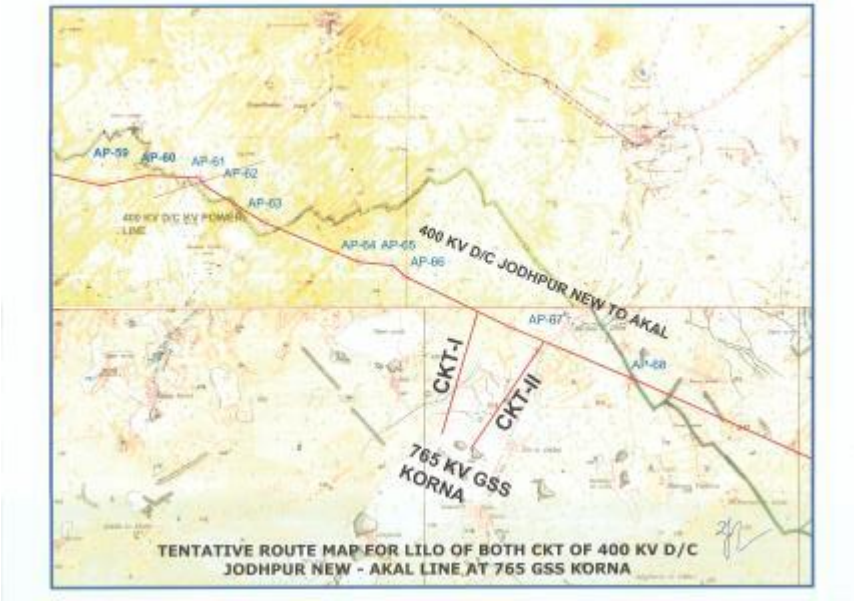


Figure 3.4: Map of Korna GSS along with LILO lines

Figure 3.5: Photograph of Korna GSS

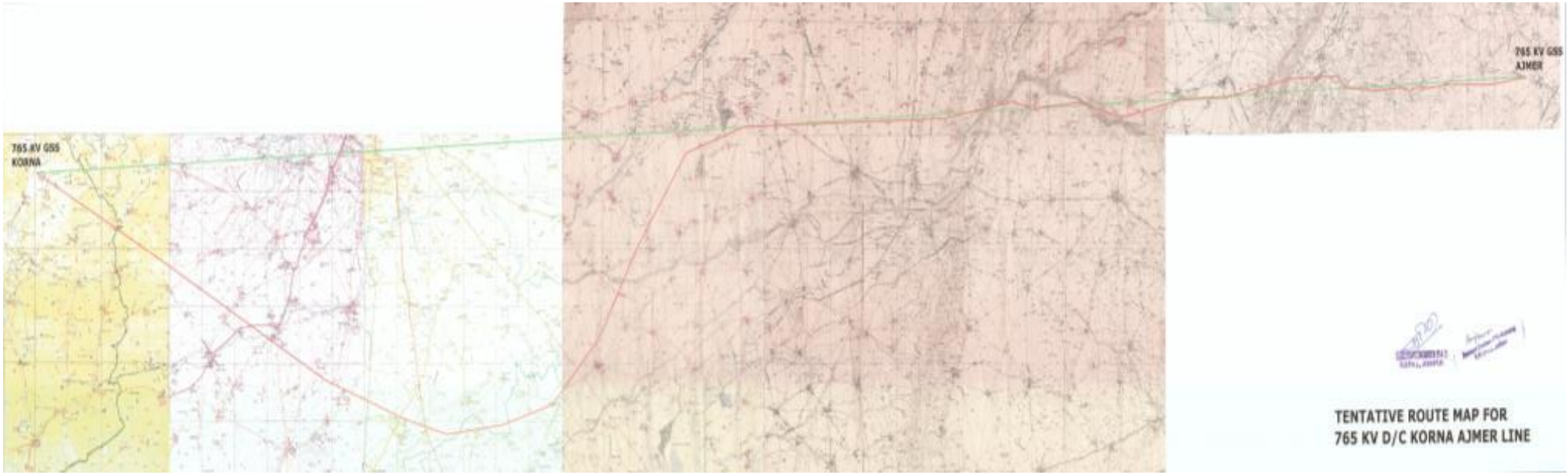


Figure 3.6: Route Map of 765 kV line from Korna GSS-Ajmer GSS (List of Villages attached in Section 6)

Figure 3.7: Photograph of connecting bay at 765 Ajmer GSS (Powergrid)

Figure 3.8: Route Map of 400 kV line from Korna GSS to Pokharan GSS (List of Villages attached in Section 6) (Original documents available with RVPN with relevant details)

Figure 3.9: Photograph of Pokharan GSS

Figure 3.10: Route Map of 400 kV line from Korna GSS to Jailsalmer II (List of Villages attached in Section 6) (Original documents available with RVPN with relevant details)

Figure 3.11: Photograph of connecting bay at Jaisalmer II GSS

Figure 3.12: Route Map of 220 kV Baithwasia to Khinvsar GSS (List of Villages attached in Section 6) (Original documents available with RVPN with relevant details)

Figure 3.13: Proposed 220 kV Bay at Undoo

Figure 3.14: Proposed 220 kV Sheo 220 GSS

Figure 3.15: Photograph of 132 kV Kitasar GSS

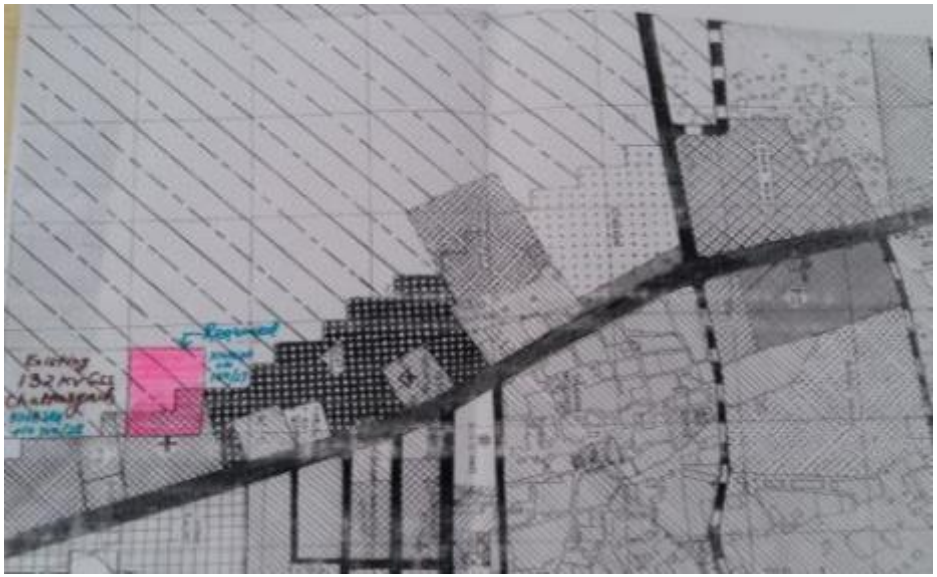


Figure 3.16: Proposed 220 kV GSS Chhattargarh (highlighted in Pink) and barren land shown picture adjoining 132 kV GSS (Original documents available with RVPN with relevant details)

Figure 3.17: Land for Bay for 132 kV D/C Chhatargarh-Loonkaransar terminating lines at Loonkaransar

Figure 3.18 Land for bay for 220 kV Chhattargarh – Gajner at Gajner

Figure 3.19 Route Map for 132 kV D/C Chhatargarh – Loonkaransar line (Details of villages provided in Section 6) (Original documents available with RVPN with relevant details)

Figure 3.20 220 kV Chhattargarh Gajner Line (Details of villages provided in Section 6) (Original documents available with RVPN with relevant details)

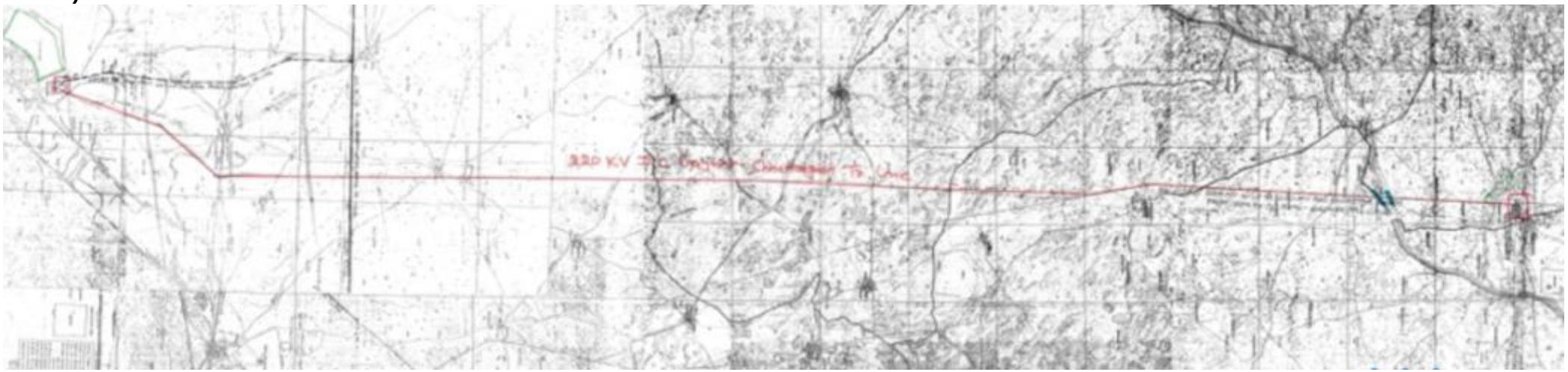


Figure 3.21A: 132 kV Nathrau GSS land

Figure 3.21B: 132 kV Dechu Nathrau line road crossing

Figure 3.22A: 132 kV Sangarh GSS

Figure 3.22B: 132 kV LILO line to Sangarh GSS

Figure 3.23A: 132 kV Bana ka Bans GSS

Figure 3.23 B: LILO tower at Jaatipura

3.4 Size and Magnitude of Operation

Project components

30. **Table 3.6** shows Tranche 2 Components and their associated key features under Rajasthan Renewable Energy Transmission Investment Program (RRETIP) funded by ADB.

Table 3.6: Tranche 2: Components and their key features

	Sub-Project components*	Key features of sub-project component
A	Transmission Lines:	
1	765 kV double circuit transmission line from Korna to Ajmer (210 km)	210 km Line has no land issue - no forestland conversion/private land acquisition required.
2	LILO of 400 kV Raj West – Jodhpur at Korna (10 km)	10 km Line has no land issue - no forestland conversion/private land acquisition required.
3	LILO of 400 kV Akal – Jodhpur at Korna (4 km)	4 km Line has no land issue - no forestland conversion/private land acquisition required.
4	400 kV double circuit transmission line from Korna – Pokaran (115 km)	115 km Line has no land issue - no forestland conversion/private land acquisition required.
5	400 kV double circuit transmission line from Korna – Jaisalmer II (135 km)	135 km Line has no land issue - no forestland conversion/private land acquisition required.
6	220 kV double circuit transmission line from Sheo – Undoo (50 km)	50 km Line has no land issue - no forestland conversion/private land acquisition required.
7	LILO of 220 kV Akal – Barmer at Sheo (25 km)	25 km Line has no land issue - no forestland conversion/private land acquisition required.
8	132 kV double circuit transmission line from Sheo – Undoo (5 km)	210 km Line has no land issue - no forestland conversion/private land acquisition required.
9	132 kV double circuit transmission line from Sheo – Jaisalmer (5 km)	5 km Line has no land issue - no forestland conversion/private land acquisition required.
10	220 kV double circuit transmission line from Baithwasia – Khinvsar (65 km)	65 km Line has no land issue - no forestland conversion/private land acquisition required.
11	LILO 2 km D/C Jaislamer-Sheo Line (at Sangarh 132 kV GSS, Jaisalmer)	2 km Line has no land issue - no forestland conversion/private land acquisition required.
12	LILO 20 km D/C line 132 kV Tinwari-Osian Line (at Bana Ka Bas 132 kV GSS, Jodhpur	20 km Line has no land issue - no forestland conversion/private land acquisition required.
13	LILO 3 km D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner)	3 km Line has no land issue - no forestland conversion/private land acquisition required.
14	20 km 132 kV D/C line from 220 kV GSS Dechu 132 kV Nathrau, Jodhpur	20 km Line has no land issue - no forestland conversion/private land acquisition required.
15	100 km 220 kV Chhattargarh-Gajner line	100 km line has no land issue. It will cross Indira Gandhi Nahar Pariyojana (IGNP) and would require forest approval of manmade strip plantation of about 5-10 ha. Gajner WL Sanctuary is 4 km away from the line and existing GSS at Gajner Town.
16	77 km 132 kV Chhattargarh GSS to Loonkaransar GSS line	77 km line ha no land issue. It wll cross IGNP canal twice and would require forest approval for acquisition of mandmade strip plantation of about 5-10 ha
B	Substations:	
1	765/400/220kV new substation with 3x1500 MVA transformers at Korna	This is a government land. Approximately 64 hectares of land will be required and RVPN will take it from the government revenue department through transfer.

2	400/220kV substation with 2x500 MVA transformers at Pokaran (upgrade)	This is a government land. Approximately 27.2 hectares of land will be required and RVPN will take it from the government revenue department through transfer.
3	220/132kV new substation with 2x160 MVA transformers at Sheo	This is a government land. Approximately 6.4 hectares of land will be required and RVPN will take it from the government revenue department through transfer.
4	220/132 kV new substation at Chattargarh, Bikaner	This is a government land. This is an RVPN substation under construction in Govt land- approximately 6.4 hectares.
5	132/33 kV new substation at Sangarh, Jaisalmer district	This is a government land. Approximately 3.5 hectares of land will be required. Site identified/finalise. Government land for transfer under process.
6	132/33 kV new substations at Bana ka Bans, Jodhpur district	This is a government land. Approximately 3.6 hectares of land will be required and RVPN has initiated the process for land transfer.
7	132/33 kV new substations at Kitasar, Bikaner district	Approximately 3.5 hectares of land will be required. Government land.
8	132/33 kV new substations at Nathrau, Jodhpur district	This is a government land. Substation under construction on approx. 3.5 ha. land
9	Augmentation of 2x500 MVA transformers at Akal	No additional land is required. Augmentation will be done within the existing substation (approx. 28.8 ha of land) and the land belongs to RVPN.
10	Augmentation of 2x500 MVA transformers at Jaisalmer II	No additional land is required. Augmentation will be done within the existing substation (approx. 29 ha of land) and the land belongs to RVPN.
11	Extensions of the existing Jaisalmer, Ajmer, Undoo, Baithwasia and Khinvsar substations	No additional land is required. Augmentation will be done within the existing substation and the land belongs to RVPN. Approx 6.4 ha of land for each GSS will be required.
C	Optical Fibre Network:	
12	Stringing of Optical Ground Wires (OPGW) to connect 132 kV and 220 kV substations in Rajasthan	Existing lines for reconductoring proposed 220/132 kV lines. Line has no land issue.

*For some of the transmission line and substation sub-projects, the substation specific topography survey and the transmission line route survey works will be conducted during detailed design. The data regarding soil, topography, contour, land cutting and filling required, distance from water body and distance from major roads, details of forest/non-forest, fruit/non-fruit trees can be affected, land details will be collected by EPC contractor. If any sub-project sites are changed other than those indicated here, supplementary information will be provided the concerned subproject by RVPN to ADB for prior approval.

31. Site elevations are mentioned in **Table 6.2** where average altitude and coordinates are mentioned. RVPN and the EPC contractor shall prepare standards designs for each line and substation proposed in the scheme which would include - height of towers depend on design of lines, the footprints of GSS, construction methods, timing or works, staff required and material required. These are mostly technical information provided by EPC contractor in the bid document.

32. RVPN has standard documents that are used for construction practises. Following manuals are available on print and web media:

- RVPN Construction manual for substations,
- RVPN Earthing of Towers,
- RVPN stub setting practise,
- RVPN stringing practise.

4.0 DESCRIPTION OF ENVIRONMENT (Baseline Data)

33. The 400/220/132/33 kV grid substation and 400/220/132 kV transmission lines are funded under Tranche 2. The Tranche 2 subprojects are situated in Jodhpur and Osian tehsil of Jodhpur district and Jaisalmer and Pokhran tehsil of Jaisalmer district, Bikaner tehsil in Bikaner district and Ajmer tehsil of Ajmer district of Western Rajasthan. This chapter focuses on the present environmental conditions of the project areas in Jodhpur and Jaisalmer districts.

4.1 Jodhpur District

No.	List of Subprojects in the Area
1	765/400/220kV new substation with 3x1500 MVA transformers at Korna with associated lines
2	132/33 kV new substation at Bana ka Bans, Jodhpur district with associated transmission lines
3	132/33 kV new substation at Nathrau, Jodhpur district with associated transmission lines
4	Extensions of existing Baithwasia and Khinvsar substations

34. Jodhpur district is among the largest districts in the state of Rajasthan. It is centrally situated in the western region of the state, and covers a total geographical area of 22,850 Sq. Kms. Jodhpur district lies between 26°0' & 27°37' north latitude and 72°55' and 73°52' east longitude. It is bounded by Nagaur in the east, Jaisalmer in the west, Bikaner in the north and Barmer and Pali in the South. The total length of the district from north to south is about 197 Kms and from east to west it is about 208 Kms. The district of Jodhpur lies at a height of 250-300 metres above sea level.

Physiography

35. Jodhpur district forms part of Great Thar Desert of Rajasthan. In this arid region, there are sand dunes, alluvial areas dotted with few hillocks and hill chains scattered in the area. In the eastern part of the district, the area between Bilara and Jodhpur is covered by alluvium deposited due to fluvial action of Luni river system. The eastern part of the district exhibits gentle undulating topography interrupted by small ridges of hard rocks. The general elevation of plains varies from 300 m amsl in north to 150 m amsl in south. Regional slope is from north-east towards south-west direction. Orientation of alluvial plain area follows the Luni River and its tributaries. Sand dunes occupy a major part of the district north of Vindhyan escarpment in northern and northwestern part of the district. The sand dunes are transverse and longitudinal types formed due to aeolian action and overlie the denuded consolidated formations. Ridges and hillocks are common features in Bilara and Osian tehsils. A chain of escarpments and ridges composed of comparatively resistive rocks like granite, rhyolite and Jodhpur sandstone are found extending from Shergarh in the west to Bilara in the east. The alluvial and sand filled valleys are separated by the ridges whose crest elevation ranges from 325 to 460 m amsl. In the northern part of the district, highest peak of the hill is 284 m amsl. Presence of boulder beds exhibits striking plain topography around Bap and low lying outcrops of limestone, shale and sandstone layers are observed in northern part of the district near Phalodi. Distribution of various geomorphic units in the district is shown in **Table 4.1.**

Table 4.1: Distribution of various geomorphic units in Jodhpur districts

Origin	Landform Unit	Occurrence
Aeolian	Sand dunes	North and northwestern part of the district.
	Sandy Plains	North and northwestern part of the district.
Fluvial	Alluvial Plains	Eastern part of the district along rivers- Luni, Mithri etc.
	Interdunal Plains	Scattered in entire district, mainly in north and western

Origin	Landform Unit	Occurrence
		part of the district.
Denudational	Pediments	Scattered in district, mainly in east and west.
Hills	Linear Ridges	Occur in Bilara and Osian Blocks. Extend from Shergarh in the west to Bilara in the east.
	Structural Hills	In northwestern and eastern parts of the district and Jodhpur town.

Source: http://www.cgwb.gov.in/District_Profile/Rajasthan/Jodhpur.pdf, Government of India Ministry of WaterResources Central Ground Water Board, Ground Water Scenario Jodhpur District, Rajasthan, 2013

Climate

36. The district experiences arid to semi-arid type of climate. Mean annual rainfall (1971-2012) of the district is 374 mm whereas normal rainfall (1901-1970) is lower than average rainfall and is placed at 314 mm. Rainy days are limited to maximum 15 in a year. Almost 80% of the total annual rainfall is received during the southwest monsoon, which enters the district in the first week of July and withdraws in the mid of September. Drought analysis based on agriculture criteria indicates that the district is prone to mild and normal type of droughts. Occurrence of severe and very severe type of drought is very rare. As the district lies in the desert area, extremes of heat in summer and cold in winter are the characteristic of the desert. Both day and night temperatures increase gradually and reach their maximum in May and June respectively. The temperature varies from 49° C in summer to 1°C in winter. Atmosphere is generally dry except during the monsoon period. Humidity is the highest in August with mean daily relative humidity at 81%. The annual maximum potential evapotranspiration in the district is quite high and is highest (264.7 mm) in the month of May and lowest (76.5 mm) in the month of December.

Water Resources

37. Jodhpur district falls in the Luni and Barmer Basins. Major River of the district is Luni, which flows in ENE – WSW direction. It enters Jodhpur district near village Jhak in Bilara tehsil and leaves the district near village Dhundhara. Total length of the Luni River in Jodhpur district is 125 km. Channel pattern of Luni is dendritic to sub-parallel. However, in major part of the district, the drainage is essentially ephemeral and internal. Important tributaries to the Luni river are Mithri and Bandi. Other streams in the district are Jojri, Golasmi, Guniamata and Bastua, which are all ephemeral.

38. Ground water is the only source of irrigation in the district. Gross area of irrigated land by wells and tubewells works out to 407,169 hectares. Maximum irrigated area is in Osian tehsil followed by Bhopalgarh and Bilara tehsils respectively. Minimum area under irrigation is in Luni tehsil due to poor ground water potential. Source wise details of area irrigated in the district are given in **Table 4.2**.

Table 4.2: Source wise area irrigated in Jodhpur district (2010-11)

Source	Net Irrigated Area (ha)	Gross Irrigated Area (ha)
Tubewells	260535	401315
Other wells	4884	5592
Other sources	262	262
Total	265681	407169

Source: http://www.cgwb.gov.in/District_Profile/Rajasthan/Jodhpur.pdf, Government of India Ministry of Water Resources

Mineral Resources

39. District is mainly rich in non-metallic minerals like Sandstone, Rhyolite, Dolomite, Limestone, Jasper, Granite & Clay. Murram, Kankar, Brick earth, Bajri and other minor minerals.

Soil

40. Major soils of the district are Red desertic soils, Desert soils, Sand dunes and Lithosols and regosols of hills.

Ecological Resources

41. The recorded forest area of the district is 98 sq.km. which is 0.43% of the district's geographical area.

Human and Economic Development

42. In 2011, Jodhpur had population of 3,687,165 of which male and female were 1,923,928 and 1,763,237 respectively. 34.30% population lives in urban regions of district.

Crops

43. Agricultural activities in the district mainly dependent on rains. Kharif is the main crop of the district. Rabi crop is mainly cultivated in Bilara, Bhopalgarh and Osian Tehsils only. Bajra, Moong, Moth, Sesamum (Til), Jowar and Cotton to some extent are the main crops of Kharif whereas wheat, Barley, Gram, Mustard, Raida, Taramira etc are the main crops of Rabi in the district. Only 15 per cent of the cultivable land are sowed due to scarcity of irrigational facilities.

Existing Industrial Status

Table 4.3: Industrial Units

S.No.	Head	Unit	Particulars
1.	Registered Industrial Unit	Nos.	21,263
2.	Total Industrial Unit	Nos.	23,319
3.	Registered Medium and Large Unit	Nos.	15
4.	Estimated Avg. No. of Daily Worker Employed in Small Scale Industries	No.	107,151
5.	Employment in Large and Medium Industries	No.	113,260
6.	No. of Industrial Area		22
7.	Turnover of Small Scale Industries		NA
8.	Turnover of Medium and Large Scale Industries		NA

Source: http://dcmsme.gov.in/dips/DIPR_Jodhpur.pdf, Brief Industrial Profile of Jodhpur District, Government of India, Ministry of Micro, Small and medium Enterprises (MSME), 2013

4.2 Jaisalmer District

No.	List of Subprojects in the Area
1	400/220kV substation with 2x500 MVA transformers at Pokaran (upgrade)
2	132/33 kV new substations at Sangarh, Jaisalmer district with associated transmission lines
3	Augmentation of 2x500 MVA transformers at Akal

No.	List of Subprojects in the Area
4	Augmentation of 2x500 MVA transformers at Jaisalmer II
5	Extensions of the existing Jaisalmer substations

44. District Jaisalmer is located within a rectangle lying between 26°.4' – 28°.23' north parallel and 69°.20'-72°.42' east meridians. Covering an area of 38,401 sq km, it is the largest district of Rajasthan and one of the largest in the country. The breadth (East-West) of the district is 270 km and the length (North-South) is 186 km. The length of international border attached to District is 471 kms. The district is bounded on the north by Bikaner, on the west & south-west by Indian border, on the south by Barmer and Jodhpur, and on the east by Jodhpur and Bikaner Districts.

Physiography

45. Jaisalmer 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 with its famous sand dunes and slopes towards the Indus valley and the Runn of Kutch. There is no perennial river in the district. The underground water level is very low. Geographically this district is spread over in 38,401 sq. kms which is one of the largest district and almost equal to the state of Kerala.

Climate

46. District 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 °C and extremely cold during winter with minimum temperature in the range of 1°C. The variation in temperature from morning to noon and the late midnight is a sudden phenomenon. The average rainfall is only 16.4 cms.

Water Resources

47. Jaisalmer district is a part of the 'Great Thar Desert'. The terrain around Jaisalmer town, within a radius of about 60 km is stony and rocky. The area is barren, undulating with its famous sand dunes. There are no rivers worth the name in the area nor are there any perennial streams in the area. Small nallas are purely seasonal and ephemeral with the result that there is lack of effective discharge in the event of heavy precipitation.

48. Ground water and Indira Gandhi Nahar Project (IGNP) canal are the only source of irrigation in the district. Maximum irrigated area is in Jaisalmer block. Minimum area under irrigation is in Sankara block due to poor ground water potential. Indira Gandhi Canal enters Jaisalmer district near village Nachana and flows towards western direction. It has a command area falling to the north of the canal. At Mohangarh, the main canal ends and further westward extension of canal is known as Sagarmal Gopa Branch which takes southward bend near Ramgarh and is called Gadra Road Sub Branch. Major irrigation in the area is through Nachana Branch System, Sagarmal Gopa Branch System, Shaheed Birbal Shakha System and part of Charanawala Branch System.

Mineral Resources

49. The important minerals found in Jaisalmer district are fuller's earth, clay, gypsum, limestone, yellow and redocher and phosporite.

Soil

50. Major Soils of the district are Desert soil, Sand dunes, Red desertic soil and Saline soil of depressions.

Ecological Resources

51. The recorded forest area of the district is 217 sq.km. which is 0.57% of the district's geographical area.

Human and Economic Development

52. In 2011, Jaisalmer had population of 669,919 of which male and female were 361,708 and 3,08,211 respectively, out which 580,894 is rural and 89,025 is urban population.

Existing Industrial Status:

Table 4.4: Industrial Units

SNo.	Head	Unit	Particulars
1.	Registered Industrial Unit	Nos.	225
2.	Total Industrial Unit	Nos.	4242
3.	Numbers of Medium and Large Unit	Nos.	Nil
4.	Employment Generated In MSMEs	Nos.	11622
5.	Employment in Large and Medium Industries	Nos.	Nil
6.	No. of Industrial Area	Nos.	4
7.	Turnover of MSMEs	In Lacs	N.A.
8.	Turnover of Medium and Large Scale Industries	In Lacs	Nil

Source: http://dcmsme.gov.in/dips/DIPR_Jaisalmer.pdf, Brief Industrial Profile of Jodhpur District, Government of India, Ministry of Micro, Small and medium Enterprises (MSME), 2013

4.3 Bikaner District

No.	List of Subprojects in the Area
	220/132 kV new substation at Chattargarh, Bikaner and associated lines
	132/33 kV new substation at Kitasar, Bikaner district

53. Bikaner district is located between 27°11' to 29°03' North latitude and 71°54' to 74°12' East longitude in the north western part of Rajasthan covering a geographical area of about 27,244 sq.km. It is bounded by Ganganagar district on the north partly by Jaisalmer and Pakistan on the west, Churu and Hanumangarh district on the east, north-east, Nagaur and Jodhpur districts on the south and south- east respectively.

Physiography

54. Administratively, Bikaner district is a part of Bikaner division. The district is further divided into four tehsils- (1) Bikaner, (2) Lunkaransar, (3) Kolayat and (4) Nokha. The above four tehsils are also the panchayat samities of the district. The major part of the district comprises desolate and dreary regions which forms a part of the Great Indian desert of Thar. There are two natural division of district namely:- (i) Northern and Western desert and (ii) Southern and eastern semi desert. At many places one finds shifting sand dunes of varying heights ranging from 6 to 30 metre.

Climate

55. The district has a dry climate with large variation of temperatures and scanty rainfall. Hot wind blows in summer, sweeping away and creating new sand dunes. Winters are severe and sometimes touches freezing point. The average maximum temperature is 48°C and minimum up to 20°C and the mean temperature is 25°C. The normal annual rainfall in the district is 263.7 mm.

Water Resources

56. There are no hills, rivers or any stream of significance. Small ephemeral streams flow in the vicinity of Kolayat, Gajner and Gura. Natural inland depression which retains some water during the summer are located near Lunkaransar, Kolayat, Jamsar and Nal. Construction of wells in the western part has led to activation of the stable dune field to a large extent. The migrating sand is however threatening the canals and roads.

Mineral Resources

57. Almost entire district is devoid of rock outcrops except near Kolayat and at a few places in the south of Nokha and Dhulmera. The district is thus a vast sandy tract. All four tehsils except Kolayat, are covered with sand. Rocks locally known as 'Magra', are found in the parts of Kolayat tehsil. In the 'Magra' area various types of sand stone, clay and limestone are found at various depths. Fuller earth (Multani mitti), lignite, gypsum, white clay, yellow ochre and grit are important economic minerals. Gypsum bed upto 30 metre thick and of the best quality available in India is found in Jamser village in Bikaner tehsil.

Soil

58. Duny areas are light pale brown to brown, very deep, fine sand to loamy fine sand and devoid of any pedogenic manifestation except weak segregation of alkaline earth carbonates. In associated plains and interdunal areas occur light yellowish brown to brown, loamy fine sand, very weakly blocky, non-calcareous sub soil followed by a weak to moderately developed calcic/cambic horizon and are classified accordingly as calcids/cambids.

Ecological Resources

59. The recorded forest area of the district is 208 sq.km. which is 0.76 % of the district's geographical area. The vegetation of Bikaner district falls under the broad natural division of the tropical forest but due to extremely low rainfall and extremes of temperature, there is high evaporation and loss of moisture converting the district into a typical arid tract. However, where the moisture accumulates to some extent during rains, a few scattered stunted trees are found.

Human and Economic Development

60. In 2011, Bikaner had population of 2,363,937 of which male and female were 1,240,801 and 1,123,136 respectively, out which 1,563,553 is rural and 800,384 is urban population.

Existing Industrial Status:

61. The Bikaner district has the following industries located:

- Registered Industrial unit: 12,396 nos.
- Registered Large/medium scale units: 6 nos.
- Estimated Avg. No. of Daily Worker Employed in MSME's: 50,292 Nos.

- Employment in Large and Medium Industries: 14 Nos
- Turnover of Small Scale Ind.: 18,167 Lakhs
- Turnover of Medium and Large Scale Industries: 12,379 Lakhs

4.4 Ajmer

No.	List of Subprojects in the Area
	765 kV double circuit transmission line from Korna to Ajmer (210 km)

62. The district is located in the centre of the state between 25°38' and 26°58' North latitude and 73°54' and 75°22' East longitude, covering a geographical area of about 8481 sq. km. It is bounded on the north by Nagaur district, on the south by Bhilwara district, on the east by Jaipur and Tonk districts and on the west by Pali district.

Physiography

63. The district is triangular in shape. It is generally a plain interspersed with low hills, which runs in the north-westerly direction in the upper part of Ajmer sub division. Beawar sub-division is an irregular terrain lying in the south west of the district and comprises of two detached blocks. This track is generally hilly. The Kekri sub division forms the south-eastern portion of the district, and is a level plain. The Kishangarh sub-division which is eastern portion of the district is sandy except for a few isolated patches. Aravalli range which divides the plains of Marwar from the high table-land of Mewar passes through the district and the highest elevation is about 870 metres above mean sea level.

Climate

64. The district has a hot dry summer and cold bracing winter. The winter extends from December to February, while the summer season extends from March to June followed by rainy season till mid of September. The temperature during the summer scales up to 45°C and goes down up to 2°C during winter. The normal annual rainfall is 527.3 mm.

Water Resources

65. There are five rivers which flow through the district viz. Banas, Khari, Sagarmati, Saraswati and Rupnagar. There are natural lakes viz. Pushkar and Budha Pushkar near Ajmer city. Among the important tanks in the district are Foy Sagar, Phool Sagar, Bisala, Ramsar, Dilwar, Jawaja etc.

Mineral Resources

66. Important minerals found in the district are mica, asbestos, vemiculite, soap stone, masonary stone and brickclay etc.

Soil

67. Soils of Ajmer district are reddish to yellowish red and yellowish brown color. These soils are sandy loam to sandy clay loam in texture and well drained. Fertility status of these soil is, low in Nitrogen, moderate in Phosphorus and Potassium. Cultivation of crops in the soil is very much restricted due to shallow nature of these soils and presence of stones on the surface.

Ecological Resources

68. The recorded forest area of the district is 282 sq.km. which is 3.33% of the district's

geographical area.

Human and Economic Development

69. In 2011, Ajmer had population of 2,583,052 of which male and female were 1,324,085 and 1,258,967 respectively out of which 1,547,642 is rural and 1,035,410 is urban population.

Existing Industrial Status

70. In Ajmer district 8 medium scale Industries and 17,663 small scale & cottage Industries were registered up to March, 2011. The total investment involved was Rs. 92,797.54 lakhs giving employment opportunities to about 87,420 persons. The main Industries of the district are based on textile, food products, leather and leather products, wood products, felspars and quartz grinding, marble, asbestos and cement.

4.5 Nagaur

No.	List of Subprojects in the Area
	765 kV double circuit transmission line from Korna to Ajmer (210 km)

71. Nagaur district is located between latitude 26°25' and 27°40' North and longitude 73°10' and 75°15' East. Due to its central situation in Rajasthan, it shares its borders in North with Bikaner & Churu, in South with Ajmer & Pali, in East with Sikar & Jaipur & in West with Jodhpur district.

Physiography

72. The district has a geographical area of 17,718 sq.km, representing 5.18% of the total area of Rajasthan and ranks sixth among the districts of the State. The Aravali range of hills passes in eastern and south eastern part of the district. The average elevation of the hills in district is barely 310 meters.

Climate

73. Nagaur has a dry climate with a hot summer. Sand storms are common in summer. The district's climate is marked by extreme dryness, large variations of temperature & highly irregular rainfall patterns. The mean daily maximum temperature in May is 40.4°C and the mean daily minimum temperature is 25.7°C. Night temperatures in June are much higher than in May with mean daily minimum temperature of 27.9°C. During the summer month the maximum temperature sometimes exceeds 48°C. The humidity is highest in August with mean daily relative humidity being 80%. The annual maximum potential evapotranspiration in the district is quite high and it is highest (255.1 mm) in the month of May and lowest (76.5 mm) in the month of December.

Water Resources

74. There is no river which originated from the district however; the river Luni which rises near Pushkar in Ajmer district draining western slopes of the Aravalli crosses the district in the southern part flowing for about 37 km in the western direction. It is an ephemeral river and carries runoff that is generated in the upper reaches. Channel deposits of Luni facilitate percolation during rainstorm, thereby feeding the neighbouring wells along its bank. Other nalas and streams are also ephemeral in nature which originate and die out in the district itself. There is salt lake (Sambhar Lake) at south west of Didwana having an area of 777 hectare The Nawa tehsil also shares a part of well known Sambhar Lake in Jaipur district.

There are eight (8) numbers of ponds in the district. Out of these 5 are in Degana and 3 in Parbatsar blocks.

Mineral Resources

75. Nagaur district is abound with variety of mineral resources, gypsum, Limestone and Marble are the most important mineral found in the district. Nagaur district is also an important salt producing area.

Soil

76. A big part of the district is covered by blown sand and sand dunes which form part of the great Thar district. Active dunes and sand shifting are main hazards to cultivation. Sand dunes are common in the north and western parts, where they arise over 30 meters and are aligned in a north west and south cast direction. Constant deterioration of soil and mining activity has resulted in soil erosion.

Ecological Resources

77. The recorded forest area of the district is 121 sq.km. which is 0.68% of the district's geographical area.

Human and Economic Development

78. In 2011, Nagaur had population of 3,307,743 of which male and female were 1,696,325 and 1,611,418 respectively out which 2,670,539 is rural and 637,204 is urban population.

Existing Industrial Status:

79. The Nagaur district has the following industries located:

- Registered Large and Medium Industries: 3 Nos
- Registered SSI Units: 8162 Nos
- Investment in Small Scale Ind.: 14,390.54 (Rs. In Lacs).
- Employment in MSMEs: 40,901 Nos
- Employment in Large and Medium Industries: 581 Nos.

4.6 Barmer District

No.	List of Subprojects in the Area
	LILO of 220 kV D/C transmission line Akal Barmer line at Sheo
	220 kV Sheo (new) 220 kV GSS

Location:

80. The district is situated in south-west of Rajasthan between 24 58' and 26 32' North latitude and 70° 05'' and 72° 52' East longitude. It has geographical area of about 28387 sq. km. It is bounded on the north by Jaisalrner and Jodhpur distric on the south cast by Jalor district on the west by Tharparkar district of Pakistan on the east by Jodhpur.

Administrative Setup:

81. Administratively Barmer is a part of Jodhpur division and it is further divided into 7 tehsils namely: (I) Barmer, (2) Sheo, (3) Baytoo. (4) Gudha-Malani, (5) Pachpadra, (6)

Siwana and (7) Chohtan. The district is divided into 8 panchayat samiities namely: (I) Sheo. (2) Baytoo. (3) Barmer. (4) Balotra. (5) Chohtan, (6) Siwana. (7) Sindhari, (8) Dhorimanna.

Climate:

82. The characteristic features of the climate of the district are its dryness extremes of temperature and erratic rainfall. The year may be divided into four seasons, winter from November to March and summer from April to June monsoon from June to mid September and post monsoon from mid September to November. The normal annual rainfall is 277.5 mm. The minimum and maximum temperature of the district is below O°C and 49°C respectively. Even during monsoon the air is dry in between the fitful spell of rain.

Geology & Minerals:

83. The oldest rock found in the district is schist belonging to the Aravalli system. The sub arial character of lava is provided by the inclusion between the flows of bands of rolled pebbles of the lava itself and other crystalline rocks derived from the Aravalli range. The rhyolite of this area is pierced by dyke and bosses of granite (known as siwana granite) containing hornblende but no mica distinct from the Jalore granite. These granite form a considerable hill mass in the east of the district. The Saora range south of Siwana rising over 1.125 metre above sea level. The Rhyolite are also traversed by numerous bands of intrusive rock containing aegerine, augite sanidine and sodalite sandstones and conglomerates with traces of fossil leaves occur at Barmer and are probably of Jurassic age. The sand also contains salt, which has been loosened by rain over the ages to collect in the Pachpadra depression.

84. The district is poor in metallic deposits; however important minerals produced in the district are Bentonite, Gypsum, SIliceous earth and Salt.

Physiography and oils:

85. Apart from small off-shoots of the Aravalli hills in the cast the area is a vast sand covered tract with sub-stratum of gneiss, hornblende and quartz which rises through the sand in some instances it may rises to a height of about 243 to 304 metre. In the extreme south and west the sandy plain is broken by sand- hills, called tibas' which sometimes rise to a height of 91 to 122 metre. The area is dry and forms a pan of Thar Desert. The highest-peak of the district is "Chappan-ka-Pahar" in Siwana tehsil which is about 973 metre above the sea level.

86. The only river of significance is the Luni which rises in the hill south-west of Ajmer city after flowing through Nagaur, Pali & Jodhpur district it enters in this district near village Rampura in Panchpadra tehsil and flows west ward.

87. Soils of the area occupy in large sandy plain with frequent hummocks and dunes. The dominant soils of duny areas are light pale brown to brown, very deep, fine sand, very weakly blocky non- calcareous sub soil followed by a weak to moderately developed calcic/carnbic horizon and are classified accordingly as calcids/cambids great groups of aridisols order. At few places like Pachpadra, etc. salt playas are observed which have weakly salic horizons and are classified as salids great group of aridisols order.

Forest:

88. The total area under forest is about 24,020 hectares. which is about 0.85 per cent of the total area of the district.

Population:

89. The total population of the district is 1,435,222 under which 1,291,056 is rural population and 144,166 is urban population. Tehsilwise distribution of the population is as follows in **Table 4.5**:

Table 4.5: Tehsil wise population

No	Tehsil Name	Poulation in no.
I.	Sheo	121,551
2.	Baytoo	140,601
3.	Pachpadra	238,990
4.	Barmer	270,080
5.	Chohtan	256,570
6.	Gudha Malani	244,259
7.	Siwana	163,171

4.7 Pali District

No.	List of Subprojects in the Area
	765 kV double circuit transmission line from Korna to Ajmer (210 km)

90. Pali is located between 24 45' and 26° 29' North latitude and 72° 47' and 74 18' East longitude, covering an area of about 12,387 sq.krn. Pali district is bounded by Jodhpur in north, Jalor in south west, Sirohi in the south, Udaipur & Rajsamand in the south east, Ajrner In north-east and Nagaur district In north.

Administrative Setup:

91. Administratively Pali district is a part of Jodhpur division. This district is divided into 7 tehsils namely: (I) Jaiiaran, (2) Raipur, (3) Sojat, (4) Marwar Junction. (5) Bali. (6) Desun and (7) Pali. The district also divided into 10 panchayat sarmues namely (I) Jaitaran, (2) Raipur. (3) Rohat, (4) Sojat, (5) Pali. (6) Kharchi, (7) Rani, (8) Sumerpur, (9) Desuri, (10) Bali.

Climate:

92. The climate of the district is dry and has extremes of temperatures. It is very hot during summer and very cold during winter. The district has registered the maximum temperature of 45°C and minimum of O°C. The average mean temperature is 22.5°C. January is coldest, while May and June are the hottest months.

93. Normal rainfall of the district is 490.4 mm. The average number of rainy days are only 22 a year.

Geology & Minerals:

94. Geological formation of the district is represented by Igneous sedimentary and Meta-sedimentary rocks. The Deihl Super Group is represented by Ajabgarh group exposed near the eastern border of the district and consists of schist, phyllite marble and basic-volcanic and they are intruded by granite and rhyollite, predominant among which is Erinpura granite, covering the south and the south-eastern pan of the district. The Jalor type granite is exposed south of the Pall town and is generally pink in colour. The Malani rhyolite (volcanic)

covers only small areas restricted to the south-wet of Pali. Marwar Super Grup occurs in the northern part of the district and are represented by limestone, dolomite, sandstone and shale.

95. Minerals of economic Importance found in the district are Calcite, Asbestos, Feldspar, Gypsum.

Physiology and Soil

96. The area of the district may be called sub mountaneous and has undulated plains with scattered hills. The district is surrounded by Aravalli range on its south-east. The general slope of the district is from east to west. The texture of the soil is generally sandy loam. The lower level of the sand is made up of rock of calcium carbonate.

97. There is no perennial river in the district. Four tributaries of river Luni viz. Sukhri, Lilri, Bandi and Jawai flow in district. There is no lake or natural spring in the district. Important dam constructed in the district is Jawai Dam in Bali tehsil.

98. The soils of Pali, Desuri and Rani panchayat samities have good permeability and are therefore appropriate for agricultural purposes. On the other hand, the soils of Kharchi, Sojat and Rohat panchayat samities have lesser permeability and are saline in nature.

99. The soils occurring in this area are dark greyish brown to brown medium textured and moderately sub-angular blocky with heavier subsurface and well developed subangular blocky structure underlained by a thick strata of lime coated concretionary zone. The occurence of calcic and/or cambic horizon permits them to classify as Carnbonhids/Calciorthids. Some patches of salinity is observed and they are classified as Salorthids.

Forest:

100. The forest of the district constitutes about 6.28 per cent of the total area of the district. The forest comes under subsidiary edaphic type of dry tropical forest. These are widely scattered over hillocks and ridges.

Population:

101. The total population of the district is 1,486,432 out of which 1,163,085 is rural and 323347 urban. Tehsilwise population is as under shown in **Table 4.6**:

Table 4.6: Tehsil Wise population

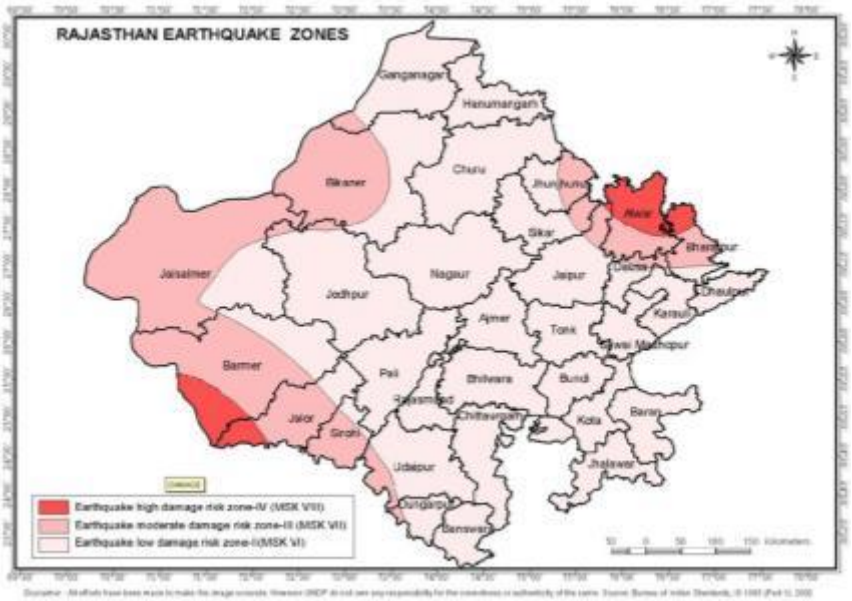
No	Tehsil Name	Population in no.
1	Jaitaran	164,036
2	Raipur	144,710
3	Sojat	170,646
4	Pali	329,127
5	Marwar Junction	164,492
6	Desuri	183,726
7	Bali	329,695

4.8 Seismology in Rajasthan

102. Western parts of the districts of Barmer and Sirohi as well as northern sections of

Alwar district lie in Zone IV, where the maximum intensity could reach VIII (MSK). The remaining areas of Barmer and Sirohi districts, as well as the districts of Bikaner, Jaisalmer and Sirohi lie in Zone III. The north-eastern districts of Jhunjhunu, Sikar, Bharatpur and the rest of Alwar also lie in Zone III. The maximum intensity expected in these areas would be around Medvedev-Sponheuer-Karnik (MSK) VII. The rest of the state, including the capital, Jaipur, lie in Zone II, where the maximum intensity expected would be around MSK VI. Bureau of Indian Standards (BIS) estimates the hazard on previously known earthquakes. The transmission towers and the substation sites fall in Seismic Zone III area (Moderate Damage Risk Zone – MSK[16] VII) which indicates a very high damage risk zone. Therefore, RVPN needs to take adequate measures while designing and installation of components of subprojects that can withstand MSK VII to avoid damage during earthquakes.

103. **Figure 4.1** shows earthquake zones of Rajasthan.



Source:http://www.rajrelief.nic.in

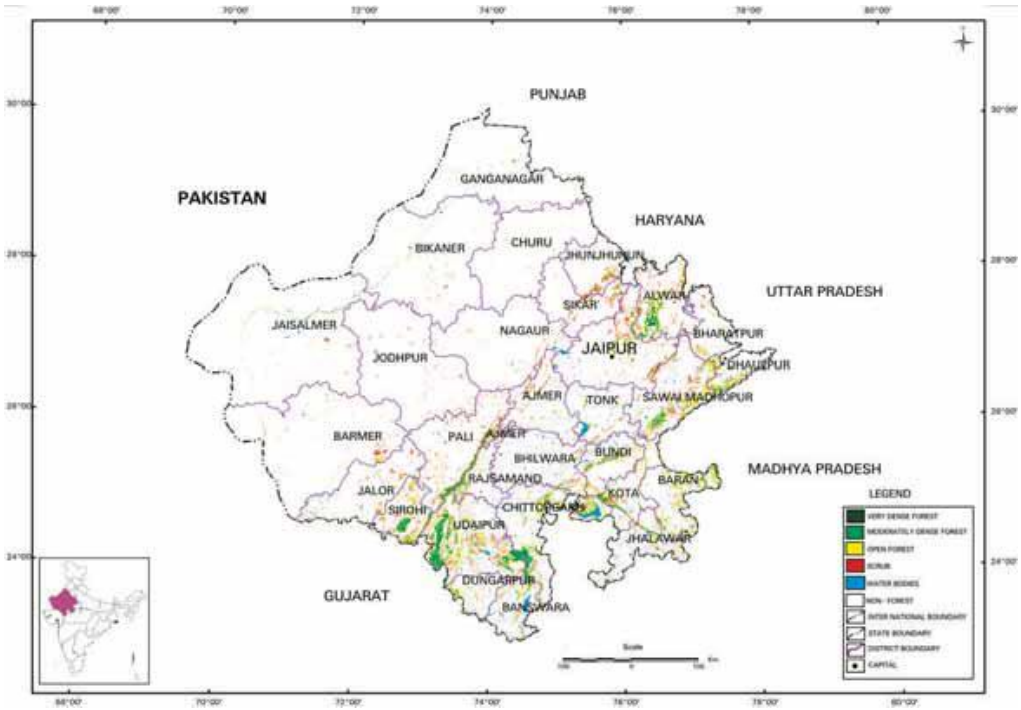
Figure 4.1: Earthquake Zones of Rajasthan

4.9 Ecological Resources

4.10 Forest Cover

104. The recorded forest area of the state is 32,737 sq.km. which is 9.57% of the state's geographical area. Reserved Forests constitute 38.1%, Protected Forests 55.64% and Unclassed Forests 6.24% area. Forest map of Rajasthan is enclosed as **Figure 4.2**.

[16] Medvedev-Sponheuer-Karnik (MSK) intensity broadly associated with the various seismic zones is VI (or less), VII, VIII and IX (and above) for Zones II, III, IV and V, respectively



Source: India State of Forest Report 2015

Figure 4.2: Forest Area of Rajasthan

105. The following two types of forest are found in Rajasthan

- Tropical Dry Deciduous
- Tropical Thorn forests

106. Forests are mostly confined in eastern and southern parts of the state. The western part of the state is devoid of forests because of prevailing hot arid conditions.

107. These transmission lines will have no impact on forest cover as the proposed transmission lines are not traversing any forest area. This is because the entire proposed project area only has a forest cover ranging between 0.43% to 5.58% of the total geographical area of the state. However, strip plantation along road and canal crossing and the manmade forest of about 5-10 ha, will be traversed by the lines for which the line height will be increased to avoid any cutting of plantation trees (comprised mainly Babool, eucalyptus and neem trees).

108. Details of forest cover of these districts are given in **Table 4.7**.

Table 4.7: Forest cover in districts within the project area

District	Geographic area (GA), km^2	2015 Assessment (sq.km.)				% of G.A
		Very dense forest	Moderately dense forest	Open forest	Total	
Jodhpur	22,850	0	2	96	98	0.43
Jaisalmer	38,401	4	49	164	217	0.57
Bikaner	27,244	0	27	181	208	0.76
Ajmer	8481	0	36	248	284	3.35
Nagaur	17,718	0	11	114	125	0.71
Barmer	28,387	0	4	186	190	0.67
Pali	12,387	0	217	474	691	5.58

Source: Forest Survey Report 2015

4.11 Protected areas in Rajasthan

109. **Figure 4.3** shows the location of National Parks and the wildlife sanctuaries in Rajasthan state.

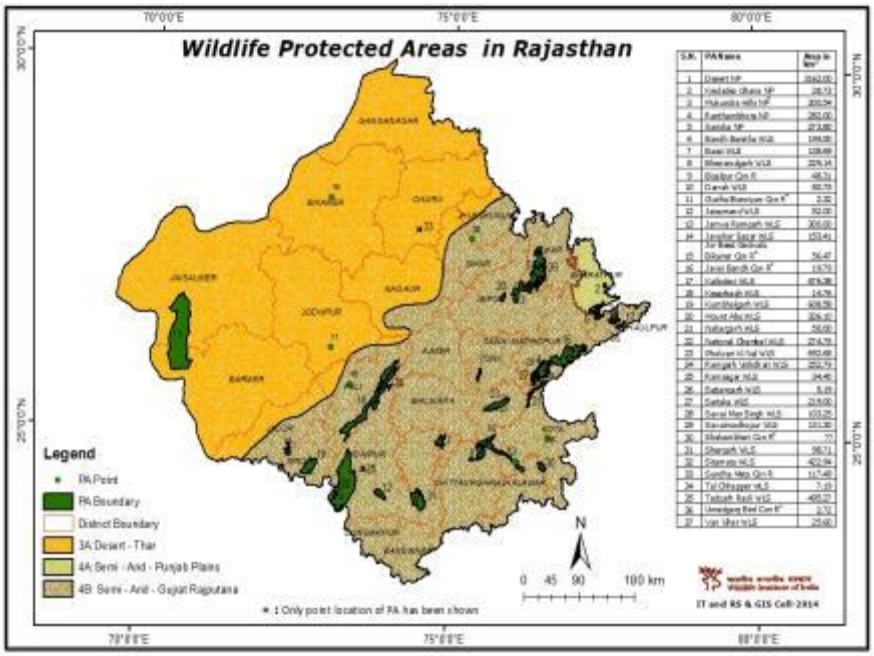


Figure 4.3: Wildlife Protected Areas in Rajasthan State

110. Rajasthan has 5 National Parks and 25 Wildlife Sanctuaries covering 9,326 sq.km. which constitutes 2.70% of the state's geographical area. Rajasthan has two Tiger Reserves, namely, Ranthambhore and Sariska. Keoladeo, Ghana National Park, Bharatpur is of international importance for its rich avifauna and migratory birds. It is one of the heritage sites of the world and also a Ramsar site. Sambhar Lake has also been designated under Ramsar Convention. None of the proposed sub-projects are located inside or near or passing through the designated core and/or buffer zones of national parks, sanctuaries, biosphere reserves, and reserved forests. One such transmission line from 220 kV Chhattargarh to Gajner line will terminated at Gajner GSS that is about 4 km away from Gajner Wildlife sanctuary, a small sanctuary adjoining the Gajner Fort and city. Details of all National Parks, Wildlife Sanctuary and Important Bird Area are listed below:

4.11.1 Desert National Park

111. Desert National Park, a protected sanctuary, is situated 45 km away from the town of Jaisalmer. This is one of the largest national parks; covering an area of 3,162 sq. km. Park is an excellent example of ecosystem of the Thar Desert and its diverse fauna. Sand dunes form around 20% of the Park. The major landform consists of craggy rocks and compact salt lake bottoms, intermediate areas and fixed dunes which are quite suitable for the Chinkara to move at high speed. The blackbuck is another common antelope in this region; its other notable inhabitants are desert fox, bengal fox, wolf and desert cat, great Indian bustard, eagles, harriers, falcons, buzzards, kestrel and vultures, short- toed eagles, tawny eagles, spotted eagles, laager falcons and kestrels are the most common among these. The landscape of the park comprises of lakebed of extinct salt lakes and thorny scrubs; a considerable area of the Desert National Park consists of sand dunes. Desert national Park is also an important bird area (IBA). Details attached in Annexure 8.

4.11.2 Khinchan Bird Sanctuary

112. Khichan is a village in Rajasthan state of India. It is located in the Phalodi tehsil of Jodhpur district. The village is known for a large number of demoiselle cranes that visit it every winter. This annual bird migration began with around a hundred cranes in the 1970s, when a local couple started feedig pigeons. Other villagers joined their efforts, and as of 2014, Khichan now hosts over 20,000 demoiselle cranes from as early as August each year to as late as March of the following year. The demoiselle cranes are found in 47 countries and are the smallest and the second most abundant of the world's crane species. The breeding grounds of these birds are reported to be from the plains and steppes of Eurasia and Mongolia. (Source: Wikipedia). Khinchan is an important bird area (IBA) and details are attached in Annexure 8.

4.11.3 Akal Wood Fossil Park

113. The fossile park is situated from 17 km from the main Jaisalmer city on Barmer Road, the park is famous for its Fossil remains of Jurassic era till 130 million years ago. The fossil trunks lie scattered in this park. Fossilized tree trunks are of various sizes with the largest being 13 meters in length and 1.5 meters in width. Covering about 10 sq. km of bare hillside, the Fossil Park contains 25 petrified trunks, in total. The park has 21 hectares of preserved area.

4.11.4 Gajner Wildlife Sanctuary:

114. Gajner Wildlife Sanctuary is located at a distance of 32 Km from Bikaner. In former times it was a hunting ground for the Maharajah of Bikaner. There is a lake in this sanctuary and a variety of animals come here to quench their thirst in summer. The lake in this wildlife sanctuary draws a variety of avian species. The residential species include wildfowl, deer, antelope, nilgai, chinkara, black buck, desert fox and wild boar. (Source: Wikipedia). However according to information gathered at site, the sanctuary is private and by the earstwhile rulers of Gajner since early1900's.

115. Currently, the sanctuary and its buffer zone is not notified in the Forest Act and it is in a highly degraded state with only 8-10 deer living inside the sanctuary area. **Figure 4.4** gives the various locations inside the sanctuary and its estimated buffer zone.

	
Road along the sanctuary area	National Highway crossing at the boundary of Sanctuary
	
Barren Area inside Buffer Zone	Barren area inside sanctuary
	
Buildings just outside sanctuary boundary	Area inside sanctuary
	
Gajner Palace Hotel inside sanctuary	Existing water pumping state in buffer area

Figure 4.4 Degraded Gajner Wildlife Sanctuary, Buffer zone and construction adjoining sanctuary

4.12 Baseline Data of Environmental Parameters: Air Quality, Noise, and Ground Water Quality.

116. The establishment of a baseline for environmental monitoring is to determine trends in the quality of ambient air, water, ambient noise and soil and how that quality is affected by the release of contaminants, other anthropogenic activities, and/or by waste treatment operations (impact monitoring). Environment monitoring needs to be carried out to estimate nutrient or pollutant fluxes discharged in atmosphere or ground waters or lakes or to the land across project and nearby areas. Monitoring is done to determine the quality of the ambient Environment before start of any kind of project related activities, as it provides a means of comparison with impact monitoring. It will be also used simply to check whether any unexpected change is occurring in otherwise pristine conditions.

117. For RVPN's Tranche 1, primary tests were conducted by a recognized laboratory from Rajasthan State Pollution Control Board in November 2011-January 2012. However, since the data is old now, data from a secondary source is used (Source: Initial Environmental Examination dated May 2016 for Rajasthan State Highway Investment Program, Prepared by PPP Division, Public Works Department, and Government of Rajasthan for the Asian Development Bank is available on ADB website).

118. Data as listed in Appendices B, C, D is being used for the appropriate sub-projects to be used as baseline - Refer https://www.adb.org/projects/49228-001/main#project-documents. The data is inserted as **Annexure 5**.

4.12.1 Ambient Noise

119. Ambient Noise can seriously harm human health and interfere with people's daily activities at school, at work, at home and during leisure time. The main health risks of noise identified by the World Health Organisation (WHO) are - pain and hearing fatigue, hearing impairment including tinnitus, annoyance, interference with social behaviour (aggressiveness, protest and helplessness) and speech communication, sleep disturbance and all its consequences on a long and short term basis, cardiovascular effects, hormonal responses (stress hormones) and their possible consequences on human metabolism (nutrition) and immune system, and poor performance at work and school.

120. The results of Ambient Noise monitoring (shown in **Table 4.8**) are lower than standard permissible limits for residential area. . Noise level in the project area has been appended as well as standards are mentioned in **Annexure 5**.

Table 4.8: Compliance Status of Noise around the project area

No	Districts	WB EHS					GOI NAANS							
		Res		Inst		Indl	Res		Indl		Comm.		Sensitive	
		D	N	D	N	D/N	D	N	D	N	D	N	D	N
1	Pali district	□	□	□	□	□	□	□	□	□	□	□	□	□
2	Barmer	□	□	□	□	□	□	□	□	□	□	□	□	□
3	Loonkaransar, Bikaner	□	□	□	□	□	□	□	□	□	□	□	□	□
4	Nagaur	□	□	□	□	□	□	□	□	□	□	□	□	□
5	Ajmer	□	□	□	□	□	□	□	□	□	□	□	□	□

Note: □ - within limits X- above limits

4.12.2 Air Quality

121. Concentrated road traffic or presence of air polluting industries in the area can result in a significant decline in air quality. Since most of the transmission line tower locations and the sub-station are located in rural and semi-urban areas, the Ambient Air Quality measurements along the project alignments are within the limits of National Ambient Air Quality Standards. Particulate Matter (PM2.5)[17] is produced by combustion, including vehicle exhaust, and by chemical reactions between gases such as Sulphur dioxide, nitrogen oxides, and volatile organic compounds. Adverse health effects from breathing air with a high PM2.5 concentration include premature death, increased respiratory symptoms and disease, chronic bronchitis, and decreased lung function particularly for individuals with asthma.

122. Monitored parameters of ambient air quality largely meet the prescribed limit (**Annexure 5**) of World Bank (WB), National Ambient Air Quality Standard (NAAQS) and Central Pollution Control Board (CPCB) except particulate matter (PM10) and Carbon Mono oxide (CO). At some places at Bikaner and Ajmer Districts, particulate matter (PM10) and Carbon Monooxide (CO) are above prescribed guidelines due to due to poor road conditions and high traffic density. Compliance status of Air quality data is presented in **Table 4.9**.

Table 4.9: Status of AAQ in the Project Area (2016) in approximate project area

No.	Districts	WB EHS (in µg/m^3)	GOI NAAQS (in µg/m^3)	Remarks
1	Pali District	□	□	--
2	Barmer	□	□	--
3	Loonkaransar, Bikaner	X	X	All parameter are meeting WB interim target GOI limit Except PM10 & CO.
4	Nagaur	□	□	--
5	Ajmer	□	X	All parameter are meeting WB interim target. PM10 at few locations exceeding GOI limit.

Note: □ - within limits X- above limits

4.12.3 Ground Water

123. Monitored parameters largely conforms to the drinking water standards (IS:10500-1991) prescribed by Bureau of Indian Standard and collected by Central Ground Water Board (CGWB). Sub-project compliance of the permissible and desirable limits is tabulated as under in **Table 4.10**.

Table 4.10: Compliance Status of Ground Water Quality in approximate project area

S.NO.	Districts	GOI LIMITS		REMARKS
		Desirable	Permissible	
1	Pali	X	□	Only some parameters are exceeding desirable limits but all are well within permissible limits.
2	Barmer	X	□	
3	Loonkaransar, Bikaner	X	□	
4	Nagaur	X	□	
5	Ajmer	X	□	
6	Nagaur	X	□	Only TDS and Alkalinity are exceeding desirable limits but all

[17] Fine Particulate Matter with a diameter smaller than 2.5 microns. (Human hair diameters range from 40 to 120 microns.)

				are well within permissible limits.

Source: Baseline Monitoring conducted at project sites.

124. Constant drinking water supply is available in project district by Government supply. Surface water is not used for drinking or domestic purpose in the project area except for outdoor bathing, cattle feeding and irrigation at some places. Although surface water samples from rivers and ponds have been analysed to confirm its suitability for different classes prescribed for freshwater classification by CPCB. Analyzed samples are summarized in **Table 4.11** for compliance of the prescribed limits.

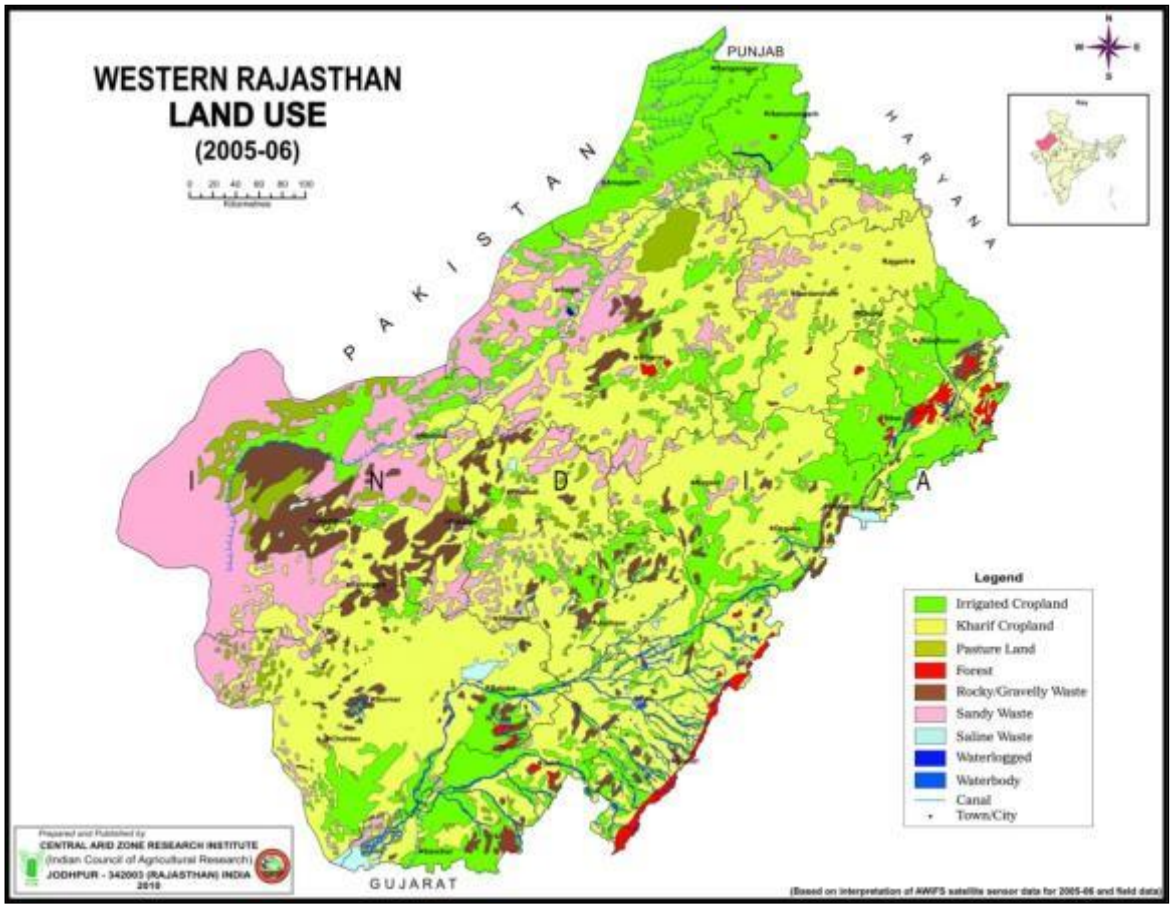
Table 4.11 Compliance Status of Surface Water Quality in approximate project area

No.	Districts	GOI (CPCB)			REMARKS
		Drinking Water Source without conventional treatment but after disinfection	Outdoor bathing (Organised)	Irrigation	
1	Pali	□	□	□	As per monitoring reports water is fit for all usage.
2	Barmer	□	□	□	
3	Loonkaransar, Bikaner	□	□	□	
4	Ajmer	□	□	□	As per monitoring reports water is fit for all usage.
5	Nagaur	□	□	□	

4.13 Economic Development

Land use pattern

125. The land use pattern map of western Rajasthan is shown below in **Figure 4.4** which shows most of the land in the area consists of sandy and rocky waste lands while the rest is barren or Karif crop land. **Table 4.12** gives the details.



Source: http://www.cazri.res.in/images/LandUse-WRaj.jpg

Figure 4.4: Land use pattern in western Rajasthan

Table 4.12: Land use pattern in Rajasthan state

LAND USE PATTERN (2012-13) Classification of land area (Hectares)	Area in '000 ha	Percentage
Total Geographic area	34,224	
Reporting area for land utilisation	34,267	100
Areas under forest	2,750	8.02
Area Not available for cultivation	4,275	12.48
Permanent Pastures and other grazing lands	1694	4.93
Land under miscellaneous trees crops and Groves	23	0.07
Cultivable waste land	4,152	12.12
Fallow land other than current fallow	2,024	5.91
Current Fallows	1,869	5.46
Net area Sown	17,479	51.01

Source: Landuse Statistics, Ministry of Agriculture, GOI 2012-13

4.14 Historical, Cultural and Archaeology Sites/Places

126. The list of important heritage, cultural and religious sites (**Table 4.13**) of the aforementioned districts are listed below.

Table 4.13: List of Important sites

SNo	Important site	Distance from sub-project feature
	Jaisalmer district	
1	• Jaisalmer fort	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• Nathmal Ji Ki Haveli.	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• The Patwon Ji ki Haveli.	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• Salim Ji Ki Haveli	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• Bada Bagh	Nearest GSS is 132 kV Sangarh GSS about 50 km

SNo	Important site	Distance from sub-project feature
	• Cenotaph of Bada Bagh	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• Amar Sagar Lake	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• Gadi Sagar Lake	Nearest GSS is 132 kV Sangarh GSS about 45 km
	• Akal Wood Fossil Park	Nearest GSS is 132 kV Sangarh GSS about 32 km
2	Jodhpur district	
	• Mandore	Nearest line is 8 km from Mandore -Korna Ajmer line
	• Osian village	Nearest GSS is 132 kV Bana Ka Bans GSS -15 km
	• Balsamand Lake	Nearest line is 10 km from Mandore -Korna Ajmer line
	• Balsamand Palace	Nearest line is 10 km from Mandore -Korna Ajmer line
3	Ajmer district	
	• Ajmer Sharif Dargah	Nearest GSS is 765 kV Ajmer GSS - 25 km
	• Taragarh Fort	Nearest GSS is 765 kV Ajmer GSS - 25 km
	• Akbari Fort and Museum	Nearest GSS is 765 kV Ajmer GSS - 25 km
	• Anasagar Lake	Nearest GSS is 765 kV Ajmer GSS - 25 km
4	Barmer District	
	• Siwana Fort	Nearest GSS is 765 kV Korna GSS - 65 km
	• Viratra Mata Temple near Chohtan	Nearest GSS is 765 kV Korna GSS - 65 km
5	Pali District	
	• Ranakpur	Nearest GSS is 765 kV Korna GSS - 145 km
	• Jawai Dam	Nearest GSS is 765 kV Korna GSS - 150 km
	• Other Temples	Nearest GSS is 765 kV Korna GSS - 145 km

5.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Environment Impacts and Mitigation Measures

127. The potential environmental impacts associated with the subprojects occur during the pre-construction, construction phases, which typically involve:

- Excavation of sites for project facilities (if at all), including transport and disposal of excavated materials, erosion at construction sites, possible noise/dust pollution, and management of workers and waste.
- Spills of fuel and other lubricants at the construction site/workshop/repair site that may affect soil and water quality.
- Dust and Noise during the use of construction equipment and vehicular movement.

5.1.1 Environment Problems due to Project Location and Design

128. Potential adverse environment impacts associated with transmission lines has been avoided or minimised through careful route selection and the alignment is sited away from major settlements taking into account future urban expansion. Forests areas and vegetation areas are avoided for all sub-projects; however route alignment passes through scrub lands, cultivated and abandoned fields. However, if a strip plantation along road and canal crossing comprising of manmade forest of about 5-10 ha. is traversed by the line, the line height may be increased to avoid any cutting of plantation trees.

129. 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. However, any damage to the crops during the construction phase of the project will be duly compensated as per the Resettlement Plan for the sub-project. Associated impacts on agricultural land will be restricted to the construction phase and will be temporary in nature. Agricultural land will be lost permanently at each tower leg (say about 0.2 sq. m) and crops can be cultivated under the transmission tower. After construction, agricultural land within the transmission corridors (right of way) can be used again for farming purpose and dwarf trees can be planted having height of less than 3 m as per Electricity Act 2003.

5.1.2 Environmental Impacts Associated with Pre-Construction Stage

5.1.2.1 Acquisition of Cultivable and Non cultivable lands

130. There may be loss of agricultural productivity due to obstruction and reduce the land of fields. Thus following measures will have to be taken prior to the project activities:

- Avoid farming season wherever possible for the project activities,
- Ensure existing irrigation facilities are maintained in working condition,
- Protect /preserve topsoil and reinstate after construction is completed,
- Repair /reinstate damaged bunds etc. after construction is completed, and
- Compensation for temporary loss in agricultural production.

5.1.2.2 Impacts on Temporary Use of Land

131. The mobilisation of construction equipment and construction materials will require storage yard (size depending on requirement of EPC contractor's need for size of inventory at hand) for storage and parking of construction vehicles and equipment, construction material storage yards, disposal sites (solid and hazardous waste disposal to licensed landfill), and labour camps for human resource to avoid environmental impact and public inconvenience. These locations must comply with the local laws and regulations and need approval from authorities to utilise these facilities (access roads, telecommunication, and pipe borne water supply). It is important that selection of temporary lands is at least 50 m

away from highly populated areas, water bodies, natural flow paths, agricultural lands, important ecological habitats and residential areas. Damage to agricultural land, removal of trees and green cover vegetation should be minimised during tower erection

5.1.3 Environmental problems associated with construction and operation stage

132. 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. For sub-station, it will involve excavation for building and equipment foundations, civil works and erection of equipment. During the operation phase, most of the construction phase impacts will get stabilised and the impacts will be restricted only to the operation and maintenance of the project.

133. The impacts on the environment from various activities of the project can be categorised as follows:

- Impact on Physical Resources
    - Impact on Topography
    - Impact on Climate
- Impact on Environmental Resources
    - Impact on Air Quality
    - Impact on Noise Levels
    - Impact on surface Water Quality
    - Impact on ground Water Quality
    - Impact on Soils and Geology
- Impact on Ecological Resources
    - Terrestrial Ecology
    - Wild Life
    - Aquatic Ecology
- Impact on Human Environment
    - Health and Safety
    - Agriculture
    - Socio-economics
    - Resettlement and Rehabilitation
    - Cultural sites
    - Traffic and Transport
    - Interference with other utilises and traffic
- Waste Disposal
    - Solid waste disposal
    - Liquid waste disposal
    - Hazardous waste disposal

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

5.1.3.1 Impact on Physical Resources

Impact on Topography

135. During the construction of the transmission line and sub-station, the topography will change due to excavation and erection of tower, fill and cut for levelling 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 and all along the right-of-way (RoW) for construction facilitation. 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. **Table 5.1** provides the ROW for different voltages as per handbook of

Forest (Conservation) Act, 1980, Forest (Conservation) Rules, 2003 (with amendments made in 2004).

Table 5.1: Transmission Voltage (kV) Width of Right of Way (in Meters)

Transmission Voltage (kV)	Width of Right of way (Meter)
11 kV	7
33 kV	15
66 kV	18
132 kV	27
220 kV	35
400 kV S/C*	52
400 kV D/C*	46
800 kV	85

* As amended as per F. No.*-44/2011-FC (Pt) circular dated 24 Jan 2012

136. No topographical changes are envisaged during the operation phase of the transmission line and the sub-station. The existing access routes will be utilised during the operation and maintenance of the transmission lines.

Impact on Climate

137. The study area along the RoW is predominantly barren, scrubs or medium size trees in the project area. However, impact on the climate conditions from the proposed projects both during the construction and operation phases will not be significant. Climate changed related impacts to the project elements is mentioned in climate change risk assessment in **Section 7**.

5.1.3.2 Impact on Environmental Resources

Impact on Air Quality

138. During the construction phase, the activity would involve excavation for the tower erection, movement of transporting vehicles carrying the construction materials etc. along the haul road (through un-built village roads which are not maintained by government). All these activities would give rise to emission of dust particles thereby affecting air quality marginally at the site which although will be transitory in nature. Sprinkling of water at substation sites during excavation will reduce the dust emission to a great extent. There is no movement of loose soil at base of transmission tower, however, if any loose soil is removed from substation site, it will be done using covered trucks to reduce dust.

139. The construction of transmission line and the sub-station will not have any negative impact on the air quality of the region during the operation phase.

Impact on Noise Levels

140. During the construction phase, the major sources of noise pollution are movement of vehicles transporting the construction material and equipment to the site. Most of the access roads along the alignment are motor able. Most construction work is expected to be carried out during the day time. There will be very limited presence of population being exposed to any noise being generated during the construction phase as there will hardly any heavy mechanized equipment used.

141. Following measures will help to keep noise and vibration in acceptable level during construction phase (Distances are listed approximately from villages for transmission lines in **Table 6.3**).

- Contractor shall equip their heavy construction equipment and plants with exhaust silencers to limit the engine noise not to exceed 75 db (compacters/rollers, loaders and cranes) and regularly maintain all construction vehicles and machinery that should meet the national Emission Standards.
- Contractor shall preferably limit working time for activities that create noise within

normal waking hours of the public except for construction site near public sensitive receptors. Construction related activities closer to sensitive receptors have to be scheduled in coordination with the relevant authorities.

- Contractor and its suppliers of construction materials should strictly implement noise control regulations stipulated by the Noise Pollution (Regulation and Control Rules 2000) for all construction vehicles and equipment as applicable to residential areas (55 dB/45 dB) in accordance with national standards[18].

142. 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 (beyond any residential house etc.), hence the ambient noise level meets the CPCB standard for residential areas (55 dB(A) during daytime and 45 dB (A) during night time).

Impact on Surface Water Quality

143. The construction and operation of the transmission lines will not have any major impact on the surface and ground water quality in the area. Contamination of water bodies may result due to spilling of construction materials and surface runoff from the construction site joining the water body/seasonal river. This can be avoided by careful selection of the tower site so that the surface runoff does not meet the seasonal river.

144. Construction activities can create temporary impacts to the existing drainage system in the area for small earth and line drains in the agricultural fields. Thus they can create temporary inundation closer to the tower/substation above locations during rainy season; and temporary breeding sites to mosquitoes which can have direct impact on public health. Thus incorporation of following measures will minimise anticipated impact due to obstruction of natural flow paths and existing drainage:

- Provisions of temporary drainage facilities to the particular locations if existing drains are obstructed due to construction activities.
- Maintenance of all drainage paths by avoiding blockages at all times.

145. Care shall be taken to locate the temporary construction worker sheds at a substation site away from any water bodies. 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[19] washing and toilet facilities must be made obligatory. This should from an integral component in the planning stage before commencement of construction activity.

Impact on Ground Water Quality

146. Ground water pollution can take place, if chemical substances and oily waste get leached by precipitation of water and percolate to the ground water table. For transmission line construction activity, no chemical substance or oil is used hence there is no impact on ground water quality. Thus following measures will be required in order to prevent deterioration of water from the construction and construction related activities:

- All construction vehicles and equipment should be maintained in proper conditions without any leakages,
- At substation sites, EPC contractor shall use silt traps and erosion control measures where the construction is carried out in close proximity to the water bodies to avoid entering of cement particles, rock, rubbles and waste water to the surrounding water bodies,
- Construction activities requiring digging should be preferably done in the dry season,

[18] Also in line with EHS Guidelines 2007.

[19] toilet connected to septic tanks, washing facilities of hot and cold water, male and female, separate area for preparation of food away from toilet area, provision of gas for cooking etc.

- Waste oil should be collected properly and disposed to the approved location.

Impact on Soil and Geology

147. Project activities including excavation, cut and fill operations, removal of trees and green cover vegetation etc. will enhance the soil erosion during the rainy season. The impact on soils will be due to the soil erosion at the tower construction sites along the access routes. The excavation activity and land clearance in the erosion prone areas have been minimised while conducting the site selection for towers. Levelling and stabilisation of tower construction sites will be done after completion of construction activity. Also increased acceleration of surface runoff will damage the topsoil. The impacts associated with excessive erosion and other civil works can be avoided or minimised by following mitigation measures:

- Effort should be taken to minimise removal of trees and green cover vegetation.
- Minimise obstruction or destruction to natural drainage pattern of the surrounding area.
- Proper treatment of clearing and filling areas against flow acceleration.
- Contractors shall restrict cut and fill operation around sharp/deep slope areas.
- Top soil which is removed during construction from the cultivated lands must be stored separately for future utilisation of cultivated lands near tower leg locations.

5.1.3.3 Impact on Ecological Resources

148. Since sub-station is constructed in government waste land and transmission line is routed away from urban areas and mostly through barren/agricultural land having very scarce scattered population, there is no displacement of people or animals. It is also not causing any disturbance to the life of people and local animals and birds movement as there are no important bird areas in the vicinity. In transmission business, 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. The ecological impacts are briefly described in the following sections

Effect on Flora and Fauna

149. On visual inspection, it seems that small number of trees will need to be removed from the project area for RoW is 67 m for 765 kV, 46 m for 400 kV line, 35 m for 220 kV, 27 m for 132 kV. None of the declared environmentally sensitive areas is located within the route alignment. According to preliminary assessment there is no flora and fauna that are rare, endangered, endemic or threatened in the project affected area that will be affected. However, if a strip plantation along road and canal crossing comprising of manmade forest of about 5-10 ha. is traversed by the line, the line height may be increased to avoid any cutting of plantation trees. Discussion on national parks, sanctuaries, important bird areas (IBA) mentioned in Section 4 esrlier. Also, 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 and fishing in water bodies. These activities are prohibited by law and punishable as per National and Government of Rajasthan laws.
- Selection of approved locations for material storage yards and labour camps away from the environmental sensitive areas

- Avoid entering of construction waste (cement particles, rock, rubbles and waste water) and sanitary waste to the surrounding water bodies.

Impact on Terrestrial Ecology

150. There is no sensitive ecological area / protected forest area such as national wildlife park, bird sanctuary crossing the proposed route alignment. However, if a strip plantation along road and canal crossing comprising of manmade forest of about 5-10 ha. is traversed by the line, the line height may be increased to avoid any cutting of plantation trees. 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 minimised through adoption of mitigation measures like paving and surface treatment and water sprinkling.

Removal of Trees

151. Trees along the line RoW are generally scrub trees, bushes besides. The major species of trees found in the sub-project area are Babul (*Vachellia nilotica*), Mango (*Mangifera indica*), Neem (*Azadirachta indica*), Banyan (*Ficus Benghalensis*), Ardu (*Ailanthus excels*), Khejri (*Prosopis cineraria*), Peepal (*Ficus religiosa*), Shisham (*Dalbergia sissoo*), Jamun (*Syzygium cumini*), Lemon (*Citrus limon*), Eucalyptus (*Eucalyptus rudis*). Some of them may be lopped or removed during the line construction and especially during stringing. The initial construction works along the alignment involving land clearance, cutting, filling and levelling that may cause loss of vegetation.

152. Approximate number of trees are mentioned in **Table 6.3** however, exact number of trees to be felled will be known during final route survey and during construction. Care has been taken to avoid the thick vegetation as far as possible and tower locations are selected mostly in plain cultivable fields where the vegetation is thin. This will minimise the tree loss. Compensation will be paid to the tree owners in the private areas as per Government norms.

153. If a strip plantation along road and canal crossing comprising of manmade forest of about 5-10 ha. is traversed by the line, the line height may be increased to avoid any cutting of plantation trees (See **Figure 5.1**). The approximate affected area per line crossing would be (i) 350m x 17m for 132 kV line and (ii). 350m x 35 m for 220 kV line (According to forest department, 200m on left bank, 100m on right bank constitute forest areas). This will be an irreversible impact. Clearing of forest area would not be involved along the route alignment and no compensatory afforestion is required. If it required, According to GOI rules, compensatory afforestation may be raised over degraded forest land twice in extent of forest area being diverted/dereserved for a transmission line project (source http://moefrolko.org/rule3.htm).

Figures 5.1: Strip Plantations at Canal Crossings

Effect on Local Road Network

154. Transformers, tower material, sub-station equipment, iron bars, concrete materials, piling equipment, etc. will be transported through the local road network to the project site. Transporting of large quantities of materials using heavy vehicles could exceed the carrying capacity of the road. This would lead to physical damages to local road network. Thus it will be necessary to obtain consent from Public Works Department (PWD) or national highway Authority to use local/national highway roads prior to transportation. Also contractor should properly maintain all road sections, which will be utilised for the construction related activities. Speed limits should be posted and adhered to by construction vehicles. Aggregates (e.g., sand, gravel, rock) that are transported by trucks should be covered to avoid nuisance to road users.

Disposal of Debris

155. As a result of construction related activities, top soil debris will be generated during the construction stage of which some may be left over for disposal. Improper disposal of the debris will have an impact on the surrounding ecology, public health and scenic beauty. Following measures will minimise the impacts associated with disposal of debris:

- Spoil materials (soil, sand, rock etc.) generated from construction activities shall be used wherever possible for site levelling, back - filling etc.
- Preparation of Disposal Management Plan for the project and selection of the solid waste and hazardous waste disposal site to engineered landfill. Prior approval should be obtained for such dumping grounds / land fill sites from relevant local authorities. For topsoil, the EPC contractor must exclude locations, which are closer to residential, commercial and public sensitive areas. Inert spoil (any waste concrete, if any) from the site will be disposed of as per directions of the local statutory body in the area.
- Dumped materials will interfere with the drainage pattern of the area, any water bodies, agricultural lands, marshlands and down slope or any environmental

sensitive areas if not planned properly.

156. During operation phase, corridor along the alignment will be chopped of vegetation and lopping of trees will be done for maintenance purpose. This will also reduce the chances of fires due to electric sparks.

Wild Life

157. There are no wildlife crossings or sensitive areas affected by the project.

158. Desert National Park in Jaisalmer and Barmer districts which is around 62 km away from the proposed Sangarh grid substation and 105 km away from Pokharan substation. This sanctuary does not have any negative impact due to project activities. IBA such as Khinchan bird sanctuary is situated about 45 km from Pokharan GSS. **Table 6.3** provides details for the same.

Impact on Aquatic Ecology

159. There are no perennial rivers or tributaries in the alignment of subprojects and therefore there are no significant impacts any aquatic ecology in the project area. The only perennial water body is Indira Gandhi Canal which is an irrigation canal and does not have any impact due to subproject activities.

5.1.3.4 Impact on Human Environment

Health and Safety

160. Health and safety impacts will be 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. To avoid this, the houses will not be allowed within the RoW of the project. During design, the transmission line and substation equipment will be rated to ensure EMF is within the permissible limits specified in the EHS guidelines. The EPC contractor shall provide necessary training regarding safety aspects to its personnel working at the line as well as provide personal protective equipment like safety gloves, helmet, mufflers etc. during construction period and during the maintenance work. First aid facilities will be made available with the labour gangs and ambulance/doctors on call from nearby towns when necessary. Workers are also covered by the statutory workmen compensation as per GoI laws by the contractor.

161. Project activities may create accidental damage to general public and the construction workers. Therefore, contractors should take necessary action to enhance personal and public safety during construction through following measures:

- Prepare health and safety risk assessment, and develop a Health and safety plan which will conform to EHS guidelines.
- Organise awareness programs relevant to personal safety of the workers and general public in the area.
- Installation of warning signs to particular locations such as transverse points of local road network near the underground transmission lines trenches.
- Provide protective safety belts, footwear, helmets, goggles, eye-shields and clothes to workers depending on their duty.
- Arrangement of proper first aid unit and transport facilities to take injured people to the hospitals.
- Workers should be covered by the statutory Workmen Compensation as per GOI laws by the contractor.

- To minimize the risk of public and worker injury appropriate GoI regulations on Occupational, Safety, and Community Health must be applied or the IFC/World Bank Environment, Health, and Safety (EHS) Guidelines (2007) that govern the safe and orderly operation of civil works should be followed.
- Prevent public access to the transmission tower during construction or substation property with effective fencing, and clear signage indicating the dangers of the different facilities. The public should be kept clear of all equipment maintenance areas.

Agriculture

162. Permanent and temporary loss of agricultural land occurs due to tower location in the agricultural field and loss of crop for access route etc. There will not be any land acquisition for the tower erection. As far as possible, the prime agricultural land will be avoided and the construction will be done after crop harvesting.

Socio-Economics

163. Construction of transmission line will generate local employment, as number of unskilled labourers (both men and women) will be required at the time of construction activities. Local employment during this period will increase socio-economic standards.

Temporary Outage of the Electricity

164. Temporary disconnection of power supply will occur during the construction activities. Thus, general public and the industrial places, which are located in project-affected area, will face inconvenience for short periods of time. Thus following measures will have to be taken:

- Advance notice to the public about the time and the duration of the utility disruption, and
- Restore the utilities immediately to overcome public inconvenience.

Resettlement and Rehabilitation

165. For the construction of transmission line, no land acquisition is required, hence there is no resettlement and rehabilitation involved in the project.

Cultural sites

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

Traffic and Transport

167. During the construction phase, traffic disturbance needs to be minimised by avoiding high-density areas, using proper traffic signs, ensuring proper access roads and avoiding road blockage. The EPC contractor shall prepare a traffic management plan before start of construction.

Interference with Other Utilities and Traffic

168. A standing committee - Power Telecom Co-ordination Committee (P.T.C.C.) has been constituted by Government of India to plan and implement the mitigating measures for the induced voltage, which may occur nearby telecom circuits and suggest necessary

protection measures to be adopted. The committee suggests measures like rerouting of the telecom circuits, conversion of overhead telecom circuits into cables etc. to minimize the interference. It is mandatory for RVPN to seek clearance prior to construction from telecom authorities and wherever necessary from aviation authorities that are likely to be affected by the construction of underground transmission lines. The exact cost to mitigate the impacts of induction in neighbouring telecom circuits would vary from case to case. In general, the system is planned and executed in such a way that adequate clearance is maintained between transmission lines and the railways, civil aviation and defence installations as per mandatory provisions. If the transmission lines will pass nearby any proposed or existing airport, it has to maintain a specific distance and the towers beyond specified height are painted in alternate orange and white stripes for easy visibility and warning lights are placed on the top of these towers.

5.1.3.5 Waste Disposal

Solid Scrap Waste Disposal

169. The solid scrap waste generation will be at the location of the tower erection site which will include metal scraps, wooden packing material etc. Wooden waste and metal scrap will be collected and disposed of to recyclers in compliance with applicable GOI regulations and rules.

Sanitary Waste Disposal at Construction Sites and Labour Camps

170. 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 and therefore may be provided with soak pits. Those places where most labour 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 with septic tanks to avoid the surface water pollution. Provision of adequate toilets connected to septic tanks, washing facilities of hot and cold water, male and female, separate area for preparation of food away from toilet area, provision of gas for cooking etc. must be made obligatory. This should from an integral component in the planning stage before commencement of construction activity.

171. There should be proper solid waste disposal procedure to enhance sanitation of workers who stay in camps. 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.

172. 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 reliance on huge labour camps, thus the selection of majority of skilled and unskilled workers from the project influence area will be a proper measure in this regard.
- Contractor should provide adequate facilities to manage its wastes in accordance with the guidance given by the Central and State Pollution Control Board and IFC/World Bank EHS guidelines.
- Provision of the solid waste disposal, sanitation and sewage facilities at all site of the construction/labour camps to avoid or minimise 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 substation sites. Also contractor should be responsible to enhance the quality of environment.
- Adequate supply of hot and cold water should be provided to the urinals, toilets and wash rooms of the workers' accommodation
- Contractor should provide garbage bins to all workers accommodation and construction sites, for dumping wastes regularly in a hygienic manner in the area.

Liquid Waste Disposal

173. There will be no oil or chemical waste generated during the construction of transmission line, hence no mitigation is required. For substations, the transformer oil is the main constituent of the liquid stored. The transformer oil shall be stored as per IS - 1866/2000[20] and IEC-60422/1998[21] codes- and any waste oil shall be disposed as per Hazardous Waste (Management, Handling, Trans-boundary Movement) Rules 2009 and any waste oil removed from transformer will be sold to government approved recycler and will not be disposed off in the ground or any rivulet/stream as per EMP.

174. Environmental impacts identified during construction are limited in magnitude and are temporary. The scale of the works is relatively minor and the project areas proximity to the work force means that very small construction camps comprising 4-5 persons are required for transmission lines whereas for substation sites, there will be larger labor camps comprising of upto 20-25 persons.

175. Fuel and other lubricants will need to be stored at the construction sites. Best industry practice will be required to ensure that accidental spills and discharge to the soil and aquatic environments are prevented. Any fuel (including drums and tanks, if any) should be placed at least 50 m away from waterways and no equipment is to be refueled within this distance.

176. Only trained personnel would undertake handling of fuel and lubricants. In addition, machinery should be properly maintained and waste oil and oil filters must be disposed of to meet best industry practice. This will be the EPC contractor's responsibility.

177. At the completion of work, the contractor will be required to rehabilitate and clean up all work sites. This includes repairing damage to pavements, roads, and drainage systems. All waste is to be removed from the sites. The contractor and the RVPN will be responsible for implementing this requirement.

Hazardous Waste Disposal

178. During the transmission line construction, generation of any hazardous waste generation is not expected.

5.1.4 Environmental Impacts Associated with Operational Stage

179. Once transmission lines and sub-stations are fully erected, fencing, danger signs must be installed at each that clearly identify and warn of the dangers of climbing into an operational substation or digging into operational underground cable. Signage meeting the IEEE[22] standards will need to be placed on all underground cable openings and overhead

[20] Code of Practice for Electrical Maintenance and supervision of Mineral Insulating oil in Equipment
[21] Supervision and maintenance guide for mineral insulating oils in electrical equipment
[22] Institute of Electrical and Electronics Engineers.

power lines warning of the electrical hazards. EPC contractor will also need to advise the community about the location and associated dangers of the same.

Electric Shock

180. This may lead to death or injury to the workers and public in the area. This can be minimised or avoided by providing security fences around sub-station, establishment of warning signs, and careful design using appropriate measures such as effective earthing at towers to minimise electric shocks/hazards.

Noise Generation

181. Nuisance to the community around the substation site can occur during the project construction and operations stage. Although, there are no villages in their vicinity of 100 m, RVPN may provide appropriate noise barriers if rqeuired and deemed essential.

Maintenance of Transmission Line and Substation

182. Possible exposure to electromagnetic interference could occur during these activities. Design of transmission line should comply with the limits of electromagnetic interference from overhead power lines in line with EHS guidelines.

Oil Spillage

183. 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 110% 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. RVPN maintains account of the usage of oil, has inbuilt technical methods and procedures for oil monitoring mechanism, and has mitigation plan for any oil spillage. Storage of bulk fuel should be on covered concrete pads away from the public and worker camp. Fuel storage areas and tanks must be clearly marked, protected and lighted. Contractors should be required to have an emergency plan to handle fuel and oil spillage. As required by law, RVPN has procedures for disposal of waste oil to approved recyclers.

Sulphur Hexa fluoride (SF_6) Leakage[23]

184. Very high grade sealing system and erection methodology to keep the loss of SF_6 within 0.01% every year. 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 are maintained in each sub-station. This allows tracking of any release of SF_6 gas to the atmosphere. SF_6 handling is part of technical specification for contract and required design and routine testing by the manufacturer of the circuit breaker.

[23] Level of SF6 leakage are covered by IEEE C37.122

6.0 ANALYSIS OF ALTERNATIVES

6.1 RVPN Approach for Planning of a subproject

185. At the planning stage itself, one of the factors that govern the establishment of the transmission line is the infringement of populated/forest/cultivated area and scarce land. Wherever such infringements are substantial, different alternative options are to be considered. During route alignment all possible efforts are made to avoid the populated/forest/cultivated area infringement completely or to keep it to the barest minimum. Whenever it becomes unavoidable due to the geographical locations/terrain, mitigation costs involved towards avoidance needs to be worked out. While identifying the transmission system for a generation project or an expansion of transmission system, preliminary route selection is done by RVPN based on the interpretation and walk over surveys according to the 1:50,000 Maps/Topographical maps of the area. The selected route is easily accessible both in dry and rainy seasons for maintenance point of view.

186. As per Rajasthan State Power Sector Restructuring Project, Environmental Guidelines for Planning, Construction and Maintenance of Transmission Lines (World Bank report) RVPN undertakes the planning of transmission line and sub-station projects in the following steps:

- The Transmission Planning Department identifies requirements for transmission lines and sub-stations, these are then approved by Government of Rajasthan;
- these requirements are passed on to the Corporate office of RVPN, and tentative route mapping is done on Survey of India topographic maps;
- a transect walk is conducted by the engineers for preliminary ground survey;
- detailed route surveys are made, including profiles, control points, obstacle crossings and avoidance of forest areas, habitations, cultural landmarks, etc.;
- the surveyed route is approved by the concerned engineer of RVPN, at this stage the applications are made for required clearances, such as forest and railway crossings, technical compliance with the Electricity Act and Rules is reviewed and assured, and the design features of the towers are prepared; and
- Procurement actions are taken on the basis of the project report of the scheme, simultaneously with the environmental evaluation.

6.2 Methodology for selection of route: environmental view

187. Route selection among alternatives consider requirements of environmental parameters, availability of logistic support during construction, operation and maintenance of transmission lines and specific geographical condition to construct the lines along most feasible routes that were identified based on the relevant topographic maps and walkover survey.

188. For selection of optimum route, the following points are taken into consideration:

i) The route of the proposed transmission lines avoids or minimizes passage through human habitations.
ii) Any monument of cultural or historical importance is not affected by the route of the transmission line.
iii) The proposed route of transmission line does not create any threat to the survival of any community with special reference to tribal community.
iv) The proposed route of transmission line does not affect any public utility services like playgrounds, schools, other similar establishments etc.
v) Minimum cutting of trees and safety of people and property.
vi) Shortest possible length and favourable ground profile.
vii) Avoidance of reserved forest, archaeological and other sensitive areas and unstable ground feature.

viii) Minimizing number of crossing of major rivers / railway lines, national and state highways, overhead EHV power line, number of angle points and communication lines.
ix) Avoidance of rocky stretches and areas reserved for planned and future development.
x) Marshy low lying areas, river beds and earth sleep zones avoided.
xi) Restricted areas such as civil and military air field avoided.
xii) Sufficient shifting of angle points within 100 m. radius during construction is also considered.
xiii) Routing is kept away from large habitations, densely populated areas, animal / bird sanctuaries and hydrocarbon pipelines to the extent possible.

6.3 Alternatives for Subproject Components

6.3.1 Transmission line alignment

189. In order to achieve this, RVPN has undertaken route selection for transmission line in close consultation with representatives from Revenue department, Land Acquisition Department, Departments of Forest (and Department of Wildlife Conservation if required) and the local community. Although under national law, RVPN has the right of way, yet it considers alternative alignments during site selection, with minor alterations often added to avoid environmentally sensitive areas and settlements at the implementation stage.

- As a principle, alignments are generally cited a minimum of 50 m away from settlements, whenever possible, to account for future expansion, and water bodies.
- Similarly, forests are avoided to the maximum extent possible. When it is not possible, a route is selected in consultation with the forest officials that causes minimum damage to existing plantation/forest resources.
- Alignments are selected to avoid wetlands and unstable areas for both financial and environmental reasons.
- In addition, care is also taken to avoid protected parks/forests, bird sanctuaries and any other forest area rich in wild life.
- If a strip plantation along road and canal crossing comprising of manmade forest Is traversed by the line, the line height may be increased to avoid any cutting of plantation trees.

190. Keeping above in mind, various alignments of line were considered taking care of above factors and two alternatives (one Bee line and another alternative) were considered by RVPN for route alignment. As such, two alternatives of each line were studied by the RVPN officials before being proposed to ADB for funding which can be taken up for initial assessment of environmental and social impacts. **Annexure 1** details inventorisation along the proposed major lines. **Table 6.1** provides details about various major transmission lines under Tranche 2. **Tables 6.1A-K** provide details about possible villages that may lie nearby to the proposed transmission line routes (these will not be traversed through or affected in any way).

Table 6.1 Alternative Analysis for Proposed Lines*

No	GSS FROM	GSS TO	Bee line	Proposed Line length	Villages	BEE line not selected as it passes through
1	Baithwasiya GSS	Khimsar GSS	51 km	65 km	List attached Table 6.1A	Avoiding 8 houses
2	Korna	Pokharan	106 km	115 km	List attached Table 6.1B	Stone and lignite mines, Villages, undulating terrain
3	Jaisalmer II	Korna	115 km	135 km	List attached Table 6.1C	Passes through sandunes, over small

No	GSS FROM	GSS TO	Bee line	Proposed Line length	Villages	BEE line not selected as it passes through
						towns Bhikodai, Balar
4	Korna	Ajmer	187 km	210 km	List attached Table 6.1D	Jodhpur city, Airport, Mines, steep hilly area, river
5	Undoo	Sheo	43 km	50 km	List attached Table 6.1E	Nearly straightline avoiding a few houses
6	Dechu	Nathrau	16 km	20 km	List attached Table 6.1F	Passes over 4 houses
7.	Chattargarn	Loonkaransan	65 km	77 km	List attached Table 6.1G	Minor re-alignment to reduce area traversed over the IGNP Canal thereby reducing plantation forest area required for diversion.
8	Chhattargarh	Gajner	80 km	100 km	List attached Table 6.1H	Minor re-alignment to reduce area traversed over the IGNP Canal thereby reducing plantation forest area required for diversion.
9	LILO at Tinwari-Osian line	Bana Ka Bans	20 km	22 km	List attached Table 6.1I	Avoid a few scattered houses
10	LILO on Jodhpur-Akal line	Korna	4 km	4 km	List attached Table 6.1J	-
11	LILO on Jodhpur-Rajwest line	Korna	8 km	10 km	List attached Table 6.1K	Avoid trees etc.

*For some of the transmission line and substation sub-projects, the substation specific topography survey and the transmission line route survey works will be conducted during detailed design. The data regarding soil, topography, contour, land cutting and filling required, distance from water body and distance from major roads, details of forest/non-forest, fruit/non-fruit trees can be affected, land details will be collected by EPC contractor. If any sub-project sites are changed other than those indicated here, supplementary information will be provided the concerned subproject by RVPN to ADB for prior approval.

Table 6.1A List of villages for 220 kV D/C Khinvsar-Baithwasia line

No.	Name of Village	No.	Name of Village
1	Baithwasia	2	Pandit-ki-Dhani
3	Thob	4	Tapoo
5	Magra Nagar	6	Bhakhron-Ki-Dhani
7	Khindakor	8	Haniya
9	Hadman sagar	10	Geengla
11	Sili	12	Dhania
13	Basni Tarda	14	Kurchhi
15	Beniwalon-Ki-Dhani	16	Loonawas
17	Kinjari	18	Khabaniya
19	Godaron-Ki-Dhani	20	Barsaloo-Kalan
21	Papasani	22	Isar Nogra
23	Madhaniyon-ki-Dhani	24	Jasnath Pura
25	Vishnoiyon-Ki-Dhani	26	Hempura

27	Sowano-ki-Dhani	28	Peepliya
29	Panchala Sidha	30	Magari wali Dhaniya
31	Kantiya	32	Joginara
33	Narwa Kalan	34	Narwa Khurd
35	Bhaduon-ki-Dhani	36	Maheshpura
37	Khimsar	38	Berawas

Table 6.1B List of villages for 400 kV DIC Korna-Pokaran line (Quad Moose) 115 KM

No.	Name of Village	No.	Name of Village
1	Korna	2	Jasti
3	Gangawas	4	Rodwa Kalla
5	Rodwa Khurd	6	Hapanada
7	Kalawanada	8	Balau Jati
9	Bhandu Jati	10	Bhandu Charnan
11	Siyadhan	12	Timri
13	Bhojan Ka was	14	Tibnan
15	Rawaji Ki Dhani	16	Phetone Ki Ohani
17	Asha Ka Was	18	Guman Singh Ki Dhani
19	Khirja	20	Bhungra
21	BabutJi Ki Ohani	22	Amti (Nayabera)
23	Suwaliya	24	Raisar
25	Mulji Ki Ohani	26	Devji Ki Dhani
27	Solankiya Talla ki Dhani	28	Kamot Wala Ohora
29	Achal Singh Ka Bera	30	Sandh Ka Ohora
31	Bharamlniyon Ka Bera	32	Someshwar
33	Songriya Ka Ohora	34	Shivdan Singh Ka Bera
35	Jethu Singh Ka Bera	36	Jethaniya
37	laton Ki Dhani	38	Maha Singh Kanodiya
39	Kalau	40	Burkiya
41	Sanwlo Ki Ohani	42	Saktaniyon Ki Ohani
43	Untwaliya	44	Gura
45	Kushal Singh Ki Dhani	46	Kojrajj Singh Ki Dhani
47	Bera Thali	48	Chandsamma
49	Lalpura	50	Lawan
51	Hajron Ki Ohani	52	Oidwaniya
53	Prothar	54	Kerawa
55	Oiddnia	56	Sankhla Sar
57	Pokaran	58	Ramdeora
59	Biramdeora		

Table 6.1C List of villages for 400 kV D/C Korna-Jaisalmer-II (Bhesara) (Quad oose) 135 KM

No.	Name of Village	No.	Name of Village
I.	Koma	2	Gnagawas
3.	Jasti	4	Rodwa Kalla
5	Rodwa Khurd	6	Hapanada
7	Kalawato Ki Dhani	8	Balau Jati
9	Mundon Ki Dhani	10	Sointra

No.	Name of Village	No.	Name of Village
11	Takhat Singh Ki Dhani	12	Siyandha
13	Shergarh	14	Adhuri Bhakari
15	Kumbaro Ki Dhani	16	Phatone Ki Dhani
17	Kisan Singh Ki Dhani	18	Dhrup Singh Ki Dhani
19	Swahalesa Ki Ohani	20	Oholu Ka Ohora
21	Chaba	22	Chohano Ki Ohani
23	Rajputo Ki Dhani	24	Brahmano Ki Dhani
25	Bhomawali Dhani	26	Kumanlyon Ki Dhani
27	Lomhrodo Ki Dhani	28	Chiliwala Ohora
29	Hinduwal Beri	30	Binjaniyo Wali Beri
31	Bheruwali Dhani	32	Baluram Ki Ohani
33	Farid Khan Ki Ohani	34	Binjariyo Ki Ohani
35	PhaIsund	36	Phulasar
37	Mir Khan Ki Dhani	38	Bhikhayon Ki Ohani
39	Dhaman Wali Thali	40	GuraIiya Ohora
41	Moti Ki Dhani	42	Bewara Ka Dhora
43	Neem Ka Dhora	44	Bhatiyon Ki Ohani
4S	Khumlaji Ki Ohani	46	Bhikhodhai
47	Balar	48	Malji Ki Ohani
49	Rajmathai	50	Kanji Ki Ohani
51	Khusal Singh Ki Dhani	52	Hussen Khan Ki Ohani
53	Sodan KMi Ohani	54	Toran Thali
55	Chochu Thali	56	Bhiraj Khan Ki Dhani
57	Badhecho	58	Khelana
S9	Damdama Magra	60	Jagoyoton Ki Dhani
61 '	Rajgarh	62	Rawat Ka Tala
63	Bhesara		

Table 6.1D 765 kV D/c Korna-Ajmer line (HEXA ZEBRA) 210 KM

No.	Name of Village	No.	Name of Village
I.	Jethana	2.	Sarsari
3	Modi Nadi	4	Jetgarh
5	Titri	6	Samla
7	Nayagaon	8	Naharpura
9	Alipur	10	Nagelav
11	Dhawariya	12	Soliya
13	Pilpai	14	Amba
15	Kisanpura	16	Amarpura
17	Shyapura	18	Karnos
19	Ratangarh	20	Rup Nagar
21	Ramgarh	22	Jhalamad
23	Phulsagar	24	Devgarh
2S	Bhimgarh	26	Bhagatpura
27	Kanyakheri	28	Jogatiya
29	Khera	30	Ras
31	Kerpur	32	Jawangarh
33	Nimbeti	34	Patan
35	Kundal	36	Pratapgarh
37	Tunkara	38	Asorlai
39	Balara	40	Mundawa

No.	Name of Village	No.	Name of Village
41	Ghorawar	42	Balunda
43	Jalthara	44	Banjakudi
45	Ramawas Kalan	46	Ramawas Khurd
47	Birol	48	Malpuriya
49	Bikrai	50	Lototi
51	Chantera Magara	52	lhak
53	Kunprawas	54	Pipliya
55	Talkiya	S6	Thakurwas
57	Karoliya	58	Raniwal
59	Pipli Bera	60	Patwally Bera
61	Ber Khurd	62	Udliya
63	Jaswant Sagar	64	Devasiyon Ki Dhani
65	Keriyon Ki Dhani	66	Bhawi
67	Kalauna	68	Rampuriya
69	Birdwas	70	Ghana Magara
71	Tilwasani	72	Boya)
73	Kaparada	74	Jun Ki Dhani
75	Rawar	76	Thapani Ki Dhani
77	Sindhyon Ki Dhani	78	Beldaron Ki Dhani
79	Ramsani	80	Bhaniya
81	Khari Khurd	82	Khari KalJan
83	Pitasani	84	Goliya
85	Singasni	86	Martuka
87	Rajola	88	Lalawas
89	Kharabera Bhimatan	90	Mori Suthara
91	Mori Manana	92	San walta Khurd
93	San walta Kallan	94	Antan
95	Khaeabera Purohitan	96	Lalki
97	Doli Kankani	98	Kankani
99	Nimbla	100	Sikarpura
101	Sikarpura Naya	102	Raikon Ki Dhani
103	Choudhriyon Ki Dhani	104	Khedo
105	Sar	!06	Sarencha
107	Jatani Basni	108	Chanvra KI Dhani
109	Thumri Dhani	110	Meghwalon Ki Dhani
1 I I	Bhandu Khurd	112	Bhandu Kallan
113	Jatiyasni	114	Khadala
115	Khatawas	116	Lunawas Charnan
117	Lunawas Khurd	118	Rabdiya
119	Bevta	120	Lunawas Khara
121	Vishnu Nagar	122	Gulla Ram Ki Dhani
123	Piraron Ki Dhani	124	Chichrali Ki Dhani
125	Godawas	126	Chichrali
127	Sonagiri	128	Babaji Ka Paraliya
129	Rajgharon Ki Dhani	130	Bishnoiyon Ki Dhani
131	Dhamata Paraliya	132	Paraliya
133	Ala Ki Dhani	134	Koma

Table 6.1E List of villages – 220 kV line Undo GSS – Sheo GSS

No	Name of Village	No	Name of Village
1	Sheo	2	Fatenara

3	Jaranada, Ambabadi	4	Panj Raj Ki Basti
5	Sawai Singh Ki Basti	6	Balai
7	Bishu Kala	8	Bisu Khurd
9	Ratnuyo Ki Dhani	10	Katariyo Ki Dhani
11	Rupa Sariya, Amar Singh Ki Dhani	12	Ratari Bhiyad
13	Nanasat, Sarano Ki Dhani	14	Kanasar Golai
15	Saron Ka Tala	16	Jivaniyon Ki Basti
17	Kashmir	18	Jakharo Ki Dhani
19	Kanasar	20	Samdariya
21	Gorsiyon Ki Dhani	22	Undoo

Table 6.1F List of villages - 132 kV Dechu-Nathrau line for 132 kV GSS Nathrau.

No	Name of Village	No	Name of Village
1	Dechu	2	Thadiya
3	Kushlawa	4	Asarlai
5	Chordiya	6	Hari Singh Nagar
7	Barnau	8	Gilakore
9	Ekalkhori	10	Bhojakore
11	Peelwa	12	Bher
13	Samrau	14	Chamu
15	Sadulnagar	16	Sukhmandla
17	Nathrau		

Table 6.1G List of villages - 132 kV Chattargarh - Loonkaransar.

No	Name of Village	No	Name of Village
1	Chattargarh	2	Sadolai
3	Ajitnama	4	Lakhawar
5	Khokhrana	6	Rojha
7	Loonkaransar		

Table 6.1H List of villages - 220 kV D/C Chattargarh - Gajner.

No	Name of Village	No	Name of Village
1	Gajner	2	Titaron Ka Bada
3	Kodamasar	4	Kawani
5	Maharsar	6	Karnisar
7	Bariya	8	Motagarh
9	5LKD	10	Badawana Talai
11	Himarwala	12	Chhattargarh

Table 6.1I List of villages - LILO of 132 kV Tinwari-Osian line for 132 kV GSS Bana Ka Bas.

No	Name of Village	No	Name of Village
1	Berdon Ka Bas	2	Ramnagar
3	Cherai	4	Bana Ka Bas
5	Khetasar	6	Bhalasariya
7	Gopasariya	8	Khabara Khurd

9	Khabara Kalan	10	Beh Charnan
11	Jetipura	12	Partapnagar
13	Bala Ki Dhani		

Table 6.1J List of villages - LILO of Both Circuit from 400 kV D/C Jodhpur New-Akal line at 765 kV GSS Korna (Quard Moose) 4 KM

No.	Name of Village	No.	Name of Villae
1.	Korna	2	Badiyon Ki Dhani
3.	Jasti	4	Dhandhaniya

Table 6.1K List of villages - LILO of One Circuit from 400KV D/C Jodhpur-Rajwest line at 765 kV GSS Korna (Twin Moose) 10 KM

No.	Name of Village	No.	Name of Village
1.	Koma	2	Badiyon Ki Dhani
3.	Jasti	4	Dhandhaniya

Topo sheet

191. The Survey of India (SOI) topographic maps were referred during the study of the transmission line route within 10 km of both sides of the proposed route. The data to be covered includes all statutory requirements for Power and Telecommunication Coordination Committee (PTCC) approval.

6.3.2 Grid Substations

192. For selection of appropriate site for substation, the following points are taken into consideration:

i) Site selection should consider seismicity and geography of the local area; the area should not be prone to landslide or be unstable.

ii) Construction activities do not adversely affect the population living near the proposed substations and does not create any threat to the survival of any community with special reference to tribal community etc.

iii) The location of substation does not affect any monument of cultural or historical importance.

iv) No resettlement of households by the substation site, no loss of livelihoods, siting of transformers away from schools, hospitals and other sensitive receptors, with due consultation with the community and local government units concerned.

v) Transformers and other equipment specifications compliant with GoI rules/regulations and International Electro-technical Commission (IEC) standards shall be followed.

vi) Construction techniques and machinery selection shall be made with a view to minimize ground disturbance.

vii) While planning for substations, drainage lines shall also be marked and studied to avoid seepage/leakages and pollution of water sources and springs etc.

viii) Substation location/design to ensure that noise will not be a nuisance to neighbouring properties. Provision of noise barriers if needed near substation sites will be made.

ix) Substation design will comply with the limits of electromagnetic interference within floor area. Security fences will be erected around substations. Warning signs shall be displayed.

x) RVPN shall adopt good practices and shall always strive for a high standard of house-keeping for its substations and ancillary facilities.

xi) RVPN shall incorporate the best technical practices to deal with environmental issues

in its working.

xii) Design of substations shall be made so as to include modern fire control systems/firewalls. Provision of fire-fighting equipment would be made to be located close to transformers, switchgears etc.

193. Similarly, RVPN has selected available government lands that are available in the area with no or very little vegetation for grid substations**. Table 6.2** provides locational details about Grid substations proposed under Tranche 2. The **Table 6.2** also shows total land requirement for Tranche 2 GSS subprojects.

Table 6.2 Locationsof proposed GSS's and Land Area

No	Substation Name	Latitude	Longitude	Altitude in ft	Status
1	Baithwasiya GSS	26°48'05.05" N	73°50'16.4" E	1033 ft	Line connectes new bay inside the GSS.
2	Khinvsar GSS	26°58'49.25" N	73°25'42.85" E	975 ft	Line connectes new bay inside the GSS.
3	765/400/220kV new substation	26° 13' 22.7" N	72°35'00.5"E	545 ft	New government land – 64 ha
4	765/400/220 kV Ajmer GSS	26°17' 19.03" N	74°27" 23.27"E	1380 ft	Under construction by Powergrid. Line connects to existing bay inside substation. It is not an associated facility.
5	400/220kV substation Pokaran	27 °00' 59.4" N	71°58'54.8" E	756 ft	Expansion-govt land 27.2 ha
6	400 kV Jaisalmer II	26°35' 05.9" N	71°30'03.6" E	1014 ft	29 ha. Govt land. Line connects to existing bay inside substation. It is not an associated facility.
7	220/132kV new substation- Sheo new	26°11' 28.5" N	71°15'01.7"E	874 ft	New government land – 6.4 ha
8	132/33 kV Undoo old GSS	26°19'15.29"N	71°39'21.30"E	752 ft	New land – 6.4 ha
9	220/132 kV Dechu GSS	26°46'18.72"N	72°20' 1.32"E	938 ft	Line connectes new bay inside the GSS.
10	132/33 kV new substations at Nathrau, Jodhpur	26 46' 42.89" N	72 30' 7.90"E	892 ft	New government land-3.5 ha
11	220/132 kV new substation at Chattargarh, Bikaner	28°39" 41.07" N	73°07" 25.15"	572 ft	220 kV substation on government land 6.4 ha
12	132/33 kV new substations at Bana ka Bans, Jodhpur (Town)	26°39"30.17 N	72°46' 8.86" E	903 ft	Govt Land identified – 3.6 ha
13	132/33 kV new substations at Kitasar, Bikaner	28°04' 28.70" N	74°13' 22.33" E	944 ft	Govt Land identified- 3.5 ha.
14	132/33 kV new substations at Sangarh, Jaisalmer	26°31' 50.48" N	71°9' 50.93" E	867 ft	Govt Land Idenified – 3.5 ha
15	132/33 kV Gajner GSS	27°58"16.88" N	73°3' 37.54" E	725 ft	Line connectes to new bay inside the GSS
16	132/33 kV Loonkaransar GSS	28 29'00.55"N	73 43'32.59" E	588 ft	Line connectes new bay inside the GSS.

6.3.3 Distance from Sensitive Receptors

194. Distance from various receptors is given in **Table 6.3** below. The table also lists the approximate number of trees that will be affected – which in technical terms may mean that lopping may be involved instead of cutting it since the towers can be placed in flexible manner.

Table 6.3: Approximate distance * of Tranche-2 transmission subprojects from sensitive receptors**

No	Sub-Project Components	Minimum Distance of transmission line from nearby village (Kilometer)	Number of Villages	Number of Towers	Name of Crops	Number of Trees Affected ***	Distance from river	Distance from Railway Line	Distance from Highways	Distance From national park and sanctuary	Distance from reserved forest	Distance from school	Distance from hospital	Distance from crematorium
1	765 kV double circuit transmission line from Korna to Ajmer (210 km)	Average 3-4 km	72	640	Bajara, Gawar, Moong, Moth, Till	1200	Seasonal river- Luni river crossing	Rail-road crossing	Major road 12 crossings	105 km from Khinchan Bird sanctuary and 255 km from Kumbhalgarh Sanctuary	None	Average 3 km	Average 3 km	Average 5 km
2	LILO of 400 kV Raj West – Jodhpur at Korna (10 km)	Average 1 km	2	30	Bajara, Gawar, Moong	2	NA	NA	NA	As above	As above	Average 3 km	Average 3 m	Average 5 km
3	LILO of 400 kV Akal – Jodhpur at Korna (4 km)	Average 1 km	1	13	Bajara, Gawar, Moong	0	NA	NA	NA	As above	As above	Average 3 km	Average 3 m	Average 5 km
4	400 kV double circuit transmission line from Korna – Pokaran (115 km)	Average 3-4 km	30	350	Bajara, Moong, Moth, Gwar, Sonamukhi	470	Seasonal river	NA	3 NH crossings	45 km from Khinchan Bird Sanctuary and 105 from Desert National Park	NAV	Average 3 km	Averge 3 km	Average 4 km

No	Sub-Project Components	Minimum Distance of transmission line from nearby village (Kilometer)	Number of Villages	Number of Towers	Name of Crops	Number of Trees Affected ***	Distance from river	Distance from Railway Line	Distance from Highways	Distance From national park and sanctuary	Distance from reserved forest	Distance from school	Distance from hospital	Distance from crematorium
5	400 kV double circuit transmission line from Korna – Jaisalmer II (135 km)	Average 4 km	28	420	Khejadi, Jaal, Babul, Neem	490	NA	NA	2 NH crossings	Jaisalmer II is about 51 km from Fossile park.	NAV	Averg ae 3 km	Averg e 2 km	Averag e 4 km
6	220 kV double circuit transmission line from Sheo – Undoo (50 km)	1-2.5 Kilometer	26	152	Bajara, Gawar, Moong, Moth, Till	180	NA	NA	2 Kilometer	Undoo 106 km from Desert National Park	None	2 Kilom eter	2 Kilom eter	2 Kilome ter
7	LILO of 220 kV Akal – Barmer at Sheo (25 km)	1 km	5	80	Bajra, Moong, Till, Moth	10	NA	NA	NH 15 1 km	Same as above	None	2 km	3 km	5 km
8	132 kV LILO double circuit transmission line from Sheo – Jaisalmer (5 km)	1 km	2	12	Bajra, Moong, Til, Moth	4	NA	NA	NH	Same as above	None	1 km	1 km	3 km
9	220 kV double circuit transmission line from Baithwasia – Khinvsar (65 km)	Average 1 km	22	200	Bajara, Moong, Moth, Till, Gawar, Cotton,	235	NA	NA	One state highway MDR 37	65 km from Khinchan Bird sanctury	NAV	1 km	1 km	1 km

No	Sub-Project Components	Minimum Distance of transmission line from nearby village (Kilometer)	Number of Villages	Number of Towers	Name of Crops	Number of Trees Affected ***	Distance from river	Distance from Railway Line	Distance from Highways	Distance From national park and sanctuary	Distance from reserved forest	Distance from school	Distance from hospital	Distance from crematorium
					Mustard									
10	LILO 2 km D/C Jaislamer-Sheo Line (at Sangarh 132 kV GSS, Jaisalmer)	1 km	1	0	Bajara, Moong	0	NA	NA	MDR 36 crossing	51 km from Fossile Park	NAV	500 m*	500 m*	1 km
11	LILO 20 km D/C line 132 kV Tinwari-Osian Line (at Bana Ka Bas 132 kV GSS, Jodhpur	Average 1 km	5	65	Moth, Till, Gawar	25	NA	NA	10 km from SH 61	60 km from Khinchan Sanctuary	NAV	1 km	1 km	1 km
12	LILO 3 km D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner)	I km	1	10	Moth, Bajara, Till, Moth	2	NA	NA	NH 11 2 km	150 km from Khinchan bird sanctuary	NAV	1 km	1 km	1 km
13	20 km 132 kV D/C line from 220 kV GSS Dechu Nathrau Jodhpur	200 m	17	60	Moong, Til	73	NA	NA	NH 2 km from NH114	40 km from khinchan bird sanctuary	NAV	1 km	NAV	NAV

No	Sub-Project Components	Minimum Distance of transmission line from nearby village (Kilometer)	Number of Villages	Number of Towers	Name of Crops	Number of Trees Affected ***	Distance from river	Distance from Railway Line	Distance from Highways	Distance From national park and sanctuary	Distance from reserved forest	Distance from school	Distance from hospital	Distance from crematorium
14	100 km D/C line from 220 kV Chhattargarh Gajner Bikaner	1 km	13	350	Bajara, gawar, till moth	80	IGNP canal crossing	6 km	State highway 3 and National Highway 15	4 km from Gajner WLS	IGNP crossing	5 km	5 km	5 km
15	77 km D/C 132 kV Chattargarh Loonkaransaar	2 km	7	235	Bajara, ground nut, gwar, till moth	30	IGNP canal crossing - 2	0.5 km	NH 15 crossing	None	IGNP crossing	1.5 km	2 km	2 km
16	132 kV kV Dechu Nathrau line	1 km	4	65	Bajra, Gwar, Moong, Moth	17	Drain – I km	20-30 km	1 km	None	NAV	0.2-0.5 km	0.5 km	1 km
17	LILO of 20 km 132 KV S/C Tinwari-Osian Line	1 km	3	65	Bajara, Moong, Moth, Till, Wheat, Groundnut, Arandi, Chillies, Jeera, Vegeta	12	1 km	9 km	10 km	-	-	2 km	3 km	1km

No	Sub-Project Components	Minimum Distance of transmission line from nearby village (Kilometer)	Number of Villages	Number of Towers	Name of Crops	Number of Trees Affected ***	Distance from river	Distance from Railway Line	Distance from Highways	Distance From national park and sanctuary	Distance from reserved forest	Distance from school	Distance from hospital	Distance from crematorium
					ble, Lemon									
18	LILO 2 km Jaisalmer-Sheo Line	1 km	1	6	Bajara, Moong, Moth, Till, Groundnut, Sarsoo, Cotton, Jeera, Arandi	4	-	-	0.5 km	-	-	0.3 km	0.2 km	0.2 km

* Most distances are more that the required distances specified as per Central Electricity Authority (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electrical Lines) Regulations 2008

**For some of the transmission line and substation sub-projects, the substation specific topography survey and the transmission line route survey works will be conducted during detailed design. The data regarding soil, topography, contour, land cutting and filling required, distance from water body and distance from major roads, details of forest/non-forest, fruit/non-fruit trees can be affected, land details will be collected by EPC contractor. If any sub-project sites are changed other than those indicated here, supplementary information will be provided the concerned subproject by RVPN to ADB for prior approval.

*** Trees Affected – Not all trees will be cut. Some will only be lopped and will be determined during detailed survey to be done by EPC Contractor

Other: Not Known/NAV: Not available with RVPN currently without detailed survey

NA – Not applicable

6.3.4 Distance from Reserve Forest/Protected Areas/national Park/Sanctuary

195. As per primary survey, the transmission lines are not passing through and protected areas. The nearest wildlife sanctuary is Desert National Park (27°04'21.53" N 10° 53'03.4" E) in Jaisalmer and Barmer districts which is around 35 km away from the nearest project transmission line. The Pokharan GSS is situated about 107 km and Sangarh about 57 km. This sanctuary and forest area does not have any negative impact due to project activities. The 220 kV Chattargarh – Gajner line connects to bay at Gajner GSS that is situated 4 km awayfrom Gajner Wildlife Sanctuary. However, RVPN will submit the SOI toposheet marked with transmission line alignment to the forest department for getting exact location of forest lands marked on the map along the alignment in the area.

196. Similarly, Akal Wood Fossil Park (26°49'34.94" N and 71°02' 32.45" E) is located at about 2 km aerial distance from Akal GSS and from 17 km from the main Jaisalmer city on Barmer Road, the park is famous for its Fossil remains of Jurassic era till 130 million years ago. The fossil trunks lie scattered in this park. Fossilized tree trunks are of various sizes with the largest being 13 meters in length and 1.5 meters in width. Covering about 10 sq. km of bare hillside, the Fossil Park contains 25 petrified trunks in total. The park has 21 hectares of preserved area. It is about 33 km from Sangarh and about 51 km from Jaisalmer II substation. The distance from the transmission lines and substations to the national parks/protected areas/reserve forests are given in the **Table 6.4**.

Table 6.4: Distance from National Parks, Sanctuaries and Forest reserves (Protected Areas) for all Tranche 2 subprojects

No	Sub-Project components	Distance from National Park and Sanctuaries/Reserve Forest areas
A	Transmission Lines:	
1	765 kV double circuit transmission line from Korna to Ajmer (210 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
2	LILO of 400 kV Raj West – Jodhpur at Korna (10 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
3	LILO of 400 kV Akal – Jodhpur at Korna (4 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
4	400 kV double circuit transmission line from Korna – Pokaran (115 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
5	400 kV double circuit transmission line from Korna – Jaisalmer II (135 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment. The route passes through the wind farm area.
6	220 kV double circuit transmission line from Sheo – Undoo (50 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
7	LILO of 220 kV Akal – Barmer at Sheo (25 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
8	132 kV LILO double circuit transmission line from Sheo – Undoo (5 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
9	132 kV LILO double circuit transmission line from Sheo – Jaisalmer line (5 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
10	220 kV double circuit transmission line from Baithwasia – Khinvsar (65 km)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
11	LILO 2 km D/C Jaislamer-Sheo Line (at Sangarh 132 kV GSS, Jaisalmer)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
12	LILO 20 km D/C line 132 kV Tinwari-Osian Line (at Bana Ka Bas 132 kV GSS, Jodhpur	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
13	LILO 3 km D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner)	No sanctuary/reserve forest within 10 km vicinity of the line alignment.
14	20 km 132 kV D/C line from 220 kV GSS Dechu	No sanctuary/reserve forest within 10 km vicinity of the line

	Nathrau Jodhpur	alignment.
15	100 km 220 kV Chhattargarh Gajner line, Bikaner	4 km from Gajner Wildlife sanctuary, a small sanctuary cohabitated with old fort at Gajner city
16	77 km 132 kV Chhattargarh to Loonkaransar line	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
B	Substations:	
1	765/400/220kV new substation with 3x1500 MVA transformers at Korna	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
2	400/220kV substation with 2x500 MVA transformers at Pokaran (upgrade)	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation. About 100 km from Desrt National park.
3	220/132kV new substation with 2x160 MVA transformers at Sheo	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
4	220/132 kV new substation at Chattargarh, Bikaner with associated transmission lines	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
5	132/33 kV new substations at Sangarh, Jaisalmer district with associated transmission lines	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.. Lies at about 30 km from Akal fossil park.
6	132/33 kV new substations at Bana ka Bans, Jodhpur district with associated transmission lines	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
7	132/33 kV new substations at Kitasar, Bikaner district with associated transmission lines	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
8	132/33 kV new substation at Nathrau, Jodhpur district with associated transmission lines	No wildlife sanctuary or ecological sensitive area within the 10 km vicinity of the substation.
9	Augmentation of 2x500 MVA transformers at Akal	Civil work within existing Akal grid substation. No associated environment impacts.
10	Augmentation of 2x500 MVA transformers at Jaisalmer II	Civil work within existing Jaisalmer grid substation. No associated environment impacts. Two wind power turbines are located just outside the substation boundary.
11	Extensions of the existing Jaisalmer, Ajmer, Undoo, Baithwasia and Khinvsar substations	Civil work within existing Jaisalmer, Ajmer, Undoo, Baithwasia, Khinvsar grid substations. No associated environment impacts.

197. Details on Important Bird Area (IBA) for Khinchan Bird Sanctuary and Desert National Park is attached in **Annexure 8**.

7.0 ENVIRONMENTAL MANAGEMENT PLAN

7.1 Mitigation

7.1.1 Climate Risks Adaptation Measures

198. Power transmission networks are the most vulnerable to storms and extreme weather events. Improving the overall condition and efficiency of the power delivery system can serve to improve the resiliency of the system, and help hasten recovery from weather-related outages. Substations are extremely vulnerable to flood risks therefore they must be designed to overcome the risks of flooding.

199. The following measures are will be considered to adapt to extreme weather events and climate variability.

i. Flood protection will be considered for all substations if necessary. Extreme rainfall events have been observed to be increasing in the recent decades. The design flood will be based on projected worst-case climate scenarios.

ii. Lightning surges may cause serious damages to the expensive equipment in the power system (e.g., generators, transformers, etc.) either by direct strokes on the equipment or by strokes on the transmission lines that reach the equipment as traveling waves. Lightning protection will be implemented to provide protection against surges, as appropriate.

iii. All transmission lines will be built to withstand strong winds. Resources will be allocated to emergency planning and restoration.

iv. High temperatures will cause overhead transmission line to sag. A minimum overhead clearance of transmission lines shall be maintained for safety. Material to reduce thermal sag (e.g., aluminum conductor composite core – ACCC) will be specified during project design. Implement measures to reduce sag if necessary. For proper transmission of power in overhead transmission lines, temperature control and sag monitoring are the two major parameters to be kept in mind.

v. Higher temperatures increase power demand and result in increased resistance of transmission lines. Adaptation measures will be taken, including: i). Inspection of substations for peak load readiness and identification of load relief projects with projected overloads; ii). Identification of potential thermal overloads and low voltages; iii). development or updating of emergency load transfer and contingency switching plans; iv). verification of the availability of capacitor banks.

vi. Higher temperatures will result in accelerated aging of transformers. Adaptation measures to be taken include: i). Implementing condition-based maintenance strategy aimed at estimating the remaining life based on online measurements, prevailing system operating conditions, and history of thermal/mechanical stresses; ii). retrofitting and reinforcing existing infrastructures with more robust construction and control solutions that can better respond to extreme weather and load patterns; iii). deploying automated restoration procedures that can bring the system back faster after the extreme weather causes damage and service interruptions.

7.1.2 Environmental Management Plan (EMP)

200. The Environmental Management Plan (EMP) for the project is attached as **Annexure 2**, which identifies feasible and cost - effective measures to be taken to reduce potential significant, adverse, impacts to acceptable levels. Here, proper mitigation measures are proposed for each potential impact, including details on responsible parties for implementation of mitigation measures and supervision.

Environmental Impact Matrix

201. The environmental impacts management matrix has been prepared for the project that discusses the anticipated impacts, monitoring requirements, and development of mitigation measures with respect to the following stages: (i) pre-construction, (ii) construction, and (iii) operation and maintenance. Detailed, site-specific mitigation measures and monitoring plans were developed and will be implemented during the project implementation phase. A summary environmental impact matrix and the mitigation measures are mentioned in **Table 7.2**.

Table 7.2: Environmental Impact Matrix

Sl. Nº	Environmental attribute	Potential impacts	Nature of impact	Magnitude of impacts			Mitigation measures	Implementation and Monitoring
				Low	Medium	High		
A.	**Physical Resources**							
1.	Topography	Change in the surface features and present aesthetics due to the construction of the project.	Direct/Local/ irreversible		X		The surface soil will be restored to normal slope after tower erection. If there is any excess soil, it shall be disposed off at suitable location. Any loss of vegetation will be attended by RVPN as per existing GoR norms. Within the sub-station, the excess soil will be disposed off in consultation with RVPN as per EMP.	During construction activity.
2.	Climate	No impact on the climatic conditions	Direct/Local/ irreversible	X			No impact on the climatic conditions, hence no mitigation is required.	
		Monitoring of SF_6 gas from Electrical Sub-stations.	Direct/Local/ irreversible	X			Proper record of all SF_6 leakages in sub-stations kept for record.	During Construction and Operation.
B.	**Environmental Resources**							
1.	Air Quality	Project will have marginal impact on air quality during the construction period due to increase in the dust emission.	Direct/Local/ reversible	X			Water sprinkling at construction site, limited bare soils, maintenance of vehicles.	During construction activity.
2.	Noise	Noise due to general construction activities.	Direct/Local/ reversible	X			Restriction of noise generating activities at night and use of personal protective equipment like ear plugs, mufflers.	During construction activity.
		Noise arising from corona noise from conductors.	Direct/Local/ reversible	X			Monitoring of possible corona noise to identify and correct problems.	During operational phase.
3.	Surface and Ground Water quality	Runoff from the construction site.	Direct/Local/ reversible	X			Careful siting of towers, and access roads.	Before and during construction activity.
		Domestic wastewater from construction sites.	Direct/Local/ reversible	X			Domestic waste treatment by providing septic tank/soak pits at substation. For tower locations, it	During construction and operation.

Sl. Nº	Environmental attribute	Potential impacts	Nature of impact	Magnitude of impacts			Mitigation measures	Implementation and Monitoring
				Low	Medium	High		
							will be temporary sites.	
4.	Soils and Geology	Soil erosion due to tower erecting and clearing of vegetation in the RoW and access roads.	Direct/Local/ reversible		X		Avoiding sites, which are prone to soil erosion. Levelling of tower construction sites. Use of few access roads. Rehabilitation and stabilisation of disturbed land at the sub-stations.	During and after the construction activity.
		Damage due to seismic activity.	Direct/regional/ reversible	X			Site selection and proper tower foundation design considering the geological conditions and seismicity of the area.	Before the construction activity.
C.	**Ecological Resources**							
1.	Terrestrial Ecology	Loss of vegetation.	Direct/Local/ reversible		X		Location of towers on non-cultivable land area. Selection of few access roads. Compensation for crop and trees to villagers. The tree planting for forest land diverted to non-forest and trees felled will be done by the forest department and paid by RVPN. Canal based strip manmade forest plantations will be afforested as per GOI norms	Before the construction phase.
2.	Terrestrial Fauna	Disturbance to the local fauna during construction.	Direct/Local/ reversible	X			Wildlife routes and their habitats have been avoided as far as possible during the route selection. Minimise encroachments, and indirect impacts.	Before and during construction phase.
	Avifauna	Disturbance to the local fauna during operation.	Direct/Local/ reversible	X			Monitoring of line especially for bird strikes during the operation and use of deflectors if required.	During operation phase
3.	Aquatic Ecology	No significant impacts envisaged.	Direct/Local/ reversible	X			Disposal of construction waste and other waste to avoid polluting the river and streams.	Before and during construction phase
D.	**Human Environment**							
1	Fires/Faults	Fires, explosion and other accidents at the route	Direct/Local	X			Use of personal protective equipment during construction. By	During construction and operation phase

Sl. Nº	Environmental attribute	Potential impacts	Nature of impact	Magnitude of impacts			Mitigation measures	Implementation and Monitoring
				Low	Medium	High		
		alignment of transmission line.					lopping and chopping of trees fire hazards will be minimised during maintenance period. Regular inspection of lines for faults prone to accidents.	
2.	Health and Safety	Exposure to electromagnetic fields	Direct/Local/ continuous	X			Alignment route away from the settlement. No houses in the immediate vicinity and will be allowed in the RoW of the alignment. No further mitigation required.	Before and after the construction phase.
3.	Agriculture	Permanent and temporary loss of agriculture land due to tower erection and due to access routes.	Direct/Local/ reversible	X			Avoid prime agriculture land. Assessment of land required and compensation. Construction activity after crop harvesting and selection of few access routes.	Before and during construction phase.
4.	Socio-economics	Beneficial impacts job opportunities during construction phase	Direct/regional		X		Unskilled labour and indirect benefits. Overall economic growth of the region.	During operational phase
5.	Resettlement	Resettlement of any house falling along the RoW.	Direct/Local/ reversible	X			Route alignment is selected in such a way that there is no resettlement issue.	Before the construction phase.
6.	Cultural sites	No archaeological, historical or cultural important sites are affected by the construction of the lines.	Direct/Local/ reversible	X			No archaeological, historical or cultural important sites are affected.	--
7.	Traffic and Transportation	Traffic congestion due to movement of construction vehicles.	Direct/Local/ reversible	X			Proper traffic signs at the construction site, ensuring availability and maintenance of proper access roads.	During construction phase
8.	Solid Waste Generation	Probability of Surface and ground water pollution.	indirect/Local/ reversible	X			Minimisation, reuse and recycle whenever possible. Final wastes to be collected and disposed off in compliance with applicable regulations and rules.	During operation phase

7.1.3 Critical Environmental Review Criteria

(i) Loss of irreplaceable resources

202. The transmission projects do not involve any large scale excavation and land is lost to the extent of 0.2-1 m^2 for each tower foundation. Rest of the area under the tower continues to be under use by the land owner. Forest cover felled in the Right-of-Way (RoW) is allowed to regenerate except in 30-52 metre (depending on ROW for line) wide strips, after construction work is over. The compensatory afforestation of equal to double the area of forest land under the RoW would be undertaken if required. The EMP includes compensation for the loss by minimising the impact of loss of vegetation as per existing norms of GoR and MoEF&CC. Thus, there will be no net "Biodiversity Loss" due to project implementation due to felling of trees. According to GOI rules, compensatory afforestation may be raised over degraded forest land twice in extent of the forest area being diverted/dereserved for a transmission line project. (Source: http://moefrolko.org/rule3.htm)

(ii) Accelerated use of resources for short-term gains

203. The project will not use any natural resources occurring in the area during construction, operation and maintenance phases. The construction material such as tower parts, cement etc. shall come from factories while the excavated soil shall be used for backfilling and revetment to restore the surface. Thus the project shall not cause any accelerated use of resources for short term gains.

(iii) Endangering of species

204. No endangered species of flora and fauna exist in the project area as well as in the affected forest thus there seems to be no possibility of endangering/causing extinction of any species.

(iv) Promoting undesirable rural-to urban migration

205. The project will not cause any submergence or loss of land holdings that normally trigger migration. It also does not involve acquisition of any private land holdings. Hence, there is no possibility of any migration.

(v) Increase in affluent/poor income gap

206. The project will increase availability and reliability of power in Rajasthan state. It is well known that power is a key input to the economic development of any area. Past experience indicates that economic development leads to generation of more jobs which in turn should raise the living standards of poor. Thus the project is expected to contribute in reduction of affluent/poor income gap by providing opportunities for employment and rural based economic activities.

7.1.4 Disaster Management, Health and Safety

Disaster Management

207. Though the state of Rajasthan has not had a major earthquake in recent years, small to

moderate earthquake have been felt in the state. The flood risk in western Rajasthan is lower than that of the other parts of country. The land strata in Jodhpur and Jaisalmer are mostly sandy and do not allow water to flow. Some part of Jaisalmer district is rocky and have seasonal water loggings. Rajasthan State Disaster Management Authority has been formed under the Disaster Management and Relief Department, Government of Rajasthan has been designated to take care of disaster management issues. The project components will be designed to meet the MSK VII earthquake design specifications as well as take note of design related issues identified in the climate change risk assessment discussed in Section 7.1 above.

Health and Safety Issues Management

208. To avoid/ minimize inherent risks during construction, operation and maintenance, RVPN will follow national and international[24] Environment, Health and Safety Procedure for EHV sub-stations and lines Operations and Maintenance (O&M) period. Power evacuation system has been designed so that each developer is provided with two distinct points for power evacuation. This arrangement provides reliability and any fault at one point can ensure continuity of power. All power producing elements shall be solidly connected to earth to ensure the safety of operating personal. Some other implications and mitigations from safety point of view are listed in **Table 7.1** below:

Table 7.1: Safety Implication and Mitigation

No	Implication	Mitigation
1	Electromagnetic effect	Adequate ground clearances are provided. Design parameters of equipment to ensure low EMF.
2	Mechanical	Factor of safety in tower structure, conductor and insulator is provided
3	Lightning stroke	Each tower is provided with ground wire and earthed. Earthing system for permissible step and touch potential in sub-station design.
4	Ground clearance infringement	No construction below the line is permitted. Land is not allowed to be converted to non-agriculture use. However, there is no restriction on movement of people

7.2 Monitoring

7.2.1 Environmental Monitoring Plan (EMoP)

209. During the construction and operation phase of this project, the monitoring of the environmental aspects shall be done at the transmission line by the PMU. The mitigation measures suggested in the IEE require monitoring of environmental parameters during construction and operational phases of the project. During the construction phase, the Contractor should ensure that activities like handling of earth works clearing work, access road construction, putting proper traffic signals is done properly to have minimum impact. This in turn should be monitored by the Project Head of the individual transmission line/substation project.

210. The PMU and site support team will ensure that EPC contractors will adhere and comply with all measures and procedures identified in the EMP. EMoP will be implemented by the EPC contractors and EA in accordance to ADB Safeguard Policy 2009 requirements. Mitigation measures related to construction as specified in the EMP are being incorporated into civil works contracts, and their implementation will be primarily the responsibility of the contractors. In addition to the EMP, to ensure that project would not generate negative impacts to the overall environment quality, an Environmental Monitoring Report (**Annexure 6**) according to the Environmental Monitoring Plan (EMoP) in **Annexure 3** will be prepared and submit to ADB for

[24] World Bank EHS guidelines

disclosure on a semi-annual basis during construction and on an annual basis during operation. The monitoring activities of the project include site supervision, verification of permits, monitoring of water quality, soil, noise and air. Monitoring of the quality of water, soil, air and noise during the construction stage is the responsibility of the contractor by the approved government agency. Other environmental good practices to be followed include sanitary waste management, noise abatement, maintaining hygienic conditions, maintenance of fire and safety equipment.

211. The contractors must submit quarterly progress reports on the implementation of EMP measures to the PMU. Progress reports will include a description of implementable activities and their status; identify the responsible party (ies) involved in their implementation; and provide project management schedules and timeframes for doing so, along with their associated costs. Monitoring report should be prepared once in six months with the corrective action plan for the problem areas, if any. PMU's monitoring report will provided to ADB on a bi-annual basis must demonstrate that sound environmental management practices are applied during construction and operation, and the set environmental mitigation targets are achieved.

7.2.2 Environmental Management Plan Budget Costs

212. The main benefits of the environmental mitigation plan are (i) ensuring that environmental standards are met during design, construction, and operation of the project; (ii) providing offsets to negate project impacts especially ecological impacts. Without such expenditures, the project might generate significant environmental impacts, causing the biophysical environment in the area to deteriorate and indirectly depressing the economies of local communities.

213. The compliance with the EMP has been prepared based upon optimum and reasonable costs that are derived upon minimisation of mitigation measures on a "least-cost" basis. From the total project cost of USD 500.70 million, USD 2.25 million has been included as the EMP costs **(Table 7.3**). The cost components include items such cost towards implementation of EMP (contractor's scope), EMP implementation and monitoring in entire route of transmission lines, training for HIV/AIDS prevention and training.

Table 7.3: Environmental Costs

S.Nº	Environmental Cost Elements	Costs in INR (Million)*
A.	Design and Pre-Construction Stage	
1.	PTCC** of Transmission line 765/400/220/132 kV (670 km@INR50,000/km)	USD 0.5 million
2	Estimated Cost towards EMP (Contractors cost)	USD 1.44 million
B.	Construction Stage	
1	EMP implementation Monitoring	USD 0.20 million
2	Medical camps for workmen and society including checkups of Sexually Transmitted Infections (STI) and Sexually Transmitted Diseases (STD) including HIV/AIDS and health awareness program on regular basis	USD 0.10 million
3	Training of staff in Environmental management and monitoring	USD 0.01 million
	Total	**USD 2.25 million**

* Maximum 0.5% of total project cost for individual package

** PTCC: Power and Telecom Coordination Committee approval

7.3 Institutional Arrangements

7.3.1 Implementation Plan

214. The proposed project involves construction of 765/400/220/132 kV transmission lines. The construction of new grid sub-stations involves government land at Korna, Sheo, Sangarh, Bana Ka Bans, Kitasar and augmentation works at Jasalmer II and Akal besides additions at exisitng GSS's– Jaislamer II, Pokharan, Chattargarh, and Nathrau. The project will involve survey work, land clearance, design and engineering of plant equipment, floating tenders for procurement, civil work and system testing and commissioning related to line and sub-station. Total project work in Tranche 2 is costing is USD 500.7 million (including IDCs and contingencies).

215. The overall draft project implementation schedule for the project is attached as **Table 7.5.**

216. Implementation arrangements specify the implementation schedule showing phasing and coordination with overall project implementation; describes institutional or organizational arrangements, namely, who is responsible for carrying out the mitigation and monitoring measures, which must include one or more of the following additional topics to strengthen environmental management capability: technical assistance programs, training programs, procurement of equipment and supplies related to environmental management and monitoring, and organizational changes; and estimates capital and recurrent costs and describes sources of funds for implementing the environmental management plan.

217. The RVPN will be the Executing Agency (EA) as well as the Implementing Agency (lA) for the project. The RVPN will constitute a Project Management Unit (PMU) for implementing the ADB loan at the corporate level and Project Implementing Units (PIUs) at the sub-project level. The proposed structure is shown in **Figure 7.1**. The PMU shall be headed by the Chief Engineer (T&C) and the Superintending Engineer (Planning) shall be responsible for coordinating all external functions with ADB. GOI, DEA, GoR as well as the internal functions such as Environment and Social/R&R reporting, Legal, Finance and Accounts, Field project offices, Procurement and Contracts etc. and other functions from within RVPN. One Environment and Social Officer (ESO) shall be designated for monitoring ADB funded projects in areas such as Environment, R&R and Social safeguards. To assist ESO in these specialist functions, RVPN will hire appropriate consultants for monitoring purposes if required to ensure proper reporting in compliance with ADB's SPS 2009 guidelines.

Table 7.5: Overall Project Implementation Schedule

Description	2016				2017				2018				2019				2020				2021			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
765/400 kV New Substation at Korna																								
Tendering and Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
Operation/Maintenance Support																								
400kV, 220kV and 132 kV Substations																								
Tendering and Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
Augmentation and bay extension of existing Substations																								
Tendering Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
765kV and 400kV Transmission lines																								
Tendering Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
220kV and 132kV Transmission lines																								
Tendering Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
OPGW Network for 132 kV Substation and Re-conductoring																								
Tendering Award																								
Preparatory works and mobilization																								
Civil works, supply and erection of equipment																								
Testing and Commissioning																								
Reviews																								
Project Completion Report																								

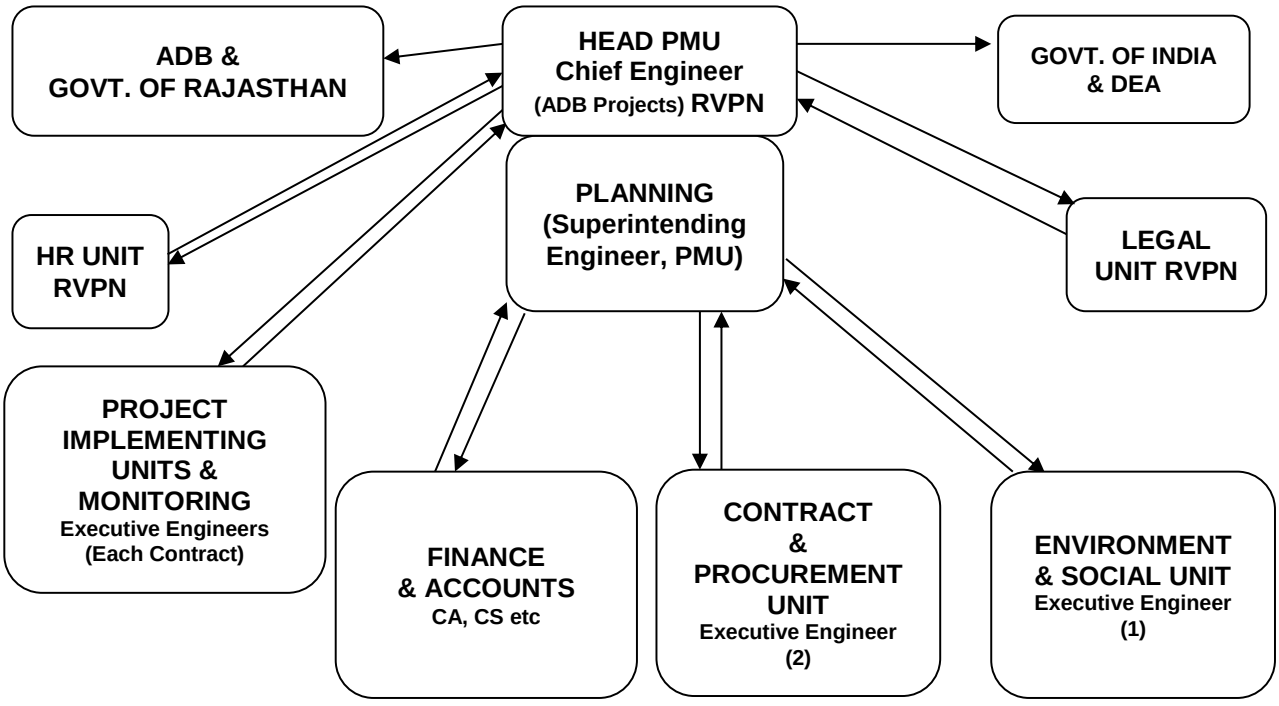
Source: Asian Development Bank

Project Management Unit

218. Under PMU, there will be Project Implementation Units (PIUs) which will assume primary responsibility for the environmental assessment as well as implementation of EMPs through contractors or third party consultants in consultation with ESO. The Project Head will be assisted by the PMU's Environmental and Social Officer (ESO) for environmental monitoring and designing of appropriate mitigation measures. Keeping in view the minimal capacity of RVPN, it is proposed that this ESO must coordinate with each project divisions (PIU along with other engineering units) to address environmental issues[25].

219. The duties of the ESO will include at a minimum: (i) oversight of PIU and construction contractors for monitoring and implementing mitigation measures; (ii) liaising with the PIU and contractor and seeking their help to solve the environment-related issues of project implementation; and (iii) preparation of environmental management reports every 6 months (as required by ADB). For each sub-project EMPs, RVPN will do the overall coordination, preparation, planning, implementation, and financing of all activities. Additional third-party services may be employed by the RVPN as necessary. The PMU may hire services of qualified experts to implement any design change required in project components due to change in technology, evacuation scheme as well as change in generating/customer load requirements. Any corrective action that is needed to ensure project is optimally designed to provide the outcome it was desired for will be under the supervision and oversight of the PMU and implemented by the EPC contractor and PIU.

Figure 7.1. PMU Structure



[25] ADB advises that all EAs develop in-house capability for environmental, health, and safety (EHS) program consistent with international best practices. The EHS program should include accounting for environmental benefits resulting from investment projects within three months of loan approval. The PMU shall report on semi-annual basis directly to ADB and determine whether sound environmental management practices have been achieved, and suggest suitable recommendations and remedial measures for midterm correction and improvement.

Project Implementation Units (PIU)

220. The PMU shall implement the ADB loan at the corporate level and the PMU will be supported for implementation activities through the field offices/ Project Implementing Units (PIUs). The PIU/Project Head will be assisted by the EPC Contractor. The PIUs will have overall responsibility to manage the site activities. The RVPN will ensure that contractor engaged for each subproject is involved in EMP monitoring and implementation.

221. Project Implementation Units (PIUs) will include experienced staff and headed by senior officers will undertake day-to-day project planning and implementation activities and manage the site activities. The PIUs will be responsible for overall project planning and implementation, including procurement, accounting, quality assurance, social and environmental issues and coordination with concerned agencies. For management of EMP, PIU will conduct overall coordination, preparation, planning, implementation, and financing of all field level activities.

Consultants, Construction Contractors, Equipment Suppliers, and Other Service Providers

222. RVPN will ensure that contractors engaged for each sub-project are engaged in regular EMP monitoring and implementation. EPC contractors will have primary responsibility for environmental and social management, and worker health and safety at sub-project construction sites under their control. They will be required to adhere to all national and state level environmental, health, and safety (EHS) guidelines and implement relevant sub-project environmental and social management measures prior to and during construction. The EPC contractor shall implement an Emergency response system for any medical emergency or any unforeseen circumstances (eg. earthquake, flooding etc.) during construction. The same system shall be continued by the Operations and Maintenance operator.

223. Further details on agencies responsible for EMP implementation activities are shown in **Table 7.4**.

Table 7.4: Institutional Roles and Responsibilities for EMP Implementation Activities

Activity	Responsible Agency
Sub-project Initiation Stage	
Assign PIUs for each subproject	RVPN
Clearances/approvals from relevant GoI/GoR agencies- forest, roads, rivers, railways, telecom etc.	RVPN
Disclosure of subproject EMP details on RVPN website	PMU-ESO/ RVPN
Grievances Redressal	PMU/ RVPN /Sub - Divisional Administration, ESO
Updating of EMP mitigation measures based on discussions	PMU – ESO
EMP Implementation Stage	
Meetings at community/household level with APs	PIU/Contractor
Implementation of proposed EMP mitigation measures	PIU/Contractor
Consultations with APs during EMP mitigation measures implementation	PIU/Contractor
Internal monitoring	PMU/ RVPN, ESO
Training	External Experts/ADB

ADB-Asian Development Bank; AP-Affected Persons; EA-Executing Agency; EMP-Environmental Management Plan; ESO – Environment and Social Officer; PIU- Project Implementation Unit; PMU- Project Management Unit

Asian Development Bank

224. ADB will review the semi-annual environmental reports submitted by EA during project implmentation and officially disclose environmental safeguards documents on its web site in accordance with SPS 2009 and the ADB's Public Communications Policy 2011.

225. To enhance the EMP implementation, environment and social safeguard skills at the PIU level, PIU staff shall be sent for capacity building training programs periodically by ADB and others in consultation with PMU. These trainings will be identified by PMU in consultation with ADB.

8.0 INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

8.1 Information Disclosure

226. RVPN will submit to ADB the following documents for disclosure on ADB's website:
(i) Environment Assessment and Review Framework Document (EARF) update, if any and the final IEE;
(ii) a new or updated IEE and corrective action plan prepared during project implementation, if any; and
(iii) the environmental monitoring reports.

227. RVPN will provide relevant environmental information, including information from the above documents in a timely manner, in an accessible place and in a form and local language(s) understandable to affected people and other stakeholders in accordance with the ADB SPS 2009 and Public Communications Policy 2011. For illiterate people, other suitable communication methods will be used.

228. IEE results will also be communicated to the local community before commencement of construction through their posting on the website of RVPN as well as providing a mechanism for the receipt of comments.

8.2 Consultation and Participation

229. During the project formulation stage, RVPN has conducted a project scoping exercise and reconnaissance survey of the existing system. Accordingly, during public consultation sessions, considerable dialogue had been held between RVPN representatives, individuals, and groups from the community to make them aware of the proposed project.

230. The project-affected community residing beside the proposed transmission line has already gained a reasonable knowledge about the potential grievances, which may arise in the future. The community were also informed about the Grievance Redressal Mechanism (GRM), which will be followed by RVPN as per procedure as describe in EARF.

231. RVPN and consultant team have carried out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. Such Consultation process undertaken by the PIU (i) which began at the project preparation stage and will be carried out on an on-going basis throughout the project cycle; (ii) will provide timely disclosure of relevant information that is understandable and readily accessible to groups and individuals, and specially women; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) will be gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) shall enable the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues. Consultation will be carried out in a manner commensurate with the impacts on affected communities. The consultation process and its results will be documented and reflected in the environmental assessment report.

232. Consultation will be based on the following principles:
(i) Early start in the individual sub-project preparation stage and continuation throughout the project cycle;
(ii) Timely disclosure of relevant and adequate information to affected people in a comprehensible and readily accessible format in local language;
(iii) Ensuring the absence of intimidation or coercion during public consultation;
(iv) Gender inclusive and responsive with focus on disadvantaged and vulnerable

groups, and

(v) Enabling the integration of all relevant views of affected people and stakeholders into decision-making.

8.3 Consultation Details

233. Public consultations were conducted in semi-urban and rural areas with persons of proposed project affected area from August to September 2016. **Annexure 7** indicates a summary of public consultations conducted during the field survey along with socio economic profile and of project villages.

234. Consultations were carried out with various stakeholders such RVPN and GoR officials, relevant land departments and the sub divisional magistrate (or his nominee) of the project area. As part of the environment and social assessment, approximately 150 households have been surveyed where the heads of the households were interviewed to collect the data during the month of August to September 2016. Additionally, public consultations were carried out by the environmental and social survey team (working in tandem) through focused group discussion along various proposed project sites. No public notices were advertised or prior information to persons interviewed were given. These discussions were carried out at various places.

235. The community consulted was requested to air their opinions freely, on the project, its impact, and suggestions for mitigating adverse impacts. People participated in voluntary public consultation sessions to express their view about the proposed project. No major environmental issues were raised during the consultation process.

236. **Annexure 7** givens the names of all participants of the public consultation conducted by the team. **Table 8.1** provides summary of public consultations. The transcript of these discussions will help RVPN and the EPC contractor conduct a proper needs assessment to ensure the issues raised by people are addressed appropriately.

Table 8.1 Summary Findings of Public Consultations

Issues Discussed	Responses and Suggestions from the Participants
General Perception and Support of local people for the Project	Generally, people are supportive about the projects; however, there are many concerns which are raised by the local people which need to be addressed by the RVPN. The major concern is the compensation. People think that Government project is required today for development but there is no such clear and people friendly policy related to the losses and its adequate compensation mechanism caused due to the transmission lines. People are generally aware about the projects, however, not specifically aware about the project design. People have conditional support at most of the places where there are sensitive issues like loss of crops, trees, and land etc is concerned. Where, the line passes through barren land, and then people don't have any objection. Some of the people also viewed the need of the Project as they face problems related to reliability of power supply for agricultural purpose. Where supply is not sufficient especially for tube well. Regular tripping during crops is a major problem. Therefore, construction of substations and transmission lines across the locality will improve in power supply.
Opinion about Construction of Transmission Lines	People viewed that proper planning need to be developed in order to avoid multiple lines by various users or developers at the same place. Lines shall be designed to avoid settlements. Construction of transmission line shall avoid the crop season or else the damage will become severe. People think that high tension lines also degrades the land value, therefore, adequate compensation needs to be paid. Some people also

Issues Discussed	Responses and Suggestions from the Participants
	viewed that transmission line has positive impact as far as the overall development is concerned; however, there is no direct benefit to the local people as such.
Critical issue and concern by the local people for the project during design, construction and operation stage	People are not much aware about the technical details and could not suggest any critical issues to the technical design. However, they suggest that the substation site at Korna needs proper mitigation measures to protect the area as the area is used for cattle grazing, drinking water ponds etc. They also suggested that towers shall be placed mostly on government land and if towers are placed on private land then the compensation should be considered as per permanent land loss. The villagers demanded that the transmission line should avoid passing over through or nearby any habituated area and fertile lands. Villagers were concerned about the safety issues related to transmission line. People also demanded for engaging local people during construction and operation phase. Villagers also demanded RVPN to avoid construction work during cropping season as the dust produced by construction may cause damage to crops.
Type and kind of compensation expected for the loss	Most of the people opted for monetary compensation for the losses. Proper compensation as per farmers demand as well as joint assessment shall be considered. People want compensation as per current local market rate. Some people also demanded land compensation for tower footings and right of way though it is not allowed under the current government regulation for transmission lines. People raised their concern about the government evaluation for crop compensation which seems to be lesser compared to the current market rate.
Type of Crops and number of seasons of Cultivation	It is mostly single crop to two crops in the project area. The types of crops are bajara, moong, moth, till, jeera, mustard, wheat, chilly and tomato.
Employment potential in the project	Current employment is mostly agricultural, labour and some employment through government schemes. People expect that the project will provide employment potential during construction and villagers showed interest in getting involved in small construction, transportation, providing security and storage of material, and providing labour at the time of construction.
Number of shops/commercial establishments and industrial units	During consultation, it was noticed that at small shops were present in the village and most of the big shops are located in the town area. The area is not industrial and except very few PVC pipe factories and stone mining.
Land Use Pattern	Most of the land is agricultural and is not irrigated and mostly dependent on the rain for cultivation. Also, there is grazing land in the project area and barren land.
Irrigation Status	Almost all the villagers are dependent upon rain water for agriculture. Some villagers are having tube wells as source of Irrigation but the quality of ground water is not very good for irrigation or drinking proposed due to high salt contents in water.
Access to Forest Land	Usually, people do not have any access to forest land. There is no rich forest cover in nearby area except some bushes and small trees where people sometime collect firewood.
Electricity Supply	All the areas covered during consultation were getting power from the government. However, people viewed that reliability of power is a matter of concern. The average monthly expenditure on electricity per household for domestic use is INR 500.
Source of Drinking Water	The sources of drinking water are very limited in the area. Only few villages in the area are connected by piped drinking water supply from

Issues Discussed	Responses and Suggestions from the Participants
	Indira Gandhi Canal. Maximum villages are getting water from own ground water sources or water coming from nearby villages for drinking and daily need at a common place in a village. Availability of water is often a problem during the summers and water quality is not good due to high salt contents in ground water.
Shortage of water	Shortage of water is one of the major concerns in the project affected villages. Villagers make their own water harvesting tanks for storage of rain water which can be utilized throughout the year. Some of these tanks are supported by government for Irrigation and other daily uses.
Protected Areas	There are no protected areas within 10 km vicinity of sub-projects. The nearby protected area is 80 kilometres away.
Health status	General health status of villagers is good. There have been no chronic diseases or health disaster or outburst of any disease is reported in recent past. In most of the villages primary health centres are available. However, people usually travel towards nearby town to access medical services.
Educational status	Literacy rate in most of the villages are around 70-80%. A primary school is present in the village or nearby village. For middle level and high school, the villagers mostly go outside. Some villages reported of having a high school. Villagers have to go to nearby urban area for their higher education.
Perceived benefits from project	Most of the people believe that there will be no direct benefit to the local people due to the project. However, some of the villages perceive that the project will result in provision of employment, small construction works, transportation works and development of basic infrastructure like roads, small commercial establishment.
Village Committee	In all the villages, the decisions are taken by Gram Panchayat and Gram Sabha held on critical and community related issues. All the Panchayat members and Sarpanch actively participate to take decisions on any community related issues. People also viewed that there are some NGOs active in the local area.
Other issues	Adequate compensation is major concern and also people demand for prior notification for construction activities and placing of towers on the agricultural field shall not be done without proper consent from the land owners and shall be compensated permanently. Similarly, the crop loss under right of way should also be adequately compensated without any interruption.

Table 8.2 Location and Number of Participants* of Consultations

#	Name of the Village/Location	Number of Participant	Male	Female
1	Korna	8	8	0
2	Lunawas Khara	13	13	0
3	Sar	8	8	0
4	Kharabera Purohitan	4	4	0
5	Sanwlta Kalla	17	12	5
6	Lolawas	17	17	0
7	Malkhasani	12	12	0
8	Garnia	7	7	0
9	Asarlai	10	10	0
10	Toonkara	12	11	1
11	Boontiwas	9	9	0
12	Roop Nagar Thorian	10	10	0
13	Dhandhaniya Bhayala	10	10	0

#	Name of the Village/Location	Number of Participant	Male	Female
14	Bhandu Jati	17	17	0
15	Hapanada	8	8	0
16	Khirja	10	10	0
17	Bhungra	7	7	0
18	Chandsama	11	11	0
19	Unthvaliya	13	13	0
20	Biramdevra	11	9	2
21	Sointara	12	12	0
22	Guman Singh Pura	7	7	0
23	Abasar	7	7	0
24	Balar	12	12	0
25	Bhainsara	8	8	0
26	Sheo	8	7	1
27	Bisu Kala	6	5	1
28	Bhiyad	10	9	1
29	Undoo	21	20	1
30	Panchala Siddha	5	5	0
31	Isar Nawara	6	5	1
32	Tapoo	10	10	0
33	Thob	6	6	0
34	Gajner	13	13	0
35	Motigarh	12	12	0
36	Chhattargarh	7	7	0
37	Shobhali	12	11	1
38	Lunkaransar	8	8	0
39	303 Head	5	5	0
40	Ajitman	6	6	0
41	Kitasar	15	15	0
42	Bana ka Bas	9	5	4
43	Jatipura	7	7	0
44	Nathurao	9	9	0
45	Guman	7	7	0
46	Sangarh	10	10	0

* List of participants and names are given in the **Annexure 7**.

9.0 GRIEVANCE REDRESS MECHANISM

9.1 Potential Grievance Channels (Framework)

237. During Public consultation sessions of the IEE study, the discussions with groups and individuals were conducted to make them aware of the proposed project. Thus the project-affected community residing beside the proposed transmission line has already gained a reasonable knowledge about the potential grievances, which may arise in future.

238. The public was informed that there will be no involuntary acquisition of land, or involuntary restrictions on land use which result in physical displacement and economic displacement. During construction of EHV lines, the land used will be preferably of agriculture use or barren land. Only agricultural land with crop is appropriate to get compensation. As area lies more or less in the desert region, it is expected that there will be no or very less agricultural land, therefore concern of damage of crop is minimum and erection of line would be faster.

9.2 Time Frame

239. A community awareness programme must be conducted one month prior to construction by the Project Implementation Unit (PIU) of RVPN regarding the scope of the project, procedure of construction activities, utility of resources, identified impacts and mitigation measures. These awareness programmes will help the community to resolve problems, clarify their distrusts related to the proposed project at initial stage. The Community should be informed about the Grievance Redress Mechanism (GRM), which is already established as per RVPN and GoR procedure for making complaints, including the place and the responsible person to contact in practical way in this regard. Almost all the stakeholders related to the GRM will also be aware of the established grievance process, the requirement of grievance mechanism, goals, benefits, relevant laws regulations etc.

9.3 The Grievance Redress Mechanism

240. RVPN does not have any specific Environment or Social Safeguards Policy currently. ADB procedures require RVPN to establish a Grievance Redressal Mechanism (GRM) having suitable grievance redress procedure for the project affected persons. The GRM would address affected persons' concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to the affected persons at no cost. This GRM consists of a Grievance Redress Committee (GRC) headed by the Project Head. The committee consists of the following constitution as listed in **Table 9.1:**

Table 9.1: Constitution of Grievance Redress Committee

1	Project Head (ADB Projects)
2	Sub District Magistrate or nominee of SDM
3	Land acquisition officer or nominee (patwari etc.)
4	Head of Finance wing at the project level
5	Representative of local Panchayat/ NGO
6	Representative of EPC contractor
7	Environment and Social Officer

241. This Grievance Redress Mechanism (GRM) will provide an effective approach for resolution of complaints and issues of the affected person/community. Project Management Unit (PMU) shall formulate procedures for implementing the GRM. The PIU shall undertake GRM's initiatives that include procedures of taking/recording complaints, handling of on-the-spot resolution of minor problems, taking care of complainants and provisions of responses

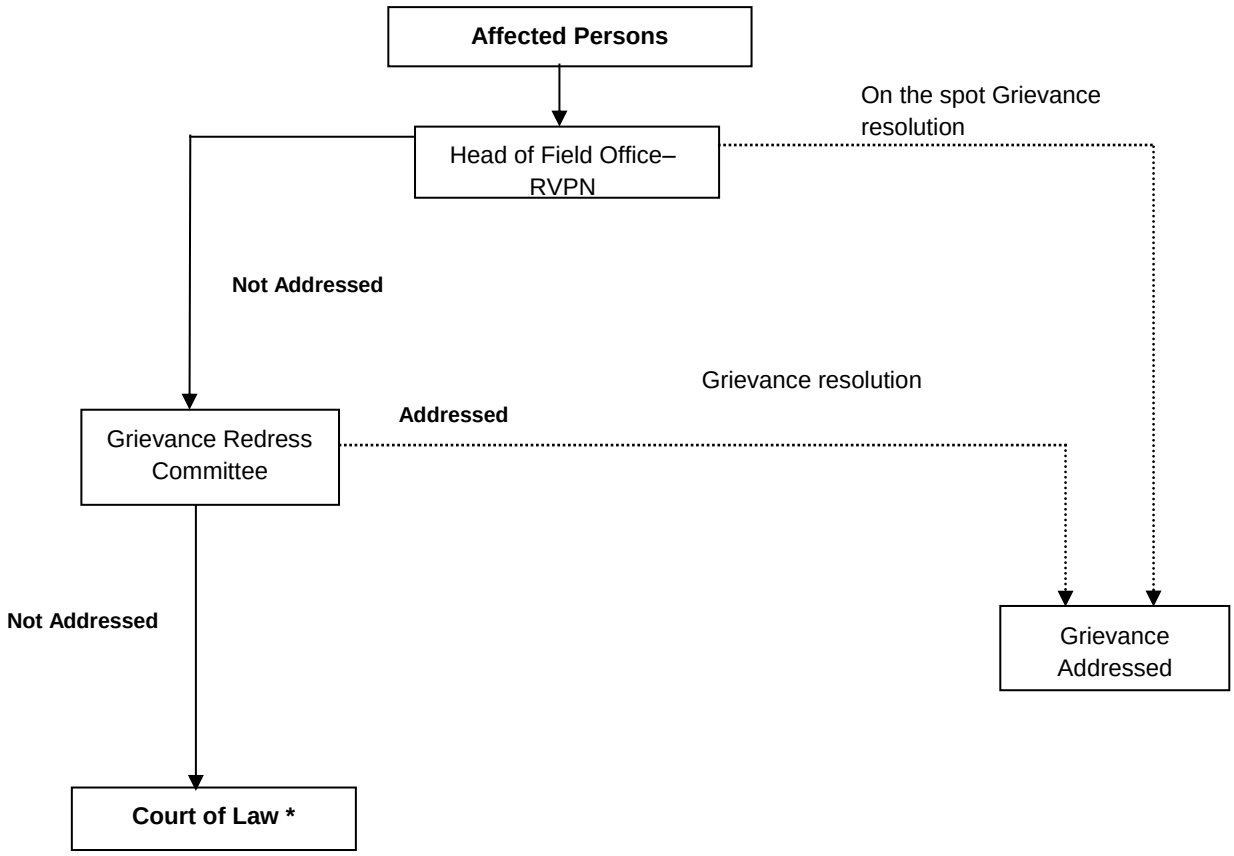
to distressed stakeholders etc. paying particular attention to the impacts on vulnerable groups.

242. Field level grievances will be addressed through Grievance Redress Committees (GRC) to be formally constituted at each PIU, and the nodal environment officer of the PMU would be responsible for management of complaints pertaining to environmental aspects. The GRC would comprise of representatives from the PIU, PMU, local administration, and local residents. A gender balance would be ensured. A complaint register would be maintained at each site for a subproject. The GRCs will be formally notified and established at the project sites, and will function as open forums for hearing complaints and exploring quick resolutions to resolving conflicts. A suitable outreach program would be carried out for local residents to be aware of the presence of such grievance redress mechanism such as notices in the local urban body offices; project sign board providing names and contact details of persons with whom complaints could be lodged; etc. Ideally, the local residents would be encouraged to discuss their grievances with the contractors. If the contractors fail to resolve the issue within two weeks, then the PIU/CSC would escalate the issue to GRC for resolution

243. Grievances of affected persons (APs) will then be brought to the attention of the Project head of the PIU. Grievances not redressed by the PIU will be brought to the Grievance Redress Committee (GRC) set up to monitor subproject Implementation for each subproject affected area. The GRC will determine the merit of each grievance, and resolve grievances within an outer time limit of three months of receiving the complaint. . Each GRC will record its deliberations and inform the concerned parties of a resolution within 3 weeks of its findings and recommendations. Communities will be informed about the GRC through the outreach mechanism of the EA. The PIU will keep records of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were affected, and final outcome.

244. The proposed mechanism does not impede access to the country's judicial or administrative remedies. The AP has the right to refer the grievances to appropriate courts of law if not satisfied with the redress at any stage of the processThe flow chart showing Grievance Redress Mechanism is presented in **Figure 9.1.**

Figure: 9.1 - Flow chart showing Grievance Redress Mechanism



(*) Affected Persons can approach the court of law at any time during the Grievance redress process.

10.0 CONCLUSION AND RECOMMENDATION

245. 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 candidate 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.

246. The selected lands for all new GSS are located within the government land. Thus acquisition of land will not be required from the surrounding communities. Since proposed for Korna, Sheo, Bana ka Bans, Sangarh sub-station lands are barren with scarce scrubs, and thus there is no need for removal of trees for the construction of new GSS's. Larger extent of proposed transmission lines runs through single season cultivated lands, uncultivated lands and lesser extend runs through human settlements and parallel to the existing transmission lines.

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

- Significantly improvement of the quality and reliability of the electricity supply to the project affected area according to current demand is the main positive impact.
- There is negligible removal of trees for the transmission line/grid sub-station, which is the main positive impact to the proposed project area.
- Environment pollution due to cut and fill operations, transportation of construction materials, disposal of debris, disturbance to the farming activities, nuisance from dust, noise, vehicle fumes, black smoke, vibration etc. due to construction activities are the short term negative impacts due to proposed project.

248. The secondary data[26] for baseline monitoring on water, air and noise can been used for developing a baseline. RVPN through the EPC contractor shall be responsible for establishing reliable baseline parameters in the beginning of construction. This data shall be utilized to monitor changes of equality of water, air and noise during the construction and operation periods.

249. Proper GRM will be implemented by RVPN 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 RVPN where two trees will be planted when a single tree is cut.

250. EMP has been prepared and attached as **Annexure 2**. One round of public consultation was conducted along the transmission corridor. The results indicate broad support for the project based on perceived economic and social benefits. 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 proposed line alignment to bypass any sensitive ecological areas, villages and important water supplies and resources. The main project impacts are

[26] Initial Environmental Examination, May 2016 for Rajasthan State Highway Investment Program, Prepared by PPP Division, Public Works Department, and Government of Rajasthan for the Asian Development Bank available on ADB website- https://www.adb.org/projects/49228-001/main#project-documents

associated with clearing of shrub vegetation, waste management and excavation and movement of soils.

251. No endangered or protected species of flora or fauna are reported at any of the subproject sites. The sub-station sites are located mostly on land owned by GoR, characterized as mostly barren, uninhabited and unused lands, removed from populated areas.

252. Environment impact analysis have been done with various criteria like demographic factors, climate and natural habitat, community and employee health and safety etc. based on the impact analysis, It is found that there is no adverse impact on the migration of habitat, any natural existing land resources and affect in the regular life of people. The environment 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 impact which cover monitoring, measuring and mitigation.

253. The IEE performed is adequate for purposes of project implementation. Based on the environmental 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.

254. The potential impacts as specified in the IEE for the construction and operation of transmission sub-component as a whole indicate the project classifies as a Category “B”, in accordance with ADB’s Safeguards Policy Statement 2009 and MoEF&CC Guidelines of GoI. Thus IEE report has been prepared for the project. Thus a full Environmental Impact Assessments (EIA) for the project is not required.

Annexure – 1: Inventorisation of Transmission Lines/Substations

A. 765 kV D/C KORNA- AJMER LINE

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	765 kV D/C Korna- Ajmer Line	0-7	4 Kilometer	3	Shivnagari, Paralia D Hamat, Korna	Baltora	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth	11	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
2	765 kV D/C Korna- Ajmer Line	7-14	4 Kilometer	3	Prihorin Ki Dhani, Chichrali, Purkhawas	Baltora	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth	9	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
3	765 kV D/C Korna- Ajmer Line	14-21	4 Kilometer	3	Khatawas, Vishnu Ki Dhani, Lunawas Khara	Luni	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth	5	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
4	765 kV D/C Korna- Ajmer Line	21-28	4 Kilometer	3	Badliya, Rohila Bhandu, Khudala,	Luni	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth	7	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
5	765 kV D/C Korna- Ajmer Line	28-35	4 Kilometer	2	Bandu Kalla, Bhandu Khurd,	Luni	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth	10	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
6	765 kV D/C Korna- Ajmer Line	35-42	4 Kilometer	2	Basani Jhuta,Sanwaron Ki Dhani,	Luni	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth	11	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
7	765 kV D/C Korna- Ajmer Line	42-49	4 Kilometer	3	Kankani, Sarensa, Sar	Luni	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth,	5	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
										Till				
8	765 kV D/C Korna- Ajmer Line	49-56	3 Kilometer	2	Nimbali Pate, Shikarpura,	Luni	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	4	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
9	765 kV D/C Korna- Ajmer Line	56-63	3 Kilometer	3	Kalali, Lalaki, Kharabera Purohitan	Rohat	Pali	Private	Cultivation	Bajara, Moong, Moth	6	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
10	765 kV D/C Korna- Ajmer Line	63-70	3 Kilometer	3	Bhatinda, Modi Josiyanlan, Antan,	Rohat	Pali	Private	Cultivation	Bajara, Moong, Moth	2	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
11	765 kV D/C Korna- Ajmer Line	70-77	4 Kilometer	2	Samwalta Khurd, Sanwlta Kalla	Rohat	Pali	Private	Cultivation	Bajara, Moong, Moth	7	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
12	765 kV D/C Korna- Ajmer Line	77-84	3 Kilometer	2	Durasani, Pabupura Bhatan,	Rohat	Pali	Private	Cultivation	Bajara, Moong, Moth	8	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
13	765 kV D/C Korna- Ajmer Line	84-91	4 Kilometer	3	Pataliya, Lanera, Lolawas	Sojat, Bilara	Pali, Jodhpur	Private	Cultivation	Bajara, Moong, Moth	5	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
14	765 kV D/C Korna- Ajmer Line	91-98	3 Kilometer	2	Hoonganv Khurd, Hoonganv Kalla,	Sojat, Bilara	Pali, Jodhpur	Private	Cultivation	Bajara, Moong, Moth	9	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
15	765 kV D/C Korna- Ajmer Line	98-105	3 Kilometer	3	Hapat, Padasla Khurd, Hariyada,	Sojat, Bilara	Pali, Jodhpur	Private	Cultivation	Bajara, Moong, Moth	3	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
16	765 kV D/C Korna- Ajmer Line	105-112	4 Kilometer	3	Jetiwas, Bijasani, Malkhasani	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	6	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
17	765 kV D/C Korna- Ajmer Line	112-119	4 Kilometer	2	, Barana, Bilara,	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	5	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
18	765 kV D/C Korna- Ajmer Line	119-126	4 Kilometer	2	Jajanwas, Binjwaria	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	2	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
19	765 kV D/C Korna- Ajmer Line	126-133	4 Kilometer	2	Jaitaran, Garnia	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	5	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
20	765 kV D/C Korna- Ajmer Line	133-140	3 Kilometer	2	Nimaj,Bhakarwas,	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	6	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
21	765 kV D/C Korna- Ajmer Line	140-147	3 Kilometer	2	Kheda Mehrajpura, Samokhi,	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	8	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
22	765 kV D/C Korna- Ajmer Line	147-154	4 Kilometer	3	Mohrai, Birampuri,, Asarlai	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	2	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
23	765 kV D/C Korna- Ajmer Line	154-161	4 Kilometer	1	Toonkara	Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	4	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
24	765 kV D/C Korna- Ajmer Line	161-168	4 Kilometer	1	Boontiwas	Raipur	Pali	Private	Cultivation	Bajara, Moong, Moth	3	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
25	765 kV D/C Korna- Ajmer Line	168-175	4 Kilometer	3	Gopalpura, Dhildeva, Bheevgarh	Raipur, Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	5	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
26	765 kV D/C Korna- Ajmer Line	175-182	3 Kilometer	3	Karnij, Mohra, Bagra,	Raipur, Jaitaran	Pali	Private	Cultivation	Bajara, Moong, Moth	3	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
27	765 kV D/C Korna- Ajmer Line	182-189	4 Kilometer	2	Peelpaya, Roop Nagar Thorian	Raipur, Pisangan	Pali, Ajmer	Private	Cultivation	Bajara, Moong, Moth	7	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
28	765 kV D/C Korna- Ajmer Line	189-196	3 Kilometer	2	Shivpura,Dhuwana,	Raipur, Pisangan	Pali, Ajmer	Private	Cultivation	Bajara, Moong, Moth	8	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
29	765 kV D/C Korna- Ajmer Line	196-203	3 Kilometer	2	Nagelia, Nahargarh,	Raipur, Pisangan	Pali, Ajmer	Private	Cultivation	Bajara, Moong, Moth	9	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil
30	765 kV D/C Korna- Ajmer Line	203-210	3 Kilometer	3	Jethana, Samla, Alipura,	Raipur, Pisangan	Pali, Ajmer	Private	Cultivation	Bajara, Moong, Moth	11	Non-Fruit/Timber	Khejadi, Jaal, Babool, Neem	Nil

B. 400 kV D/C KORNA- JAISALMER II

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	400 kV D/C Korna-Jaisalmer II	0-10	4 Kilometer	3	Korna, Gangawas, Jasti,	Baltora	Barmer	Private	Cultivation	Bajara, Moong, Moth, Gawar	3	Non-Fruit/Timber	Khejadi, Jaal, Babul	Nil
2	400 kV D/C Korna-Jaisalmer II	10-20	3 Kilometer	2	Rodwa Kalla, Rodwa Khurd,	Baltora	Barmer	Private	Cultivation	Bajara, Moong, Moth, Gawar	5	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
3	400 kV D/C Korna-Jaisalmer II	20-30	4 Kilometer	2	Hapanada, Kalawanada,	Baltora	Barmer	Private	Cultivation	Bajara, Moong, Moth, Gawar	4	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
4	400 kV D/C Korna-Jaisalmer II	30-40	3 Kilometer	2	Balau Jati, Blania,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	7	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
5	400 kV D/C Korna-Jaisalmer II	40-50	3 Kilometer	2	Balau Sasan, Chekder,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	5	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
6	400 kV D/C Korna-Jaisalmer II	50-60	4 Kilometer	2	Siyanda,Sointra,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	6	Non-Fruit/Timber	Non-Fruit/Timber Khejadi, Jaal, Babul, Neem	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
7	400 kV D/C Korna-Jaisalmer II	60-70	3 Kilometer	2	Jatawsa, Hanwant Nagar,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	8	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
8	400 kV D/C Korna-Jaisalmer II	70-80	3 Kilometer	2	Shergarh, Birad Nagar,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	2	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
9	400 kV D/C Korna-Jaisalmer II	80-90	3 Kilometer	2	Ram Nagar, Guman Singh Pura	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	1	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
10	400 kV D/C Korna-Jaisalmer II	90-100	3 Kilometer	2	Chaba, Abasar,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar	2	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
11	400 kV D/C Korna-Jaisalmer II	100-110	4 Kilometer	2	Rajpuohito Ki Dhani, Phalsund,	Bhaniyana	Jaisalmer	Private	Cultivation	Bajara, Moong, Moth, Gawar	4	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
12	400 kV D/C Korna-Jaisalmer II	110-120	3 Kilometer	2	Bhikhorai, Balar	Bhaniyana	Jaisalmer	Private	Cultivation	Bajara, Moong, Moth, Gawar	3	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil
13	400 kV D/C Korna-Jaisalmer II	120-135	4 Kilometer	3	Bhesara, Khelana, Rajmathai,	Bhaniyana	Jaisalmer	Private	Cultivation	Bajara, Moong, Moth, Gawar	5	Non-Fruit/Timber	Khejadi, Jaal, Babul, Neem	Nil

C. 400 kV D/C KORNA- POKARAN LINE

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	400 kV D/C Korna-Pokaran Line	0-10	4 Kilometer	3	Korna, Jasti, Gangawas,	Balotra	Barmer	Private	Cultivation	Bajara, Moong, Moth	5	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
2	400 kV D/C Korna-Pokaran Line	10-20	3 Kilometer	3	Rodwa Kalla, Rodwa Khurd, Hapanada	Balotra	Barmer	Private	Cultivation	Bajara, Moong, Moth, Gwar, Till	3	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
3	400 kV D/C Korna-Pokaran Line	20-30	3 Kilometer	4	Kalawanada, Balau Jati, Bhandu Jati, Bhandu Charana,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth	7	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil
4	400 kV D/C Korna-Pokaran Line	30-40	4 Kilometer	2	Tena,Bhungra	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gwar, Sonamukhi	6	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil
5	400 kV D/C Korna-Pokaran Line	40-50	4 Kilometer	4	Khirja, Tibna, Timbari, Nahar Singh	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gwar, Till	1	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
					Nagar,									
6	400 kV D/C Korna-Pokaran Line	50-60	3 Kilometer	3	Suwaliya, Dhaulpaliya Talai, Solnkiya Talla Ki Dhani,	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gwar, Sonamukhi	3	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil
7	400 kV D/C Korna-Pokaran Line	60-70	3 Kilometer	3	Chutraniyon Ki Dhani, Setrawa, Unthvaliya	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gwar, Till	4	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil
8	400 kV D/C Korna-Pokaran Line	70-80	4 Kilometer	3	Asarlai, Madala, Bara Madala	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gwar	2	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil
9	400 kV D/C Korna-Pokaran Line	80-90	4 Kilometer	2	Chandsama, Lawaran	Shergarh	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gwar	7	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem, Royda	Nil
10	400 kV D/C Korna-Pokaran Line	90-115	4 Kilometer	3	Pokaran, Ramdevra, Biramdevra	Pokhran	Jaisalmer	Private	Cultivation	Moong ,Moth, Bajara	5	Non-Fruit/Timber	Khejadi, Babul, Neem	Nil

D. 220 kV D/C KHINVSAR- BAITHWASIA LINE

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	220 kV D/C Khinvsar-Baithwasia Line	0-5 Kilometer	1-2 Kilometer	3	Khinvsar, Maheshpura, Bhaduon Ki Dhani,		Nagour	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Arandi, Mustard, Cotton, Onion	3	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
2	220 kV D/C Khinvsar-Baithwasia Line	5-10 Kilometer	1-2 Kilometer	3	Narwa Khurd, Narwa Kalan, Joginara,		Nagour	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Arandi, Mustard, Cotton, Onion	5	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
3	220 kV D/C Khinvsar-Baithwasia Line	10-15 Kilometer	1-2 Kilometer	3	Kantiya, Magari wali Dhaniya, Panchalo Sidd		Nagour	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Arandi, Mustard,	6	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
										Cotton, Onion				
4	220 kV D/C Khinvsar-Baithwasia Line	15-20 Kilometer	2 Kilometer	3	Pipaliya, Sowano Ki Dhani, Hempura,		Nagour	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Arandi, Mustard, Cotton, Groundnut	4	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
5	220 kV D/C Khinvsar-Baithwasia Line	20-25 Kilometer	2 Kilometer	2	Vishnoiyon Ki Dhani, Jasnata pura,		Nagour	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Arandi, Mustard, Cotton, Groundnut	2	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
6	220 kV D/C Khinvsar-Baithwasia Line	25-30 Kilometer	2 Kilometer	2	Madhaniyon Ki Dhani, Isar Nawara		Nagour	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till,	5	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
										Arandi, Mustard, Cotton, Groundnut				
7	220 kV D/C Khinvsar-Baithwasia Line	30-35 Kilometer	1.5 Kilometer	3	Papasani, Barsaloo Kalan, Godaron Ki Dhani,		Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar, Cotton, Mustard, Arandi	2	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
8	220 kV D/C Khinvsar-Baithwasia Line	35-40 Kilometer	1.5 Kilometer	3	Khubuniya, Kinjari, Loonawas		Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Gawar, Cotton, Mustard, Arandi	7	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
9	220 kV D/C Khinvsar-Baithwasia Line	40-45 Kilometer	1 Kilometer	2	Beniwalon Ki Dhani, Kurchhi,		Jodhpur	Private	Cultivation	Moong, Moth, Bajara, Gawar, Maize, Cotton, Mustar	4	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
										d				
10	220 kV D/C Khinvsar-Baithwasia Line	45-50 Kilometer	1 Kilometer	3	Basanitarda, Dhania, Silli		Jodhpur	Private	Cultivation	Moong, Moth, Bajara, Gawar, Maize, Cotton, Mustard	3	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
11	220 kV D/C Khinvsar-Baithwasia Line	50-55 Kilometer	1 Kilometer	3	Geengla, Hadman Sagar, Haniya,		Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Cotton, Mustard, Onion	5	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
12	220 kV D/C Khinvsar-Baithwasia Line	55-60 Kilometer	1 Kilometer	3	Khindakor, Bhakron ki Dhani, Magra Nagar		Jodhpur	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till, Cotton, Mustard, Onion	8	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
13	220 kV D/C Khinvsar-	60-65 Kilometer	1 Kilometer	4	Tapoo, Thob,		Jodhpur	Private	Cultivation	Bajara, Moong	3	Non-Fruit/Ti	Khejadi, Babul,	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private /Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
	Baithwasia Line				Pandit Ki Dhani, Baithwasia					, Moth, Till, Gawar, Cotton, Mustard		mber	Jaal, Neem	

E. 220 kV SHEO-UNDOO LINE

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	Sheo-Undoo-220 kV Line	0-6 Kilometer	1 Kilometer	2	Sheo, Fatenara,	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	4	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
2	Sheo-Undoo-220 kV Line	6-12 Kilometer	1 Kilometer	3	Jaranada, Ambabadi, Panj Raj Ki Basti,	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	3	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
3	Sheo-Undoo-220 kV Line	12-18 Kilometer	1 Kilometer	3	Sawai Singh Ki	Sheo	Barmer	Private	Cultivation	Bajara, Gawar,	5	Non-Fruit/Ti	Khejadi, Babul,	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
					Basti, Balai, Bishu Kala					Moong, Moth, Till		mber	Jaal, Neem	
4	Sheo-Undoo-220 kV Line	18-24 Kilometer	2-5 Kilometer	3	Bisu Khurd, Ratnuyo Ki Dhani, Katariyo Ki Dhani,	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	2	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
5	Sheo-Undoo-220 kV Line	24-30 Kilometer	2-5 Kilometer	3	Rupa Sariya, Amar Singh Ki Dhani, Ratari Bhiyad	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	4	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
6	Sheo-Undoo-220 kV Line	30-36 Kilometer	2.5 Kilometer	3	Nanasat, Sarano Ki Dhani, Kanasar Golai,	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	3	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
7	Sheo-Undoo-220 kV Line	36-42 Kilometer	2.5 Kilometer	3	Saron Ka Tala, Jivaniyon Ki Basti, Kashmir	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	9	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil
8	Sheo-Undoo-220 kV Line	42-48 Kilometer	2.5 Kilometer	2	Jakharo Ki Dhani, Kanasar,	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong	3	Non-Fruit/Timber	Khejadi, Babul, Jaal,	Nil

No	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
										, Moth, Till			Neem	
9	Sheo-Undoo-220 kV Line	48-57 Kilometer	2.5 Kilometer	3	Samdariya, Gorsiyon Ki Dhani, Undoo	Sheo	Barmer	Private	Cultivation	Bajara, Gawar, Moong, Moth, Till	7	Non-Fruit/Timber	Khejadi, Babul, Jaal, Neem	Nil

F. 132 kV Dechu Nathrau - Line

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	132 kV Dechu Nathrau - Line	0-6 Kilometer	1 Kilometer	2	Nathrau, Gilkor	Balesar	Jodhpur	Private	Cultivation	Bajara, Gawar, Moon, Moth, ground nut	8	Non-Fruit	Khejadi, Babul, Jaal, Neem	Nil
2	132 kV Dechu Nathrau - Line	6-12 Kilometer	1 Kilometer	1	Puniya ki Dhani	Balesar	Jodhpur	Private	Cultivation	Bajara, Gawar, Moong	5	Non-Fruit	Khejadi, Babul, Jaal, Neem	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
3	132 kV Dechu Nathrau - Line	12-20 Kilometer	1 Kilometer	1	Gumarnpura	Shergarh	Jodhpur	Private	Cultivation	Bajara, Gawar, Moon, Moth, Till	7	Non-Fruit	Khejadi, Babul, Jaal, Neem	Nil

G. LILO of 132 KV S/C Tinwari-Osian Line

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	LILO of 132 KV 20 km S/C Tinwari-Osian Line	0-10 Kilometer	1 Kilometer	2	Khabara, Khetasar	Balesar	Jodhour	Private	Cultivation	Khabara, Khetasar	8	Non-Fruit	Khejadi, Babul, Jaal, Neem	Nil
2	LILO of 132 KV S/C Tinwari-Osian Line	10-20 Kilometer	0.2 Kilometer	1	Jaatipura	Tinwari	Jodhpur	Private	Cultivation	Bajara, Moong, Moth, Till, Groundnut, Sarsoo,	12	Non-Fruit	Khejadi, Babul, Jaal, Neem, Ker	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
										Cotton, Jeera, Arandi				

H. LILO 2 km of Jaisalmer – Sheo Line at Sangarh GSS

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	LILO 2 km Jaisalmer-Sheo Line	0-2 Kilometer	1 Kilometer	2	Sangarh	Fatehgarh	Jaisalmer	Private	Cultivation	Bajara, Moong, Moth, Till, Groundnut, Sarsoo, Cotton, Jeera, Arandi	4	Non-Fruit	Khejadi, Babul, Jaal, Neem, Akada, Sheesham	Nil

I. LILO D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner (3 km)

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	LILO D/C of 132 kV Sridungarh-Ratangarh Line (at Kitasar 132 kV GSS, Bikaner (3 km)	0-3 Kilometer	2	1	Kitasar	Sri Dungargarh	Bikaner	Private	Cultivation	Bajara, Moong, Moth, Till, Groundnut	2	Non-Fruit	Khejadi, Babul	Nil

J. LILO 220 kV D/C line from Chhattargarh GSS to 132 kV Gajner GSS, Bikaner (100 km)

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	220 kV D/C line from Chhattargarh GSS to 132 kV Gajner GSS, Bikaner (100 km)	0-10 Kilometer	4	2	Gajner, Titaron ka Bada	Bikaner	Bikaner	Private /Government	Cultivation/Barren	Bajara, Moong, Moth, Till,	6	Non-Fruit	Khejadi, Babul	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
2		10-20 Kilometer	3	2	Titaron ka Bada, Kodamsar	Bikaner	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moong, Moth, Till,	3	Non-Fruit	Khejadi, Babul	Nil
3		20-30 Kilometer	5	1	Kawani	Bikaner	Bikaner	Private/Government	Cultivation/Barren	Bajara	5	Non-Fruit	Khejadi, Babul	Nil
4		30-40 Kilometer	2	2	Maherasar/ Karnisar	Bikaner	Bikaner	Private/Government	Cultivation/Barren	Bajara	2	Non-Fruit	Khejadi, Babul	Nil
5		40-50 Kilometer	3	2	Motigarh/Bariya	Bikaner	Bikaner	Private/Government	Cultivation/Barren	Bajara	3	Non-Fruit	Khejadi, Babul	Nil
6		50-60 Kilometer	2	1	Baririya		Bikaner	Private/Government	Cultivation/Barren	Bajara	5	Non-Fruit	Khejadi, Babul	Nil
7		60-70 Kilometer	4	1	Bariya		Bikaner	Private/Government	Cultivation/Barren	Bajara	6	Non-Fruit	Khejadi, Babul	Nil
8		70-80 Kilometer	3	1	5 LKD	Satasar	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moong, Moth, Till,	2	Non-Fruit	Khejadi, Babul, Uclipatas	Nil
9		80-90 Kilometer	2	2	Himarwala/ Chhattargarh	Chhattargarh	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moong, Moth, Till,	6	Non-Fruit	Khejadi, Babul	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
10		90-100 Kilometer	2	1	Chhattargarh	Chhattargarh	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moong, Moth, Till,	3	Non-Fruit	Khejadi, Babul	Nil

K. 132 kV D/C line from proposed 220 kV GSS Chhattargarh to existing 132 kV GSS Loonkaransar (77 km)

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
1	132 kV D/C line from proposed 220 kV GSS Chhattargarh to existing 132 kV GSS Loonkaransar (77 km)	0-10 Kilometer	1.5	2	Loonkaransar	Loonkarasar	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar	2	Non-Fruit	Khejadi, Babul	Nil
2		10-20 Kilometer	1	1	Loonkaransar	Loonkarasar	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar,	3	Non-Fruit	Khejadi, Babul	Nil

#	Name of the Transmission Line	Approximate Distance (in kilometers) for sampling of 1 kilometer of Survey	Approximate Distance of transmission line from nearby village (Kilometer)	Number of Villages	Names of Villages	Name of Tehsil	Name of District	Ownership of land (Private/Government, Forest)	Use of Land	Name of Crops	Number of Trees within RoW	Types of Trees	Name of Trees	Affected House/Building/Structure
3		20-30 Kilometer	5	1	Rojha	Loonkarasar	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar	4	Non-Fruit	Khejadi, Babul	Nil
4		30-40 Kilometer	2	1	Khokhrana	Bikaner	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar	5	Non-Fruit	Khejadi, Babul	Nil
5		40-50 Kilometer	3	1	Lakhawar	Bikaner	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar	2	Non-Fruit	Khejadi, Babul	Nil
6		50-60 Kilometer	2	1	Ajitmana	Ajitmana	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar	1	Non-Fruit	Khejadi, Babul	Nil
7		60-77 Kilometer	4	1	Chhattargarh	Chhattargarh	Bikaner	Private/Government	Cultivation/Barren	Bajara, Moth, Gawar	4	Non-Fruit	Khejadi, Babul	Nil

Annexure – 2: Environment Management Plan (EMP)

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
Pre-construction						
1. Physical Resources						
Equipment specifications and design parameters.	Release of chemicals and harmful gases in receptors (air, water, land).	Chloro Fluorocarbons (CFCs), including Halons not used in transformers, project facilities or any other equipment.	Transformers other equipment specifications compliance with GoI rules/regulations & (International Electro-technical Commission) IEC standards	Exclusion of Polychlorinated Byphenyls (PCBs), CFCs stated in tender documents - Once.	RVPN	Detailed design.
2. Environment Resources						
Location of land for substations/transmission towers	Impact to the existing surface water environment.	Construction facilities should be placed at 100 m from water bodies, natural flow paths, important ecological habitats and residential areas.	Water and Air Quality.	Air quality Standards and Water Quality standards – Once.	RVPN	Detailed design/Planning Stage.
Substation location and design.	Noise generation Exposure to noise, Nuisance to neighbouring properties.	Substation location/designed to ensure noise will not be a nuisance to neighbouring properties.	Expected noise emissions based on substation design, noise levels.	Noise control regulations Noise levels to be specified in tender documents	RVPN	Detailed design/Planning Stage
Location of transmission towers and transmission line alignment and design.	Impact on water bodies / land/ residences.	Consideration of site location to avoid water bodies or agricultural land/orchards 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- Once.	RVPN	Part of detailed project siting and survey and design.
Interference with drainage patterns/Irrigation channels.	Temporary flooding hazards/loss of agricultural production.	Appropriate siting of towers to avoid channel interference.	Site location and line alignment selection.	Consultation with local authorities and design engineers.	RVPN	Detailed alignment survey and design.
3. Ecological Resources						
Encroachment into precious	Loss of precious ecological values/	Avoid encroachment by careful site and alignment selection and reconnaissance	Floral and faunal habitats loss.	Enumeration of flora and fauna at	ESO of RVPN.	Detailed design/Plannin

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
ecological areas.	damage to precious species.	before final siting of activities.		site.		g Stage.
4. Human Environment						
Involuntary resettlement or land acquisition.	Loss of lands and structures.	Compensation paid for temporary/ permanent loss of productive land.	Public complaints	Rates paid as per the Resettlement plan/Frame work for the project.	ESO of RVPN	Prior to construction phase/Land Acquisition.
Encroachment into farmland.	Loss of agricultural/horticultural productivity.	Avoid siting new towers on farmland/orchards wherever possible.	Tower location and line alignment selection Statutory approvals for tree trimming /removal from competent authority.	Consultation with local authorities and design engineers in consonance with RVPN.	ESO of RVPN	Part of detailed alignment survey and design.
Location and design of Substation.	Disturbance to adjacent lands and the people due to cut and fill operations.	Maintain adequate[27] clearance, construction of retaining structures, minimise cut and fill operations adjoining to the dwellings.	Transformers and specifications and compliance with setback distances ("as-built" diagrams).	Technical specification- Once Measure setback distances to nearest house structures – Once.	RVPN	Detailed design/Planning Stage.
Location of transmission towers and transmission line alignment and design.	Exposure to safety related risks.	Setback of dwellings to overhead line route designed in accordance with voltage levels specified in Electricity Act.	Tower location and line alignment selection with respect to nearest dwellings.	Setback distances to nearest houses – Once.	RVPN	Part of tower siting survey and detailed alignment survey and design.
Explosions/Fire	Hazards to life	Design of substations to include fire control systems/firewalls. Provision of fire fighting equipment to be located close to transformers, switchgear.	Substation design compliance with fire prevention and control codes.	Tender document to mention detailed specifications – Once.	RVPN	Part of detailed substation layout and design /drawings
Construction						

[27] According to Central Electricity Authority (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electrical Lines) Regulations 2008

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
A. Physical Resources						
Site clearance	Soil erosion and surface runoff	Construction near seasonal rivers, erosion and flood-prone areas should be restricted to the non-rainy season. Provision and maintenance of drains and retention ponds. Treat clearing and filling areas against flow acceleration and construction work should be carefully designed to minimise obstruction or destruction to natural drainage.	Soil erosion	Visual inspection (Turbidity and sedimentation)	Contractor through contract provisions under supervision of RVPN	Construction period
Removal or disturbance to other public utilities	Public inconvenience	Advance notice to the public about the time and the duration of the utility disruption Use of well trained and experienced machinery operators to reduce accidental damage to the public utilities Restore the utilities immediately to overcome public inconvenience	Disruption to other commercial and public activities / Public complaints	Visual inspection and consultations	RVPN and Contractor through contract provisions	Throughout construction period
Equipment layout and installation	SF6 leakage during storage and erection of Switchgear	Record of all substation switchgear, cylinders located within secure casings	Switchgear casings and Substation bounding	As per (International Electro-technical Commission) IEC standards Once in year	RVPN Contractor through contract provisions	Throughout construction/erection period
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 farms and houses or used for creating flat grounds like school playgrounds etc., in agreement with the local community or landowners.	Location and amount (m3) of fill disposal Soil disposal locations and volume (m3)	Appropriate fill disposal and dispersal locations monthly	Contractor through contract provisions under supervision of RVPN	Construction period
B. Environment Resources						

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
Equipment layout and installation	Noise and vibrations	Selection of construction techniques and machinery to minimise ground disturbance.	Construction techniques and machinery	Minimal ground disturbance Monthly	Contractor through contract provisions under supervision of ESO, RVPN	Construction period
Substation construction	Loss of soil	Cutting and filling for the substation foundations obtained by creating or improving local drainage system.	Borrow area siting (area of site in m2 and estimated volume in m^3)	CPCB norms Quarterly	Contractor through contract provisions under supervision of ESO, RVPN	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-monthly	Contractor through contract provisions under supervision of ESO, RVPN	Construction period
Provision of facilities for construction workers	Contamination of receptors (land, water, air).	Construction workforce facilities to include soak pits/septic tanks, water supply and waste disposal facilities.	Amenities for Workforce facilities.	Presence of proper sanitation, water supply and waste disposal facilities -, visual inspection - continuous.	Contractor through contract provisions under supervision of RVPN	Construction period
Mechanised construction	Noise, vibration and operator safety, efficient operation.	Construction equipment to be well maintained.	Construction techniques and equipment - estimated noise emissions and operating schedules.	Technical specifications, safety regulations, Noise control regulations- monthly.	Contractor through contract provisions under supervision of RVPN.	Construction period
	Noise, vibration, equipment wear and tear.	Construction techniques and Machinery selection to minimize ground disturbance. Proper maintenance and turning off plant not in use.				
Construction of	Increase in airborne dust	Existing roads and tracks used for	Access roads, routes	Use of established	Contractor	Construction

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
roads for accessibility for sub stations	particles.	construction and maintenance access to the site wherever possible.	(length and width of access roads).	roads wherever possible.	through contract provisions under	period
	Increased land requirement for temporary accessibility.	Use of access ways restricted to a minimum of single carriageway width.		Access restricted to a minimum of single carriageway width.	supervision of RVPN.	
C. Ecological Resources						
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 m2).	Clearance strictly limited to target vegetation –Once.	Contractor through contract provisions under supervision of RVPN.	Construction period
Trimming/cutting of trees within RoW.	Loss of vegetation and deforestation.	Trees that can survive pruning to comply should be pruned instead of cleared.	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.	RVPN, Contractor through contract provisions under supervision of forest	Construction period
		Felled trees and other cleared or pruned vegetation to be disposed of as authorised by the statutory bodies.	Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m^2).		department	
Wood/ vegetation harvesting, cut and fill operations	Loss of vegetation and deforestation	Construction workers prohibited from harvesting wood in the project area during their employment.	Illegal wood /vegetation harvesting (area in m^2, number of incidents reported).	Complaints by local people or other evidence of illegal harvesting .	RVPN, Contractor through contract provisions	Construction period
	Effect on fauna	Prevent work force from disturbing the flora, fauna including hunting of animals and fishing in water bodies.	Habitat loss.	Complaints by local people or other evidence of illegal hunting.	RVPN.	Construction period
		Proper awareness programme regarding				

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
		conservation of flora, fauna including ground vegetation to all workers.				
D. Human Environment						
Construction schedules for substation.	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 in decibels (dBA).	Construction as per Scheduled timings only.	RVPN, Contractor through contract provisions.	Construction period.
Acquisition of cultivable lands.	Loss of agricultural/ horticultural productivity.	Avoid faming/harvesting season for field crops wherever possible for the project activities. Avoid construction/stringing during fruits season. Ensure existing irrigation facilities are maintained in working condition. Protect /preserve topsoil and reinstate after construction completed. Repair /reinstate damaged bunds etc. after construction completed. Compensation for temporary loss in agricultural production.	Land area of agriculture loss. Construction Schedule in non-fruiting season. Usage of existing utilities. Status of facilities (earthwork in m3). Implementation of crop compensation (amount paid, dates, etc.).	Loss of crops-work in post-harvest period but before next crop – Once per site.	RVPN / Contractor through contract provisions.	Throughout construction period.
Temporary use of land.	Losses to neighbouring land uses/ values.	Contract clauses specifying careful construction practices. As much as possible existing access ways will be used. Productive land will be reinstated following completion of construction.	Contract clauses Design basis and layout. Reinstatement of land status (area affected, m2). Implementation of Tree/Crop compensation (amount	Incorporating good construction management, design engineering practices. Consultation with affected parties immediately after completion of	Contractor through contract provisions under supervision of RVPN	Construction period.

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
		Compensation will be paid for loss of production, if any.	paid).	construction and after the first harvest.		
Construction of transmission lines and substations	Loss/theft of precious archeological item uncovererd in digging at sites.	In case of chance find of cultural artifacts and property/archaeological features	Chance find	GOI's Treasure and Trove Act. - Continous	Contractor through contract provisions under supervision of RVPN	Construction period
Transportation and storage of materials.	Nuisance to the general public.	Transport loading and unloading of construction materials should not 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, Air Quality and Noise in decibels (dBA).	CPCB Emission standards and Water Quality standards - Half yearly	Contractor through contract provisions under supervision of RVPN.	Construction period.
Temporary outage of the electricity	Loss of power supply to the local community when distribution lines crossing the new transmission line are switched off.	Advance notice to the public about the time and the duration of the utility disruption. Restore the utilities immediately to overcome public inconvenience.	Power disruption to houses and commercial premises.	Regular monitoring during the period of strengthening the conductors	Contractor through contract provisions under supervision of RVPN	Throughout the construction period.
Health and safety	Injury and sickness of workers and members of the public.	Contract provisions specifying minimum requirements for construction camps. Contractor to prepare and implement a health and safety plan and provide workers	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness).	RVPN and ADB Health and safety standards - Monthly.	Contractor through contract provisions under supervision of	Construction period.

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
		and health and safety measures.			RVPN.	
		Contractor to prepare Emergency Response Plan. Availability of ambulance or medical facility at work site both for workers and public should be kept by contractor	Contract clauses	National Disaster Management	Contractor through contract provisions under supervision of RVPN	Construction period.
		Contractor to arrange for health and safety awareness programmes including on AIDS and sexually transmitted diseases (STD).	Contract clauses	Half yearly	Contractor through contract provisions under supervision of RVPN	Construction period.
Capacity Building	Improve standards of implementation and monitoring.	Training of RVPN Environment and Social Cell.	Training schedules.	Number of training program - Half Yearly.	RVPN.	Construction period.
Operation and Maintenance Phase						
A. Physical Resources						
Operation of Switchgear.	Leakage of SF6 gas.	Record of all substation switchgear located within secure casings.	Switchgear casings and Substation bounding – Monthly.	Ozone Depleting substances.	RVPN.	Throughout the operation.
B. Environmental Resources						
Soil Erosion at tower base of transmission line.	Removal of top soil.	Planting of buffer zone species suitable for hilly terrain.	Turbidity of water (Visual Inspection).	Visual inspection (Turbidity and sedimentation).	RVPN.	Throughout the operations
Oil spillage.	Contamination of land/nearby water bodies.	Substation transformers located within secure and impervious bundled areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bounding (“as-built” diagrams)- Monthly.	Hazardous Waste (Management, handling, Trans-boundary Movement) Rules	RVPN.	Throughout the operation

Project Activity	Potential Environmental Impact	Mitigation Action	Parameters to be Monitored	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
				2009.		
C. Ecological Recourses						
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. Trees that can survive pruning should be pruned instead of cleared.	Species-specific tree retention as approved by statutory authorities (average and maximum tree height at maturity, in metres) – Quarterly.	Presence of target species in RoW following vegetation clearance.	RVPN, with forest department.	Operation period.
D. Human Environment						
Maintenance of Transmission line.	Exposure to electromagnetic interference.	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines.	Required ground clearance (metres) – Quarterly.	Ground clearance, standards on EMF.	RVPN.	Throughout the operation.
Substation maintenance.	Exposure to electromagnetic interference.	Substation design to comply with the limits of electromagnetic interference within floor area.	Required vibrations level, instrumentation – on public complaint.	Technical specifications	RVPN	Throughout the operation
Noise generation.	Nuisance to the community around the site.	Provision of noise barriers near substation sites if needed during operations.	Noise level.	Noise level (dbA)- Once a year.	RVPN	Throughout the operation
Electric shock.	Death or injury to the workers and public.	Security fences around substation Establishment of warning signs. Careful design using appropriate technologies to minimise hazards inside substation and awareness raising programmes.	Proper maintenance of fences and sign boards. Usage of proper earthing/instrumentation.	Periodic maintenance. Number of programmes and percent of staff/ workers covered.	RVPN	Throughout the operation
Training for Electric safety.	Rising of awareness for electric safety.	Training of RVPN personnel.	Training schedules.	Number of training program-Yearly.	RVPN	Operation

Annexure – 3: Environment Monitoring Plan (Environmental Parameters)

Environmental component	Project stage	Parameters to be monitored	Sampling Location	Monitoring Frequency	Regulatory Standards for parameter	Agency responsible for implementation
1.Air Quality	A. Pre-construction stage (Baseline development)	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substations	One time	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5]	RVPN
	B. Construction Stage	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substations	Every month of construction period	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5	
	C. Operation Stage (Testing and Commissioning)	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	One time during commissioning	Spot check using field portable instruments National Air quality standards of CPCB PM10 or PM2.5	
2.Water Quality	A. Pre-construction stage (Baseline development)	EC, TSS, DO, BOD, P^H Oil and grease, Pb, colliforms	Nearest well, near substations	One time	National water quality standards of CPCB	RVPN
	B. Construction Stage	EC, TSS, DO, BOD, P^H Oil and grease, Pb, coliforms	Nearest well near substations	Every month of construction period	National water quality standards of CPCB	
	C. Operation Stage	EC, TSS, DO, BOD, P^H Oil and grease, Pb, colliforms	Nearest well near substations	One time during commissioning	National water quality standards of CPCB	
3.Noise/ Vibration	A. Pre-construction stage (Baseline development)	Noise level [dB(A)]	Boundary of substations	One time	CPCB standards for Noise and vibrations	RVPN
	B. Construction Stage	Noise level [dB(A)]	Boundary of substations	Every month of construction period	CPCB standards for Noise and vibrations	

	C. Operation Stage	Noise level [dB(A)]	Boundary of substations	One time during commissioning	CPCB standards for Noise and vibrations	
4. Soil	A. Pre-construction stage (Baseline development)	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time	Hazardous Waste Management rules	RVPN
	B. Construction Stage	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time	Hazardous Waste Management rules	
	C. Operation Stage	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time during commissioning	Hazardous Waste Management rules	
SF6	Operation Stage	Volumetric loss from GIS equipment	Substation equipment, circuit breakers	Online monitoring by data loggers	As per Approved Specifications of Equipment	

Abbreviations:

SO_{2-} -Sulphur Dioxide; NO_{2-} - Nitrogen Dioxide; CO- Carbon Monoxide; EC – Electric Conductivity;
Pb – Lead; $PM_{2.5}$ - Particulate Matter <2.5; PM_{10} - Particulate Matter <10; TSPM- Total suspended Particulate Matter;
EC - Electrical Conductivity; DO - Dissolved Oxygen; TSS - Total Suspended Solids;
SF_6 – Sulphur Hexafluoride gas
BOD - Biological Oxygen Demand; ORP – Oxidation Reduction Potential
NAAQS - National Ambient Air Quality Standards specified by CPCB, GoI;

Annexure – 4: Letters from Rajasthan Renewable Energy Corporation Limited (RREC) to Ministry of New and Renewable Energy

A4.1 Letter Dated 12 Jan 2015 Reg RE Capacity Addition Plan upto 2021-22

RAJASTHAN RENEWABLE ENERGY CORPORATION LIMITED

(A Govt. of Rajasthan Undertaking)

E-166, Yudhishthir Marg, C-Scheme, Jaipur

CIN No.U40101RJ1995SGC009847

Tel:2229839 / 2229343 / 2223966 & 223965 Fax:0141-2226028

Email: rrec_jai@yahoo.co.in Website :-www.rrecl.com

No.F.12(468)Solar/RREC/Power Evacuation/2010-11/D-5364 Dated: 12/1/15

The Joint Secretary,
Ministry of New & Renewable Energy,
Govt. of India,
CGO Complex, Lodhi Road,
New Delhi-110003.

Sub- Information regarding Districtwise details of RE capacity addition plan and RE capacity proposed to be consumed within the State upto 2021-22.

Ref- E-mail dated 2.1.2015 received from Shri J.K. Jethani, Scientist-D, MNRE, New Delhi

Sir,

Kindly refer aforesaid E-mail in the subject matter. The RE generation/evacuation capacity perspective plan estimates in prescribed formats (Annexure-I and Annexure-II) is as under:

Annexure-I

RE generation capacity perspective plan estimates:

S. No.	State	District	Year	RE Source		Capacity targeted in MW
				Solar	Wind	
1.	Rajasthan	Barmer	2014-15	200	400	600
		Bikaner		300	-	300
		Banswara		-	100	100
		Total		500	500	1000
2.	Rajasthan	Barmer	2015-16	1000	400	1400
		Bikaner		1000	-	1000
		Banswara		-	100	100
		Total		2000	500	2500
3	Rajasthan	Barmer	2016-17	2000	400	2400
		Bikaner		2000	-	2000
		Banswara		-	100	100
		Total		4000	500	4500
4	Rajasthan	Barmer	2017-18	2000	500	2500
		Bikaner		2000	-	2000
		Banswara		-	120	120
		Total		4000	620	4620
5.	Rajasthan	Barmer	2018-19	2000	500	2500
		Bikaner		2000	-	2000
		Banswara		-	120	120
		Total		4000	620	4620

6.	Rajasthan	Jaisalmer/ Barmer	2019-20	2000	600	2600
		Jodhpur/Bikaner		2000	-	2000
		Pratapgarh/Banswara		-	250	250
		Total		**4000**	**850**	**4850**
7.	Rajasthan	Jaisalmer/ Barmer	2020-21	2000	600	2600
		Jodhpur/Bikaner		2000	-	2000
		Pratapgarh/Banswara		-	300	300
		Total		**4000**	**900**	**4900**
8.	Rajasthan	Jaisalmer/ Barmer	2021-22	2000	700	2700
		Jodhpur/Bikaner		2000	-	2000
		Pratapgarh/Banswara		-	300	300
		Total		4000	**1000**	**5000**
		Grand Total		**26500**	**5490**	**31990**

Annexure-II

RE evacuation capacity perspective plan estimates:

S. No.	State	Year	Total RE capacity to be set up (MW)	Capacity targeted to be consumed within the State (MW)	Capacity proposed to be evacuated outside the State (MW)
1.	Rajasthan	2014-15	1000	700	300
2.	Rajasthan	2015-16	2500	1000	1500
3	Rajasthan	2016-17	4500	1000	3500
4	Rajasthan	2017-18	4620	1000	3620
5	Rajasthan	2018-19	4620	1000	3620
6	Rajasthan	2019-20	4850	1000	3850
7	Rajasthan	2020-21	4900	1400	3500
8	Rajasthan	2021-22	5000	1500	3500
	Total		**31990**	**8600**	**23390**

Yours faithfully,

(S. K. Barwal)
Director (Tech.)

A 4.2 Letter from RREC regarding Power Evacuation System from Rajasthan to Other states

RAJASTHAN RENEWABLE ENERGY CORPORATION LIMITED
(A Govt. of Rajasthan Undertaking)
E-166, Yudhisthir Marg, C-Scheme, Jaipur
CIN No.U40101RJ1995SGC009847
Tel:2225859 / 2229341 / 2223966 & 223965 Fax:0141-2226028
Email: rrec_jai@yahoo.co.in Website
www.rrecl.com

No. F12 (27) RREC/ Solar/General /2010-2011/D- 6547 dated 19/05/15

Joint Secretary
Ministry of New & Renewable Energy,
Block-14, CGO Complex,
Lodi Road, New Delhi-110003.

Sub : Setting up of Evacuation system for solar power from Rajasthan to other states.
Ref. : Letter dated 27.2.2015 from Director(NSM), MNRE.

Dear Sir,

Please refer your letter dated 27.2.2015 on the above subject vide which details of Joint Venture Agreements / MoUs signed by GoR with various firms for setting up / development of solar power projects / solar parks has been desired.

In this regard, it is submitted that in order to achieve the GoR target of 25000 MW & national target of 100GW solar capacity addition, GoR has signed Joint Venture Agreements / MoUs (copy enclosed at Annexure-A1 to A6) for development of Solar Parks and setting up of solar power projects under Rajasthan Solar Energy Policy, 2014 as per following details:

S. No	Name of firm	Capacity (MW)	Agreement / MoU signed for Solar Park / Solar Power Projects
1	M/s IL& FS Energy Limited	5000	Solar Park
2	M/s SunEdison Solar Power India Ltd.	5000	Mega Solar Power Projects
3	M/s Azure Power Limited	1000	Solar Power Projects
4	M/s Essel Infraprojects Limited.	5000	Solar Park
5	M/s Adani Enterprises Limited(AEL)	10000	Solar Park with manufacturing units. M/s AEL have also proposed to install solar power projects of 5000MW capacity in the parks on their own
6	M/s Reliance Power Limited (RPOWER)	6000	Solar Park. M/s RPOWER have also proposed to install solar power projects of 3000MW capacity in the parks on their own
	Total	32000	

For implementing the aforesaid Agreements / MoUs, RREC has identified the large chunks of govt land for installation of Solar Power Plants and development of solar parks which are based on the information received from concerned District Collectors (copy enclosed at Annexure-B). Out of total 32000MW capacity for which Joint Venture Agreements / MoUs have been signed,

following locations have been identified after discussions with prospective solar park developers and solar power producers:

S. No.	District	Location	Area in hectare (Approx.)	Capacity of Solar Park (in MW)
1	Jodhpur	Bhadla, Ph-II Bhadla, Ph-III	1600 2500	700 1000
2	Jaisalmer (Teh. Jaisalmer)	Issaniyon Ki Dhani, Kuchhdi, Sheewa, Joga, Parewar	12000	5000
3	Jaisalmer (Teh: Fatehgarh)	Devda, Bhimsar, Rasla Naya Achla, Achla, Naya Rosla, Neharajot	6500	3000
4	Jaisalmer (Teh: Pokaranh)	Nokh	2700	1000
5	Bikaner Teh: Pugal	Jhudkiya, Sursar, Ramsar Chhota, Sirasar Panchkosa	7000	3000

RREC has planned generation schedule for RE power of 26000MW solar and 5000MW wind power capacity upto 2021-22 as per Annexure-C. Besides aforesaid proposed solar capacity of 13700MW, sufficient government land is available to accommodate the remaining solar capacity of 12300MW and wind capacity of 5000MW.

As Rajasthan State will not be able to absorb the envisaged solar and wind power generation, it will have to be transmitted to other parts of the country. This will require setting up a robust transmission infrastructure in Rajasthan which can be developed by PGCIL.

In view of the above, it is requested to kindly take up the matter with PGCIL to include the transmission system of western Rajasthan in Green Energy Corridor for establishment of GSS of 400kV & above voltage level at following locations so that RE power generated in Rajasthan may be evacuated to other states.

1. Bhadla (Distt. Jodhpur).
2. Parewar (Distt.Jaisalmer)
3. Fatehgarh (Distt.Jaisalmer)
4. Nokh (Distt. Jaisalmer)
5. Pugal (Distt.Bikaner)
6. Akal-II(Distt. Jaisalmer) for wind

Encl.: As above

(B.K.Dosi)
Managing Director

Copy to the following for information and necessary action:

1. Chairman & Managing Director, Power Grid Corporation Of India, "SAUDAMINI", Plot No. 2, Sector – 29, Gurgaon-122001, Haryana.
2. The Chairman & Managing Director, RVPN, Jaipur
3. The Chief Engineer(OPM & RE), CEA, 6th Floor, Sewa Bhawan, R.K. Puram, New Delhi.
4. Director (NSM)Technical),RVPN, Jaipur.
5. Director(Trans & PG), MoP, GoI, Shram Shakti Bhawan, Rafi Marg, New Delhi-1, in reference to his letter dated 19.2.2015.

Managing Director

Annexure – 4A.3: Wind and Solar Power Generation Schedule for Condition Corresponding to 2021-22

		Wind Farm		Solar Projects		Total	
No	Name Of GSS	Sanctioned	Commissioned (As On 31-1-2016)	Sanctioned	Comissioned (As On 31-1-2016)	Sanctioned	Commissioned (As On 31-1-2016)
	400 kV GSS						
1	Akal	3332	1726.8	-	-	3332	1726.8
2	Barmer	500	0			500	0
3	Ramgarh (U/C)	1193.7	271.2	128	5	1321.7	133
4	Jaisalmer-2 (U/C)	1368.5	0		-	1368.5	0
5	Bhadla (U/C)		-	1705	60	1705	60
	220 kV GSS						
1	Amarsagar	1039.3	1036.56	-	-	1039.3	1036.6
2	Chhatrail	102	0	0	0	102	0
3	Pokran	250	0	100	0	350	0
4	Balotra	-	-	5	5	5	5
5	Tinwari	141.9	141.9	15	15	156.9	156.9
6	Bhopalgarh	45	27.5	-	-	45	27.5
7	Dechu	150	0	300	140	450	140
8	Bap	-	-	181	171	181	171
9	Kanasar (u/c)	-	-	0	0	0	0
10	Badisid	-	-	170	130	170	130
11	Aau	-	-	0	0	0	0
12	Bhawad	-	-	101	101	101	101
13	Pratapgarh	396	217.925	-	-	396	208.325
14	PS_1 (u/c)	-	-	0	0	0	0
15	Kolayat	-	-	0	0	0	0
16	Gajner	-	-	105.6	88.85	105.6	87.95
17	Undoo (u/c)	-	-	100	0	100	0
	132 kVGSS						
1	Baori	59.4	59.4	-	-	59.4	59.4
2	Osian	30	30	10	10	40	40
3	PS_8	98.4	98.4	-	-	98.4	98.4
4	Chamu	31.5	31.5	-	-	31.5	31.5
5	PS-5	2.1	2.1	-	-	2.1	2.1
6	Sanwareej	60	0	20	20	80	20
7	Dalot	114	109.5	-	-	114	109.5
8	Kolayat	-	-	101.25	72.1	101.25	72.1
9	Gajner (Nokha Dahiya)	-	-	26	16	26	16
10	Pugal Road	-	-	10	2.5	10	2.5
11	Aau	-	-	5	5	5	5
12	PS_1	-	-	61	0	61	0
13	PS_2	-	-	65	55	65	55
14	PS_3	-	-	128	119.9	128	119.9
15	PS_4	-	-	0	0	0	0
16	Lohawat	-	-	10	0	10	0
17	Khetusar	-	-	30	30	30	30
18	Jaisalmer	41.16	41.16	-	-	41.16	41.16
19	Sheo	195.5	49.6	-	-	195.5	49.6
20	Pokhran	-	-	100	90	100	90
21	Ramgarh GTPS	-	-	5	5	5	5
22	Undoo	-	-	10	0	10	0
	Other Parts of Rajasthan						
	220 kV GSS						
1	Kheenvaar	-	-	5	5	5	5

		Wind Farm		Solar Projects		Total	
No	**Name Of GSS**	**Sanctioned**	**Commissioned (As On 31-1-2016)**	**Sanctioned**	**Comissioned (As On 31-1-2016)**	**Sanctioned**	**Commissioned (As On 31-1-2016)**
2	Gulabpura	-	-	5	5	5	5
3	Neemrana	-	-	5	5	5	5
4	Bali	-	-	10	10	10	10
	132 kV GSS						
1	Khood	12	12			12	12
2	Rani	-	-	30.12	30	30.12	30
3	Jayal	-	-	40	40	40	40
4	Gangapur (Bhilwara)	-	-	5	0	5	0
5	Shahpura (Bhilwara)	-	-	10	10	10	10
6	Masuda	75	-	-	-	75	-
7	Deogarh	102	-	-	-	102	-
	Other Discom Station	22.2	22.2	18	18	18	38.6
	Total	**9361.66**	**3877.745**	**3619.97**	**1264.35**	**12981.63**	**5142.095**

Annexure – 5: Sample Environment Monitoring for Air, Water, Noise and Soil Sampling for Similar ADB funded Road Project April 2016

Data incorporated from the Initial Environmental Examination, May 2016 collected for ADB funded Rajasthan State Highway Investment Program and Prepared by PPP Division, Public Works Department, and Government of Rajasthan for the Asian Development Bank available on ADB website. The Appendix B, C, D from the report reproduced interpreted for Tranche 2 RVPN project and reproduced here for relevant subprojectsto be used as baseline data - https://www.adb.org/projects/49228-001/main#project-documents

A5.1 Standards

Water Quality Protocols (Central Pollution Control Board, GOI)

Table 1 Parameters of analysis for groundwater samples

Type of station	Frequency	Parameter
Baseline	Once every year, (pre-monsoon, May-June)	Temp, EC, pH, $NO_2^- + NO_3^-$, total P, K^+, Na^+, Ca^{++}, Mg^{++}, CO_3^{--}, HCO_3^-, Cl^-, SO_4^{--}, COD, SiO_2, F, B.
Trend	Four times every year, (pre-monsoon, May-June & after intervals of 3 months)	Temp, EC, pH, $NO_2^- + NO_3^-$, total P, Cl^-, COD.
Trend–cum–surveillance – ***Fluoride*** – ***Iron*** – ***Industrial, mining*** – ***Salinity due to irrigation, natural contribution or sea water intrusion*** – ***Urban*** **pollution**	Minimum four times a year (as above), higher frequency if dictated by importance of water use	According to the problem under surveillance (e.g. Heavy metals in mining areas) F^- Fe As, Cd, Hg, Zn Na^+, K^+, Ca^{++}, Mg^{++}, CO_3^{--}, HCO_3^-, Cl^-, SO_4^{--} Total and faecal coliforms

Table 2 Parameters of analysis for surface water samples[a]

Parameter Group	Initially	Baseline	Trend
General	Temp, EC, pH, DO,TDS	Temp, EC, pH, DO,TDS	Temp, EC, pH, DO
Nutrients	NH_3-N, $NO_2 + NO_3$, total P	NH_3-N, $NO_2 + NO_3$, total P	NH_3-N, $NO_2 + NO_3$, total P
Organic matter	BOD, COD	None	BOD, COD
Major ions	Ca^{++}, Mg^{++}, K^+, Na^+, CO_3^{--}, HCO_3^-, Cl^-, SO_4^{--}	Ca^{++}, Mg^{++}, K^+, Na^+, CO_3^{--}, HCO_3^-, Cl^-, SO_4^{--}	Cl^-
Other inorganics	None	None	None
Metals	None	None	None
Organics	None	None	None
Microbiological[b]	Total coliforms	None	Total and faecal coliforms
Biological	None	None	None

a- based on 'Surface Water Quality Network Design, Guidelines and an Example', June 1997
b- depending on workload, analysis frequency may be reduced upto 2 samples per year

Table 3: Drinking Water standards

Parameter	Standard Drinking water Specification as per IS –10500:1991 as amendment up to 3 July 2010		Protocol (Test Method)
	Desirable Limit	Permissible Limit in absence of alternate source	
Essential CharacteristicsPhysical Parameter			
Color, Hazen Units	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	5	10	IS: 3025 Part 10 - 1984
pH	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters			
Total Hardness as $CaCO_3$	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters			
Dissolved Solids	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO_4	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO_3	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C_6H_5OH	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr^{+6}	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics			
Coliform Organisms	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	IS: 1622 - 1981

Table 4: Ambient Air Quality Standards in respect of Noise

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

Note

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is defined as an area comprising not less than 100 metres around hospitals, educational institutions and courts. The silence zones are zones which are declared as such by the competent authority.

4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.
*dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.
A "decibel" is a unit in which noise is measured.
"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.
Leq: It is an energy mean of the noise level, over a specified period.
Source: Ministry of Environment and Forests Notification, New Delhi, the 14 February, 2000 S.O. 123(E)

A5.2 Comparative Project Areas: IEE for Road project and Tranche 2 IEE:

Sno as per IEE	Road Section Particulars as per IEE	Nearest Power Project Component for Tranche 2	Distance	District
5	Barmer -Sindari -Jalore	Sheo GSS	52 km	Pali
6	Ahore-Bali -Mundara	Sheo GSS	179 km	Barmer, Jalore
8	Sardarsahar-Loonkaransar	Loonkaransar GSS	0 km	Churu, Bikaner
10	Sanju-Tarnau	Khinvsar GSS	67 km	Nagaur
11	Roopangarh-Naraina	Khinvsar GSS	145 km	Jaipur, Ajmer
12	Tarnau-Mukundgarh	Khinvsar GSS	36 km	Nagaur, Sikar, Churu, Jhunjhunu
14	Sikar-Ganeri-Jaswantgarh	Kitasar GSS	61 km	Sikar, Churu, Nagaur
15	Bidasar-Nokha	Gajner GSS	66 km	Churu and Bikaner

A5.3 Baseline Air Quality Status in Project Area

S. No	Locations	PM 10 µg/m3	PM 2.5 µg/m3	Sox µg/m3	NOx µg/m3	CO µg/m3
BARMER-SINDARI-JALORE						
1	km 4+600	69.00	19.00	9.00	19.00	0.50
2	km 28+300	72.00	18.00	11.40	18.00	1.10
3	km 63+500	73.00	21.00	14.00	28.00	0.45
4	km 88+400	74.00	22.00	16.80	33.00	0.70
5	km 122+300	59.00	26.00	12.00	15.00	0.85
6	km 148+000	65.00	22.00	14.00	16.00	0.35
AHORE-BALI-MUNDARA						
1	km 226	76	29	7.7	14	0.35
2	km 232	74	26	7.8	14.1	0.34
3	km 244	77	28	7.5	14.2	0.37
SARDARSHAHAR-LUNKARANSAR						
1	Mitthasar	85.4	48.2	9.2	20.4	320
2	Garabdeshar	272	57.8	7.9	18.5	270
3	Police Station,	142.5	54.4	8.4	18.3	290
CHURU-BHALERI						
1	Lohiya ground*	189.1	72	8.6	17.3	240
2	Johri SagaR	176.9	68.4	9.7	21.2	310
3	Bharat Gas	170	65.9	12.3	25.1	360
SANJU-TARNAU						
1	Sanju	71.5	49.9	17.43	11.23	0.094
2	Tarnau	71.51	49.73	17.36	11.04	0.084
ROOPANGARH-NARAINA						
1	Sirohi Khurd	84.27	44.71	16.94	10.1	0.067
2	Roopangarh	79.24	44.69	16.06	10.31	0.086
NAGAUR-TARNAU-MUKUNDGARH						
1	Nagaur	70.8	41.46	17.33	9.56	0.043
2	Tarnau	74.93	39.71	15.96	8.85	0.063
4	Deedwana	76.1	39.17	15.19	30.3	0.74
5	Meetheri	86.28	40.4	16.12	33.25	0.78
6	Laxmangarh	86.45	41.55	14.65	33.33	0.75
SIKAR-GANERI-JASWANTGARH						
1	Sikar	80.9	43.3	15.88	34.56	0.76
2	Chailasi	74.25	44.86	14.98	33.84	0.71
3	Sewad Badi	77.1	38.9	15.15	28.6	0.73
4	Kachawa	68.1	38.6	10.5	26.1	0.7
5	Nechawa	73.2	36.7	15.7	30.1	0.74
BIDASAR-NOKHA						
1	Sandwa	113+000	81.1	40.9	15.94	31.28
2	Kaatar	139+500	77.54	35.85	14.86	30.3
3	Jasrasar	151+000	78.2	38.5	16.15	34.05
4	Himmatsar	173+000	76.3	36.85	17.11	30.54
5	Somalsar	185+500	75.88	37.5	17.23	35.14

A5.4 Baseline Noise Level in Project Area

S. No	Locations	Leq - Day in dB (A)	Leq – NightdB (A)
BARMER-SINDARI-JALORE			
1	km 4+600	39.00	12.00
2	km 28+300	42.00	14.00
3	km 63+500	44.00	18.00
4	km 88+400	22.00	12.00
5	km 122+300	29.00	16.00
6	km 148+000	22.00	15.00
AHORE-BALI-MUNDARA			
1	km 226	51	41
2	km 232	52	38
3	km 244	54	40
SARDARSHAHAR-LUNKARANSAR			
1	Mitthasar	52.4	40.7
2	Garabdeshar	53.7	40.1
3	Police Station,	54.8	40.2
CHURU-BHALERI			
1	Lohiya ground*	59.3	39.6
2	Johri SagaR	57.9	37.8
3	Bhaleri	53.8	40.3
SANJU-TARNAU			
1	Sanju	55	49
2	Tarnau	62	50
ROOPANGARH-NARAINA			
1	Sirohi Khurd	59	50
2	Roopangarh	63	51
NAGAUR-TARNAU-MUKUNDGARH			
1	Nagaur	62	51
2	Tarnau	64	53
4	Deedwana	57.65	46.2
5	Meetheri	54.1	44.3
6	Laxmangarh	51.3	42.1
SIKAR-GANERI-JASWANTGARH			
1	Sikar	52.22	43.54
2	Chailasi	53.1	42.14
3	Sewad Badi	51.65	42.98
4	Kachawa	52.14	41.64
5	Nechawa	50.85	43.1
BIDASAR-NOKHA			
1	Sandwa	49.54	40.12
2	Kaatar	53.18	43.34
3	Jasrasar	51.21	42.33
4	Himmatsar	53.44	43.29
5	Somalsar	52.34	42.68

A5.4 Baseline Ground Water Quality

BARMER-SINADRI-JALORE

S. No	Parameters and Unit	Location1	Location 2	Location3	Location 4	Location 5
1	pH	7.16	7	6.8	6.9	7
2	Temperature (C)	38	36	38	40	35
3	Dissolved Oxygen (mg/l)	3.8	3.2	4	3.3	3.1
4	Conductivity	959.78	722	672	739	699
5	TSS (mg/l)	<1.0	<1.0	<1.0	<1.0	<1.0
6	Total Dissolved Solid	623.86	626.86	629.86	632.86	635.86
7	Alkalinity (mg/l)	312	315	318	321	324
8	Total Hardness as CaCO3 (mg/l)	373	376	379	382	385
9	Ca as CaCO3 (mg/l)	298	301	304	307	310
10	Mg as CaCO3 (mg/l)	75	78	81	84	87
11	Chlorides as Cl (mg/l)	56	59	62	65	68
12	Phosphate as PO4 (mg/l)	<0.1	<0.1	<0.1	<0.1	<0.1
13	Nitrates as NO3 (mg/l)	4.5	4.2	3.9	3.6	3.3
14	Sulphates as SO4 (mg/l)	48.4	48.1	47.8	47.5	47.2
15	Sodium as Na (mg/l)	45	44.7	44.4	44.1	43.8
16	Potassium (as K) (mg/l)	5	4.7	4.4	4.1	3.8
17	COD (mg/l)	BDL	BDL	BDL	BDL	BDL
18	BOD (at 270C 3-Days)	BDL	BDL	BDL	BDL	BDL

AHORE-BALI-MUNDARA

S. No	Parameters and Unit	Location1	Location 2	Location3
1	pH	7.44	7.54	7.2
2	Temperature (C)	37	35	34
3	Dissolved Oxygen (mg/l)	4.7	4.5	4.2
4	Conductivity	1025.24	989.15	984.26
5	Total Suspended Solid (mg/l)	<1.0	<1.0	<1.0
6	Total Dissolved Solid(mg/l)	666.41	642.95	639.77
7	Alkalinity(mg/l)	332	310	320
8	Total Hardness as CaCO3 (mg/l)	330	335	335
9	Ca Hardness as CaCO3(mg/l)	270	275	275
10	Mg Hardness as CaCO3 (mg/l)	60	60	60
11	Chlorides as Cl (mg/l)	66	68	60
12	Phosphate as PO4 (mg/l)	<0.1	<0.1	<0.1
13	Nitrates as NO3 (mg/l)	2.5	2.4	2.38
14	Sulphates as SO4 (mg/l)	48	48	45
15	Sodium as Na (mg/l)	77	72	70
16	Potassium (as K) (mg/l)	2.6	2.7	2.6
17	COD (mg/l)	BDL	BDL	BDL
18	BOD (at 270C 3-Days) (mg/l)	BDL	BDL	BDL

SARDARSHAR-LUNKARANSAHAR AND CHURU-BHALERI

S. No	Parameters	Unit	Mitthasar	Garabdeshar	Lunkaransar	Bhaleri
1	pH	-	7.91	7.8	7.85	7.88
2	Colour	Hazen	<5.0	<5.0	<5.0	<5.0
3	Turbidity	NTU	2	2	2	2
5	Chloride as a	mg/l	132.63	136.56	141.3	132.65
6	Total Hardness	mg/l	290.56	310.45	298.65	290.56
7	Calcium as Ca	mg/l	78.5	89.63	92.56	90.5
8	Sulphate as 504	mg/l	48.77	45.78	50.66	48.7
10	Total Dissolved Solid	mg/l	502.35	490.45	522.35	501
11	Alkalinity	mg/l	340.8	270.8	290.5	341
12	Iron	mg/l	0.42	0.26	0.4	0.4
13	Fluoride as F	mg/l	1.2	0.95	0.88	1.2
14	Magnesium as Mg	Mg/l	23.01	21.1	16.45	21.1
15	Boron	mg/l	0.91	0.58	0.62	0.91
16	Chromium	mg/l	<0.01	<0.01	<0.01	<0.01

S. No	Parameters	Unit	Mitthasar	Garabdeshar	Lunkaransar	Bhaleri
17	Copper	mg/l	<0.02	<0.02	<0.02	<0.02
18	Manganese	mg/l	<0.02	<0.02	<0.02	<0.02
19	Nitrate	mg/l	8.62	9.78	9.01	8.62
20	Cadmium	mg/l	<0.003	<0.003	<0.003	<0.003
21	Lead	mg/l	<0.01	<0.01	<0.01	<0.01
22	Arsenic	mg/l	<0.01	<0.01	<0.01	<0.01
23	Mercury	mg/l	<0.001	<0.001	<0.001	<0.001
24	Selenium	mg/l	<0.01	<0.01	<0.01	<0.01
25	Aluminum	mg/l	<0.02	<0.02	<0.02	<0.02
26	Zinc	mg/l	0.35	0.25	0.31	0.28
27	Residual free Cl	mg/l	<0.05	<0.05	<0.05	<0.05
28	Anionic Detergent	mg/l	<0.02	<0.02	<0.02	<0.02
29	Cyanide	mg/l	<0.02	<0.02	<0.02	<0.02
30	Phenolic Compound	mg/l	<0.001	<0.001	<0.001	<0.001
31	Total Coliform	MPN/ 100ml	Absent	Absent	Absent	Absent
32	E.coli	CFU/ 100 ml	Absent	Absent	Absent	Absent

SANJU-TARNUA

S. No	Parameters	Unit	Location1	Location 2
1	Specific Conductance	µS/cm	1202	1236
2	pH value		7.5	7.3
3	Total hardness	mg/l	228	228
4	Sulphate	mg/l	40.3	36.5
5	Chloride	mg/l	226	206
6	Fluoride	mg/l	1.1	1.3
7	Total Dissolved Solids	mg/l	760	720
8	Total Alkalinity	mg/l	276	290
9	Calcium	mg/l	46.4	46.4
10	Magnesium	mg/l	27.3	27.3
11	Nitrate	mg/l	5.8	6.8
12	Fixed Residue	mg/l	540	500
13	Volatile Residue	mg/l	220	220

ROOPANGARH-NARAINA

S. No	Parameters	Unit	Location1	Location 2
1	Specific Conductance	µS/cm	1260	1296
2	pH value		7.5	7.5
3	Total hardness	mg/l	368	352
4	Sulphate	mg/l	30.5	33.5
5	Chloride	mg/l	220	280
6	Fluoride	mg/l	1.1	0.9
7	Total Dissolved Solids	mg/l	882	926
8	Total Alkalinity	mg/l	320	310
9	Calcium	mg/l	80	78.4
10	Magnesium	mg/l	41	38.1
11	Nitrate	mg/l	5.7	6.1
12	Fixed Residue	mg/l	646	700
13	Volatile Residue	mg/l	236	226

NAGAUR-TARNAU-MUKUNDGARH

S. No	Parameters	Unit	Location1	Location 2
1	Specific Conductance	µS/cm	1180	980
2	pH value		7.6	7.1
3	Total hardness	mg/l	156	148
4	Sulphate	mg/l	41.3	41.3
5	Chloride	mg/l	302	380
6	Fluoride	mg/l	0.8	1
7	Total Dissolved Solids	mg/l	686	770

S. No	Parameters	Unit	Location1	Location 2
8	Total Alkalinity	mg/l	280	296
9	Calcium	mg/l	36.8	33.6
10	Magnesium	mg/l	15.6	15.6
11	Nitrate	mg/l	3.7	5.7
12	Fixed Residue	mg/l	474	572
13	Volatile Residue	mg/l	212	196

SIKAR-JASWANTGARH

S. No	Parameters	Unit	Location1	Location 2	Location3	Location 4	Location 5
1	Turbidity	NTU	>1	>1	>1	>1	>1
2	PH	° C	7.67	7.42	8.01	7.38	7.5
3	Hardness (total)	mg/l	416.8	360.80	246.90	366.10	420.1
4	Iron	mg/l	0.35	0.30	0.30	0.31	0.32
5	Chloride	mg/l	197.45	160.10	68.52	75.49	98.24
6	TDS	mg/l	650.50	530.00	260.10	290.00	480.2
7	Calcium	mg/l	59.54	52.40	48.28	64.13	78.25
8	Odour		Unobjectionable				
9	Magnesium	mg/l	65.18	55.90	30.73	50.08	54.64
10	Copper(as Cu)	mg/l	0.32	0.21	0.24	0.18	0.20
11	Sulfate (as SO4)	mg/l	75.24	39.80	35.72	41.82	46.48
12	Fluoride (as F)	mg/l	1.01	0.60	0.67	0.71	1.05
13	Zinc (as Zn)	mg/l	0.23	0.30	0.20	0.26	0.23
14	Alkanity-T	mg/l	253.18	215.20	102.65	108.30	220.54
15	Aluminum	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
16	Boron (as B)	mg/l	0.99	0.75	0.70	0.74	0.76
17	Selenium	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
18	Barium as B++	mg/l	<1	<1	<1	<1	<1

BIDASAR-NOKHA

S. No	Parameters	Unit	Location1	Location 2	Location3	Location	Location 5	Location 6
1	Turbidity	NTU	>1	>1	>1	>1	>1	>1
2	PH	° C	7.32	7.40	7.25	8.11	7.45	7.68
3	Hardness	mg/l	414.50	329.90	351.37	228.70	429.20	568.48
4	Iron	mg/l	0.33	0.30	0.34	0.29	0.31	0.32
5	Chloride	mg/l	97.97	79.63	106.34	95.55	123.37	93.88
6	TDS	mg/l	480.00	240.10	327.50	304.20	525.10	420.30
7	Calcium	mg/l	60.82	69.68	78.84	34.75	82.84	80.96
8	Odour		Unobjectionable					
9	Magnesium	mg/l	63.85	37.92	37.58	34.51	54.07	89.06
10	Copper	mg/l	0.27	0.27	0.25	0.22	0.26	0.27
11	Sulfate	mg/l	44.92	49.35	38.52	62.23	59.12	39.45
12	Fluoride	mg/l	0.81	0.72	0.78	0.91	0.92	0.68
13	Zinc (as Zn)	mg/l	0.19	0.31	0.20	0.28	0.33	0.22
14	Alkanity-T	mg/l	132.19	122.75	197.60	167.50	252.25	214.05
15	Aluminum	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
16	Boron	mg/l	0.65	0.81	0.63	0.90	0.82	0.90
17	Selenium	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18	Barium	mg/l	<1	<1	<1	<1	<1	<1

A5.5 Baseline Surface Water Quality in Project Area

SARDARSHAHAR-LUNKARANSAR

No.	Parameter	Lunkaransar
1	pH (at 25C)	7.98
2	Color(Hazen Units)	<5.0
3	Turbidity (NTU)	3
4	odor	Agreeable
5	Taste	Agreeable
6	Chloride Cl (mg/l)	240.5
7	Total Hardness (Mg/l)	305.63
8	Calcium Ca (mg/l)	80
9	Sulphate (mg/l)	52
10	Total dissolved Solids (mg/l)	690
11	Alkalinity(mg/l)	410
12	Iron as Fe (mg/l)	0.52
13	Fluoride as F(mg/l)	0.79
14	Magnesium as Mg (mg/l)	26
15	Boron as Br (mg/l)	0.7
16	Chromium as Cr. (mg/l)	<0.01
17	Copper as Cu (mg/l)	<0.02
18	Manganese as Mn (mg/l)	<0.02
19	Nitrogen (mg/l)	28
20	Cadmium (mg/l)	<0.003
21	Lead as Pb (mg/l)	<0.01
22	Arsenic as (mg/l)	<0.01
23	Mercury as Mg (mg/l)	<0.001
24	Selenium as Se(mg/l)	<0.01
25	Aluminum as Al (mg/l)	<0.02
26	Zinc as Zn(mg/l)	1.25
27	Residual Free Chlorine (Mg/l)	<0.05
28	Anionic Detergents as MBAS (ng/l)	<0.02
29	Cyanide as Cy (mg/l)	<0.02
30	Phenol Compounds (mg/l)	<0.001

NAGAUR-TARNAU-MUKUNDGARH

S. No	Parameters	Unit	Deedwana
1	pH at 25C	--	7.6
2	Colour	Hazen	BDL (DL 5Hazen)
3	Turbidity	NTU	BDL(DL 1 NTU)
4	Odour	--	Agreeable
5	Taste	--	Agreeable
6	Total Hardness (as CaCO3)	mg/l	402.3
7	Calcium as Ca	mg/l	85.6
8	Total Alkality	mg/l	450.2
9	Chloride (as Cl)	mg/l	165.3
10	Residual Free Chlorine	mg/l	BDL (DL 0.02 mg/l)
11	Cyanide as CN	mg/l	BDL (DL 0.02 mg/l)
12	Magnesium as Mg	mg/l	45.96
13	Total Dissolved Solids (as TDS)	mg/l	763.4
14	Sulphate as SO4	mg/l	95.6
15	Flouride (as F)	mg/l	1.9
16	Nitrate as NO3	mg/l	51.2
17	Iron (as Fe)	mg/l	0.7
18	Aluminum as Al	mg/l	BDL (DL 0.02 mg/l)
19	Boron	mg/l	0.9
20	Phenolic Compound	mg/l	BDL (DL 0.001 mg/l)
21	Anionic Detergent as MBAS	mg/l	BDL (DL 0.02 mg/l)
22	Chromium as Cr	mg/l	BDL (DL 0.02 mg/l)
23	Zinc as Zn	mg/l	1.93

24	Copper as Cu	mg/l	0.8
25	Manganese as Mn	mg/l	B(DL 0.02 mg/l)
26	Cadmium as Cd	mg/l	BDL (DL 0.003 mg/l)
27	Lead as Pb	mg/l	BDL (DL 0.01 mg/l)
28	Selenium as Se	mg/l	BDL (DL 0.01 mg/l)
29	Arsenic as As	mg/l	BDL (DL 0.01 mg/l)
30	Mercury as Hg	mg/l	BDL (DL 0.001 mg/l)
31	Total Coliform	100 ml	<2/100 ml
32	E coli	100 ml	Absent

Annexure - 6: Sample Environment Monitoring Report

Environmental Safeguards Document

Environment Monitoring Report

(ICB-XX)

Document Stage:
Project Number: 45224 (IND)
Period –
Reporting –

India: Rajasthan Renewable Energy Transmission Investment Program

Prepared for Asian Development Bank by Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPN), Government of Rajasthan.

Environment Monitoring Report

Compliance Status & Monitoring Report of Environment Safeguards

Period:
Submitted by: Rajasthan Rajya Vidyut Prasaran Nigam Limited, Rajasthan

Table of Contents

Abbreviations

AP's	Affected Persons
C/o	Construction of
Deptt.	Department
Distt.	District
FCA	Forest Conservation Act
GIS	Gas Insulated Switchgear
GoI	Govt of India
GRC	Grievance Redressal Committee
Ha.	Hectare (10,000 sq. m. land)
IE Rule	Indian Electricity Rule
MOEFCC	Ministry of Forest, Environment and Climate Change
MPAF	Main Project Affected Family

Project Information

A.1. General

I	Name of Project	**Rajasthan Renewable Energy Transmission Investment Program**
II	Loan Number	
II	Name of Monitoring/Reporting Agency and address	
III	Monitoring Period (Season/month)	
IV	Report No.	
V	Report for the period	
VI	Date of reporting	

A.2. Subproject details

	List of sub-projects	
I		

A.3. Overall Project Progress, Agreed Milestones and Implementation Schedules

S No	Name of sub-project	Progress as on date of Report	Implementation Schedule
1			
2			
3			
4			

B.1: Compliance Status with National/State/Local Statutory Environmental Requirements and international standards

S No	Legal Requirements/Acts/Rules/Guidelines	Applicable Attributes	RVPN's Compliance Status
1	The Water (Prevention and Control of Pollution) Act, 1974 as amended;	Water Pollution	
2	The Air (Prevention and Control of Pollution) Act, 1981	Air Pollution	
3	The Environment (Protection) Act, 1986	Construction Practices	
4	The Environment Impact Assessment Notification, 1994 as amended	EMP monitoring	
5	The Hazardous Wastes (Management and Handling) Rules, 1989 as amended	Transformer Oil	
6	The Ozone Depleting Substances (Regulation and Control) Rules, 2000	Cleaning of electrical contacts using HFCs etc.	
7	The Batteries (Management and Handling) Rules, 2001 as amended	Batteries	
8	The Indian Forest Act, 1927 as amended	Reserve Forest areas, Right of way	
9	The Wild Life (Protection) Act, 1972 as amended	Critical habitats	
10	The Biological Diversity Act, 2002	Wetland	
11	The Forest (Conservation) Act, 1980 as amended	Construction work in forest areas	
12	The National Environmental Policy, 2006 of GoI	Construction Practices	
13	Other State Level Acts	Compensation	
14	Other International levels conventions and treaties	Biodiversity, GHG emissions	

B.2: General Implementation Status

B.2.1. Forest Clearance.

SNo.	Measures/ stipulation	Compliance Status
I	**Sub-Project #**	
1	Right of Way/ land required	
2	Clearance from trees	
3	Forest area and Nos. of trees.	
4	Damage to forest	
5	Wild life sanctuaries	

B.2.2. Fulfilment of commitments made during Public Hearing/Consultation

S.No.	Query/Apprehension	Commitment	Compliance Statement
I	**Sub-project #**		
1	Compensation for crop	As per EPC contractor bid	
2	Compensation for land damages	As per EPC contractor bid	
3	Compensation for pathways, channels for waterway.	Restoration after erection by EPC contractor	
4	Nuisance due to dust, noise, vibrations, labour during construction	As per EMP implemented by EPC contractor	

B.2.3. ADB Stipulations/ safeguarding measures on Environment.

SNo.	Product Activity/Stage	Parameter to be monitored	Compliance Status
I	**Sub-Project #**		
	Construction		
1	Archaeological site/	Chance find along	

SNo.	Product Activity/Stage	Parameter to be monitored	Compliance Status
	monument safety	transmission line routes and substations	
2	Public places, schools, ponds, airport, railway etc.	Distance 50 m away	
3	Safeguard against critically endangered Flora and fauna.	Avoid	
4	Rain and Flood prone area.	Avoid	
5	Environmental parameters for air, noise, land and water during project construction	Environmental Monitoring Plan Incudes – Air monitoring, Water monintoring, Soil monitoringand Noise Monitoring	

B.2.4 Record of complaints (regarding environment safeguard measures) and their resolution

Sr.No	Complainant Name and address	Date of receipt	Subject/Issue	Date of resolution	Remarks
I	**Sub-Project #**				

B.2.5. Staffing, Institutional Arrangements and Grievance Redress

S.No.	Parameters	Commitment	Compliance Statement
1	Numbers of Staff deputed/employed for environment safeguards	One at -site	
2	PIU established as per proposed institutional mechanism	Date	
3	GRC formation	Date	
4	Grievance Redress Mechanism followed	Proper record	

B.2.6. Other measures:

I	Sub-Project #
1	
2	
3	
4	

B2.7 Annexures

I	Sub-Project #
1.	
2.	
3.	
4.	

B.3: Status of Implementation of Environment Management Plan (EMP) and Environment Monitoring Plan (EMoP)

B3.1. Environment Management Plan and Status on Implementation

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
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 50 m away from water bodies, natural flow paths, important ecological habitats and residential areas	Water and air quality					
Substation location and design	Noise generation Exposure to noise, Nuisance to neighbouring properties	Substation designed to ensure noise will not be a nuisance.	Expected noise emissions based on substation design, noise levels					
	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	Setbacks to houses and other structures					
Location of transmission towers and transmission line alignment and design	Exposure to safety related risks	Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and the regulation of supervision at sites.	Tower location and line alignment selection with 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)					
Equipment	Release of	PCBs free substation	Transformers					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
specifications and design parameters	chemicals and harmful gases in receptors (air, water, land)	transformers or other project facilities or equipment.	and specifications and compliance with setback distances (“as-built” diagrams)					
Encroachment into precious ecological areas	Loss of precious ecological values/ damage to precious species	Avoid encroachment by careful site and alignment selection and reconnaissance before final siting of activities. Minimise the RoW wherever possible	Floral and faunal habitats loss					
Involuntary resettlement and acquisition	Loss of lands and structures	Compensation paid for temporary/ permanent loss of productive land	Public complaints					
Encroachment into farmland	Loss of agricultural productivity	Use existing tower footings/towers wherever possible Avoid siting new towers on farmland wherever possible Farmers compensated for any permanent loss of productive land and trees that need to be trimmed or removed along RoW.	Tower location and line alignment selection Design of Implementation of crop and tree compensation (based on affected area) Statutory approvals for tree trimming /removal					
Interference with drainage patterns/Irrigation channels	Temporary flooding hazards/loss of agricultural production	Appropriate sighting of towers to avoid channel interference Appropriate provision	Site location and line alignment selection					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		or excess soil dug up from the foundations/trenches						
Explosions/Fire	Hazards to life	Design of substations to include modern fire control systems/firewalls. Provision of fire fighting equipment to be located close to transformers, power generation equipment.	Substation design compliance with fire prevention and control codes					
Construction								
Removal or disturbance to other public utilities	Public inconvenience	Advance notice to the public about the time and the duration of the utility disruption Use of well trained and experienced machinery operators to reduce accidental damage to the public utilities Restore the utilities immediately to overcome public inconvenience	Disruption to other commercial and public activities / Public complaints	.				
Acquisition of cultivable lands	Loss of agricultural productivity	Avoid faming season wherever possible for the project activities. Ensure existing irrigation facilities are maintained in working condition Protect /preserve topsoil and reinstate after construction completed	Land area of agriculture loss Usage of existing utilities Status of facilities (earthwork in m^3)					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		Repair /reinstate damaged bunds etc. after construction completed Compensation for temporary loss in agricultural production.	Implementation of crop compensation (amount paid, dates, etc.)					
Temporary outage of the electricity	Loss of power supply to the local community when distribution lines crossing the new transmission line are switched off	Advance notice to the public about the time and the duration of the utility disruption Restore the utilities immediately to overcome public inconvenience	Power disruption to houses and commercial premises of power disruption					
Equipment layout and installation	Noise and vibrations	Selection of construction techniques and machinery to minimise ground disturbance.	Construction techniques and machinery					
	SF6 leakage during storage and erection of Switchgear	Record of all substation switchgear, storage cylinders located within secure casings	Switchgear casings and substation bounding					
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)					
	Interference in drainage of rain and waste water at site	Removal of silt and trash choking the drainage of the substation land	Drains choked with rain/water due to silt and trash					
	Water pollution	Construction activities involving significant	Water Quality (pH,					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	BOD/COD, Suspended solids, other) during major earthworks					
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)])					
Provision of facilities for construction workers	Nuisance to wildlife if the line construction crosses their migratory path	Restrict construction work during the known period of migration by any wildlife in the area	Timing of Construction					
	Contamination of receptors (land, water, air)	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Amenities for Workforce facilities					
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 and amount (m^3) of fill disposal Soil disposal locations and volume (m^3)					
Air Pollution	Loose dust might blow in the area causing dusty conditions	Damping of dust by sprinkling of water within the work area and stack the loose soil and contain it with covers if required.	Soil stacking locations, access roads, tower locations, substation site					
Wood/ vegetation harvesting, cut and fill operations	Loss of vegetation and deforestation	Construction workers prohibited from harvesting wood in the project area during their employment.	Illegal wood /vegetation harvesting (area in m^2, number of incidents reported)					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
	Effect on fauna	Prevent work force from disturbing the flora, fauna including hunting of animal and fishing in water bodies. Proper awareness programme regarding conservation of flora, fauna including ground vegetation to all drivers, operators and other workers.	Habitat loss					
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)					
	Soil erosion and surface runoff	Construction near seasonal rivers, erosion and flood-prone areas (if any) should be restricted to the dry season. Provision and maintenance of drains and retention ponds. Treat clearing and filling areas against flow acceleration and construction work should be carefully designed to minimise obstruction or destruction to natural drainage.	Soil erosion					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Chance Find	Loss/theft of precious archeological item uncovererd in digging at sites.	In case of chance find of cultural artifacts and property/archaeological features	GOI's Treasure and Trove Act.					
Mechanised construction	Noise, vibration and operator safety, efficient operation Noise, vibration, equipment wear and tear	Construction equipment to be well maintained. Proper maintenance and turning off plant not in use.	Construction equipment - estimated noise emissions and operating schedules					
Construction of roads for accessibility	Increase in airborne dust particles Increased land requirement for temporary accessibility	Existing roads and tracks used for construction and maintenance access to the site wherever possible. New access ways restricted to a single carriageway width within the Row.	Access roads, routes (length and width of access roads)					
Transportation and storage of materials	Nuisance to the general public	Transport loading and unloading of construction materials should not 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	Water and Air Quality					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		such materials should be bundled in environment friendly and nuisance free manner						
Trimming/cutting of trees within RoW	Fire hazards Loss of vegetation and deforestation	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. Trees that can survive trimming to comply with statutory distance should be lopped and not felled Felled trees and other cleared or pruned vegetation to be disposed of as authorised by the statutory bodies.	Species-specific tree retention as approved by statutory authorities (average and maximum tree height at maturity, in metres) Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m^2)					
Health and safety	Injury and sickness of workers and members of the public	Contract provisions specifying minimum requirements for construction camps from water bodies, reserved areas etc. Contractor to prepare and implement a health and safety plan and provide workers and health and safety measures.	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		Contractor to prepare Emergency Response Plan. Availability of ambulance or medical facility at work site both for workers and public should be kept by contractor Contractor to arrange for health and safety awareness programmes						
Nuisance to nearby properties	Losses to neighbouring land uses/ values	Contract clauses specifying careful construction practices. As much as possible existing access ways will be used. Productive land will be reinstated following completion of construction Compensation will be paid for loss of production, if any.	Contract clauses Design basis and layout Reinstatement of land status (area affected, m^2) Implementation of Tree/Crop compensation (amount paid)					
Electric shock	Death or injury to the workers and public	Security fences around substation Establishment of warning signs Careful design using appropriate technologies to minimise hazards	Proper maintenance of fences and sign boards Usage of appropriate technologies (lost work days due to illness and injuries)					
Noise generation	Nuisance to the community around the site	Provision of noise barriers if needed near substation sites	Noise level					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Soil Erosion	Removal of top soil	Planting of buffer zone species suitable for arid climate.	Turbidity of water (Visual Inspection)					
Maintenance of Transmission line	Exposure to electromagnetic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Required ground clearance (metres)					
Substation maintenance	Exposure to electromagnetic interference	Substation design to comply with the limits of electromagnetic interference within floor area	Required vibrations level, instrumentation					
Oil spillage	Contamination of land/nearby water bodies	Substation transformers located within secure and impervious bundled areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bounding (“as-built” diagrams)					
Operation of Switchgear	Leakage of SF6 gas	Record of all substation switchgear located within secure casings	Switchgear casings and Substation bounding					

B.3.2 Environment Monitoring Plan and Status on Implementation

Environmental component	Project stage	Parameters to be monitored	Sampling Location	Monitoring Frequency	Regulatory Standards parameter	Agency responsible for implementation	Agency responsible for supervision	Test Results	Observations/Comments	Actions for Compliance	Further follow-up required
1.Air Quality	A. Pre-construction stage (Baseline development)	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	One time	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5]	RVPN					
	B. Construction Stage	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	Every one month of construction period	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5						
	C. Operation Stage (Testing and Commissioning)	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	One time during commissioning	Spot check using field portable instruments National Air quality standards of CPCB PM10 or PM2.5						
2.Water Quality	A. Pre-construction stage (Baseline development)	EC, TSS, DO, BOD, P^H Oil and grease, Pb,	Nearest well near substations	One time	National water quality standards of CPCB	RVPN					

	B. Construction Stage	EC, TSS, DO, BOD, P^H Oil and grease, Pb,	Nearest well near substations	One time during cable laying	National water quality standards of CPCB	
	C. Operation Stage	EC, TSS, DO, BOD, P^H Oil and grease, Pb,	Nearest well near substations	One time during commissioning	National water quality standards of CPCB	
3.Noise/ Vibration	A. Pre-construction stage (Baseline development)	Noise level [dB(A)]	Boundary of substation	One time	CPCB standards for Noise and vibrations	RVPN
	B. Construction Stage	Noise level [dB(A)]	Boundary of substation	Every one month of construction period	CPCB standards for Noise and vibrations	
	C. Operation Stage	Noise level [dB(A)]	Boundary of substation	One time during commissioning	CPCB standards for Noise and vibrations	
4. Soil	A. Pre-construction stage (Baseline development)	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time	Hazardous Waste Management rules	RVPN
	B. Construction Stage	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time	Hazardous Waste Management rules	
	C. Operation Stage	Visible spills and/or soil staining, Oil &	1 location inside substation	One time during commissioning	Hazardous Waste Management rules	

		grease			
SF6	Operation Stage	Volumetric loss from GIS equipment	Substation equipment, circuit breakers	Online monitoring by data loggers	As per Approved Specifications of Equipment

Abbreviations:

SO_{2}- -Sulphur Dioxide; NO_{2}- - Nitrogen Dioxide; CO- Carbon Monoxide; EC – Electric Conductivity;
Pb – Lead; $PM_{2.5}$ - Particulate Matter <2.5; PM_{10} - Particulate Matter <10; TSPM- Total suspended Particulate Matter;
EC - Electrical Conductivity; DO - Dissolved Oxygen; TSS - Total Suspended Solids;
SF_6 – Sulphur Hexafluoride gas
BOD - Biological Oxygen Demand; ORP – Oxidation Reduction Potential
NAAQS - National Ambient Air Quality Standards specified by CPCB, GoI;
NWQS - National Water Quality Standards specified by CPCB, GoI.

Annexure - 7: Details of Public Consultation (Environment)

No	Participants' Opinion, Comments and Suggestions					
	Issues	**765 kV D/C Korna-Ajmer Line Name of Village: Bheevgarh**	**400 kV D/C Korna – Pokharan Line Name of Village: Bhungra**	**Name of the Component /Site: 220Kv Khinvsar-Baithwasia Line Name of Village: Khindokor**	**400 kV D/C Korna-Pokharan Line Name of Village: Khirja**	**765 kV D/C Korna- Ajmer Line Name of Village: Lolawas**
		1	**2**	**3**	**4**	**5**
	General perception about the project and the awareness about the proposed project.	From out side the village I km distance	People not aware about the project and not in favor of the project, agriculture land is the only source of livelihood for the farmers	Already supply line crossing from the agriculture field, land holding size is very less, no other source of income	People not aware about the project, people in favor of the project believe it will improve the electricity in the village	People not aware about the project, maximum land will be loosed and safety of human and animal will be at high risk, not in favor of the proposed project
	Is the land Irrigated and what are the sources of Irrigation?	Open well-20, engine use to lift water for irrigation	Tube well and rain water is the only source of irrigation	Bore well facility almost in all agriculture field	Tube well and rain water is the source of irrigation	Fully Depend on rain water, ground water is salty
	Loss of residential/commercial structures, if any due to the project	No	No	May be	No	No
	Loss of community life like any market Places or community activities to be affected	No	No	No	No	No
	Protected areas (national park, protected forest, religiously sensitive sites, historical or archaeological sites), if any	2000 Bigha, government plantation scheme launch to improve the area	No	No	No	No
	Current environmental conditions in the area – air, dust, noise conditions in the area.	Due to factory of cement dust noise a common problem eye problem is common in the village	Overall environmental condition in the area is good		Overall environmental condition in the area is good	No issue with the current environmental condition in the area
	Will the project siting adversely impact the water or soil resource in the locality	Became sillty water gradually after cement factory	Temporary impact might be possible during tower footing	No	Temporary impact might be possible during tower footing	Temporary impact might be possible during tower footing
	Type of trees in the area: Fruit/non fruit/forest/ rare/endangered species etc.	Babool, Neem, Khejadi, Pipal, Ber	Khejadi, Jaal, Neem, Babul	Neem, Khejadi	Khejadi, Jaal, Neem, Babul	Khejadi, English Babul, Neem, Jaal
	Wild, endemic, endangered animals in the area.	No	Deer, Peacock	Deer, Junglee Pig , Goat, Sheep, Cow, Ox, Bufflow, Gouchar land will get affected due to the proposed project	Deer, Peacock	Deer, Peacock

No	Participants' Opinion, Comments and Suggestions					
	Issues	**765 kV D/C Korna-Ajmer Line Name of Village: Bheevgarh**	**400 kV D/C Korna – Pokharan Line Name of Village: Bhungra**	**Name of the Component /Site: 220Kv Khinvsar-Baithwasia Line Name of Village: Khindokor**	**400 kV D/C Korna-Pokharan Line Name of Village: Khirja**	**765 kV D/C Korna- Ajmer Line Name of Village: Lolawas**
		1	**2**	**3**	**4**	**5**
	Type of agriculture/crops in the area.	Bajara, Groundnut, Gawar, Moong, Maize, Cotton, Till, Wheat, 2 crops, 40 man per bigha yield	Bajara, Moth, Gwar, Till, Jeera, Sonamukhi	Cotton, Groundnut, Bajara, Moong, Moth, Till, Gwar, Mustard, Jeera, Wheat, Ishabgol	Bajara, Moth, Gawar, Till, Jeera, Mustard	Moong, Bajara, Jawar, Till, Moth, Gawar
	Number of Households in the Village/District, Area populated by ethnic minorities etc.	400, SC-95%, OBC-5%	900 Household	350 HH,	700 HH, 25% Bhil	300-400 Household, no ethnic minorities
	General socio-economic standing: What are the economic activities? Land use, cropping pattern (Seasonal), types of crops, Average land holding size etc.	Agriculture, animal husbandry labour work in the factory area 2-5 bigha average land holding	Economic activities- Agriculture, Labour Land use- Cultivation Season- 2 Type of crops- Bajara, Moth, Gwar, Till, Jeera, Sonamukhi Average land holding- 5-30 Bigha	Agriculture- 100%, Agriculture land, 10-15 Bigha average land holding size	Economic activities- Agriculture, Labour Land use- Agriculture Season- 2 Type of crops- Bajara, Moth, Gawar, Till, Jeera, Mustard Average land holding- 2-5 Bigha	Economic activities- Agriculture, Labour Land use- Farming Cropping- Depend on rain Types of crops- Moong, Bajara, Jawar, Till, Moth, Gawar Average land holding- 10-15 Bigha
	What other organizations of a social nature (NGOs/CBOs/ Civil Society) active in the area? Name of these organisations	Rural foundation organized by cement factory working -2008	No	No	No	No
	Any critical issue or concern by the local people regarding the project?	Safety by tower is major issue, one young man got current on the roof and died 33/11 kV Line	Jaal and Khejadi tree should not be cut during implementation of proposed project, they worship the these trees	Due to small land holding of land and already power line existing	Compensation should be 4-6 times of the local market rate	Loss of land and safety of human and animal is the major concern during and after tower footing
	Any Other Observations	At least 5 lac Rupees demanding for one tower installation				

No	Participants' Opinion, Comments and Suggestions							
	Issues	**765 kV D/C Korna-Ajmer Line** **Name of Village: Lolawas**	**765 kV D/C Korna – Ajmer Line** **Name of Village: Lunawas Khara**	**400 kV D/C Korna-Jaisalmer Line** **Name of Village: Sointara**	**220 kV D/C Sheo - Undoo Line Name of Village: Undoo**	**220 kV line from Chattargarh to Gajner GSS Name of Village/Town: Chattargarh**	**132 kV line from Chattargarh to Loonkarasar line. Name of Village/Town: Loonkaransar**	**132 kV Dechu-Nathrau Village: Nathrau**
		6	**7**	**8**	**9**	**10**	**11**	**12**
	General perception about the project and the awareness about the proposed project.	People not aware about the project, maximum land will be loosed and safety of human and animal will be at high risk, not in favor of the proposed project	People not aware about the project and believe it is good for the nation but farmers will loss agriculture land, not in favor of the project	People not aware about the proposed project, Safety of human and animals, Compensation should be given 4-6 times of local market rate and residential places should be avoid during implementation of project	People are well awared, long demand project for the local people, people want immidieate completion of project	People not aware about the proposed project,	People not aware about the proposed project,	People do support the project 15 Gram Punchyat will get benefit from this proposed GSS power supply will improve specially for agriculture tube well
	Is the land Irrigated and what are the sources of Irrigation?	Fully Depend on rain water, ground water is salty	Tube well and rain water is the only source of irrigation	Tube well and rain water is the only source of irrigation	Only 30-40% land irrigated by Tube well personal, rest land fully depend on rain water	IGNP, tubewells	IGNP, tube wells	Land Irrigated through Rain and 70% Tube well
	Loss of residential/commercial structures, if any due to the project	No	No	No	No	No	No	No

No	Participants' Opinion, Comments and Suggestions							
	Issues	**765 kV D/C Korna-Ajmer Line** **Name of Village: Lolawas**	**765 kV D/C Korna – Ajmer Line** **Name of Village: Lunawas Khara**	**400 kV D/C Korna-Jaisalmer Line** **Name of Village: Sointara**	**220 kV D/C Sheo - Undoo Line Name of Village: Undoo**	**220 kV line from Chattargarh to Gajner GSS Name of Village/Town: Chattargarh**	**132 kV line from Chattargarh to Loonkarasar line. Name of Village/Town: Loonkaransar**	**132 kV Dechu-Nathrau Village: Nathrau**
		6	**7**	**8**	**9**	**10**	**11**	**12**
	Loss of community life like any market Places or community activities to be affected	No	No	No	GSS is 2.5 Km away from the village	No 3 km for Chattargarh 5 km from Gajnertown	500m from Loonkaransar	None
	Protected areas (national park, protected forest, religiously sensitive sites, historical or archaeological sites), if any	No	No	No	No	4 km Gajner Fort one canal crossing	Nill Two canal crossings about	Forest land 1 km from village
	Current environmental conditions in the area – air, dust, noise conditions in the area.	No issue with the current environmental condition in the area	No issue with the air, dust, noise condition in the area	Overall environmental condition in the area is good	Current environmental condition is very good, no air pollution, dust, noise in the air noticed	National highway construction leading to air dust	Normal desert like conditions	Normal desert like conditions
	Will the project siting adversely impact the water or soil resource in the locality	Temporary impact might be possible during tower footing	Temporary impact might be possible during tower footing	Temporary impact might be possible during tower footing	No	No	No	Tower footing loss of land
	Type of trees in the area: Fruit/non fruit/forest/	Khejadi, English Babul, Neem,	Khejadi, Jaal, English	Khejadi, Jaal, Babul, Neem, Roida	Khejadi, Neem, English	Khejdi, Babul, Eycalytus, Neem	Khejdi, Babul, Eycalytus	Khejdi, Babul

No	Participants' Opinion, Comments and Suggestions							
	Issues	**765 kV D/C Korna-Ajmer Line** **Name of Village: Lolawas**	**765 kV D/C Korna – Ajmer Line** **Name of Village: Lunawas Khara**	**400 kV D/C Korna-Jaisalmer Line** **Name of Village: Sointara**	**220 kV D/C Sheo - Undoo Line** **Name of Village: Undoo**	**220 kV line from Chattargarh to Gajner GSS** **Name of Village/Town: Chattargarh**	**132 kV line from Chattargarh to Loonkarasar line.** **Name of Village/Town: Loonkaransar**	**132 kV Dechu-Nathrau** **Village: Nathrau**
		6	**7**	**8**	**9**	**10**	**11**	**12**
	rare/endangered species etc.	Jaal	Babul, Neem		Babul, Roida			
	Wild, endemic, endangered animals in the area.	Deer, Peacock	Deer, Peacock	Deer, Peacock	Deer, Peacock	Deer, Peacock	Deer, Peacodk	Deer
	Type of agriculture/crops in the area.	Moong, Bajara, Jawar, Till, Moth, Gawar	Bajara, Moong, Moth, Till	Bajara, Moong, Moth, Till, Gawar, Jeera, Mustard, Groundnut	Mostly single crop- Bajara, Gawar, Moong, Moth, Till If rain well – cotton, Arandi, Mustard, Ground nut	Mostly single season crop. Bajara, gwar, moth, till	Ground nut, bajara, moth till, gwar	Bajara, Moong, Moth, Gwar, Groundnut, Till, Royda, Sarsoo, Wheat, Jeera, Sofe, Isabgol
	Number of Households in the Village/District, Area populated by ethnic minorities etc.	300-400 Household, no ethnic minorities	1000 Household, no ethnic minorities in the village	800 Household	1100 Household, No ethnic minorities	800 households in Chhattargarh 7000 Households in Gajner	5000 households in Loonkaransar	1500 households
	General socio-economic standing: What are the economic activities? Land use, cropping pattern (Seasonal), types of crops,	Economic activities-Agriculture, Labour Land use-Farming Cropping-	Economic activities-Agriculture and Labour work Land use – Agriculture	Economic activities-Agriculture, Labour Land use-Cultivation Cropping	Mostly depend on cultivation almost 80% of the population. If rain well	Economic activities-Agriculture, Labour. Cropping pattern-Depend on rain and some on	Economic activities-Agriculture, Labour. Cropping pattern-Depend on rain and some on canal Land holding about 6 ha	Average size 10 ha,

No	Participants' Opinion, Comments and Suggestions							
	Issues	**765 kV D/C Korna-Ajmer Line** **Name of Village: Lolawas**	**765 kV D/C Korna – Ajmer Line** **Name of Village: Lunawas Khara**	**400 kV D/C Korna-Jaisalmer Line** **Name of Village: Sointara**	**220 kV D/C Sheo - Undoo Line Name of Village: Undoo**	**220 kV line from Chattargarh to Gajner GSS Name of Village/Town: Chattargarh**	**132 kV line from Chattargarh to Loonkarasar line. Name of Village/Town: Loonkaransar**	**132 kV Dechu-Nathrau Village: Nathrau**
		6	**7**	**8**	**9**	**10**	**11**	**12**
	Average land holding size etc.	Depend on rain Types of crops- Moong, Bajara, Jawar, Till, Moth, Gawar Average land holding- 10-15 Bigha	Cropping – 2 Season, Crops- Bajara, Moong, Moth, Till Average land holding- 5-10 Bigha	pattern- Depend on rain and tube well Type of Crops- Bajara, Moong, Moth, Till, Gawar, Jeera, Mustard, Groundnut Average Land Holding – 25 Bigha	double crops in a year, 3-4 quintals per bigha average yield, 20-25 bigha average land holding size	canal Land holding about 6 ha Solar plants in the area	Oil mill at Loonkaransar	
	What other organizations of a social nature (NGOs/CBOs/ Civil Society) active in the area? Name of these organisations	No	No	No	No	No	No	No
	Any critical issue or concern by the local people regarding the project?	Loss of land and safety of human and animal is the major concern during and after tower footing	Proposed project is good for the nation, farmers will loss maximum land, it is the only	Safety of human and animals, Compensation should be given 4-6 times of local market rate and residential	Power supply is not sufficient and proper, overloading and tripping a major problem specifically for	Power supply is not sufficient and proper, overloading and tripping a major problem specifically for irrigation by tube well. Less that 6	Power supply is not sufficient and proper, overloading and tripping a major problem specifically for irrigation by tube well. Supply for tubewell is scarcely available	Loss of land for tower footing

No	Participants' Opinion, Comments and Suggestions							
	Issues	**765 kV D/C Korna-Ajmer Line** **Name of Village: Lolawas**	**765 kV D/C Korna – Ajmer Line** **Name of Village: Lunawas Khara**	**400 kV D/C Korna-Jaisalmer Line** **Name of Village: Sointara**	**220 kV D/C Sheo - Undoo Line Name of Village: Undoo**	**220 kV line from Chattargarh to Gajner GSS Name of Village/Town: Chattargarh**	**132 kV line from Chattargarh to Loonkarasar line. Name of Village/Town: Loonkaransar**	**132 kV Dechu-Nathrau Village: Nathrau**
		6	**7**	**8**	**9**	**10**	**11**	**12**
			source of livelihood	places should be avoid during implementation of project	irrigation by tube well, people are worry about the tower footing inside the agriculture land	hour of supply for tubewell		
	Any other Observations				No any major issue regarding environment observed for the propose project, no tree cutting or any Negative impact on vegetation especially during tower footing	People want reliable power supply. People do not see any endangered species in Gajner WL Sanctuary	People want reliable power supply	Labour work could be provide during construction of GSS and utility vehicle might be used

List of Participants in Public Consultations

Sl. Nº	Name of the Participant *	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 765 kV D/C Korna- Ajmer Line			
1	Devi Singh	Agriculture	
2	Mohan Meghwal	Agriculture	
3	Raju Singh	Worker	
4	Vishnu Singh	Shopkeeper	
5	Shankar	Driver	
6	Manga Ram	Worker	
7	Kalu Naya	Mechanic	
8	Puran Singh	Worker	
Name of the Component /Site: 400 kV D/C Korna – Pokharan Line			
	Name of Village: Bhungra		
1	Dungar Ram	Agriculture	
2	Shakti Singh	Agriculture	
3	Rawad Ram	Agriculture	
4	Inder Singh	Agriculture	
5	Prem Ram	Agriculture	
Sl. Nº	Name of the Participant	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 220 kV Khinvsar-Baithwasia Line			
	Name of Village: Khindokor		
1	Raju Ram	Agriculture	
2	Jaswant Singh	Agriculture	
3	Uday Singh	Agriculture	
4	Sangram Singh	Agriculture	
5	Dayal Singh	Agriculture	
6	Megh Singh	Agriculture	
7	Sangram Singh	Agriculture	
8	Raghveer Singh	Agriculture	
9	Babu Singh	Agriculture	
Sl. Nº	Name of the Participant	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 400 kV D/C Korna- Pokharan Line			
	Name of Village: Khirja		
1	Roop Ram	Agriculture	
2	Phool Singh	Agriculture	
3	Jetha Ram	Agriculture	
4	Bhum Singh	Agriculture	
5	Swaran Singh	Student	
6	Uma Ram	Agriculture	
Sl. Nº	Name of the Participant	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 765 kV D/C Korna- Ajmer Line			
	Name of Village: Lolawas		
1	Ram Sunder Ji	Agriculture	
2	Narsingh Ram	Agriculture	
3	Khanya Lal	Study	
4	Megh Ram	Agriculture	
5	Om Prakesh	Agriculture	
6	Dungar Ram	Agriculture	
Sl. Nº	Name of the Participant	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 765 kV D/C Korna – Ajmer Line			
	Name of Village: Lunawas Khara		
1	Om Prakash	Labour	
2	Kailash Das	Agriculture	

3	Bakar Ram	Agriculture	
4	Buda Ram	Agriculture	
5	Aka Ram	Agriculture	
6	Deva Ram	Agriculture	
7	Daulat Ram	Agriculture	
Sl. Nº	Name of the Participant	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 400 kV D/C Korna- Jaisalmer Line			
	Name of Village: Sointara		
1	Govind Singh	Social worker	
2	Abdul Khan	Labour	
3	Jog Singh	Driver	
4	Ramesh	Labour	
5	Ganesh Kumar	Service	
6	Madan Singh	Agriculture	
Sl. Nº	Name of the Participant	Occupation	Signature (If agreed by the participants)
Name of the Component /Site: 220 kV D/C Sheo - Undoo Line			
	Name of Village: Undoo		
1	Dalip Singh	Agriculture	
2	Meva Ram	Business	
3	Teja Singh	Agriculture	
4	Bhawar Ram	Agriculture	
5	Kishari Singh	Agriculture	
6	Govind Singh	Agriculture	
7	Saukat Khan	Agriculture	
8	Shambhu Ram	Agriculture	
Name of the Component /Site: 132 kV D/C Chattargarh Loonkaransar Line			
	Name of Town: Chattargarh		
1	Bajranj Sharma	Contractor	
2	Rajveer Singh	Labour	
3	Hatmesh Singh	Labour	
4	Parvinder Singh	Labour	
5	Nathu Singh	Labour	
6	Narender Singh	Labour	
7	Gurvinder Singh	Mechanic	
	Name of Town: Loonkaransar		
1	Kanhaiya Lal	Driver	
2	Bhagirath	Driver	
3	Madan	Farmer	
4	Verwal	Unemployed	
5	Manful	Unemployed	
6	Ram kumar	Painter	
7	Suresh	Painter	
8	Rana	Shop	
	Name of Village: 303 Head		
1	Narendra	Student	
2	Muni Ram	Labour	
3	Deep Chand	Farmer	
4	Sethi	Farmer	
5	Manoj	Farmer	
	Name of Village: Ajeet Mena		
1	Subhash	Student	
2	Madhe Ram	Farmer	
3	Madan Lal	Farmer	
4	Kalu Ram	Farmer	
5	Sai Ram	Teacher	
6	Kalu Ram	Student	
Name of the Component /Site: 220 kV D/C Chattargarh Gajner Line			

	Name of Village: Shibolai		
1	Sukh Ram	Student	
2	Lal Chand	Driver	
3	Gopi Ram	Farmer	
4	Ed Ram	Farmer	
5	Hat Ram	Farmer	
6	Anif	Farmer	
7	Ram Kumar	Farmer	
8	Likhma Ramji	Farmer	
9	Pusha Ramji	Farmer	
10	Jesha Ram	Farmer	
11	Gopal Ram	Mechanic	
12	Dayawanti	Sarpanch	
	Name of Village: Gajnour		
1	S N Singh	Contractor	
2	Mithu	shop	
3	Gautam	Student	
4	Ram Chandra	Labour	
5	Narshi Ram	Sarpanch	
6	Ram Lal	Retd	
7	Bhushan Ram	Retd	
8	Kishan lal	Mechanic	
9	Shankar Lal	Unemployed	
10	Baban lal	Retd	
11	Aje khan	Labour	
12	Bhagwan Ram	Shop	
13	Karni Singh	Driver	
	Name of Village: Motigarh		
1	Ganesh	Shop	
2	Durga Ram	Farmer	
3	Yogesh	Shop	
4	Palu Ram	Farmer	
5	Jetha Ram	Student	
6	Madan Singh	Farmer	
7	Kiya ram	Farmer	
8	Govind	Student	
9	Hukuma Ram	Farmer	
10	Ganesh	Farmer	
11	Om Prakash	Farmer	
12	Babu Singh	Farmer	
Name of the Component /Site: 132 kV Kitasar GSS and LILO lines			
	Name of Village: Kitasar		
1	Mal Chand	Farmer	
2	Jai Narayan	Shop	
3	Pawan	Shop	
4	Ganga Ram	Farmer	
5	Karan Pal	Business	
6	Prem Seni	Shop	
7	Rigta Ram	Farmer	
8	Manish	Student	
9	Rupa Ram	Farmer	
10	Jai Chand	Farmer	
11	Bajrang Lal	Nai Shop	
12	Surya Ram	Farmer	
13	Surya Ram 2	Shop	
14	Rajinder	Farmer	
15	Mohan Lal	Farmer	
Name of the Component /Site: 132 KV GSS Dechu Nathrau Jodhpur			
	Name of Village: Nathrau		
1	Sanjeev Kumar Sharma	Gram Panchyat Sectary	

2	Bhanwar Singh	Ex Sarpunch	
3	Nathu Singh	Contractor	
4	Jaswant Singh	Government Service	
5	Amb Singh	Business	
6	Malaram	Contractor	
7	Swai Singh	GSS	
8	Paras Soni	Business	
9	Ratan Singh	Agriculture	
	Name of Village: Gumanpura		
1	Roshan Khilji	Shop	
2	Farukh	Mason	
3	Bhagirath	Driver	
4	Gaj Singh	Driver	
5	Papu Singh	Labour	
6	Manohar Singh	Labour	
7	Farid	Shop	
Name of the Component /Site: LILO of 132 KV S/C Tinwari - Osian Line			
	Name of Village: Bana Ka Bans		
1	Gana Ram	Shop	
2	Laxman	Shop	
3	Sultan	Shop	
4	Shyari Devi	Housewife	
5	Chukhi Devi	Housewife	
6	Antri Devi	Housewife	
7	Mahender	Agriculture	
8	Luni Devi	Housewife	
9	Gopilal	Agriculture	
	Name of Village: Jaatipura		
1	Ganpat Ram	Railway Service	
2	Nem Singh	Agriculture	
3	Kewal Ram	Unemployed	
4	Mahendra	Shop	
5	Babu Ram	Agriculture	
6	Budha Ram	Agriculture	
7	Multana Ram	Shop	
Name of the Component /Site: LILO 2 km D/C Jaisalmer- Sheo Line and Sangarh 132 KV, Jaisalmer			
	Name of Village: Sangarh		
1	Harkha Ram	Agriculture	
2	Anopa Ram	Agriculture	
3	Laxman Dan	Agriculture	
4	Magudan	Agriculture	
5	Nathuram	RTO	
6	Ugamdan	Job	
7	Dayam Khan	Business	
8	Inderdan	Student	
9	Vabani Singh	Teacher	
10	Laxmandan	Business Dairy	

PHOTOGRAPHS OF CONSULTATIONS
1. Korna – Ajmer Transmission Line

Village: Lolawas Khara

Village: Lolawas Khara

Village: Lolawas Khara

Village: Sar

Village: Kharabera Purohitan

Village: Sanwalta Kalla

Village: Lolawas

Village: Malkhasani

Village: Garnia

Village: Asarlai

Village: Toonkara

Village: Bootiwas

Village: Bootiwas

Village: Roop Nagar Thorian

2. Korna- Pokharan Transmission Line

Village: Bhandu Jaati

Village: Hapanada

Village: Khirza

Village: Bhungra

Village: Chandsma

Village: Chandsma

Village: Biramdevra	Village: Uthwaliya

3. Korna- Jaisalmer II Transmission Line

 Village: Hapanada	 Village : Balar
 Village: Sointra	 Village: Guman Singh Pura
 Village: Abasar	 Village: Abasar

Village: Bhesara

Village: Dhandriya Bhayala

4. 132kV Chattargarh – Loonkaransar Line

Village : Ajitmena

Village: Shiboli

Village: Loonkaransar

5. 220 kV Chhattargarh – Gajner Line

Village :Chhattargarh	Village: Motigarh
	
Village: Gajner	

6. Kitasar LILO and GSS

	
Village : Kitasar	Village: Kitasar

7. 132 kV Nathrau Dechu line

	
Village : Nathrau	Village: Gumanpura

7. 132kV Sangarh LILO line

Village : Sangarh

8. Bana ka Bans GSS and LILO line

Village : Bana ka Bans

Village: Jaatipura

Annexure - 8 : Details of National Park/Sanctuary/Important Bird Area near Project area

Desert National Park

Sites (IBAs)
Home
Search by name
Search by map
IBAs in Danger
IBA Criteria
IBA Monitoring
Publications
Data zone
Home
Species
Sites (IBAs)
Endemic Bird Areas
State of the world's birds
Country profiles
Marine IBA e-Atlas
Citizen Science
CBD support
BirdLife forums
Seabird Tracking
BirdLife
Home
How to help BirdLife

Email a friend

IN060 Desert National Park

Location	India, Rajasthan
Central coordinates	70° 45.02' East 26° 54.50' North
IBA criteria	A1, A3
Area	916,200 ha
Altitude	0
Year of IBA assessment	2004

Bombay Natural History Society

Site description In order to protect the fauna and flora of the Thar Desert, the Government of India in the late 1970s started planning the establishment of a large sanctuary or a park where human pressure could be kept to a minimum and the wildlife could be given maximum security from hunters as well as from habitat alteration. The Desert Wildlife Sanctuary (popularly called Desert National Park) was the result of this planning. It is among the one of the three protected areas of the Thar Desert (Rahmani 1997). It was notified in 1984 and it was planned to gradually upgrade it to a Park; hence its popular name Desert National Park. One of the main purposes of establishing this Park was to protect the Great Indian Bustard *Ardeotis nigriceps*. The major objective of the Park is to develop core areas (enclosures) in which human interference is kept to a minimum and livestock grazing is totally banned. In the initial stages, Sam, Sudasari, Phulia, and Miyajlar enclosures were established. Every year, the Forest Department is adding new enclosures. Presently, there are 20 enclosures. Besides the enclosures within the Park, there are six enclosures outside the boundary, which are called satellite conservation areas (Rahmani 1989, 1997).

Key Biodiversity

AVIFAUNA: This is perhaps one of the most important sites for the long-term survival of the globally threatened Great Indian Bustard. In the 1980s, there could have been between 200 to 400 Great Indian Bustards in and around this sprawling Park, but now the number has gone down to about 100. However, the bustard still breeds in many parts of the Park, especially in Sudasari, Sam and Miyajlar enclosures. Even now, if poaching and habitat degradation are stopped, increase in the number of bustards is possible. Other birds of conservation interest are the two *Gyps* species of vultures that are still seen in the Park, although not in their former numbers. This site is also important for the Vulnerable Stoliczka's Bushchat *Saxicola macrorhyncha*. It has been seen in Sudasari, Sam and Nibha areas of the Park (Rahmani 1996a). There are stray records of Green Munia *Amandava formosa* (Rahmani 1996b). Among the Near Threatened species, the most notable is the Macqueen's or Houbara Bustard *Chlamydotis macqueenii* (= *undulata*). Although population estimates for the Park are difficult to make, overall in the Thar Desert, Rahmani (1998) estimated a crude density of 0.31 Houbara/km² based on actual sightings and 1.05 Houbara/km² based on sightings and Houbara tracks. Houbara are regularly found in small groups of 3-5 birds in winter in Sudasari and Sam enclosures. The Red-headed or King Vulture *Sarcogyps calvus* is widespread but generally seen solitary or in twos or threes. Two nests were found in February near Sudasari inside the Park (Rahmani 1997). The Cinereous Vulture *Aegypius monachus* is widespread in winter, along with the Eurasian Griffon *Gyps fulvus* and other species of vultures. This Park represents the typical desert ecosystem flora and fauna of the Indian Thar Desert, which is a part of the much larger Sahara- Sindian Desert. BirdLife International (undated) has identified it as Biome-13 and has listed 11 bird species. Including the Great Indian Bustard and Stoliczka's Buchchat, six more species of this Biome have been found in the Desert NP. The Greater Hoopoe Lark *Alaemon alaudipes* probably breeds here, as its display was seen just outside the Park in July (Rahmani 1997). Another interesting bird found breeding was the Cream-coloured Courser *Cursorius cursor* (Rahmani and Manakadan 1989). For both these species, the Thar desert is the easternmost limit of their wide distribution from Morocco in North Africa to the whole of the Middle East, and then Iran to India.

OTHER KEY FAUNA: Among the large mammals, Chinkara *Gazella bennettii* is the most common. Thanks to the development of the Indira Gandhi Naher Project (IGNP), and increase in irrigation fields, Bluebul *Boselaphus tragocamelus* has been increasingly sighted. Golden Jackal *Canis aureus*, Red Fox *Vulpes vulpes pusilla* and, in some areas, the Indian Fox *Vulpes bengalensis* are the major natural predators. The Desert Cat *Felis silvestris* is also found but is difficult to sight. Desert Hare *Lepus nigricollis dayanus*, a subspecies of the Black-naped Hare, and the Long-eared Hedgehog *Hemiechinus auritus* are among smaller denizens of the Park.

The Desert Skink *Ophiomorus tridactylus*, known as sandfish as it 'swims' or burrows through sand down to a depth of 30 cm, is found here. There are over 43 species of reptiles, including the Spiny-tailed Lizard

Uromastyx hardwickii, Russell's Viper *Daboia russelii*, Saw-scaled Viper *Echis carinata* and the Common Monitor Lizard *Varanus bengalensis*.

Populations of IBA trigger species

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria	IUCN Category
White-rumped Vulture *Gyps bengalensis*	non-breeding	2004	present	-	A1	Critically Endangered
Greater Spotted Eagle *Clanga clanga*	winter	2004	present	-	A1	Vulnerable
Indian Vulture *Gyps indicus*	non-breeding	2004	present	-	A1	Critically Endangered
Great Indian Bustard *Ardeotis nigriceps*	resident	2004	present	-	A1, A3	Critically Endangered
Chlamydotis undulata	winter	2004	present	-	A1	Not Recognised
White-browed Bushchat *Saxicola macrorhynchus*	resident	2004	present	-	A1, A3	Vulnerable

IBA Monitoring

Monitoring summary			
Year Of Assessment	**Threat status score (pressure)**	**Condition status score (state)**	**Action status score (response)**
2014	high	favourable	medium
Was the whole site covered?	✓	**State assessed by**	unset
Accuracy of information	Good - based on reliable and complete / representative data		

Threats to the site (pressure)					
Threat Level 1	**Threat Level 2**	**Timing**	**Scope**	**Severity**	**Result**
Agriculture and aquaculture	annual & perennial non-timber crops - small-holder farming	happening now	small area/few individuals (<10%)	slow but significant deterioration	low
Agriculture and aquaculture	livestock farming and ranching (includes forest grazing) - small-holder grazing, ranching or farming	happening now	some of area/population (10-49%)	slow but significant deterioration	medium
Energy production and mining	renewable energy	happening now	some of area/population (10-49%)	very rapid to severe deterioration	high
Invasive & other problematic species, genes & diseases	problematic native species/diseases - named species	happening now	some of area/population (10-49%)	slow but significant deterioration	medium

Condition of habitat (state)						
Habitat	**Habitat Detail**	**Reference Area (ha)**	**Actual Area (ha)**	**% of habitat remaining**	**% of carrying capacity (overall)**	**Result**
Desert		0	0	good (> 90%)	good (> 90%)	favourable
Shrubland		0	0	good (> 90%)	good (> 90%)	favourable

Conservation actions taken at site (response)			
Conservation Designation	**Management Planning**	**Conservation Action**	**Result**
Whole area of site (>90%) covered by appropriate conservation designation	A comprehensive and appropriate management plan exists that aims to maintain or improve the populations of qualifying bird species	Some limited conservation initiatives are in place	medium

Protected areas

Protected area	Designation	Area (ha)	Relationship with IBA	Overlap with IBA (ha)	
Desert	National Park	316,200	is identical to site	316,200	ⓘ

Habitats

IUCN habitat	Habitat detail	Extent (% of site)
Desert		-
Shrubland		-
Grassland		-
Artificial - terrestrial		-

Land use

Land-use	Extent (% of site)
energy production and mining	-
Notes: ONGC oil exploration	
nature conservation and research	-

Khinchan Bird Sanctuary

Sites (IBAs)
Home
Search by name
Search by map
IBAs in Danger
IBA Criteria
IBA Monitoring
Publications
Data zone
Home
Species
Sites (IBAs)
Endemic Bird Areas
State of the world's birds
Country profiles
Marine IBA e-Atlas
Citizen Science
CBD support
BirdLife forums
Seabird Tracking
BirdLife
Home
How to help BirdLife

email a friend

IN065 Khichan

Location	India, Rajasthan
Central coordinates	72° 24.00' East 27° 7.00' North
IBA criteria	A1, A4i
Area	2,200 ha
Altitude	0
Year of IBA assessment	2004

Bombay Natural History Society

Site description Khichan, 150 km north of Jodhpur in the northern part of the Thar Desert, Rajasthan, is a small village off the main tourist track. The village has recently been recognized as a tourist spot by the Rajasthan Tourist Development Corporation, mainly due to the presence of large wintering flocks of Demoiselle Cranes *Grus virgo*. Khichan is located in a sandy desert area, so it has the typical xerophytic vegetation of the Thar. Among the tree species, *Prosopis cineraria* and *Salvadora* sp. are the commonest plants.

Key Biodiversity

AVIFAUNA: Every year towards the end of August and in early September, just after the monsoon ceases, Demoiselle Cranes fly in from their breeding grounds on the steppes of Eurasia and Mongolia. The village is transformed overnight into a noisy crowded place, as krok-krok calls fill the air. The cranes have been attracted because for the last 150 years, villagers traditionally have fed them in a feeding house locally known as Chugga ghar. The number is about 4,000 (Rahmani 1997) but villagers claim that sometimes up to 10,000 are seen. The West Central Asia breeding population, which comes to the Indian subcontinent (especially western India) is estimated to be 100,000 birds, (Wetlands International 2002). Khichan has been selected as an IBA because it holds more than around 4% of the wintering population. Besides the Demoiselle cranes, Khichan holds most of the desert fauna and flora. The Great Indian Bustard *Ardeotis nigriceps* is sometimes seen in the vicinity, especially during summer when it comes to drink water from the two lakes, which also attract assorted numbers of ducks and waders, but not in any significant number. The Black-capped Kingfisher *Halcyon pileata*, a coastal wetlands bird (Grimmett et al. 1999) has been sighted here. Among the globally threatened species, Oriental White-backed *Gyps bengalensis* and Long-billed *Gyps indicus* vultures are still seen, albeit in very small numbers. Stoliczka's Bushchat *Saxicola macrorhyncha* may be present in the surrounding scrub areas.

OTHER KEY FAUNA: The common mammals found in Khichan are the Red Fox *Vulpes vulpes bengalensis* and Chinkara *Gazella bennettii*, Bluebull *Boselaphus tragocamelus* is spreading due to availability of water from the Indira Gandhi Canal Project.

Populations of IBA trigger species

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria	IUCN Category
White-rumped Vulture *Gyps bengalensis*	non-breeding	2004	present	-	A1	Critically Endangered
Indian Vulture *Gyps indicus*	non-breeding	2004	present	-	A1	Critically Endangered
Great Indian Bustard *Ardeotis nigriceps*	resident	2004	present	-	A1	Critically Endangered
White-browed Bushchat *Saxicola macrorhynchus*	resident	2004	present	-	A1	Vulnerable

IBA Monitoring

Monitoring summary			
Year Of Assessment	**Threat status score (pressure)**	**Condition status score (state)**	**Action status score (response)**
2014	low	favourable	low
Was the whole site covered?	✓	**State assessed by**	unset

Accuracy of information	Good - based on reliable and complete / representative data

Threats to the site (pressure)					
Threat Level 1	Threat Level 2	Timing	Scope	Severity	Result
No known threats	no known threats	happening now	whole area/population (>90%)	no or imperceptible deterioration	low

Condition of habitat (state)						
Habitat	Habitat Detail	Reference Area (ha)	Actual Area (ha)	% of habitat remaining	% of carrying capacity (overall)	Result
Artificial - terrestrial		0	0	good (> 90%)	good (> 90%)	favourable

Conservation actions taken at site (response)			
Conservation Designation	Management Planning	Conservation Action	Result
Little/none of site covered (<10%)	No management planning has taken place	Substantive conservation measures are being implemented but these are not comprehensive and are limited by resources and capacity	low

Habitats

IUCN habitat	Habitat detail	Extent (% of site)
Artificial - aquatic		-
Desert		-
Artificial - terrestrial		-
Shrubland		-

Land use

Land-use	Extent (% of site)
tourism/recreation	-
Notes: Tourism and recreation	
urban/industrial/transport	-
Notes: Human settlement	

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References

Grimmett, R., Inskipp, C. and Inskipp, T. (1998) Birds of the Indian subcontinent. Christopher Helm (Publishers) Ltd;, London, U.K.

Rahmani, A. R. (1997) The effect of Indira Gandhi Nahar Project on the avifauna of the Thar desert. J. Bombay Nat. Hist. Soc. 94(2): 233- 266.

Wetlands International (2002) Waterbird Population Estimates: Third Edition. Wetlands International Global Series No. 12, Wageningen, The Netherlands.