

Initial Environmental Examination

Document Stage: Final Document for Disclosure
Project Number: 45224 (IND)

June 2012

India: Rajasthan Renewable Energy Transmission Investment
Program Volume -2 (Annexures 1-10)

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

The initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

Table of Contents

Annexure - 1 Key Environmental Legislations	1
Annexure – 2 Rajasthan Solar Park at Bhadla	4
Annexure – 3 Description of Transmission Lines/Sub-station Alternatives	9
Annexure – 4 Important Historical Monuments of Jodhpur and Jaisalmer district	14
Annexure – 5 Environment Management Plan (EMP)	17
Annexure - 6 Summary of Results for Environment Monitoring for Air, Water, Noise and Soil Sampling	25
Annexure – 7 Illustrative Contents of Environment monitoring Report	49
Annexure – 8 Details of Solar Power Projects Commissioned in Rajasthan	56
Annexure – 9A Socio Economic Status of Project Villages	58
Annexure – 9B Details of Public Consultations	60
Annexure – 9C List of Participants in Public Consultation	63
Annexure - 10 Institutional Structure of RRVPNL	68

Annexure - 1**Key Environmental Legislations****A. National Environmental Laws**

1. The Environmental regulations, legislation, policy guidelines that may impact this project, are the responsibility of a variety of government agencies. The principal Environment Regulatory Agency in India is the Ministry of Environment and Forests (MoEF). MoEF formulates environmental policies and accords environmental clearances for different projects.

2. The Important environmental legislations in India are mentioned below
- (i) The Water (Prevention and Control of Pollution) Act, 1974, amended 1988
 - (ii) The Water (Prevention and Control of Pollution) Rules, 1975
 - (iii) The Air (Prevention and Control of Pollution) Act 1981, amended 1987
 - (iv) The Air (Prevention and Control of Pollution) Rules, 1982
 - (v) The Environment (Protection) Act, 1986, amended 1991 and including the following Rules/Notification issued under this Act.
 - The Environment (Protection) Rules, 1986, including amendments
 - The Municipal Solid Wastes (Management and Handling) Rules, 2000
 - The Hazardous Wastes (Management and Handling) Rules, 2003
 - The Hazardous Wastes (management, handling and transboundary movement) Rules 2009
 - The Bio-Medical Waste (Management and Handling) Rules, 1998
 - Noise Pollution (Regulation and Control) Rules, 2000,
 - Wild Life (Protection) Amendment Act, 2002
 - Ozone Depleting Substances (Regulation & Control) Rules, 2000.
 - The Biological Diversity Act, 2002;
 - The Environment Impact Assessment Notification, 1994; amended up to 2009;
 - Batteries (Management & Handling) Rules, 2001
 - The Environmental Clearance Notification, 1994
 - Environmental Standards of CPCB
 - (vi) Noise Pollution (Regulation and Control) Rules, 2000
 - (vii) The Indian Wildlife (Protection) Act, 1972, amended 1993
 - (viii) The Wildlife (Protection) Rules, 1995
 - (ix) The Indian Forest Act, 1927
 - (x) Forest (Conservation) Act, 1980, amended 1988 (National Forest Policy, 1988)
 - Forest (Conservation) Rules, 1981 amended 1992 and 2003
 - Guidelines for diversion of forest lands for non-forest purpose under the Forest (Conservation) Act, 1980
 - (xi) The National Environmental Appellate Authority Act, 1997
 - (xii) The National Green Tribunal Act, 2010

Other relevant act of Government of Rajasthan

- (i) The Rajasthan Monuments, Archaeological Sites and Antiquities Act, 1961.
- (ii) Amended by Raj. Act No. 6 of 2006.
- (iii) 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.
- (iv) The Rajasthan Religious Buildings and Places Act, 1954, Amended by Rajasthan Act Nos. 27 of 1957 and 8 of 1962.
- (v) The Rajasthan Irrigation and Drainage Act, 1954, Amended by Rajasthan Act Nos. 21 of 1960 and 8 of 1962.

- (vi) The Rajasthan Agricultural Lands Utilization Act, 1954, Amended by Rajasthan Act Nos. 27 of 1957, 28 of 1960 and 8 of 1962.
- (vii) The Rajasthan Forest Act, 1953, Amended by Rajasthan Act No.27 of 1957.
- (viii) The Rajasthan Land Revenue Act, 2003.

B. Other Acts

The policy framework consists of following main regulations:

1. The Electricity Act, 2003
2. National Resettlement & Rehabilitation Policy, 2007 (NRRP) (MoRD, DoLR).
3. Right of Way and compensation under Electricity Laws.
4. Land Acquisition Act, 1894.
5. The Indian Telegraph Act (ITA), 1885
6. Indian Treasure Trove Act, 1878 as amended in 1949
7. Provisions of the Panchayats (Extension to the Scheduled Area) Act, 1996.
8. The Right to Information Act, 2005
9. National Policy on HIV/AIDS and the World of Work, Ministry of Labour and Employment, GoI
10. National Policy on Safety, Health and Environment at Work Place, Ministry of Labour and Employment, GoI

C. Key Environmental Legislations

Name	Scope and Objective	Key Areas	Operational Agencies/Key Players
Water (Prevention and Control of Pollution Act, 1974)	To provide for the prevention and control of water pollution and enhancing the quality of water	Controls sewage and industrial effluent discharges	Central and State Pollution Control Board
Air (Prevention and Control of Pollution Act - 1981)	To provide for the prevention and control of air pollution	Controls emissions of air pollutants	Central and State Pollution Control Boards
Forest Act, 1927	To consolidate acquisition of common property such as forests	Regulates access to natural resources, state has a monopoly right over land, categories forests	State government, forest settlement officers
Forest Conservation Act, 1980	To halt India's rapid deforestation and resulting Environmental degradation	Restriction on de-reservation and using forest for non-forest purpose	Central Government
Wildlife Protection Act, 1980	To protect wildlife	Creates protected areas (national parks, sanctuaries) categories of wildlife which are protected	Wildlife Advisory Boards; Central Zoo Authorities
Environment Protection Act, 1986 Environmental Impact Assessment Notifications 1994 and amendments up to 2009	To provide for the protection and improvement of Environment	An umbrella legislation; supplement laws	Central government nodal agency MoEF; can deplete powers to state department of Environment
The Batteries (Management and Handling) Rules, 2001 as amended;	Provide safe disposal of lead acid and all other types of batteries	To control unsafe disposal of batteries contents by authorised recyclers	Central government nodal agency MoEF; can deplete powers to state department of Environment
The Hazardous Wastes (Management, Handling and	Movement, handling, of waste chemical oils in industries, commercial, other services	To control the disposal of hazardous chemicals, oils etc. into water, land and air	Central government nodal agency MoEF; can deplete powers to state department of Environment

Name	Scope and Objective	Key Areas	Operational Agencies/Key Players
Transboundary Movement) Rules 2009			
The National Green Tribunal Act, 2010	Effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto	All civil cases where a substantial question relating to environment (including enforcement of any legal right relating to environment) is involved	Chairperson, National Green Tribunal

Rajasthan Solar Park at Bhadla

Source:

1. Site visits and Detailed Project Report for Bhadla Solar Park Rajasthan (February 2012) by Agostinho Miguel Garcia, and
2. Technical Report for Geotechnical Investigation for Proposed structure of Photovoltaic Solar Power Plant at Solar Park of Rajasthan Renewable Energy Corporation (RREC) at Village Bhadla, Jodhpur district by K.C.T. Consultancy Services.

2.0 Concept

1. The Rajasthan's Bhadla Solar Park will be developed by Rajasthan Renewable Energy Corporation Limited (RREC), Government of Rajasthan (GoR) similar to a special economic zone (SEZ) dedicated for generation of power through solar energy. The park will have adjoining manufacturing area for solar energy components being developed by Rajasthan State Industrial Development and Investment Corporation (RIICO). The Solar Park will hold a number of solar power plants each developed by separate or the same groups/ promoters. The concept aims to accelerate the development of Solar power generation projects by providing developers with a developed area that has facilitation of the permissions process; is well characterized, has proper infrastructure which minimizes the risk of the project development.

2. The solar park site will be enabled by the provision of necessary infrastructure build-up in the form of developed land, water access, gas availability and access infrastructure, power evacuation/transmission system, which will be provided to individual developers through a lease arrangement. The state and national government will conduct the necessary evaluation of the environmental and social impacts of utility-scale solar deployment before allocating the land to prospective developers, allowing developers to save time and money often spent on development work for multiple, individual plants in different locations.

3. The RREC, GoR will be the nodal agency for the development of the solar parks in Rajasthan. In addition, Rajasthan State Industrial Development and Investment Corporation Limited (RIICO), an Industrial catalyst of Rajasthan will develop an Industrial area to facilitate the Industrial production of solar equipment in the area, and Indian Institute of Technology (IIT) Rajasthan, Jodhpur will provide all Research and Development (R & D) support to the Solar industries in Rajasthan and Rajasthan Rajya Vidyut Prasaran Nigam Limited (RRVPL), the power transmission utility licensed to operate in the state of Rajasthan, will develop the Power evacuation system for pooling of generated power.

2.1 Location

4. Proposed Solar Park is to be developed on 10,000 Ha. vacant Government land in village Bhadla in Phalodi sub-division of Jodhpur district in Rajasthan in 2-3 phases. The Government of Rajasthan has designated areas of land that will allow for the build-up in "convoy" of multiple plants over the next 5 to 10 years, eventually totaling 2 to 3 GW of generation capacity. The following sets of coordinates provide the detail of available land, which is estimated to be a total of 10,000 hectares.

Phase	Latitude	Longitude	Area (hectare)
1 st phase	27.561436°	71.929246°	3000
	27.561003°	71.949858°	
	27.536027°	71.970592°	
	27.509074°	71.969121°	
	27.505844°	71.934704°	
	27.508915°	71.896030°	

	27.541685°	71.902458°	
2 nd phase	27.469911°	71.891085°	5000
	27.463404°	71.967841°	
	27.464040°	72.038529°	
	27.488111°	72.041165°	
	27.488480°	71.967818°	
	27.509074°	71.969121°	
	27.508915°	71.896030°	
3 rd phase	27.525330°	72.023196°	2000
	27.488111°	72.041165°	
	27.488849°	72.023203°	
	27.488480°	71.967818°	
	27.536027°	71.970592°	

2.2 Overall Park Level Generation Details for Phase-1

5. The solar park in Bhadla for Phase I encompasses 150 MW of CSP and 100 MW of PV projects. Based on the numbers previously given on available radiation, it may be considered that 5 hours at nominal rate is available for both PV and CSP power plants.

Technologies	MW	Hours	MWh (year)
PV	100	5	182,500
CSP	150	5	273,750
Total	250		456,250

2.3 Manufacturing Hub

6. A manufacturing hub will be developed by the Bureau of Investment Promotion (BIP) and RIICO, which will be situated to the northern side of the Bhadla Solar Park land. The area provided for RIICO is about 560 hectares (1400 acres) for accommodating several industries, assemblies and warehouses.

2.4 Land use

7. Majority of the land in the park is waste uncultivable land with sand dunes due to desertic conditions and lack of water for irrigation. Some portion of land is under seasonal cultivation of castor oil seed, Gawar and Bajara, though the agriculture in the area is purely depended on rainfalls or bore pumps.

2.5 Geological Investigations

8. The project consists of a proposed solar plant, including photovoltaic (PV) panels; transformers and associated infrastructure - control room etc. The following preliminary table of loads and settlement criteria for project features was considered for this investigation.

Table: Civil Foundation Designs

Structure Details	Approx. Load (Max T/m ²)	Approximate Footing Size	Max. settlement	
			Total	Differential
Transformer Pad	5	2.5m X 2.5m	40	25
Control room	10	2.0m X 2.0m	40	25
PV Panel Support Pier	Vertical Load of Max 0.5 T	0.45 m diameter	25	NA
PV Panel Support Pier	Lateral Load of 1 T	0.45 m diameter	25	NA
PV Panel Support Pier	Moment of 0.5 T-m	0.45 m diameter	25	NA

2.5.1 Local Geological Settings

9. The project site is located at elevation ranging between approximately 168 to 185 m above mean sea level. The area is nearly flat, shallow, south – east to north –west sloping surface. The first stratum of sand layer consists of fine sand and silty sand (up to 0 to 3m) and

the second stratum consist of cemented fine sand (between 3 to 6m). The ground water was not available up to 3 m depth.¹

2.5.2 Geotechnical Hazards

10. Base on geotechnical investigation and published data, it can be concluded that there is little to no potential for landslides, subsidence, fault surface rupture, liquefaction and seismic settlement. There is no potential for flooding and erosion. Further, poor soil conditions may exist in form of collapsible soil pockets and strong ground shaking is possible. All identified geological and seismic hazards are considered less than significant. According to the information available for this investigation, geological and seismic hazards do not appear to represent a “fatal flaw” for the proposed development.

2.5.3 Landslides

11. The proposed project lies in the relatively flat-lying plan, where landslides would not be expected to occur. Therefore, landslides are not anticipated to pose a hazard to the proposed project.

2.5.4 Flooding and eorsion

12. Flooding and the consequent erosion associated with flooding are those hazards that are the result of concentrated flow of storm water during rains. Based on both review of published maps and Geotechnical observations during site work, site topography is relatively flat void of significant drainages or collection areas, and inclined gently toward the northeast at an average gradient. The expected rainfall in the area is very low, therefore, the potential for flooding and erosion within the southern portion of the site is considered to be very low.

2.5.5 Dune Sand of the Area

13. Dune sands have low bearing capacities. The traditional and standard methods of computation of soil bearing capacity and settlement tend to over-predict the soil bearing capacity. This is because dune sands have a collapsible soil structure and are highly compressible. Settlement of these soils is higher than that for other soils with similar engineering characteristics. The behavior of dune sands is not governed by the normal laws of soil-water relationship. SPT values decrease on addition of water. Settlement also occurs on contact with water even without application of load. It has been observed that in loose desert sands of Rajasthan, the total settlement due to rise in water table is much larger than twice the initial settlement.

2.6 Summary of Metrological Data

14. Overall meteorological data and wind directions at the site are indicated below:

Parameter	Maximum	Minimum	
Air Temperature (°C)	50		3
Wind speed (m/s)	6.2	3.6	
Relative humidity (%)	100	5	
Rainfall (mm) avg. annual	338	0.05	

Source: KCT Report

2.7 Recourses available at Solar Park

2.7.1 Water

15. Indira Gandhi Nahar is passing through less than 1 km away from the solar park site. A

¹ Based on KCT study.

common water supply line will be constructed and storage may be done jointly or individually by the solar power producers. Total 450 cusec water has been allocated to power sector by the Indira Gandhi Nahar Board, out of which 58 cusec water is reserved for solar CSP power plants. GoR will allocate the required water to individual solar power producers (CSP) from the overall reserved 58 cusec water.

2.7.2 Gas Availability

16. Gas is not available in Jodhpur. It is available in Ramgarh, which is about 300 km away from the Bhadla Solar Park site.

2.7.3 Roads

17. In order to provide free access for individual solar power project site, internal and external roads will be constructed/upgraded. The main roads are proposed to be constructed to 10 meters width. All common approach roads (main roads, external roads and internal roads in solar park excluding within boundary of any solar project) shall be considered as common infrastructure facility.

2.7.4 Power Evacuation System

18. In order to evacuate the power from the solar power plant, RRVPNL is developing an integrated power evacuation system according to solar power evacuation requirements comprising of one 400 kV sub-station at Bhadla and construction of 3 pooling sub-stations of 132 kV GSS in solar park for evacuation of power with provision of their up gradation to 220 kV at a later date and its interconnection with 400 kV GSS. Power from Bhadla 400 kV sub-station shall be evacuated by double circuit 400 kV line to Mokla 400 kV sub-station and double circuit 400 kV line from 400 kV GSS Bhadla to 765/400 kV Jodhpur sub-station.

2.8 Demography of Bhadla Village

Village: Bhadla

Tehsil: Phalodi (Distance from tehsil headquarter is 83 km).

District: Jodhpur (Distance from district headquarter is 235 km).

2.8.1 Population

19. Total population of Bhadla Village is 1,141 which include 610 males and 531 females.

Table No. 1 Population of Village Bhadla

Total Population	Households	Male	Female	Literates	Workers
1141	169	610	531	213	230

Source: Census 2001

2.8.2 Education

20. Only one primary school is available. There is one primary school (up to 5th standard) in the village beyond which the children have to go Chinnu or Nachana for secondary and higher secondary education studies.

2.8.3 Available amenities in village

21. Detail of other facilities like water, toilet, medical, power etc. in the village Bhadla are as follow:

Table No. 2: Available amenities in village

Available amenities	Status
Potable water	<ul style="list-style-type: none"> Available through Well and by government supply.
Sources of water	<ul style="list-style-type: none"> Available through Well and Indira Gandhi Canal.
Toilets	<ul style="list-style-type: none"> Some households have their private toilets. Maximum villagers practice open defecation.
Medical facility	<ul style="list-style-type: none"> Not available in village (available at 5 km away at village Chinnu). Medical facility like "108" available but weak because of lack of transportation. No chronic disease prevalent in this area and people aware about HIV/AIDS and STD.
Education facility	<ul style="list-style-type: none"> One primary School in village.
Community hall	<ul style="list-style-type: none"> Available in village.
Recreation facility	<ul style="list-style-type: none"> Not available in village.
Electricity for agriculture and domestic use	<ul style="list-style-type: none"> Electricity is available for agriculture and household purposes.
Transportation	<ul style="list-style-type: none"> State transport facility not available up to village.
Roads	<ul style="list-style-type: none"> Black top road is only up to defense land in village; rest of the village. roads are graveled roads which are generally covered with sand.

2.9 Environmental Issues

22. Based on the environmental assessment and site surveys conducted for the project, there are very minimal associated potential adverse environmental impacts, which can be mitigated to an acceptable level by adequate implementation of the measures as stated in the Environment Management Plan (EMP) documents. Overall, the major social and environmental impacts associated with project are limited to the construction period and can be mitigated to an acceptable level by implementation of recommended measures and by best engineering and environmental practices. Adequate budget provisions should be made in the project to cover the environmental mitigation and monitoring requirements, with associated costs.

2.10 Sensitive Area Investigation

23. No part of the project site lies within protected areas, conservation areas or any other reservation areas. There is no threat to any rare, endemic or useful species due to the construction of these projects. There are no ecological sensitive areas within or near by the solar park site, the nearest wildlife sanctuary to the project area is the Desert National park which is situated at a distance of 135 km and will not have any adverse impact due to project activities.

2.11 Technologies

24. The technologies used in Rajasthan Solar Park for energy generation will be PV – Photovoltaic, based on the photovoltaic effect and CSP – Concentrated Solar Power usually related to heat based conversion of radiation and use of that heat to generate electricity. Concentrated photovoltaic - has emerged in recent years and although it is similar in principle to PV, it is different in the way it harnesses solar energy.

Features of different technologies: Solar Photovoltaic and Concentrated Solar Power (CSP)

S. No	Issue	Solar Photovoltaic (SPV)	Concentrated Solar Power (CSP)
1	Electricity generation	Solar cells are commonly placed within a panel and fixed on top to generate electricity from solar energy. Solar PV cells are made out	Harnesses the heat in the solar radiation and uses it to generate steam to feed into a turbine and produces electricity.

		of silicon which are semiconductors. These convert sunlight directly into electricity.	
2	Technologies	Concentrated Photovoltaic CPV, the other category of the photovoltaic uses different PV cells, called triple junction CPV technologies can be divided into Fresnel lenses or mirror based systems	The most common technologies, considered commercial, are parabolic troughs, Linear Fresnel reflectors, power towers and Stirling engines.
3	Water requirement	Low water requirement (only for maintenance)	High water/oil requirements for electricity generation
4	Module for generation	Simple module of electricity generation	Complex module for electricity generation
5	Operation and Maintenance	Simple O & M	O&M is complex, with each facility requiring miles of pipe and thousands of joints and seals to circulate heated fluid.
6	Energy storage	Cannot be stored without additional devices like invertors and storage batteries	CSP power stations can deliver dispatchable electricity that you can store and use at night as well

2.12 Description of Solar Park Site

S No	Description	Site – A
1.		
1.a	Area of land	10,000 hectares
1.b	Slope/Plain Land	Sloping land with sand dunes
1.c	Approximate Amount of land cutting required	To be determined after detailed topographical survey
2.	Owner Ship of land (Private / Forest/ Other Govt. Department/ Other)	Government land
3.	Private land (in ha.)	
	(i) Agriculture:- a) a) Irrigated b) b) Non – irrigated	Nil
	(ii) Non - Agriculture/ Private Waste land / Banjar.	To be determined after detailed survey
	(iii) House or Building: c) Residential d) Non – Residential	Nil
4.	Distance from Nearest (With name)	
4.a	River/ Canal (Name/Distance)	1.3 km from Indira Gandhi Canal
4.b	National / State Highway	35 km from NH-15
4.c	Forest Area	Nil
4.d	Village / town	Bhadla
4.e	Market/Area of Economic Activity	Phalodi - 50 km from park
5.	Road accessibility	Connected with Nachna – Bhap Road
6.	EHV Line Passing Nearby (Distance)	None
7.	HT line Passing Nearby	33 kV
8.	Telephone line Passing Nearby	
9.	National / State Highway Passing Nearby	None

S No	Description	Site – A
10.	Distance from Interstate / International Boundaries	50 km from Pakistan boundary
11.	No. of Forest Trees:- a) Trees to be felled b) Trees to be lopped	Nil
12.	No. of private trees	
	(i) Fruit Trees: a) Trees to be felled b) Trees to be lopped	Nil
	(ii) Non - Fruit Trees: a) Trees to be felled b) Trees to be lopped	To be assessed after final survey.
14.	Distance from in cultivated area	Within the park
15.	Altitude of Area	Varies from 168 to 185 meter above MSL
16.	Nearest distance from Airport	Jodhpur Airport 170 km
17.	Distance from nearest religious or Archaeological sites	About 55 km (aerial distance) from Ramdevra

Annexure - 3

Description of Transmission Lines/Sub-stations Alternatives

3.0 Alternate analysis of Route for 400 kV D/C Transmission Line from LILO point Jodhpur-Merta Line to Bhadla GSS

No	Description	Route – A	Route – B
1.	Length of line	160 km	177 km
2.	Canal / River crossings	1 canal (Jodhpur lift canal)	1 canal (Jodhpur lift canal)
3.	(i) Forest Area (in Hectare) (ii) Wild life Sanctuary/National Park (in Hectare) (iii) Distance from nearest Wildlife sanctuary/ National Park	Nil Nil 150 km (Desert National Park WLS)	Nil Nil 150 km (Desert National Park WLS)
4.	Development of Tower site - Number of towers - Land to be acquired for tower base	TBD*	TBD*
5.	Land Strata	Sandy	Sandy
6.	Road accessibility	Different roads are running parallel to transmission line alignment within 0.1-4 km distance	Different roads are running parallel to transmission line alignment within 0.1-4 km distance
7.	Private land (in Ha.) (i) Agriculture:- a) Irrigated b) Non-irrigated (ii) Non-Agriculture / Private Waste land / Banjar. (iii) House or Building: c) Residential d) Non-Residential	TBD*	TBD*
8.	EHV Line Crossing		
9.	HT line crossings	4	4
10.	Road crossing	22 times	
11.	Railways crossing	3 times	3 times
12.	National Highway (NH) / State Highway (SH) Crossing	2 times NH (15 and 65), 6 times SH (58, 61 and 19)	2 times NH (15 and 65), 4 times SH (58, 61 and 19)
13.	Telephone line crossing	Nil	Nil
14.	Length of line passing in the territory of other state	Nil	Nil
15.	No. of Forest Trees:- a) Trees to be felled b) Trees to be lopped	TBD*	TBD*
16.	No. of private trees (iii) Fruit Trees: a) Trees to be felled b) Trees to be lopped (iv) Non-Fruit Trees: a) Trees to be felled b) Trees to be lopped	TBD*	TBD*
17.	Length of line in cultivated area	TBD*	
18.	Length of line in un-cultivated area	TBD*	
19.	Nearest distance from Airport	20 km (Jodhpur airport)	
20.	Distance from nearest religious or Archaeological sites	3 km (Osian temples)	
21.	Name of villages involved/Name of District	Jodhpur District - Bhadla, Kanasar, Bhap, Kheerwa, Hindal Gol, Malar, Godarli, Kheechan, Lordiyan, Amla, Kanasar, Lohawat Bisnawas, Chheela, Lohawat Jatahwass, Dhelana, Osian, Harlaya, Indon Ki Dhani, Bheekam Kor, Osian, Ghevara, Khudiyala, Ujaliya, Khudiyala, Bhainsar Kotwali, Ummed Nagar, Jajiwai Bhatiyani, Jajiwai Gehlota, Lordi-Pandit Ji, Lordi Daijagra, Lordi Doliya, Jheepasani,	Jodhpur District - Bhadla, Kanasar, Phalodi, Lohawat, Loradiya Jatahwass, Dhelana, Osian, Harlaya, Indon Ki Dhani, Bheekam Kor, Osian, Mathaniya Ghevara, Khudiyala, Ujaliya, Khudiyala, Bhainsar Kotwali, Ummed Nagar, Jajiwai Bhatiyani, Jajiwai Gehlota, Lordi-Pandit Ji, Lordi Daijagra, Lordi Doliya, Jheepasani,
22.	Land to be permanently acquired: a) Area (in ha.) b) Cost.	TBD*	
	Route Selected	Selected on account of least impact	

Source: Detailed site survey, study of Survey of India 1:50,000 toposheet and Google earth Satellite maps of tentative alignment provided by RRVPL

TBD* – To be determined during detailed survey by RRVPL or the contractor.

3.1 Alternate analysis of route for 400 kV D/c Transmission line from Bhadla GSS – Ramgarh GSS

No	Description	Route – A	Route – B
1.	Length of line	180 km	137 km
2.	Canal / River crossings	3 Canal crossing	6 Canal Crossing
3.	(i) Forest Area (in Hectare)	Nil	Nil
	(ii) Wild life Sanctuary/National Park (in Hectare)	Nil	Nil
	(iii) Distance from nearest Wildlife sanctuary/ National Park	50 km (Desert National Park WLS)	50 km (Desert National Park WLS)
4.	Development of Tower site - Number of towers - Land to be acquired for tower base	TBD	TBD
5.	Land Strata	Sandy	Sandy
6.	Road accessibility	Different roads are running parallel to transmission line alignment within 0.1-4 km distance	Different roads are running parallel to transmission line alignment within 0.1-4 km distance
7.	Private land (in Ha.) (i) Agriculture:- a) Irrigated b) Non-irrigated (ii) Non-Agriculture / Private Waste land / Banjar. (iii) House or Building: e) Residential f) Non-Residential	TBD*	TBD*
8.	EHV Line Crossing		
9.	HT line crossings	4	2
10.	Road crossing	11 times	10
11.	National / State Highway Crossing	Nil	Nil
12.	Telephone line crossing	Nil	Nil
13.	Length of line passing in the territory of other state	Nil	Nil
14.	No. of Forest Trees:- c) Trees to be felled d) Trees to be lopped	TBD*	TBD* (dense plantation near canal)
15.	No. of private trees (v) Fruit Trees: c) Trees to be felled d) Trees to be lopped (vi) Non-Fruit Trees: c) Trees to be felled d) Trees to be lopped	TBD*	TBD*
16.	Length of line in cultivated area	TBD*	TBD*
17.	Length of line in un-cultivated area	TBD*	TBD*
18.	Nearest distance from Airport	45 km (Jaisalmer airport)	45 km (Jaisalmer airport)
19.	Distance from nearest religious or Archaeological sites	45 km (Jaisalmer Fort)	45 km (Jaisalmer Fort)
20.	Name of villages involved/Name of District	Jodhpur district - Bhadla, Rola Jaisalmer district – Askandra, Didhoo, Satyaya, Ramgarh, Joga, Parewar, Kabeer Basti, Kheeya, Nehdai, Mohangarh, Balana, Tadana, Mandhau, Boha, Joga	Jodhpur district - Bhadla, Jaisalmer district – Awai, Nachana, Ghantiali, Sankhla, Arjana, Kabeer Basti, Joga Ramgarh
21.	Land to be permanently acquired: c) Area (in ha.) d) Cost.	TBD*	
	Route Selected	Selected on account of least impact	

Source: Detailed site survey, study of Survey of India 1:50,000 toposheet and Google earth Satellite maps of tentative alignment provided by RRVPNL

TBD* – To be determined during detailed survey by RRVPL or the contractor.

3.2 Alternate analysis of route for 400 kV D/C Transmission Line from Ramgarh GSS - Akal GSS

No	Description	Route – A	Route – B
1.	Length of line	100 km	76 km
2.	Canal / River crossings	Nil	Nil
3.	(i) Forest Area (in Hectare)	Nil	Nil
	(ii) Wild life Sanctuary/National Park (in Hectare)	Nil	Nil
	(iii) Distance from nearest Wildlife sanctuary/ National Park	36 km (Desert National Park WLS)	26 km (Desert National Park WLS)
4.	Development of Tower site - Number of towers - Land to be acquired for tower base	TBD*	TBD*
5.	Land Strata	Sandy, Rocky	Sandy, Rocky
6.	Road accessibility	Different roads are running parallel to transmission line alignment within 0.1-4 km distance	Ramgarh – Jaisalmer and Jaisalmer – Barmer roads are running parallel to transmission line alignment within 0.1-4 km distance.
7.	Private land (in Ha.) (i) Agriculture:- a) Irrigated b) Non-irrigated (ii) Non-Agriculture / Private Waste land / Banjar. (iii) House or Building: g) Residential h) Non-Residential	TBD*	TBD*
8.	EHV Line Crossing		
9.	HT line crossings	5	
10.	Road crossing	11 times	
11.	Railway crossing	1 time	1 time
12.	National / State Highway Crossing	2 time (NH -15)	1 time (NH -15)
13.	Telephone line crossing	Nil	
14.	Length of line passing in the territory of other state	Nil	Nil
15.	No. of Forest Trees:-	TBD*	TBD*
	e) Trees to be felled		
	f) Trees to be lopped		
16.	No. of private trees	TBD*	TBD*
	(vii) Fruit Trees:		
	e) Trees to be felled		
	f) Trees to be lopped		
	(viii) Non-Fruit Trees:		
	e) Trees to be felled		
f) Trees to be lopped			
17.	Length of line in cultivated area	TBD*	TBD*
18.	Length of line in un-cultivated area	TBD*	TBD*
19.	Nearest distance from Airport	20 km (Jaisalmer airport)	9 km (Jaisalmer airport)
20.	Distance from nearest religious or Archaeological sites	17 km (Jaisalmer Fort)	4.5 km (Jaisalmer Fort)
21.	Name of villages involved/Name of District	Jaisalmer district – Ramgarh, Joga, Parewar, Gogade, Chaudhariya, Hadda, Asoda, Hameera, Bhagoo Ka Gaon, Thaiyat, Moklat, Basanpeer (Jooni), Basanpeer (Southern), Joga, Akal	Jaisalmer district – Ramgarh, Sanu, Bhadasar, Lanela, Kuriya, Jaisalmer, Dhabla, Akal
22.	Land to be permanently acquired:	Nil	
	e) Area (in ha.)		
	f) Cost.		
	Route Selected	Selected on account of least impact	

Source: Detailed site survey, study of Survey of India 1:50,000 toposheet and Google earth Satellite maps of tentative alignment provided by RRVPL

TBD* – To be determined during detailed survey by RRVPL or the contractor.

Important Historical Monuments of Jodhpur and Jaisalmer district

Jodhpur district

Mandore was the ancient capital of Marwar situated 8 km north of Jodhpur. Main attractions of the place are Hall of Heroes where sixteen huge figures which have been carved out of a single rock, the shrine of 330 million Gods and the royal cenotaphs. The sixteen gigantic figures carved out of a single rock depicting popular Hindu and folk deities stand there in bright colours. This place has caves in crags and the sprawling gardens, which are now shelter place for monkeys and peacocks. Many of these monuments are protected by Department of Archaeology and Museums of Rajasthan, Government of Rajasthan.

Osian village is 65 km from Jodhpur; it has ruins of an ancient city Ossian. This city is famous for Brahmanical and Jain temples, which belong to 8th and 11th century. The Surya or Sun temple and the Sachiya temples are famous for their beauty. The Shikhar of Sachiya temple is clustered by two rows of turrets, an ambulatory and a large assembly hall with an elaborate ceiling. This town which was once a great trading center is an oasis and houses an abundance of peacocks. The largest of the 16 Jain and Brahmanical temples is dedicated to Lord Mahavira, the last of the Jain Tirthankars. In the same area, the Surya temple has fascinating images of Durga, Surya and Ganesh. Many of these temples are protected by Department of Archaeology and Museums of Rajasthan, Government of Rajasthan.

Balsamand Lake is a lake situated 5 km from Jodhpur on Jodhpur-Mandore Road. The lake is a popular picnic spot. This artificial lake was built in 1159 AD by Balak Rao Parihar. It was a water reservoir to provide water to Mandore. The lake has a length of one kilometer, breadth of 50 meters and a depth of 15 meters.

The **Balsamand Lake** Palace was built later as pleasure or summer palace on its shore. The lake is surrounded by lush green gardens that house groves of trees like mango, papaya, pomegranate, guava and plum and many animals and birds like jackal and peacock.

The **Balsammand palace** was created by Maharajah Sur Singhji, as a summer pavilion. It is very finely carved with latticed windows that allow the soft, cool breeze to blow into the interiors of the palace. The embankments of the lake, in front of the palace, have domed structure that offers fabulous views of the lake encircled by hills. An artificial cascading waterfall brings water down from the reservoir to the gardens.

Jaisalmer district

Jaisalmer fort is one of the largest forts in the world. It is situated in Jaisalmer city; it was built in 1156 AD by the Bhati Rajput ruler Rawal Jaisal, from where it derives its name. The fort stands proudly amidst the golden stretches of the great Thar Desert, on Trikuta Hill, and has been the scene of many battles. Its massive yellow sandstone walls are a tawny lion color during the day, fading to honey-gold as the sun sets, thereby camouflaging the fort in the yellow desert. For this reason, it is also known as the "Golden Fort", this fort is listed under list of Monuments protected by Archeological Survey of India (ASI).

Nathmal Ji Ki Haveli is situated in the heart of Jaisalmer it is famous for its Architecture and miniature haveli was commissioned to serve as the residence of Diwan Mohata Nathmal, the then Prime Minister of Jaisalmer. Maharawal Beri Sal commissioned the construction of this

Haveli. The architects of this haveli were Hathi and Lulu who happened to be brothers. There is a very interesting story regarding its construction. It is said that the two brothers started building different facets of haveli simultaneously. In those days there were no such instruments, which could keep a track on continuity and thus when this building came up finally it had irregular shape. Barring that, this haveli is still considered the best in Jaisalmer in terms of grandeur. The Haveli also consists of pictures engraved on pillars and walls of Horses, Cattle, and depiction of Flora among other things. But the most interesting aspect of this haveli is the drawing of modern amenities such as cars, fans etc. It is said and believed that the Architect brothers didn't see these things ever in their life and engraved it with mere help of their descriptions given by people who had seen it. Thus the architecture present in this haveli is quite different from the one popular in other parts of Jaisalmer. The workmanship of Jaisalmer Havelis is an amalgam of both Rajput architecture as well as Islamic art that was imported via the traders' caravan through the desert. This monument is protected by Department of Archaeology and Museums of Rajasthan, Government of Rajasthan.

The **Patwon Ji ki Haveli** is in a narrow lane near Patwa Complex. The Patwon Ji ki Haveli is an interesting piece of Architecture and is the most important among the havelis in Jaisalmer. This is precisely because of two things, first that it was the first haveli erected in Jaisalmer and second, that it is not a single haveli but a cluster of 5 small Havelis. The first among these Havelis was commissioned and constructed in the year 1805 by Guman Chand Patwa and is the biggest and the most ostentatious. It is believed that Patwa was a rich man and was a renowned trader of his time. He could afford and thus ordered the construction of separate stories for each of his 5 sons. These were completed in the span of 50 years. All five houses were constructed in the first 60 years of the 19th century. The havelis are also known as the 'mansion of brocade merchants. This name has been given probably because the family dealt in threads of gold and silver used in embroidering dresses. This haveli is presently occupied by the government, which uses it for various purposes. The office of the Archeological Survey of India and State art and craft department is situated in the haveli itself. This monument is protected by Department of Archaeology and Museums of Rajasthan, Government of Rajasthan.

Salim Ji Ki Haveli is located in the heart of Jaisalmer near Railway station. Salim Singh ki haveli was built on the remains of an older haveli built in the late 17th century. The new building was built in the year 1815 and was occupied by the Mehta family of Jaisalmer. They were the most influential family of their time. This haveli was commissioned by Salim Singh, the then Prime Minister of the kingdom. The haveli has a distinct architecture. The roof has been constructed in the form of Peacock. The haveli is situated beside the hills near the Jaisalmer Fort.

Like other havelis in Jaisalmer, this too has tuskers guarding the gateways. These are made of sand stones and look very close to the original in appearance. The haveli consists of as many as 38 balconies and they all have distinct designs for themselves. The front facet of the haveli resembles ship stern and thus this haveli is also sometimes referred as Jahaz Mahal. This monument is protected by Department of Archaeology and Museums of Rajasthan, Government of Rajasthan.

Bada Bagh is located 6 km off the Jaisalmer city on Ramgarh Road. Bada Bagh, which literally means 'Big Garden', was commissioned by Maharawal Jait Singh in the early 16th century and completed by his son Lunakaran after his death. The site has three different things, a garden, a tank and a dam. In the vicinity a Govardhan Stambh (pillar). This pillar was constructed to commemorate the construction of the Dam and the Tank. In local dialect, the Dam and the Tank are known as Jait Bandh and the Jait Sar respectively. The Jait Bandh is a dominating structure.

It is about 1,200 feet in length and 350 feet in width. It was built out of solid blocks of stone. The same material has been used for the construction of the well and the Tank.

Cenotaph of Bada Bagh: Other interesting monuments in the vicinity are the Cenotaphs. These cenotaphs also known as chattris were constructed by the various Bhatti rulers. One cenotaph has been erected for each ruler. The oldest among them is the cenotaph of Maharawal Jait Singh who reigned from year 1470-1506. This tradition was discontinued when in 1947, one of the prince died of a mysterious disease. This was taken as a bad omen and thus this tradition came to its end.

Amar Sagar Lake is located 7 km in the western outskirts of Jaisalmer. Amar Sagar is a small and beautiful lake cum oasis and is adjacent to a 17th century palace called the Amar Singh Palace. Maharawal Akhai Singh built this palace in honor of one of his predecessors Amar Singh. Next to the palace are pavilions with large stairs leading down to the Amar Sagar Lake. This haveli has been constructed in the pattern of apartments. The Amar Sagar is a five story high haveli and is famous for its murals. There is an old Shiva temple in the complex itself.

Gadi Sagar Lake is at south of the city walls, once held the town water supply, and befitting its importance in providing precious water to the inhabitants of this arid city, it is surrounded by small temples and shrines. The beautiful yellow sandstone gateway arching across the road down to the tank is the Tilon-ki-Pol (monument is protected by Department of Archaeology and Museums of Rajasthan, Government of Rajasthan), and is said to have been built by a famous prostitute, Tilon. When she offered to pay to have this gateway constructed, the Maharaja refused permission because to go to the tank, he would have to go under it and he felt that this would be beneath his dignity. While he was away, she built the gate adding a Krishna temple on top so that king could not tear it down.

Akal Wood fossil Park is located 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.

Annexure - 5

Environment Management Plan (EMP)

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	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 Gol rules/regulations & (International Electro-technical Commission) IEC standards	Exclusion of PCBs, CFCs stated in tender documents - Once.	RRVPNL	Detailed design.
2. Environment Resources						
Location of land for sub-stations/transmission towers	Impact to the existing surface water environment.	Construction facilities should be placed at suitable distance from water bodies, natural flow paths, important ecological habitats and residential areas.	Water and Air Quality.	Air quality Standards and Water Quality standards – Once.	RRVPNL	Detailed design/Planning Stage.
Sub-station location and design.	Noise generation Exposure to noise, Nuisance to neighbouring properties.	Sub-station location/ designed to ensure noise will not be a nuisance to neighbouring properties.	Expected noise emissions based on sub-station design, noise levels.	Noise control regulations Noise levels to be specified in tender documents	RRVPNL	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.	RRVPNL	Part of detailed project siting and survey and design.
Interference with drainage patterns/Irrigation on 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.	RRVPNL	Detailed alignment survey and design.
3. Ecological Resources						
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.	Floral and faunal habitats loss.	Enumeration of flora and fauna at site.	ESC of RRVPNL.	Detailed design/Planning Stage.
4. Human Environment						
Involuntary	Loss of lands and	Compensation paid for temporary/	Public complaints	Rates paid as per	ESC of	Prior to

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
resettlement or land acquisition.	structures.	permanent loss of productive land.		the Resettlement plan/Frame work for the project.	RRVPNL	construction phase/Land Acquisition.
Encroachment into farmland.	Loss of agricultural/horticultural productivity.	Avoid siting new towers on farmland/orchards wherever possible. Farmers compensated for any permanent loss of productive fruit trees that need to be trimmed removed along RoW.	Tower location and line alignment selection Statutory approvals for tree trimming /removal from competent authority. Implementation of crop and tree compensation (based on affected area)	Consultation with local authorities and design engineers in consonance with RRVPNL.	ESC of RRVPNL	Part of detailed alignment survey and design.
Location and design of Sub-station.	Disturbance to adjacent lands and the people due to cut and fill operations.	Maintain adequate 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.	RRVPNL	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 permitted level of power frequency and the regulation of supervision at sites.	Tower location and line alignment selection with respect to nearest dwellings.	Setback distances to nearest houses – Once.	RRVPNL	Part of tower siting survey and detailed alignment survey and design.
Explosions/Fire	Hazards to life	Design of sub-stations to include modern fire control systems/firewalls. Provision of fire fighting equipment to be located close to transformers, switchgear.	Sub-station design compliance with fire prevention and control codes.	Tender document to mention detailed specifications – Once.	RRVPNL	Part of detailed sub-station layout and design /drawings
Construction						
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	Soil erosion	Visual inspection (Turbidity and sedimentation)	Contractor through contract provisions under supervision of RRVPNL	Construction period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
		drainage.				
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	Technical specification	RRVPNL and Contractor through contract provisions	Throughout construction period
Equipment layout and installation	SF ₆ leakage during storage and erection of Switchgear	Record of all sub-station switchgear, cylinders located within secure casings	Switchgear casings and Sub-station bounding	As per (International Electro-technical Commission) IEC standards Once in year	RRVPNL Contractor through contract provisions	Throughout construction/erection period
Surplus earthwork/soil	Runoff to cause water pollution, solid waste disposal	Any excess material will only be used as fill material offsite when the owner's agreement has been obtained and with the disposal site restored in a manner that prevents erosion and does not block any drainage path	Location and amount (m ³) of fill disposal Soil disposal locations and volume (m ³)	Appropriate fill disposal and dispersal locations quarterly	Contractor through contract provisions under supervision of RRVPNL	Construction period
B. Environment Resources						
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 ESC, RRVPNL	Construction period
Sub-station construction	Loss of soil	Cutting and filling for the sub-station foundations obtained by creating or improving local drainage system.	Borrow area siting (area of site in m ² and estimated volume in m ³)	CPCB norms Quarterly	Contractor through contract provisions under supervision of ESC, RRVPNL	Construction period
	Water pollution	Minimize construction activities involving significant ground disturbance (i.e. sub-station land forming) during the monsoon season. Provide drains and retention ponds if required.	Water Quality (pH, BOD/COD, Suspended solids, other) during major earthworks	GOI water quality standards, Timing of major disturbance activities - prior to	Contractor through contract provisions under supervision of	Construction period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
				start of construction activities.	ESC, RRVPNL	
Provision of facilities for construction workers	Contamination of receptors (land, water, air).	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Amenities for Workforce facilities.	Presence of proper sanitation, water supply and waste disposal facilities - Once.	Contractor through contract provisions under supervision of RRVPNL	Construction period
Mechanised construction	Noise, vibration and operator safety, efficient operation. Noise, vibration, equipment wear and tear.	Construction equipment to be well maintained. Construction techniques and Machinery selection to minimize ground disturbance. Proper maintenance and turning off plant not in use.	Construction techniques and equipment - estimated noise emissions and operating schedules.	Technical specifications, safety regulations, Noise control regulations- Quarterly.	Contractor through contract provisions under supervision of RRVPNL.	Construction period
Construction of roads for accessibility for sub stations	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 minimum of single carriageway width.	Access roads, routes (length and width of access roads).	Use of established roads wherever possible. Access restricted to a minimum of single carriageway width.	Contractor through contract provisions under supervision of RRVPNL.	Construction period
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 m ²).	Clearance strictly limited to target vegetation –Once.	Contractor through contract provisions under supervision of RRVPNL.	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. 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	Presence of target species in RoW following vegetation clearance.	RRVPNL, Contractor through contract provisions under supervision of forest department	Construction period

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
			cleared in m ²).			
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 .	RRVPNL, 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. Proper awareness programme regarding conservation of flora, fauna including ground vegetation to all workers.	Habitat loss.	Complaints by local people or other evidence of illegal hunting.	RRVPNL.	Construction period
D. Human Environment						
Construction schedules for sub-station.	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, dBA).	Construction as per Scheduled timings only.	RRVPNL, 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 /reinstae 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 m ³).	Loss of crops-work in post-harvest period but before next crop – Once per site.	RRVPNL / 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.	Contract clauses Design basis and layout. Reinstatement of land status (area affected, m ²).	Incorporating good construction management, design engineering practices. Consultation with	Contractor through contract provisions under supervision of RRVPNL	Construction period.

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
		Productive land will be reinstated following completion of construction. Compensation will be paid for loss of production, if any.	Implementation of tree/crop compensation (amount paid).	affected parties immediately after completion of construction and after the first harvest.		
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 (dBA).	CPCB Emission and Water Quality standards - Quarterly.	Contractor through contract provisions under supervision of RRVPNL.	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 RRVPNL	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 with required PPE. Contractor to arrange for health and safety awareness programmes including on AIDS and sexually transmitted diseases (STD).	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness).	RRVPNL and ADB Health and safety standards - Monthly.	Contractor through contract provisions under supervision of RRVPNL.	Construction period.
Capacity Building	Improve standards of implementation and monitoring.	Training of RRVPNL Environment and Social Cell.	Training schedules.	Number of training program - Yearly.	RRVPNL.	Construction period.

Operation and Maintenance Phase
A. Physical Resources

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
Operation of Switchgear.	Leakage of SF ₆ gas.	Record of all sub-station switchgear located within secure casings.	Switchgear casings and Sub-station bounding – Monthly.	Ozone Depleting substances.	RRVPNL.	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).	RRVPNL.	Throughout the operations
Oil spillage.	Contamination of land/nearby water bodies.	Sub-station transformers located within secure and impervious bundled areas with a storage capacity of at least 100% of the capacity of oil in transformers and associated reserve tanks.	Sub-station bounding (“as-built” diagrams)- Monthly.	Hazardous Waste (Management, handling, Trans-boundary Movement) Rules 2009.	RRVPNL.	Throughout the operation
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.	RRVPNL, 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.	RRVPNL.	Throughout the operation.
Sub-station maintenance.	Exposure to electromagnetic interference.	Sub-station design to comply with the limits of electromagnetic interference within floor area.	Required vibrations level, instrumentation – on public complaint.	Technical specifications	RRVPNL	Throughout the operation
Noise generation.	Nuisance to the community around the site.	Provision of noise barriers near sub-station sites.	Noise level.	Noise level (dBa)- Once a year.	RRVPNL	Throughout the operation
Electric shock.	Death or injury to the workers and public.	Security fences around sub-station 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	Periodic maintenance. Number of programmes and percent of staff/ workers covered.	RRVPNL	Throughout the operation

Project Activity	Potential Environmental Impact	Mitigation Action	Monitoring Scope	Standards/ Measurement/ Frequency	Institutional Responsibility	Implementation Schedule
Training for Electric safety.	Rising of awareness for electric safety.	Training of RRVPNL personnel.	injuries). Training schedules.	Number of training program-Yearly.	RRVPNL	Operation

Annexure - 6

Summary of Results for Environment Monitoring for Air, Water, Noise and Soil Sampling

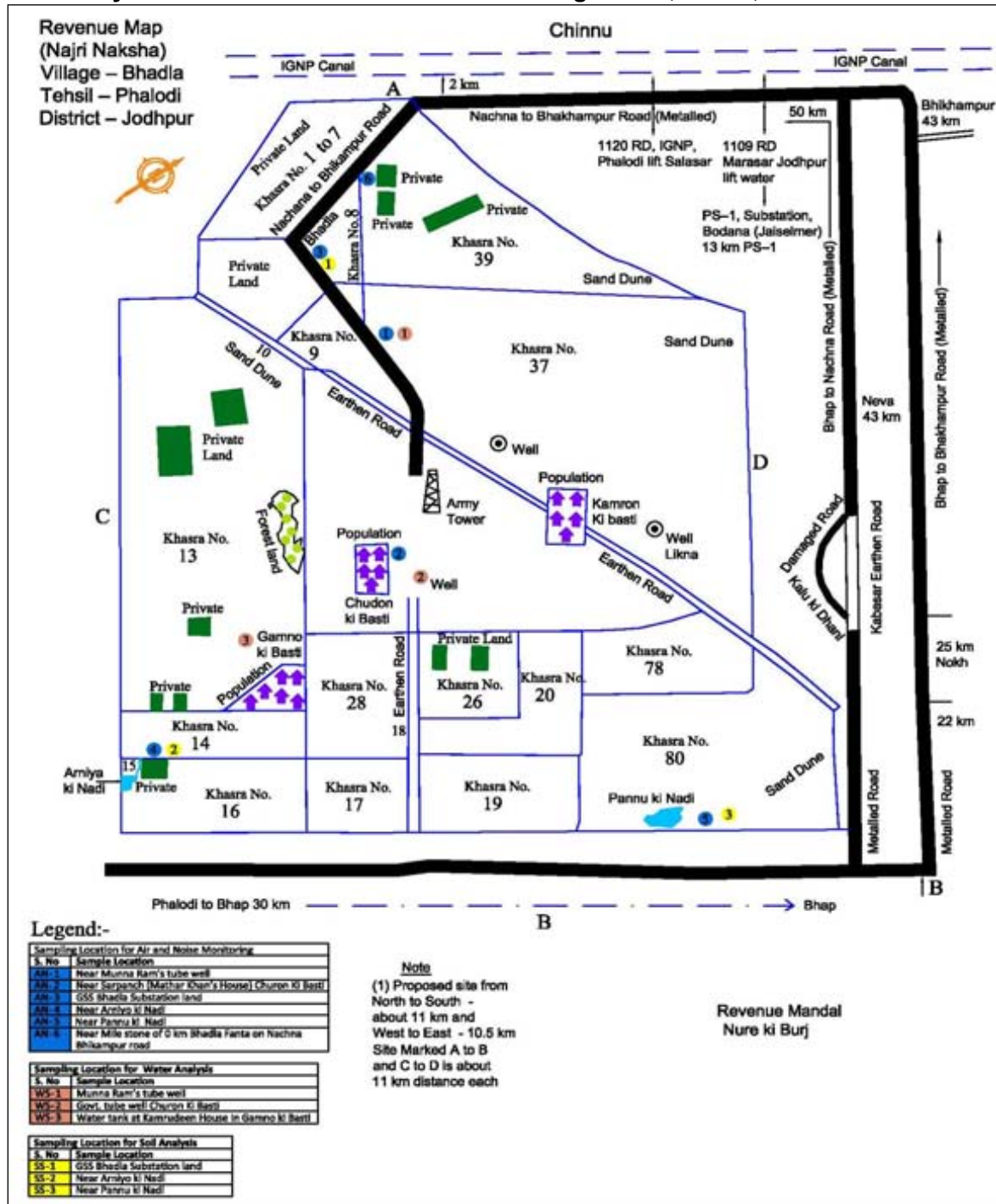


Figure 15: Sampling Locations within Bhadla Park

i. **Location of Sampling Inside the Bhadla Solar Park (November 2011)**

S. No	Component	No. of Sample	Report Reference No.	Sampling Location
1 and 2	Air Monitoring and Noise Monitoring	6	AN - 1	Near Munna Ram's tube well
			AN - 2	Near Sarpanch (Mathar Khan's House) Churon Ki Basti
		6	AN - 3	GSS Bhadla Sub-station land
			AN - 4	Near Arniyo ki Nadi
			AN - 5	Near Pannu ki Nadi
			AN - 6	Near Mile stone of 0 km Bhadla Fanta on Nachna – Bhikampur road
3	Water Analysis	3	WS - 1	Munna Ram's tube well
			WS - 2	Govt. tube well Churon Ki Basti
			WS - 3	Water tank at Kamrudeen House in Gamno ki Basti
4	Soil Analysis	3	SS - 1	GSS Bhadla Sub-station land
			SS - 2	Near Arniyo ki Nadi
			SS - 3	Near Pannu ki Nadi

ii. **Location of Sampling along the associated Grid Sub-stations (November 2011)**

S. No	Component	No. of Sample	Report Reference No.	Sampling Location
1 and 2	for Air and Noise Monitoring	4 each	SS-1	GSS Sub Station Land, Khasara No. 8, Village: Bhadla, Post: Nuro Ki Burj, Tehsil: Phalodi, District Jodhpur
			SS - 2	400 KVA GSS Site, Village: Meyon Ki Dhani, Post: Ramgarh, Jaisalmer
			SS - 3	Near SE office 400 KVA (RRVNL), Village: Akal, Post: Jodha, Jaisalmer
			SS - 4	GSS 400 kVA Site, Village: Kakani, Post and Tehsil: Luni, Jodhpur
3	Water Analysis	4	SS-1	Water sample collected from Bore well of Munna Ram Ji, Village: Bhadla (Khasra No.9), Post: Nuro Ki Burj, Tehsil: Phalodi, District Jodhpur
			SS - 2	Water sample collected from Govt. Bore well (Nearest Bore well GSS Ramgarh), Village and Post: Sonu, District Jaisalmer
			SS - 3	Water sample collected from Govt. Bore well inside 400 KVA GSS (RRVNL), Village: Akal, Post: Jodha, Jaisalmer
			SS - 4	Water sample collected from Open Well of Babu Singh Champavat, Village: Kakani, Post and Tehsil: Luni, Jodhpur
4	Soil Analysis	4	SS-1	Soil sample collected from the land of proposed GSS Sub Station, Khasara No. 8, Village: Bhadla, Post: Nuro Ki Burj, Tehsil: Phalodi, District Jodhpur
			SS - 2	Soil sample collected from the proposed Ramgarh GSS 400 KVA, Village and Post: Sonu, District Jaisalmer
			SS - 3	Soil sample collected from the land of proposed GSS 400 KVA (RRVNL), Village: Akal, Post: Jodha, Jaisalmer
			SS - 4	Soil sample collected from the land of Proposed GSS 400 KVA, Village: Kakani, Post and Tehsil: Luni, Jodhpur

iii. Location of sampling along the Tranche -1 transmission lines (December 2011 to January 2012)

S. No	Component	No. of Sample	Sample No.	Sampling Location
1 and 2	for Air and Noise Monitoring	17 each	Sample No. 1	Village: Jajiwai Gehlotan, Post: Jajiwai via Mandor, District Jodhpur
			Sample No. 2	Village and Post: Umed Nagar, Tehsil: Osian, District Jodhpur
			Sample No. 3	Near 44 No. Railway crossing, Bhikamkhor, Tehsil: Osian, District Jodhpur
			Sample No.4	Village: Amla (Near Kichan), Post and Tehsil: Phalodi, District Jodhpur
			Sample No.5	Village: Khirwa, Post: Hidal Gol, Tehsil: Phalodi, District Jodhpur)
			Sample No.6	Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur)
			Sample No. 7	(Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer)
			Sample No. 8	Village and Post: Tadana, Tehsil and District Jaisalmer)
			Sample No. 9	Village: Nirudeen Ki Dhani, District Jaisalmer)
			Sample No.10	Village: Nehdai, District Jaisalmer
			Sample No.11	Village: Tanusar, District Jaisalmer
			Sample No.12	Village: Joga, District Jaisalmer
			Sample No. 13	Village: Parewer, District Jaisalmer
			Sample No. 14	Village: Asda, District Jaisalmer
			Sample No. 15	Village: Hadda, District Jaisalmer
			Sample No.16	Hamira Rly Station, Village: Thaiyat, District Jaisalmer)
			Sample No.17	Village: Bhagu Ka Gaon, District Jaisalmer
3	Water Analysis	7	Sample No. 1	Water sample collected from Pond, Village: Jajiwai Gehlotan, Post: Jajiwai via Mandor, District Jodhpur
			Sample No. 2	Water sample collected from Bore well of Sukh Ram S/o Shri Bhagirath Ram, Village: Sirmandi, Post and Tehsil: Osian, District Jodhpur
			Sample No. 3	Water sample collected from Bore well of Manish S/o Shri Panna Lal Ji, Village: Amla, Post and Tehsil: Phalodi, District Jodhpur
			Sample No.4	Water sample collected from Govt. Bore well, Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer
			Sample No.5	Water sample collected from Water Tank of Babu Singh S/o Shri Bagh Singh, Village: Tanusar, Jaisalmer
			Sample No.6	Water sample collected from Govt. Bore well, Village: Joshiyan (Hadda), Post: Kanod, Tehsil: and District: Jaisalmer
			Sample No.7	Water sample collected from Govt. Bore well, Village and Post: Bhagu Ka Gaon, Tehsil and District: Jaisalmer
4	Soil Analysis	7	Sample No. 1	Soil sample collected from the Pond of Village: Jajiwai Gehlotan, Post: Jajiwai via Mandor, District Jodhpur
			Sample No. 2	Soil sample collected from the land of Sukh Ram S/o Shri Bhagirath Ram, Village: Sirmandi, Post and Tehsil: Osian, District Jodhpur
			Sample No. 3	Soil sample collected from the land of Manish S/o Shri Panna Lal Ji, Village: Amla, Post and Tehsil: Phalodi, District Jodhpur
			Sample No.4	Soil sample collected from the land of Padam Singh

S. No	Component	No. of Sample	Sample No.	Sampling Location
				S/o Shri Chandan Singh Ji, Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer
			Sample No.5	Soil sample collected from the land of Babu Singh S/o Shri Bagh Singh, Village: Tanusar, Jaisalmer)
			Sample No.6	Soil sample collected from the land of Bheraram Ji S/o Shri Manglaram Ji Village: Hadda, Post: Kanod, Tehsil and District Jaisalmer
			Sample No.7	Soil sample collected from the land of Barkat Khan S/o Shri Jalu Khan, Village and Post: Bhagu Ka Gaon, Tehsil and District: Jaisalmer

A. AMBIENT AIR QUALITY MONITORING REPORT**i. Ambient Air Quality Monitoring Report for Solar Park at Bhadla (November 2011)**

S. No	Site	Particulate Matter (PM _{2.5})	Particulate Matter (PM ₁₀)	Sulphur Dioxide (SO ₂)	Oxide Of Nitrogen (NO _x)	Carbon Monoxide as (CO)
AN -1	Near House of Munna Ram Ji	26.5 µg / m ³	53.1 µg / m ³	6.2 µg / m ³	9.3 µg / m ³	573 µg / m ³
AN -2	Near House of Mathar Khan (Sarpanch), Chudon Ki Basti	31.4 µg / m ³	58.6 µg / m ³	6.3 µg / m ³	9.1 µg / m ³	458 µg / m ³
AN -3	GSS Sub Station Land	24.1 µg / m ³	47.5 µg / m ³	6.0 µg / m ³	9.0 µg / m ³	373 µg / m ³
AN -4	Arniya Ki Nadi	29.4 µg / m ³	56.8 µg / m ³	6.3 µg / m ³	9.2 µg / m ³	458 µg / m ³
AN -5	Panna Ki Nadi	25.3 µg / m ³	50.8 µg / m ³	6.0 µg / m ³	9.0 µg / m ³	458 µg / m ³
AN -6	0 km Mile stone of Bhadla at Badhla Fanta	21.4 µg / m ³	43.6 µg / m ³	6.0 µg / m ³	9.0 µg / m ³	373 µg / m ³
	Standard Value	60 µg / m ³	100 µg / m ³	80 µg / m ³	80 µg / m ³	2000 µg / m ³
	Methods of Measurement	Gravimetric Method	Gravimetric Method	Improved West and Gaeke Method	Modified Jacob and Hochheiser Method	IS: 5182 – 1975 Part X

ii. Ambient Air Quality Monitoring Report for Grid Sub-stations (November 2011)

Sample No	Site	Particulate Matter (PM _{2.5})	Particulate Matter (PM ₁₀)	Sulphur Dioxide (SO ₂)	Oxide of Nitrogen (NO _x)	Carbon Monoxide as (CO)
SS - 1	GSS Sub Station Land, Khasara No. 8, Village: Bhadla, Post: Nuro Ki Burj, Tehsil: Phalodi, District Jodhpur	24.1 µg / m ³	47.5 µg / m ³	6.0 µg / m ³	9.0 µg / m ³	373 µg / m ³
SS - 2	400 KVA GSS Site, Village: Meyon Ki Dhani, Post: Ramgarh, Jaisalmer	27.3 µg / m ³	57.7 µg / m ³	6.5 µg / m ³	9.3 µg / m ³	573 µg / m ³
SS - 3	Near SE office 400 KVA (RRVPLN), Village: Akal, Post: Jodha, Jaisalmer	32.6 µg / m ³	65.8 µg / m ³	6.3 µg / m ³	9.7 µg / m ³	687 µg / m ³
SS - 4	GSS 400 kVA Site, Village: Kakani, Post and Tehsil: Luni, Jodhpur	20.5 µg / m ³	44.6 µg / m ³	6.0 µg / m ³	9.0 µg / m ³	458 µg / m ³
	Standard Value	60 µg / m ³	100 µg / m ³	80 µg / m ³	80 µg / m ³	2000 µg / m ³
	Methods of Measurement	Gravimetric Method	Gravimetric Method	Improved West and Gaeke Method	Modified Jacob and Hochheiser Method	IS: 5182 – 1975 Part X

iii. Ambient Air Quality Monitoring Report along 3 nos. 440 kV Transmission Lines (December 2011 to January 2012)

Sample No	Site	Particulate Matter (PM _{2.5})	Particulate Matter (PM ₁₀)	Sulphur Dioxide (SO ₂)	Oxide of Nitrogen (NO _x)	Carbon Monoxide as (CO)
1	Near Nageshwar Mahadev Temple, Village: Jajiwai Gehlotan, Post: Jajiwai via Mandor, District Jodhpur	33.6 µg / m ³	65.5 µg / m ³	6.3 µg / m ³	9.7 µg / m ³	458 µg / m ³
2	Near 33 KVA Sub Station, Village and Post: Umed Nagar, Tehsil: Osian, District Jodhpur	36.2 µg / m ³	70.5 µg / m ³	6.6 µg / m ³	9.8 µg / m ³	573 µg / m ³
3	Near 44 No. Railway crossing, Bhikamkhor, Tehsil: Osian, District Jodhpur	39.5 µg / m ³	62.3 µg / m ³	6.8 µg / m ³	10.1 µg / m ³	687 µg / m ³
4	Near house of Manish S/o Shri	24.1 µg / m ³	52.3 µg / m ³	6.2 µg / m ³	9.5 µg / m ³	458 µg / m ³

Sample No	Site	Particulate Matter (PM _{2.5})	Particulate Matter (PM ₁₀)	Sulphur Dioxide (SO ₂)	Oxide of Nitrogen (NO _x)	Carbon Monoxide as (CO)
	Panna Lal Ji, Village: Amla (Near Kichan), Post and Tehsil: Phalodi, District Jodhpur					
5	Near Naya Talab, Village: Khirwa, Post: Hidal Gol, Tehsil: Phalodi, District Jodhpur)	22.6 µg / m ³	47.8 µg / m ³	6.1 µg / m ³	9.3 µg / m ³	458 µg / m ³
6	(Near house of Gopal S/o Shri Prem Pal Vishnoi, Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur)	30.5 µg / m ³	62.3 µg / m ³	6.3 µg / m ³	9.8 µg / m ³	573 µg / m ³
7	Crossing point at Askandra – Nachna Road, Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer	41.5 µg / m ³	76.6 µg / m ³	7.6 µg / m ³	11.9 µg / m ³	687 µg / m ³
8	Near Stone Quarry, Nachna – Tadana Road, Village and Post: Tadana, Tehsil and District Jaisalmer)	24.0 µg / m ³	52.6 µg / m ³	6.7 µg / m ³	9.6 µg / m ³	458 µg / m ³
9	Near Nirudeen Ki Dhani, District Jaisalmer)	18.6 µg / m ³	41.4 µg / m ³	6.0 µg / m ³	9.0 µg / m ³	344 µg / m ³
10	Near Pandi Dungari, Village: Nehdai, District Jaisalmer	21.8 µg / m ³	49.4 µg / m ³	6.1 µg / m ³	9.3 µg / m ³	344 µg / m ³
11	Near house of Babu Singh S/o Shri Bagh Singh, Village: Tanusar, District Jaisalmer	23.0 µg / m ³	52.4 µg / m ³	6.2 µg / m ³	9.6 µg / m ³	458 µg / m ³
12	Village: Joga, Post. Saiwi, Tehsil and District Jaisalmer	25.7 µg / m ³	59.8 µg / m ³	6.2 µg / m ³	9.5 µg / m ³	458 µg / m ³
13	Near Tulsiram Ki Dhani, Village: Parewer, Tehsil and District Jaisalmer)	28.0 µg / m ³	62.4 µg / m ³	6.5 µg / m ³	9.7 µg / m ³	573 µg / m ³
14	Near house of Fajal Khan S/o Shri Viram Khan, Village: Asda, Post: Deva, Tehsil and District Jaisalmer	32.0 µg / m ³	62.5 µg / m ³	6.3 µg / m ³	9.8 µg / m ³	573 µg / m ³
15	Near Mile Stone KM. 3, Village: Hadda, Post: Kanod, Tehsil and District Jaisalmer	34.2 µg / m ³	71.7 µg / m ³	6.8 µg / m ³	10.9 µg / m ³	687 µg / m ³
16	Near Hamira Rly Station, Village: Thaiyat, District Jaisalmer	31.9 µg / m ³	67.1 µg / m ³	6.8 µg / m ³	9.7 µg / m ³	573 µg / m ³
17	Near house of Barkat Khan S/o Shri Jalu Khan, Village and Post: Bhagu Ka Gaon, Tehsil and District Jaisalmer	23.0 µg / m ³	56.2 µg / m ³	6.3 µg / m ³	9.5 µg / m ³	573 µg / m ³
	Standard Value	60 µg / m ³	100 µg / m ³	80 µg / m ³	80 µg / m ³	2000 µg / m ³
	Methods of Measurement	Gravimetric Method	Gravimetric Method	Improved West and Gaeke Method	Modified Jacob and Hochheiser Method	IS: 5182 – 1975 Part X

B. AMBIENT NOISE MONITORING REPORT

i. Ambient Noise Monitoring Report for Solar Park (November 2011)

S. No	Site	Ld (Day Equivalent)	Ln (Night Equivalent)	Ldn (Day-Night Equivalent)
AN -1	Near House of Munna Ram	47.15	41.57	49.16
AN -2	Near House of Mathar Khan (Sarpanch), Chudon Ki Basti	47.35	41.87	49.42
AN -3	GSS Sub Station Land	45.45	41.00	48.15
AN -4	Arniya Ki Nadi	47.53	41.71	49.40
AN -5	Panna Ki Nadi	47.47	40.77	48.87

AN -6	0 km Mile stone of Bhadla at Badhla Fanta	44.20	40.31	47.27
-------	---	-------	-------	-------

ii. Ambient Noise Monitoring Report for Grid Sub-stations (November 2011)

Sample No	Site	Ld (Day Equivalent)	Ln (Night Equivalent)	Ldn (Day-Night Equivalent)
SS - 1	GSS Sub Station Land, Khasara No. 8, Village: Bhadla, Post: Nuro Ki Burj, Tehsil: Phalodi, District Jodhpur	45.45	41.00	48.15
SS - 2	400 KVA GSS Site, Village: Meyon Ki Dhani, Post: Ramgarh, Jaisalmer	48.58	41.94	50.01
SS - 3	Near SE office 400 KVA (RRVPLN), Village: Akal, Post: Jodha, Jaisalmer	52.31	42.31	52.31
SS - 4	GSS 400 kVA Site, Village: Kakani, Post and Tehsil: Luni, Jodhpur	53.17	41.75	52.74

iii. Ambient Noise Monitoring Report for Along the 3 400 kV transmission lines (December 2011 to January 2012)

Sample No	Site	Ld (Day Equivalent)	Ln (Night Equivalent)	Ldn (Day-Night Equivalent)
1	Village: Jajiwai Gehlotan, Post: Jajiwai via Mandor, District Jodhpur	47.18	41.61	49.20
2	Village and Post: Umed Nagar, Tehsil: Osian, District Jodhpur	52.82	43.64	53.11
3	Near 44 No. Railway crossing, Bhikamkhor, Tehsil: Osian, District Jodhpur	49.73	41.23	50.29
4	Village: Amla (Near Kichan), Post and Tehsil: Phalodi, District Jodhpur	54.09	42.03	53.51
5	Village: Khirwa, Post: Hidar Gol, Tehsil: Phalodi, District Jodhpur	51.05	41.88	51.34
6	Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur	48.00	44.12	51.07
7	(Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer)	49.90	43.03	51.21
8	Village and Post: Tadana, Tehsil and District Jaisalmer)	52.64	42.43	52.57
9	Village: Nirudeen Ki Dhani, District Jaisalmer)	44.38	40.87	47.71
10	Village: Nehdai, District Jaisalmer	50.58	42.08	51.14
11	Village: Tanusar, District Jaisalmer	49.67	41.20	50.24
12	Village: Joga, District Jaisalmer	47.29	41.42	49.13
13	Village: Parewer, District Jaisalmer	49.94	41.74	50.62
14	Village: Asda, District Jaisalmer	47.82	41.59	49.47
15	Village: Hadda, District Jaisalmer	48.06	41.79	49.68
16	Hamira Rly Station, Village: Thaiyat, District Jaisalmer)	52.63	42.40	52.55
17	Village: Bhagu Ka Gaon, District Jaisalmer	49.20	41.86	50.27

All results are in Decibel (dB) Unit

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)

C. ANALYSIS REPORT OF SOIL**i. Analysis Report of Soil for Solar Park (November 2011)**

Parameters (Unit)	Unit	SS -1: GSS Sub Station	SS -2 Near Arniya Ki Nadi	SS - 3: Near Pannu Ki Nadi
Color	Visual Comparison	Light Brown	Light Brown	Light Brown
pH (1:5)	-	7.87	7.86	7.56
Conductivity(1:5)	(μ S/cm)	141	132	291
Moisture	(%)	6.1	4.8	5.3
Chlorides as Cl	(%)	0.004	0.002	0.004
Sulphate as SO ₄	(%)	0.005	0.001	0.005
Total Carbonates	(%)	0.05	0.04	0.05
Total Soluble Solids	(%)	0.064	0.036	0.136
Total Organic Matter	(%)	0.13	0.04	0.11
Nitrogen as N	(%)	0.07	0.03	0.09
Phosphorus as P	(%)	< 0.0005	< 0.0005	< 0.0005
Potassium as K	(%)	0.012	0.013	0.025
Zinc	Mg / 100 Gm	BDL	BDL	BDL
Copper	Mg / 100 Gm	BDL	BDL	BDL
Chromium	Mg / 100 Gm	BDL	BDL	BDL
Cadmium	Mg / 100 Gm	BDL	BDL	BDL
Nickel	Mg / 100 Gm	BDL	BDL	BDL
Lead	Mg / 100 Gm	BDL	BDL	BDL

BDL* - Below Detectable Limit

ii. Analysis Report of Soil for Grid Sub-stations (November 2011)

Parameters (Unit)	Unit	SS -1 Bhadla GSS	SS -2 Ramgarh GSS	SS -3 Akal GSS	SS 4 Jodhpur GSS at Kakani
Color	Visual Comparison	Light Brown	Light Brown	Light Brown	Light Brown
pH (1:5)	-	7.87	7.25	7.71	7.64
Conductivity(1:5)	(μ S/cm)	141	823	203	388
Moisture	(%)	6.1	6.5	7.2	6.8
Chlorides as Cl	(%)	0.004	0.037	0.005	0.01
Sulphate as SO ₄	(%)	0.005	0.016	0.002	0.003
Total Carbonates	(%)	0.05	0.04	0.05	0.02
Total Soluble Solids	(%)	0.064	0.33	0.072	0.122
Total Organic Matter	(%)	0.13	0.14	0.07	0.08
Nitrogen as N	(%)	0.07	0.09	0.04	0.04
Phosphorus as P	(%)	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Potassium as K	(%)	0.012	0.04	0.024	0.012
Zinc	Mg / 100 Gm	BDL	BDL	BDL	BDL
Copper	Mg / 100 Gm	BDL	BDL	BDL	BDL
Chromium	Mg / 100 Gm	BDL	BDL	BDL	BDL
Cadmium	Mg / 100 Gm	BDL	BDL	BDL	BDL
Nickel	Mg / 100 Gm	BDL	BDL	BDL	BDL
Lead	Mg / 100 Gm	BDL	BDL	BDL	BDL

BDL* - Below Detectable Limit

iii. Analysis Report of Soil along Transmission lines (December 2011 to January 2012)

Sample No		1	2	3	4	5	6	7
Parameters (Unit)	Unit	Results Jajiwai Gehlotan , Jodhpur	Village: Sirmandi, Jodhpur	Village: Amla, Jodhpur	Village Askandra , Jaisalme r	Village: Tanusar, Jaisalme r	Results Village: Hadda, Jaisalme r	Village: Bhagu Ka Gaon, Jaisalmer
Color	Visual Comparison	Grey	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown
pH (1:5)	-	7.58	7.33	7.31	7.23	7.12	7.7	7.06
Conductivity(1:5)	(μ S/cm)	406	340	424	110	2520	146	1795
Moisture	(%)	2.64	2.06	2.49	0.06	1.98	0.30	0.34
Chlorides as Cl	(%)	0.007	0.016	.016	0.003	0.005	0.004	0.072
Sulphate as SO ₄	(%)	0.014	0.012	0.004	0.008	0.156	0.009	0.068
Total Carbonates	(%)	13.88	1.17	6.95	2.91	21.96	11.56	22.54
Total Soluble Solids	(%)	0.201	0.158	0.165	0.136	1.199	0.108	0.708
Total Organic Matter	(%)	0.187	0.037	0.091	0.026	0.029	0.034	0.004
Nitrogen as N	(%)	0.020	0.013	0.021	0.008	0.005	0.009	0.119
Phosphorus as P	(%)	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Potassium as K	(%)	0.007	0.003	0.004	0.002	0.015	0.003	0.007
Zinc	Mg / 100 Gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Copper	Mg / 100 Gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	Mg / 100 Gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Cadmium	Mg / 100 Gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nickel	Mg / 100 Gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead	Mg / 100 Gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL

All results are on dry basis.
BDL - Below Detectable Limit

D. ANALYSIS OF WATER QUALITY

i. Analysis of Water Quality Within Solar Park (November 2011)

Water sample collected from Govt. Bore well, Churon ki Basti

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.97	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	588.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.06 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	443.86 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	2,674.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	136.00 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	60.76 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	137.03 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	8.54 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.31 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	372.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	19 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

Water sample collected from Cement Tank (Kharuddin S/o Shri Kalu Khan, Gamno ki Basti

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.81	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	552.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.08 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	851.74 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	2,652.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	118.40 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	62.72 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	147.94 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	8.94 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.21 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	292.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	12 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

ii. **Analysis of Water Quality Along the Grid Sub-station Sites (November 2011)**

Sample No: SS-1: Water sample collected from Bore well of Munna Ram Ji, Village: Bhadla (Khasra No.9), Post: Nuro Ki Burj, Tehsil: Phalodi, District Jodhpur (for GSS Bhadla)

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.40	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	548.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.10 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	775.76 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	2,532.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	110.40 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	66.64 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	166.34 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	7.56 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.33 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	404.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	6 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

Sample No. SS – 2: Water sample collected from Govt. Bore well (Nearest Bore well GSS Ramgarh),
Village and Post: Sonu, District Jaisalmer

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	8.05	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	276.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.05 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	495.85 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	1,785.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	70.40 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	24.50 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	113.49 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	12.93 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.47 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	268.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	7 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

Sample No. SS – 3: Water sample collected from Govt. Bore well inside 400 KVA GSS (RRVPL),
Village: Akal, Post: Jodha, District Jaisalmer

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	8.36	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	120.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.03 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	61.98 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	977.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	27.20 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	12.74 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	131.75 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	2.25 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	0.83 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	0.2 Mg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	204.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	6 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

Sample No. SS – 4: Water sample collected from Open Well of Babu Singh Champavat Village: Kakani,
Post and Tehsil: Luni, District Jodhpur

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	8.30	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	108.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.02 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	7.99 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	181.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	33.60 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	5.88 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	27.22 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	2.79 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	0.18 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr+6	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	124.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	3 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

iii. Analysis Report of Water Along the 3 nos. 400 kV transmission lines (December 2011 to January 2012)

Sample No. 1 (Water sample collected from Pond, Village: Jajiwai Gehlotan, Post: Jajiwai via Mandor, District Jodhpur)

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	2.3	5	10	IS: 3025 Part 10 - 1984
pH	7.75	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	100.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.02 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	57.98 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	580.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	30.40 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	5.88 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	33.30 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	8.12 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.00 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	192.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	80 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

CFU-Colony Forming Unit

Sample No. 2: (Water sample collected from Bore well of Sukh Ram S/o Shri Bhagirath Ram, Village: Sirmandi, Post and Tehsil: Osian, District Jodhpur)

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.88	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	588.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.08 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	591.82 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	3,619.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	113.60 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	74.48 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	185.06 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	16.82 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.50 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	260.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	16 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

CFU-Colony Forming Unit

Sample No. 3: (Water sample collected from Bore well of Manish S/o Shri Panna Lal Ji, Village: Amla, Post and Tehsil: Phalodi, District Jodhpur)

Parameter	Concentration	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	
1.1.1.1.1 Essential Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.13	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	300.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.04 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	127.96 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	1,245.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	73.60 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	28.42 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	77.41 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	19.66 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.16 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	352.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	18 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

CFU-Colony Forming Unit

Sample No.4: (Water sample collected from Govt. Bore well, Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer)

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.78	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	600.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.11 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	404.87 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	3,081.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	104.00 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	83.30 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	152.63 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	173.00 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.30 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	340.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	13 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

CFU-Colony Forming Unit

Sample No.5: (Water sample collected from Water Tank of Babu Singh S/o Shri Bagh Singh, Village: Tanusar, District Jaisalmer)

Parameter	Concentration	Standard Drinking water Specification as per IS –10500:1991 as amendment up to 3 July 2010		Protocol (Test Method)
		Desirable Limit	1.1.1.1.2 ermissible Limit in absence of alternate source	
Essential Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.39	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	344.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.04 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	33.98 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	748.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	97.60 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	24.50 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	49.97 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	13.95 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	0.55 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	240.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	23 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

CFU-Colony Forming Unit

Sample No.6 (Water sample collected from Govt, Bore well, Village: Joshiyan (Hadda), Post: Kanod, Tehsil: and District: Jaisalmer)

Parameter	Concentration	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 Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	7.71	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	396.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	0.09 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	427.87 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	3,161.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	84.80 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	45.08 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	173.52 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	0.74 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.72 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	452.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	10 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

CFU-Colony Forming Unit

Sample No.7: (Water sample collected from Govt. Bore well, Village and Post: Bhagu Ka Gaon, Tehsil and District: Jaisalmer)

Parameter	Concentration	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	
2.1.1.1.1 Essential Characteristics-Physical Parameter				
Color, Hazen Units	< 1	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7,8 -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	8.22	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO ₃	120.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1983
Iron as Fe	< 0.01 Mg / L	0.3 Mg / L	1.0 Mg / L	IS: 3025 Part 53 - 2003
Chloride as Cl	129.96 Mg / L	250 Mg / L	1000 Mg / L	IS: 3025 Part 32 - 1988
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	IS: 3025 Part 26 - 1986
Desirable Characteristics-Chemical Parameters				
Dissolved Solids	1,455.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	24.00 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	14.70 Mg / L	30 Mg / L	100 Mg / L	IS: 3025 Part 46 - 1994
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	IS: 3025 Part 42 - 1992
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	IS: 3025 Part 59 - 2006
Sulphate as SO ₄	121.67 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO ₃	0.32 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.86 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	IS: 3025 Part 48 - 1994
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 41 - 1992
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	IS: 3025 Part 56 - 2003
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 37 - 1998
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 27 - 1986
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 47 - 1994
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	IS: 3025 Part 49 - 1994
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	APHA 5540 C
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	IS: 3025 Part 39 - 1991
Alkalinity	364.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	IS: 3025 Part 55 - 2003
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	IS: 3025 Part 57 - 2005
Bacteriological Characteristics				
Coliform Organisms	26 CFU	10 CFU	10 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

Significance of Water analysis

Parameter	Results	Desirable Limit	Permissible Limit in absence of alternate source	Instrument Detection Limit	Undesirable effect outside the Desirable Limit
Color, Hazen Units	< 1	5	25	1	Above 5 consumer acceptance decreases
Turbidity, NTU	< 1	5	10	1	Above 5 consumer acceptance decreases
Residual Free Chlorine	< 0.1 Mg / L	0.2 Mg / L	-	0.1 Mg / L	To be applicable when water is chlorinated
Copper as Cu	< 0.02 Mg / L	0.05 Mg / L	1.5 Mg / L	0.02 Mg / L	Encrustation in water supply structure and adverse effects on domestic use
Manganese as Mn	< 0.01 Mg / L	0.1 Mg / L	0.3 Mg / L	0.01 Mg / L	Beyond this limit taste/appearance are affected, has adverse effect on domestic uses and water supply structures
Phenolic Compounds as C ₆ H ₅ OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	0.001 Mg / L	Beyond this, it may cause objectionable taste and odour
Mercury as Hg	< 0.2 µg / L	0.001 Mg / L	No relaxation	0.2 µg / L	Beyond this, the water becomes toxic
Cadmium as Cd	< 0.005 Mg / L	0.01 Mg / L	No relaxation	0.005 Mg / L	Beyond this, the water becomes toxic
Selenium as Se	< 0.005 Mg / L	0.01 Mg / L	No relaxation	0.005 Mg / L	Beyond this, the water becomes toxic
Arsenic as As	< 0.005 Mg / L	0.05 Mg / L	No relaxation	0.005 Mg / L	Beyond this, the water becomes toxic
Cyanide as CN	< 0.02 Mg / L	0.05 Mg / L	No relaxation	0.02 Mg / L	Beyond this, the water becomes toxic
Lead as Pb	< 0.01 Mg / L	0.05 Mg / L	No relaxation	0.01 Mg / L	Beyond this, the water becomes toxic
Zinc as Zn	< 0.02 Mg / L	5 Mg / L	15 Mg / L	0.02 Mg / L	Beyond this limit it can cause astringent taste and an opalescence in water
Anionic Detergents as MBAS	< 0.1 Mg / L	0.2 Mg / L	1.0 Mg / L	0.1 Mg / L	Beyond this limit it can cause a light froth in water
Chromium as Cr ⁺⁶	< 0.02 Mg / L	0.05 Mg / L	No relaxation	0.02 Mg / L	May be carcinogenic above this limit
Mineral Oil	< 0.01 Mg / L	0.01 Mg / L	0.03 Mg / L	0.01 Mg / L	Beyond this limit undesirable taste and odour after chlorination take place Toxic
Aluminum as Al	< 0.005 Mg / L	0.03 Mg / L	0.2 Mg / L	0.005 Mg / L	Beyond this limit taste becomes unpleasant Cumulative effect is reported to cause dementia
Boron as B	< 0.02 Mg / L	1 Mg / L	5 Mg / L	0.02 Mg / L	-

7.1 Table: Details of On-going works

Locations	Sub-projects Components (Package No.)	Listing of works under the package	What type of works continued at present	Expected changes from approved scope	Fulfillment of objectives- Type of remedial measures needed	Key assumptions and risks that affect attainment of the objectives

7.2 Table: Progress of Environmental Management Plan

S. No.	Environmental components related to project activities	Compliance		Explanation (in case of done or not done justification necessary)
		YES	NO	
PRECONSTRUCTION STAGE				
1	Site preparation work completed by field office of RRVPNL including necessary clearance.			
CONSTRUCTION STAGE				
2	PCBs not used in transformers or other project facilities or equipment Processes, equipment and systems not to use chlorofluorocarbons (CFCs), including halogen Use of PCBs and CFCs in the existing systems should be phased out and to be disposed of in a manner consistent with the requirements of the government.			
3	Careful route selection to avoid existing settlements.			
4	Involuntary resettlement or land acquisition.			
5	Avoid encroachment into precious ecological areas by careful site and alignment selection.			
6	Avoid encroachment into forestland.			
7	Avoid encroachment into farmland.			
8	Better design to ensure noise will not be a nuisance.			
9	Appropriate placement of towers to avoid drainage/channel interference.			
10	Equipment specification with respect to potential pollutants.			
11	Construction technique and machinery selection to minimize noise disturbance.			
12	Construction activities to be scheduled to avoid disturbance to farming activity.			
13	Construction equipment to be well maintained and turn of the plant not in use to avoid noise, vibration and operator safety.			
14	Existing roads and tracks used for construction and maintenance access to the line.			
15	Marking of vegetation to be removed prior to site clearance and strict control on clearance activities to ensure minimal clearances.			

S. No.	Environmental components related to project activities	Compliance		Explanation (in case of done or not done justification necessary)
16	Trees allowed growing up to a height within the ROW by maintaining adequate clearance between the top of tree and the regulator as per the regulations. Trees that can survive pruning should be pruned instead of clearing.			
17	Construction workers prohibited from harvesting wood in the project area.			
18	Dispose scrap materials such as batteries, transformers, conductors, capacitors etc. in environmentally sound manner.			
19	tree clearances for easement to only involve cutting trees.			
20	Excavated earth to be stored and reused for back filling.			
21	Fuels and other hazardous materials to be stored above high flood level.			
22	Noisy construction activities shall be carried out during day time.			
23	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.			
24	Existing irrigation facilities are to be maintained. Use existing access roads for transportation of materials Protect/preserve top soil and reinstate after construction is completed Repair/reinstate damaged bunds etc. after construction.			
25	Take measures to prevent erosion and /or silt run off. Limit site clearing to work area Regeneration of vegetation to stabilize work areas on completion. Avoidance of excavation in wet season. Water courses protected from siltation through use of bunds and sedimentation ponds.			
26	Careful construction practices to avoid loss to neighboring properties. Productive land to be reinstated after construction Compensation for loss of production.			
27	Existing borrow sites will be used to source aggregates therefore no need to develop new sources for aggregates.			

S. No.	Environmental components related to project activities	Compliance	Explanation (in case of done or not done justification necessary)
28	Ensure health and safety of workers.		
29	Training to the RRVPNL environmental monitoring personnel.		
30	Effective environmental monitoring system using checklist.		
31	Hiring of Environment and Social Consultant (s) by RRVPNL for implementation and monitoring of EMP.		

7.3 Frequency of Monitoring

Environmental component	Project stage	Parameters to be monitored	Location	Frequency	Standards	Rate (Rs.)	Implementation	Supervision
1.Air Quality	A. Pre-construction stage (The project once assigned to contractor)	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, SPM, CO along with Meteorological data- temperature Humidity, wind speed, wind direction	Inside and outside (0.5 km) of the proposed sub-station	One time	National Air quality standards of CPCB	Per sample Rs. 15,000	Contractor by CPCB approved laboratory	Contractor/ PMU
	B. Construction Stage	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, SPM, CO along with Meteorological data- temperature Humidity, wind speed, wind direction	Inside and outside (0.5 km) of the proposed sub-station	Two times	National Air quality standards of CPCB	Per sample Rs. 15,000	Contractor by CPCB approved laboratory	Contractor/ PMU
	C. Operation Stage	PM ₁₀ , PM _{2.5} , SO ₂ , NOx, SPM, CO along with Meteorological data- temperature Humidity, wind speed, wind direction	Inside and outside (0.5 km) of the proposed sub-station	One time	National Air quality standards of CPCB	Per sample Rs. 15,000	Contractor by CPCB approved laboratory	PMU
2.Water Quality	A. Pre-construction stage (The project once assigned to contractor)	EC, TSS, DO, BOD, P ^H Oil and grease, Pb,	Nearest downstream spring/hand pump wells (2 wells) around the sub-station	One time	National water quality standards of CPCB	Per sample Rs. 1,500	Contractor by CPCB approved laboratory	Contractor/ PMU
	B. Construction Stage	EC, TSS, DO, BOD, PH, Oil and grease, Pb	Nearest downstream spring/hand pump wells (2 wells) around the sub-station	Three times /year	National water quality standards of CPCB	Per sample Rs. 1,500	Contractor by CPCB approved laboratory	Contractor/ PMU

Environmental component	Project stage	Parameters to be monitored	Location	Frequency	Standards	Rate (Rs.)	Implementation	Supervision
	C. Operation Stage	EC, TSS, DO, BOD, P ^H Oil and grease, Pb	Nearest downstream spring/hand pump wells (2 wells) around the sub-station	Yearly	National water quality standards of CPCB	Per sample Rs. 1,500	Contractor by CPCB approved laboratory	PMU
3.Noise/ Vibration	A. Pre-construction stage (The project once assigned to contractor)	Noise level (dB level)	Inside and outside (0.25 km) of the proposed sub-station	A single time	CPCB standards for Noise and vibrations	Per sample Rs. 6,000	Contractor by CPCB approved laboratory	Contractor/ PMU
	B. Construction Stage	Noise level (dB level)	Inside and outside (0.25 km) of the proposed sub-station	2 times / year	CPCB standards for Noise and vibrations	Per sample Rs. 6,000	Contractor by CPCB approved laboratory	Contractor/ PMU
	C. Operation Stage	Noise level (dB level)	Inside and outside (0.25 km) of the proposed sub-station	3 times /year	CPCB standards for Noise and vibrations	Per sample Rs. 6,000	Contractor by CPCB approved laboratory	PMU
4. Soil	A. Pre-construction stage (The project after assign to contractor)	PH, Sulfate (SO ₃), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content	Inside and outside (just close to the proposed site, 2 locations) of the proposed sub-station	A single time	Technical specifications	Per sample Rs. 1,500	Contractor by CPCB approved laboratory	Contractor/ PMU
	B. Construction Stage	PH, Sulfate (SO ₃), Chloride, ORP, water Soluble salts EC, Organic Matter, Moisture Content	Inside and outside (just close to the proposed site, 2 locations) of the proposed sub-station	Two times	Technical specifications	Per sample Rs. 1,500	Contractor by CPCB approved laboratory	Contractor/ PMU
	C. Operation Stage	PH, Sulfate (SO ₃), Chloride, ORP, water Soluble	Inside and outside	A single	Technical specifications	Per sample Rs.	Contractor by CPCB approved	PMU

Environmental component	Project stage	Parameters to be monitored	Location	Frequency	Standards	Rate (Rs.)	Implementation	Supervision
		salts EC, Organic Matter, Moisture Content	(just close to the proposed site, 2 locations) of the proposed sub-station	time	ations	1,500	laboratory	

ESC –Environment & Social Cell of RRVPNL

Abbreviations:

SO₂- Sulphur Dioxide; NO₂- Nitrogen Dioxide; CO- Carbon Monoxide; EC – Electric Conductivity; Pb – Lead; PM_{2.5}- Particulate Matter <2.5; PM₁₀- Particulate Matter <10; TSPM- Total suspended Particulate Matter;
 EC - Electrical Conductivity; DO - Dissolved Oxygen; TSS - Total Suspended Solids;
 BOD - Biological Oxygen Demand; NAAQS - National Ambient Air Quality Standards;
 NWQS - National water Quality Standards;
 ORP – Oxidation Reduction Potential

Notes: Transport/Accommodation & Sample collection cost, VAT are not included for the EMoP.

Source for Rates: MoEF (CPCB) New Delhi, Notification Dated 15 June 2008

Annexure - 8

Details of Solar Power Projects Commissioned in Rajasthan

S. No	Registration No	Name of Solar Power Producer	Scheme	Capacity (MW)	Technology	Location	Date of Commissioning
1	S/2/2004	Reliance Ind. Ltd	GBI	5	PV	Khimsar, Tehsil - Khimsar Nagaur	31.3.2011
2	S/6/2004	ACME Tele Power Ltd	Migration	2.5	Thermal	Bherukehra, Tehsil - Kolayat Bikaner	27.5.2011
3	057-RPSSGP /IREDA /Rajasthan/2010	Lanco Solar Power Ltd	RPSSGP	1	PV	Lathi, Tehsil - Pokaran Jaisalmer	16.9.2011
4	S/9/2004	Refex Refrigerants Limited	Migration	5	PV	Vituza Tehsil - Pachpadara Barmer	14.10.2011
5	S/8/2004	Comet Power Pvt. Ltd	Migration	5	PV	Bhambuo Ki Dhani, Tehsil - Osian Jodhpur	14.10.2011
6	S/7/2004	AES Solar Ltd	Migration	5	PV	Tinwari Osian Jodhpur	15.10.2011
7	S/38/2004	OPG Energy Pvt. Ltd	Migration	.5	PV	Bap, Tehsil - Phalodi Jodhpur	13.10.2011
8	S/37/2004	Swiss Park Vanijya Pvt. Ltd	Migration	5	PV	Tinwari, Tehsil - Osian Jodhpur	14.10.2011
9	S/7/2004	Astonfield Solar (Rajasthan) Pvt. Ltd.	Migration	5	PV	Betwasia, Tehsil - Osian Jodhpur	15.10.2011
10	S/4/2004	Moserbaer Photovoltaic Ltd	Migration	5	PV	Tinwari, Tehsil - Osian Jodhpur	20.11.2011
11	008-RPSSGP /IREDA /Rajasthan/2011	Asian Aero-Edu Aviation Pvt. Ltd.	RPSSGP	1	PV	Fatehgarh, Tehsil - Fatehgarh Jaisalmer	3.12.2011

Details of Sanctioned Solar Power Project in Rajasthan under Migration Scheme

S. No	Reg. No	Name of Company and address	Capacity allotted (in MW)	Tech Proposed	Location
1	S/9/2004	Refex Refrigerants Limited No. 67, Bazullah Road, T. Nagar, Chennai 600017 (TN)	5	SPV	Vituza Village, Panchpadra tehsil, Barmer
2	S/6/2004	ACME Telepower Limited DLF Infinity Tower, Building C, 9 th Floor, DLF Cyber City, Phase-II, Gurgaon - 122002 (Haryana).	10	Solar Thermal (CSP)	Village Sobasar, Tehsil Kolayat, Bikaner
3	S/7/2004	Astonfield Solar (Rajasthan) Pvt. Ltd, 302b-303, World Trade Centre, Babar Road Connaught Place, New Delhi-110001	5	SPV	Village-Betwasiya, Tehsil Osian, Jodhpur
4	S/4/2004	Competent Solar Energy Pvt Ltd, (Formerly Moserbaer Photo Voltaic Ltd.) 43B, Okhla Industrial Estate New Delhi-110020	5	SPV	Village - Tiwari, Tehsil- Osian, Jodhpur

S. No	Reg. No	Name of Company and address	Capacity allotted (in MW)	Tech Proposed	Location
5	S/8/2004	Comet Power Ltd Videocon Industries Limited. (I) 221, 2nd Floor, Fort House, Dr. D. N. Road, Mumbai – 400001 (II) 12th Floor, Videocon Tower, E-1, Jhandewalan Extn. New Delhi - 110055	5	SPV	Village- Betwasiya, Tehsil - Osian, Jodhpur
6	S/20/2004	AES Solar Energy Pvt. Ltd., 9th Floor, Tower B Building 10 DLF Cyber city, Phase – II Gurgaon – 122002 (Haryana)	5	SPV	Village - Tiwari, Tehsil - Osian, Jodhpur
7	S/37/2004	Swiss Park Vanijaya Pvt. Ltd., 85, Manohar Das Street, 1st, Floor, Sona Patti, Kolkata-70007	5	SPV	Village - Tiwari, Tehsil- Osian, Jodhpur
8	S/38/2004	OPG Energy Power Pvt. Ltd. 56, K.B. Dasan, Teynampet, Chennai-600018	5	SPV	Village Bap, Tehsil Phalodi, Jodhpur
9	S/36B/2004	Entegria Ltd. 1003 10th Floor Ansal Bhawan 16 Kasturba Gandhi Marg Delhi	1	CPV	Village – Bhadla, Tehsil – Phalodi, Jodhpur
10	S/47/2004	Dalmia Solar Power Limited Hansalaya (11 & 12 th Floor) 15 Barakhamba Road Post Box 364 New Delhi- 110001	10	Dish Stirling Engine	Village Bap, Tehsil Phalodi, Jodhpur
11	S/36/2004	Entegria Ltd. 1003 10 th Floor Ansal Bhawan 16 Kasturba Gandhi Marg Delhi	10	Soalr Thermal (CSP)	Village – Bhadla, Tehsil – Phalodi, Jodhpur

Status of Wind Power Project Commissioned (District Wise) (as on March 2011)

S. No	Developer/ investor	Capacity Commissioned in MW					Total
		Jaisalmer	Jodhpur	Chittorgarh	Barmer	Sikar	
1	Rajasthan Renewable Energy Corporation Limited (RREC)	37.2	2.10	2.25			41.55
2	Rajasthan State Mines & Minerals Limited (RSMML)	19.80					19.80
3	Individual Power Producers (IPPs)	1151.12	286.65	0.675	9.6	12	1460.045
	Total	1208.12	288.75	2.925	9.6	12	1521.395

Socio Economic Status of Project Villages

Project Villages of Jodhpur District

NAME	Tehsil	House hold	Population	Male	Female	Schedule cast	Schedule Tribes	Literates
Bhadla Chuhron Ki Basti	Phalodi	169	1,141	610	531	14	0	213
Kanasar	Phalodi	413	2,806	1,505	1,301	759	0	977
Bap	Phalodi	1,350	8,890	4,717	4,173	1,522	135	3,978
Kheerwa	Phalodi	117	868	454	414	122	134	393
Hindal Gol	Phalodi	256	1,793	916	877	119	13	589
Malar	Phalodi	145	943	501	442	97	103	485
Godarli	Phalodi	227	1,646	866	780	245	44	208
Kheechan	Phalodi	789	5,068	2,644	2,424	1,617	67	2,362
Lordiyan	Phalodi	404	2,335	1,229	1,106	124	15	1,583
Amla	Phalodi	572	3,989	2,129	1,860	1,204	133	1,424
Rola	Phalodi	123	767	400	367	101	0	326
Kanasar	Phalodi	47	423	204	219	8	0	191
Lohawat Bisnawas	Phalodi	564	3,331	1,758	1,573	512	44	2,084
Chheela	Phalodi	334	2,375	1,252	1,123	1,055	0	1,678
Lohawat Jatahwas	Phalodi	474	3,195	1,634	1,561	437	151	1,552
Dhelana	Phalodi	469	3,066	1,631	1,435	613	303	1,271
Osian	Osian	1,971	12,452	6,555	5,897	2,132	693	6,536
Harlaya	Osian	327	2,316	1,214	1,102	683	3	688
Indon Ki Dhani	Osian	187	1,316	705	611	119	0	424
Bheekam Kor	Osian	438	2,852	1,520	1,332	574	97	1,079
Osian	Osian	1,971	12,452	6,555	5,897	2,132	693	6,536
Ghevara	Osian	639	4,624	2,420	2,204	565	38	1,780
Khudiyala	Osian	248	1,565	814	751	193	189	501
Ujaliya	Osian	192	1,157	586	571	234	293	459
Khudiyala	Osian	583	3,958	2,094	1,864	730	152	1,090
Bhainser Kotwali	Osian	286	2,212	1,151	1,061	524	77	961
Ummednagar	Osian	567	3,752	1,972	1,780	415	126	1,282
Jajawal Bhatiyani	Jodhpur	293	1,800	913	887	313	24	707
Jajawal Gehlota	Jodhpur	229	1,617	843	774	92	65	628
Lordi-Pandit Ji	Jodhpur	248	1,740	908	832	292	0	600
Lordi Daijagra	Jodhpur	315	2,161	1,100	1,061	163	289	722
Lordi Doliya	Jodhpur	72	461	238	223	190	0	163
Jheepasani	Jodhpur	95	641	326	315	141	0	268

Source: Census 2001

Project Villages of Jaisalmer District

NAME	Tehsil	House hold	Population	Male	Female	Schedule cast	Schedule Tribes	Literates
Ramgarh	Jaisalmer	1,333	6,918	4,010	2,908	1,536	415	3,375
Joga	Jaisalmer	196	995	628	367	117	11	420
Parewar	Jaisalmer	285	1,750	933	817	612	8	670
Kabeer Basti	Jaisalmer	85	526	274	252	444	0	349
Kheeya	Jaisalmer	123	755	407	348	271	240	363
Nehdai	Jaisalmer	278	1,232	694	538	503	79	510
Mohangarh	Jaisalmer	1,634	8,895	5,015	3,880	1,916	320	3,589
Balana	Jaisalmer	19	111	75	36	0	0	46
Tadana	Jaisalmer	195	1,291	733	558	208	0	459
Mandhau	Jaisalmer	331	2,116	1,175	941	118	3	457
Boha	Jaisalmer	99	646	324	322	124	43	308
Gogade	Jaisalmer	78	491	262	229	0	0	198

NAME	Tehsil	House hold	Population	Male	Female	Schedule cast	Schedule Tribes	Literates
Chaudhariya	Jaisalmer	93	602	314	288	0	34	222
Hadda	Jaisalmer	215	1,260	659	601	219	34	419
Asoda	Jaisalmer	7	44	22	22	0	0	2
Hameera	Jaisalmer	287	1,619	922	697	261	123	704
Bhagoo Ka Gaon	Jaisalmer	185	1,167	631	536	59	128	425
Tanasar	Jaisalmer	51	294	160	134	0	0	40
Thaiyat	Jaisalmer	72	453	241	212	23	172	247
Moklat	Jaisalmer	4	28	14	14	12	1	10
Basanpeer (Jooni)	Jaisalmer	132	876	447	429	0	0	171
Basanpeer (Southern)	Jaisalmer	107	642	329	313	337	33	297
Joga	Jaisalmer	15	92	49	43	0	92	19
Akal	Jaisalmer	99	611	310	301	1	0	215
Askandra	Pokran	271	1,727	910	817	682	54	582
Didhoo	Pokran	189	1,216	646	570	361	38	266
Satyaya	Pokran	396	2,213	1,196	1017	373	10	570

Source: Census 2001

Details of Public Consultations

General Perception about Project

1. People of the area are very positive towards this project which will give employment and development through income generation by selling of clean energy. The income generated by the project will insure better infrastructure development in the state and area.
2. Villagers of Bhadla also appreciated the engagement of local people in weather monitoring stations and solar plants (under construction) being developed by the different companies. The only matter of concern for the villagers was losing their encroached agriculture lands.
3. Similarly people staying in nearby area of proposed Solar park and sub-station site at Bhadla showed a positive response for the project as they felt that such projects will increase the importance of the area. However they wanted that priority in jobs should be given to local residents staying in nearby areas. They were also concerned regarding disturbance to public staying nearby area such as dust emissions during construction phase.

Support of local people for proposed project

4. All villages covered under the consultation were ready to support the project. According to the villagers, such type of projects leads to infrastructure improvement in all aspects and they are also ready to support such environmental friendly projects proposed by the government.
5. Villagers of the projected area near solar park assured full support to the solar park project as project will increase the employment potential and the area and it will also improve the quality of basic infrastructure facilities like road, education level, drinking water, electricity etc. The project will also increase the income generation activities by renting room, tractors, bullock carts etc.

Critical issue and concern by the local people for the project

6. 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 and requested proper education about probable harms of power transmission line to human and crops and required proper training to mitigate those harms. People also demanded for engaging local people during construction and operation phase.
7. For solar park, villagers did not raise any critical concern as the only issue of concern was losing encroached government owned agriculture land but this will generate employment opportunities within the village.

Precautions demanded by local people during project design, operation stage, and construction

8. Jodhpur and Jaisalmer districts of Rajasthan are very dry and agriculture which their primary source of income is totally dependent on rainfall and maximum land in the area is non-cultivable. People demanded that RRVPNL should avoid locating towers in agriculture land.
9. Villagers also demanded RRVPNL to avoid construction work during cropping season as the dust produced by construction may cause damage to crops.

Employment potential in the project

10. Almost all the villagers felt that the project will definitely increase the employment potential of the villages. Villagers showed interest in getting involved in small construction, transportation, providing security and storage of material, and providing labour at the time of construction. Restaurants and shopkeepers near Bhap village informed that their business had increased 10 times after start of construction of solar park projects in nearby villages. The villagers felt that the increase in income from electricity generation to the state will also lead to development in area and additional employment opportunities.

Ethnic Minorities

11. No ethnic minorities or vulnerable people are residing in or nearby project area.

No of shops/commercial establishments

12. During consultation, it was noticed that at least one or two shops were present in all villages covered in the project area, which comprise of daily need shops, tea shops and flour mills. Large villages like Lohavat, Osian, Bhap, have their own markets comprising of all types of shops for daily need. For nearby area, major commercial establishments are situated in towns like Jodhpur, Osian, Phalodi, Nachana, Mohangarh and Ramgarh within 20 - 40 km area from all the villages.

Number of industrial units

13. Upcoming solar parks are situated in vicinity to the new industrial area in Jaisalmer and Jodhpur. Soapstone, Gypsum, limestone mines are abundant in the area with small part of area near Bhap also having saltpans and salt processing industries. Majority of villagers are involved in agriculture, animal husbandry and milk producing activities.

Socio economic standing: land use, cropping pattern

14. In most villages, the major occupation of the people was animal husbandry and agriculture. Most of the farmers have own lands and they are involved in works related to animal husbandry, and agriculture. Along with agriculture, few people have their small shops in village and some villagers are employed by government and in other industrial works like mining in other parts of state.

Sources of irrigation

15. Almost all the villagers are dependent upon rain water for agriculture. Some part of the Jodhpur and Jaisalmer districts are having direct irrigation by Indira Gandhi Canal. Many 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

16. There is no rich forest cover in nearby area. Dense plantations are seen only near Indira Gandhi Canal Area which has open access for villagers to collect wood and fodders for their daily uses.

Current rates for agricultural land

17. Buying and selling of land in the area has recently increased due to the increasing demand of land by solar power producers, the average cost of irrigated land is near about Rs. 70,000-1,00,000 per Bigha (1 Bigha=1,618 square meter of land) and for non-irrigated land it's about Rs 30,000 to 50,000 per Bigha.

Sources of power supply

18. All the areas covered during consultation were getting power from Jodhpur DISCOM. Some villagers also arranged small solar panel kits available in nearby markets as alternate source of electricity.

Source of drinking water

19. 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 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

20. Availability of water is a problem in entire area except villages nearby Indira Gandhi Canal. Villagers made 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.

21. In the project area, agriculture is only seasonal and highly dependent on rains. Only few villages along the transmission lines area are covered by canal for irrigation proposes. Government is promoting drip and sprinkler system for irrigation over traditional flood irrigation system or better management of water resources in the area.

Protected areas

22. There are no protected areas within 10 km vicinity of sub-projects. The nearest wildlife sanctuary is Desert national Park which is around 35 km away from the nearest project transmission line and around 130 km away from solar park site. This sanctuary does not have any negative impact due to project activities.

Health status

23. 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 not present, but they are available within area of 5 to 25 km from village, the people usually travel towards nearby town to access medical services such as Chinnu, Nokh, Bhap, Phalodi, Osian, Nachana, Mohangarh, Ramgarh, and Jaisalmer. Villagers are aware of HIV/AIDS and about sexually transmitted diseases (STD).

Educational status

24. 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. The education level of boys and girls is at par.

Employment status

25. Most villagers were engaged in animal husbandry, agricultural and agriculture related activities throughout the year. Among the youth, unemployment is about 50 - 60%, In Bhadla and nearby villages, some youth are working in middle-east countries as daily labours and security in oil producing industries. The villagers are very positive for employment generation by upcoming solar projects in the nearby areas.

Perceived benefits from project

26. Most 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

27. 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.

Other issues

28. Better roads and employment is a demand in some villages. Few villagers demanded that crop and loss of agricultural land due to projected activities should be compensated or given employment.

Annexure – 9C

List of Participants in Public Consultation

Bhadla Solar Park

Sl. N°	Name of the Participant	Occupation
Village Ajeri		
1	Mohamed Allahbax	Agriculture
2	Ikbal	Labour
3	Rehman	Labour
4	Saley Mohmad	Agriculture
5	Shah Mohamad	Agriculture
6	Samastdin	Retired
7	Mohmad Hanif	Labour
8	Mohmad Sareef	Agriculture
9	Ishnuldin	Agriculture
Village Bodana		
1	Phus Das	Agriculture
2	Ashu Singh	Agriculture
3	Ravent Singh	Agriculture
4	Karhar Ram	Labour
5	Khiv Singh	Agriculture
6	Parm Singh	Agriculture
7	Narayan Ram	Agriculture
8	Magh Ram	Agriculture
9	Hansa Ram	Agriculture
10	Ramchandra	Agriculture
11	Gaje Singh	Agriculture
Village Chinnu		
1	Lukman Khan	Labour
2	Umer Khan	Agriculture
3	Janu Khan	Labour
4	Nabu Khan	Agriculture
5	Gulam Khan	Agriculture
6	Ali Khan	Agriculture
7	Dawood Khan	Agriculture
8	Mohmad Khan	Labour
9	Allahbax Khan	Labour
10	Mehboob Khan	Labour
Village Bhadla (Gamno ki Basti)		
1	Kherdeen Khan	Labour
2	Saddam Hussien	Labour
3	Nydle Khan	Labour
4	Ahamed Khan	Labour
5	Basser Khan	Labour
6	Aladeen	Labour
7	Saradeen	Labour
8	Ameen Khan	Labour
9	Khamesha Khan	Labour
10	Chotey Khan	Labour
11	Peerane Khan	Labour
12	Deene Khan	Labour
13	Hale Khan	Labour
14	Sadeek Khan	Labour
15	Sadhu Khan	Labour
Village Bhadla (Kalo ki basti)		
1	Yaar Mohamad	Agriculture
2	Husen Khan	Agriculture

SI. N°	Name of the Participant	Occupation
3	Allahbax	Agriculture
4	Yasheen Khan	Agriculture
5	Sumer Khan	Agriculture
6	Ahmed	Agriculture
7	Bhagu Khan	Agriculture
8	Samsudin	Agriculture
9	Ismik Khan	Agriculture
Village: Nurey ki Bhuraj		
1	Harji Ram	Agriculture
2	Narayan	Agriculture
3	Haru Ram	Agriculture
4	Bhoja Ram	Agriculture
5	Bagwana Ram	Agriculture
6	Nekh Ram	Agriculture
7	Sukha Ram	Agriculture
8	Ajj	Agriculture
9	Yaar Mohmad	Agriculture
10	Samsudin	Agriculture
11	Saley Mohmad	Agriculture

400 kV Jodhpur-Merta line LILO – 400 kV Bhadla GSS Transmission Line

SI. N°	Name of the Participant	Occupation
Village Bhadla (Gamno ki Basti)		
1	Kherdeen Khan	Labour
2	Saddam Hussien	Labour
3	Nydle Khan	Labour
4	Ahamed Khan	Labour
5	Basser Khan	Labour
6	Aladeen	Labour
7	Saradeen	Labour
8	Ameen Khan	Labour
9	Khamesha Khan	Labour
10	Chotey Khan	Labour
11	Peerane Khan	Labour
12	Deene Khan	Labour
13	Hale Khan	Labour
14	Sadeek Khan	Labour
15	Sadhu Khan	Labour
Village Bhadla (Kalo ki Basti)		
1	Yaar Mohamad	Agriculture
2	Husen Khan	Agriculture
3	Allahbax	Agriculture
4	Yasheen Khan	Agriculture
5	Sumer Khan	Agriculture
6	Ahmed	Agriculture
7	Bhagu Khan	Agriculture
8	Samsudin	Agriculture
9	Ismik Khan	Agriculture
Village: Nurey ki Bhuraj		
1	Harji Ram	Agriculture
2	Narayan	Agriculture
3	Haru Ram	Agriculture
4	Bhoja Ram	Agriculture
5	Bagwana Ram	Agriculture
6	Nekh Ram	Agriculture
7	Sukha Ram	Agriculture

Sl. N°	Name of the Participant	Occupation
8	Ajj	Agriculture
9	Yaar Mohmad	Agriculture
10	Samsudin	Agriculture
11	Saley Mohmad	Agriculture
Village Jheepasni		
1	Ashok Kumar	Agriculture
2	Premrattan	Agriculture
3	Ram dayal	Labour
4	Raghu Ram	Agriculture
5	Bhoma Singh	Labour
6	Narayan Singh	Labour
7	Birbal	Labour
8	Bhawar Singh	Agriculture
9	Jetha Ram	Labour
Village Hindal Gol		
1	Basheer Khan	Agriculture/Labour
2	Mohmmad Khan	Agriculture/Labour
3	Ali Khan	Agriculture/Labour
4	Kamrrudin	Agriculture/Labour
5	Haji Sadiqqui	Agriculture/Labour
6	Shami Khan	Agriculture/Labour
7	Molana Yusef	Agriculture/Labour
8	Jamaal Din	Agriculture/Labour
9	Mohmmad Saleh	Agriculture/Labour
10	Abdullah	Agriculture/Labour
11	Esmily	Agriculture/Labour
12	Taaj Mohmmad	Agriculture/Labour

400 kV Bhadla GSS – Ramgarh GSS Transmission Line

Sl. N°	Name of the Participant	Occupation
Village Bhadla (Gamno ki Basti)		
1	Kherdeen Khan	Labour
2	Saddam Hussien	Labour
3	Nydle Khan	Labour
4	Ahamed Khan	Labour
5	Basser Khan	Labour
6	Aladeen	Labour
7	Saradeen	Labour
8	Ameen Khan	Labour
9	Khamesha Khan	Labour
10	Chotey Khan	Labour
11	Peerane Khan	Labour
12	Deene Khan	Labour
13	Hale Khan	Labour
14	Sadeek Khan	Labour
15	Sadhu Khan	Labour
Village Bhadla (Kalo ki basti)		
1	Yaar Mohamad	Agriculture
2	Husen Khan	Agriculture
3	Allahbax	Agriculture
4	Yasheen Khan	Agriculture
5	Sumer Khan	Agriculture
6	Ahmed	Agriculture
7	Bhagu Khan	Agriculture
8	Samsudin	Agriculture
9	Ismik Khan	Agriculture

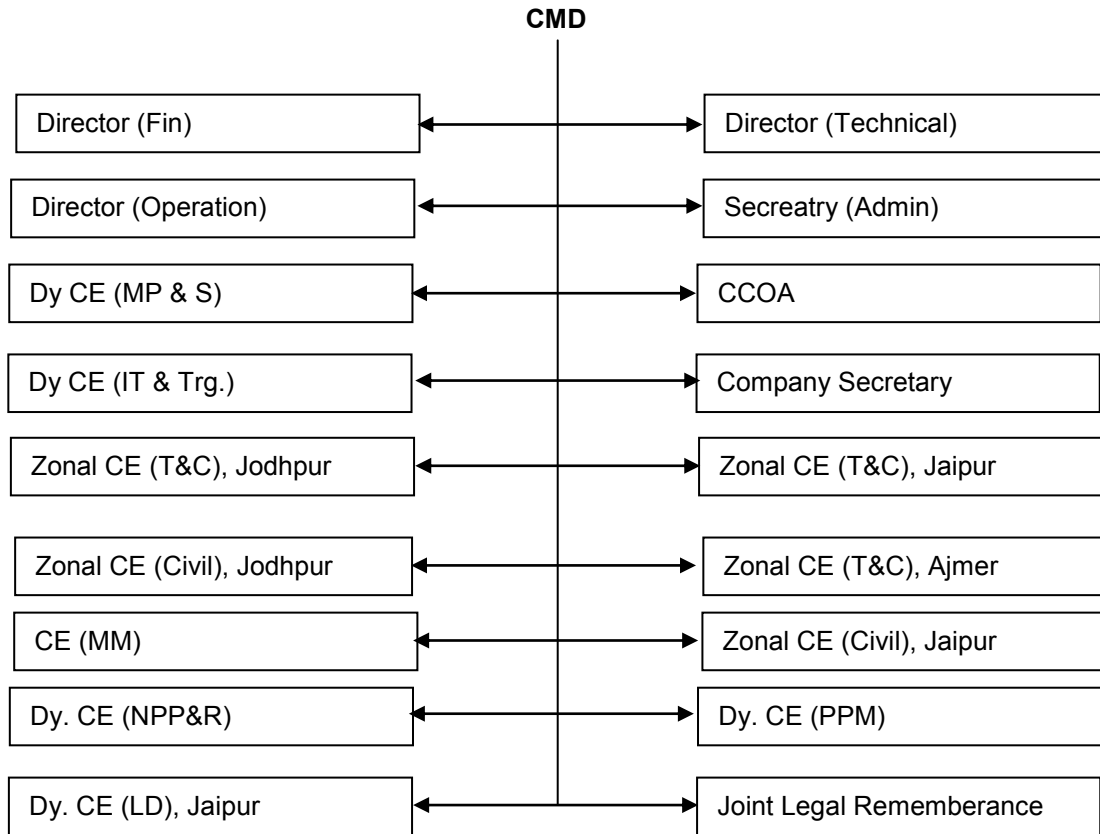
Sl. N°	Name of the Participant	Occupation
Village Sankhla Nehrai		
1	Tanyrav Singh	Agriculture
2	Narpat Singh	Unemployed
3	Bhur Singh	Agriculture
4	Amb Singh	Agriculture
5	Chun Singh	Agriculture
6	Khet Singh	Agriculture
7	Parag Singh	Agriculture
8	Bhawar Singh	Agriculture
9	Shankar Singh	Agriculture
10	Deen Singh	Agriculture
11	Ravat Singh	Agriculture
12	Durg Singh	Agriculture
13	Keser Singh	Agriculture
14	Raghunath Singh	Agriculture
15	Ashu Singh	Agriculture
16	Poonam Singh	Agriculture
17	Vijay Singh	Agriculture
18	Bhooj Raaj	Agriculture
Village Hameera		
1	Saitan Singh	Govt Job
2	Gopa Ram	Surpunch
3	Chotu Singh	Labour
4	Roop Singh	Agriculture
5	Madhav Singh	Labour
6	Sawroop Singh	Agriculture
7	Khangar Singh	Agriculture
8	Swai Singh	Labour
9	Deepa Ram	Labour
10	Panna Ram	Labour
Village Khardi, Mohan Garh		
1	Umed Ali	Agriculture/Animal Husbandry
2	Gaji Khan	Agriculture/Animal Husbandry
3	Deny Khan	Agriculture/Animal Husbandry
4	Mamdeh Khan	Agriculture/Animal Husbandry
5	Maley Khan	Agriculture/Animal Husbandry
6	Abdullah	Agriculture/Animal Husbandry
7	Dost Ali	Agriculture/Animal Husbandry
8	Eden Khan	Agriculture/Animal Husbandry
9	Elav Khan	Agriculture/Animal Husbandry
10	Raydin Khan	Agriculture/Animal Husbandry
11	Allahjiya	Agriculture/Animal Husbandry
12	Shaban Khan	Agriculture/Animal Husbandry
13	Litty Khan	Agriculture/Animal Husbandry
14	Bali Khan	Agriculture/Animal Husbandry

400 kV Ramgarh GSS – Akal GSS Transmission line

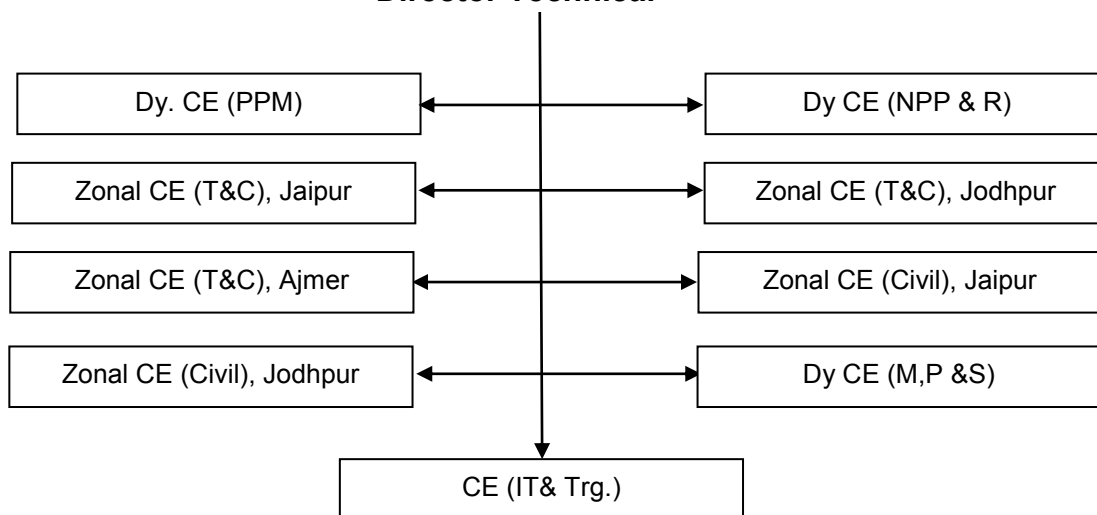
Sl. N°	Name of the Participant	Occupation
Village Asda		
1	Faisel Khan	Labour
2	Rahim Khan	Labour
3	Mugal Khan	Labour
4	Punma Ram	Teacher
5	Mir Khan	Labour
6	Rojey Khan	Labour
7	Samah Khan	Labour

Sl. N°	Name of the Participant	Occupation
8	Karun Khan	Labour
9	Habib Khan	Labour
10	Peru Khan	Labour
11	Sai Khan	Labour
12	Sheru Khan	Labour
13	Rahim Khan	Labour
14	Maley Khan	Labour
15	Kyam Khan	Labour
16	Noorey Khan	Labour
Village Hameera		
1	Saitan Singh	Govt Job
2	Gopa Ram	Surpunch
3	Chotu Singh	Labour
4	Roop Singh	Agriculture
5	Madhav Singh	Labour
6	Sawroop Singh	Agriculture
7	Khangar Singh	Agriculture
8	Swai Singh	Labour
9	Deepa Ram	Labour
10	Panna Ram	Labour

Institutional Structure of RRVPNL



Director Technical



PMU and Field Office linkage of RRVPNL

