Environmental Monitoring Report

Project Number: 45224-003
October 2016

Period: March 2015 – March 2016

IND: Rajasthan Renewable Energy Transmission Investment Program - Tranche 1

Subprojects: 400KV D/C Ramgarh – Akal Transmission Line (ICB 5); and
400 KV D/C LILO of Jodhpur – Merta Transmission Line to Bhadla (ICB 6)

Submitted by

Rajasthan Rajya Vidyut Prasaran Nigam Limited, Jaipur

Asian Development Bank

for signing pls NK/VRK.

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED
OFFICE OF THE Addl. CHIEF ENGINEER (Contracts)
Corporate Identity Number(CIN): U 40109RJ2000SGC016485
Regd.Office: MM Building of RVPN, Old Power House Premises (Back Side),Near Ram Mandir, Bani Park,Jaipur-302006

NO. RVPN /ACE (Contracts)/ SE (Contracts-I) / D. 91 Dated 15-9-16

Dear Mr. Karbar,
Energy Specialist
ADB

Please find enclosed herewith the Social & Environmental Safeguard reports for ICB 1, 2, 5 & 6 under Tranche-1 for the period up to March-16. These reports for the period of April-16 to September-16 will be submitted by the end of the October-16.

Regards

15/9/16

(V. K. Mishra)
Addl. Chief Engineer (Contracts)
RVPN, Jaipur

Copy to Mr. Len George for information please.

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Environmental Safeguards Document

1st Environment Monitoring Report

400 KV D/C Ramgarh – Akal Transmission Line (JCB-5)

Document Stage: Final Document
Project Number: 45224 (IND)
Period – March2015 - March2016.
Reporting - April 2016.

India: Rajasthan Renewable Energy Transmission Investment Program

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

Environment Monitoring Report

Compliance Status & Monitoring Report of Environment Safeguards

Period: March 2015 –March 2016
Submitted by: Rajasthan Rajya Vidyut Prasaran Nigam Limited, Rajasthan

Table of Contents

Abbreviations

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

Project Information

A.1. General

I	Name of Project	**Rajasthan Renewable Energy Transmission Investment Program**
II	Loan Number	Loan 3052-IND: Rajasthan Renewable Energy Transmission Investment Program – Tranche 1
II	Name of Monitoring/Reporting Agency and address	RRVPNL/Vidut Bhawan, Janpath , Jyoti Nagar Jaipur – 302005 Tata Projects Limited , Mithon Towers -1 , Prenderghast Road , Secunderabad - 500003
III	Monitoring Period (Season/month)	March -2015 to March -2016
IV	Report No.	1
V	Report for the period	March -2015 to March -2016
VI	Date of reporting	9 September -2016

A.2. Subproject details

	List of sub-projects	Name of the Project site
I	**400 KV D/C Ramgarh to Akal Transmission Line. (ICB 5)**	400kV D/C TWIN ACSR Moose Transmission Line from Ramgarh to Akal under specification No. RRVPN / ADB / Tranche 1/ICB-5 (Supply & Service contract) to TATA Projects Limited

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

S No	Name of sub-project	Progress as on date of Report	Implementation Schedule
1	Survey	99.163 KM	April -15 – Sep -15
2	Foundation	260Nos	May -15 to March - 16
3	Erection	239Nos	Aug-15 to March -16
4	Stringing	Not Started	Dec -15 to Mar -16

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

S No	Legal Requirements/Acts/Rules/Guidelines	Applicable Attributes	RRVPNL's Compliance Status
1	The Water (Prevention and Control of Pollution) Act, 1974 as amended;	Water Pollution	Preventive measures are being adopted to avoid such pollution. Report shall be submitted by Sep'2016.
2	The Air (Prevention and Control of Pollution) Act, 1981	Air Pollution	Preventive measures are being adopted to avoid such pollution. Report shall be submitted by Sep'2016.
3.	The Environment (Protection) Act, 1986	Construction Practices	Report shall be submitted by Sep'2016.
4	The Environment Impact Assessment Notification, 1994 as amended	EMP monitoring	Report shall be submitted by Sep'2016.
5	The Hazardous Wastes (Management and Handling) Rules, 1989 as amended	Transformer Oil	Not applicable
6	The Ozone Depleting Substances (Regulation and Control) Rules, 2000	Cleaning of electrical contacts using CFCs etc.	Not applicable
7	The Batteries (Management and Handling) Rules, 2001 as amended	Batteries	Not applicable
8	The Indian Forest Act, 1927 as amended	Reserve Forest areas, Right of way	Forest Land is not involved; we have avoided the forest area in complete Line. Line is more than 1.0 km away from Forest Land.
9	The Wild Life (Protection) Act, 1972 as amended	Critical habitats	No Wild life is involved in Project.Line is more than 4-5 km's away from Forest Land.
10	The Biological Diversity Act, 2002	Wetland	No Wetland is involved.
11	The Forest (Conservation) Act, 1980 as amended	Construction work in forest areas	Forest Land is not involved; we have avoided the forest area in complete Line. Line is more than 1.0 km away from Forest Land.
12	The National Environmental Policy, 2006 of GoI	Construction Practices	GOI norms for environmental management followed for all construction work
13	Other State Level Acts	Compensation	Compensation as per RRVPNL and state Revenue department.
14	Other International levels conventions and treaties	Biodiversity, GHG emissions	Not being affected.

B.2: General Implementation Status

B.2.1. Forest Clearance.

SN o.	Measures/ stipulation	Compliance Status
I	Sub-Project #	
1	Right of Way/ land required	23 Mtr either side of the central line, corridor width 46 mtrs, as per approved RVPNL tower schedule.
2	Clearance from trees	26 Mtr either side of central line.
3	Forest area and Nos. of trees.	No Forest land is being involved. No trees being affected during the Foundation and erection work. During the stringing work no trees shall be cut, only trimming of branches shall be done

SN o.	Measures/ stipulation	Compliance Status
4	Damage to forest	No damage shall be done to forest area.
5	Wild life sanctuaries	No Wild life is involved in Project.Line is more than 4-5 Kms away from Forest Land.

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

S.No.	Query/Apprehension	Commitment	Compliance Statement
I	**Sub-project #**		
1	Compensation for crop	As per EPC contractor bid	All seasonal cultivated crops if damaged during the work compensated as per the RVPN/State Revenue department.
2	Compensation for land damages	As per EPC contractor bid	No land is damaged during the construction of line.
3	Compensation for pathways, channels for waterway.	Restoration after erection by EPC contractor	Till date no pathways, channels for waterways have been affected during the work. If affected, they shall be restored properly.
4	Nuisance due to dust, noise, vibrations, labor during construction	As per EMP implemented by EPC contractor	Preventive actions are being adopted to avoid such nuisance. No reported dust, noise, vibrations and labor problems currently. Report shall be submitted by Sep'2016.

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

SNo.	Product Activity/Stage	Parameter to be monitored	Compliance Status
I	**Sub-Project #**		
	Construction		
1	Archeological site/ monument safety	Chance find	Not involved
2	Public places, schools, ponds, airport, railway etc.	Distance 500 m away	No school, ponds have been affected Proposal has been submitted to concerned authority.
3	Safeguard against critically endangered Flora and fauna.	Avoid	Flora Fauna not involved in project
4	Rain and Flood prone area.	Avoid	The entire construction area of transmission line beyond the flood prone area
5	Environmental parameters for air, noise, land and water during project construction	Environmental Monitoring Plan	Report shall be submitted by Sep'2016.

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

Sr.No	Complainant Name and address	Date of receipt	Subject/Issue	Date of resolution	Remarks
	Sub-Project #				
	As on date no complaint has been received				

B.2.5. Staffing, Institutional Arrangements and Grievance Redress

S.No.	Parameters	Commitment	Compliance Statement
1	Numbers of Staff deputed/employed for environment safeguards	One at -site	One Safety Officer for 100 No tower erection.
2	PIU established as per proposed institutional mechanism	Date	16-5-2015
3	GRC formation	Date	1-3-2016
4	Grievance Redress Machanism followed	Proper record	No tree cutting involved. Currently no environment related grievance received.

B.2.6. Other measures:

I	Sub-Project #
1	At Workplace like stores, we have provided Toilet facilities to our workmen.
2	Gas cylinders are being used to avoid the usage of wood for cooking.
3	Good quality water is being provided for drinking, cooking and bathing purpose.
4	Control of dust near habitats for top soil being stored near foundations using covering sheets

B2.7 Annexures

I	Sub-Project #
1.	Photographs of the following – foundation construction, tower erection, stores, toilets, drinking water, kitchen, safety workshop, training material for HSE, flora fauna etc.
2.	RVPNL Letter dated 19.02.2016 regarding EMP issues
3.	Baseline Report of Environmental Parameters (Pre-construction)
4.	Tata Projects Limited Reply to RVPNL Letter dated 19.02.2016 regarding EMP Issues: Remedial measures take from Tata Projects in response to Annexure 1 and 2 above.

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

B3.1. Environment Management Plan and Status on Implementation

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Pre-construction								
Temporary use of land	Impact to the existing environment	Selection of lands adhering to local laws and regulations Construction facilities should be placed at least 500 m away from water bodies, natural flow paths, important ecological habitats and residential areas	water and air quality	Inventory activity of tree, crop and asset in the area that may affected by project implementation such as excavation and material transportation was undertaken before construction activities. Compensation is implemented to damage crop.	260	Excess soil after foundation Kept on board.	Need to maintain same practice up to completion of project	RRVPNL
Substation location and design	Noise generation Exposure to noise, Nuisance to neighbouring properties	Substation designed to ensure noise will not be a nuisance.	Expected noise emissions based on substation design, noise levels	Not Applicable				
	Disturbance to the adjacent lands and the people due to cut and fill operations	Maintained adequate clearance, construction of retaining structures, minimise cut and fill operations adjoining to the dwellings	Setbacks to houses and other structures					

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (Incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
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	Tower Location on 26 Meter either side is away from House/dwelling area. Line is minimum 500 Mtr away from such dwelling area.	199.151km	46 Mtr corridor from center of tower is maintained during survey work to avoid house & for 500 mtr for reserve.	Need to maintain up to completion of project.	RRVPNL
	Impact on water bodies / land/ residences	Consideration of site location to avoid water bodies or agricultural land as much as possible. Careful site selection to avoid existing settlements	Site location, line alignment selection (distance to dwelling, water and/or agricultural land)	All the water bodies/dwelling s are more than 500 mtrs awayfrom the Line	F-260 E – 234	46 Mtr corridor from center of tower is maintained during survey work to avoid house & for 500 mtr for reserve	Need to maintain up to completion of project	RRVPNL
Equipment specifications and design parameters	Release of chemicals and harmful gases in receptors (air, water, land)	PCBs free substation transformers or other project facilities or equipment.	Transformers and specifications and compliance with setback distances ("as-built" diagrams)		Not Applicable			
Encroachment into precious ecological areas	Loss of precious ecological values/ damage to precious species	Avoid encroachment by careful site and alignment selection and reconnaissance before final siting of activities. Minimise the RoW wherever possible	Floral and faunal habitats loss		Route has been selected in a manner to avoid such encroachments No ecological areas are involved in TL	Entire line passing away from flora & funa & forest area / NOC had taken before starting of project.	Non	RRVPNL
Involuntary resettlement and acquisition	Loss of lands and structures	Compensation paid for temporary/ permanent loss of productive land	Public complaints		Compensation is implemented for the crop damaged. Compensatio	Land acquisition not required for work.	Crop compensation provide to affected person.	RRVPNL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
					n shall be paid for the cultivated crop damaged as measured jointly by RVPNL, Patwari and Tata project site incharge			
Encroachment into farmland	Loss of agricultural productivity	Use existing tower footings/towers wherever possible Avoid siting new towers on farmland wherever possible Farmers compensated for any permanent loss of productive land and trees that need to be trimmed or removed along RoW.	Tower location and line alignment selection Design of implementation of crop and tree compensation (based on affected area) Statutory approvals for tree trimming /removal		Compensation is implemented for the crop/tree damaged during construction activity. Avoided, though some are unavoidable During Foundation and erection work no trees are not involved.	F- 260 E- 239 Discuss with owner	Non RVPNL to provide proper crop compensation None	RRVPNL RRVPNL
Interference with drainage patterns/irrigation channels	Temporary flooding hazards/loss of agricultural production	Appropriate sighting of towers to avoid channel interference Appropriate provision or excess soil dug up from the	Site location and line alignment selection	All tower are spotted beyond the boundaries of water channel.		250	Non	RRVPNL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		foundations/trenches						
Explosions/Fire	Hazards to life	Design of substations to include modern fire control systems/firewalls. Provision of firefighting equipment to be located close to transformers, power generation equipment.	Substation design compliance with fire prevention and control codes	Not Applicable				
Construction								
Removal or disturbance to other public utilities	Public inconvenience	Advance notice to the public about the time and the duration of the utility disruption Use of well trained and experienced machinery operators to reduce accidental damage to the public utilities Restore the utilities immediately to overcome public inconvenience	Disruption to other commercial and public activities / Public complaints	Advance notice published into the local newspaper for electric utility shutdown.	F- 260 E-239	Nil	Advance notice published in daily newspaper.	RRV/PNI
Acquisition of cultivable lands	Loss of agricultural productivity	Avoid farming season wherever possible for the project activities. Ensure existing irrigation facilities	Land area of agriculture loss Usage of existing utilities	We have avoided the work for the locations where there is farming season. Compensation provided to land	F – 260 Nos E – 239 Nos	None		

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		are maintained in working condition. Protect /preserve topsoil and reinstate after construction completed Repair /reinstate damaged bunds etc. after construction completed Compensation for temporary loss in agricultural production.	Status of facilities (earthwork in m^3) Implementation of crop compensation(amount paid, dates, etc.)	owner against the crop damaged. Top soil is restored during the back filling work.			None	RRVPNL
Temporary outage of the electricity	Loss of power supply to the local community when distribution lines crossing the new transmission line are switched off	Advance notice to the public about the time and the duration of the utility disruption Restore the utilities immediately to overcome public inconvenience	Power disruption to houses and commercial premises of power disruption	Advance notice published into the local newspaper for electric utility shutdown.	E – 239 Advance notice published in to newspapers.	None	None	RRVPNL
Equipment layout and installation	Noise and vibrations	Selection of construction techniques and machinery to minimise ground disturbance.	Construction techniques and machinery	Construction activity carried out during in day. Reports are still awaited.	Foundation - 260 Erection – 239	None	None	RRVPNL
	SF6 leakage during storage and erection of Switchgear	Record of all substation switchgear, storage cylinders located within secure casings	Switchgear casings and substation bounding	Not Applicable				

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Substation construction	Loss of soil	Fill for the substation foundations obtained by creating or improving local drain system.	Borrow area sighting (area of site in m^2 and estimated volume in m^3)	Not Applicable				
	Interference in drainage of rain and waste water at site	Removal of silt and trash choking the drainage of the substation land	Drains choked with rain/water due to silt and trash	Not Applicable				
	Water pollution	Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	Water Quality (pH, BOD/COD, Suspended solids, other) during major earthworks	Not Applicable				
Construction schedules	Noise nuisance to neighboring properties	Minimize construction activities undertaken during the night and local communities informed of the construction schedule.	Timing of construction (noise emissions, [dB(a)])	All Construction activity carried out during day time. (Report shall be submitted September -16 still awaited) We have avoided the work for the locations where there is farming season.	F – 260 Nos E -239 Nos	Non	Non	RRVPNL/TPL
Provision of facilities forconstruction workers	Nuisance to wildlife if the line construction crosses their migratory path	Restrict construction work during the known period of migration by any wildlife in the area	Timing of Construction	No wild lifearea involve through the TL	F -260 E - 239	Non	Non	RRVPNL/TPL
	Contamination of receptors	Construction workforce facilities	Amenities for Workforce facilities	Covered and fence wall				RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to data	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
	(land, water, air)	to include proper sanitation, water supply and waste disposal facilities.		around the worker living area. Worker have sufficient waste water collection system and septic camp.				
Surplus earthwork/soil	Runoff to cause water pollution, solid waste disposal	Excess fill from tower foundation excavation to be reused on site or disposed of next to roads or around houses, in agreement with the local community or landowners.	Location and amount (m^3) of fill disposal Soil disposal locations and volume (m^3)	Excess soil is dumped on the bound of field and also dumped to path after discussing with the local persons as per requirement.	F – 260 E – 239	Need to maintain same practice up to completion of project.	Non	RRVPNL/TPL
Air Pollution	Loose dust might blow in the area causing dusty conditions	Damping of dust by sprinkling of water within the work area and stack the loose soil and contain it with covers if required.	Soil stacking locations, access roads, tower locations, substation site	Sprayed water to minimize dust releasing in case of windy and dry weather, Excavated earth is covered.	F -260 F – 239	Need to maintain same practice up to completion of project.	Non	RRVPNL/TPL
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)	LPC cylinder provided to Labor.	Always	Non	Non	RRVPNL/TPL
	Effect on fauna	Prevent work force from disturbing the flora, fauna including hunting of animal and fishing in water bodies. Proper awareness programme	Habitat loss	Training program conducted to create awareness among the workers and staff to conserve the	F – 260 E – 239	Non	Non	RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		regarding conservation of flora, fauna including ground vegetation to all drivers, operators and other workers.		flora and fun. (Provice annexure if available).				
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)	Vegetation land not involve through the TL.	Always	Non	Nor	RRVPNL/TPL
	Soil erosion and surface runoff	Construction near seasonal rivers, erosion and flood-prone areas (if any) should be restricted to the dry season. Provision and maintenance of drains and retention ponds. Treat clearing and filling areas against flow acceleration and construction work should be carefully designed to minimise obstruction or destruction to natural drainage.	Soil erosion	No soil erosion involve during the construction activity of tower foundation.	Always	Non	Non	RRVPNL/TPL
Mechanised construction	Noise, vibration and operator	Construction equipment to be well maintained.	Construction equipment - estimated noise	Construction equipment is regularly	Always	Work carried out with the standards	Need to maintain same	RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
	safety, efficient operation Noise, vibration, equipment wear and tear	Proper maintenance and turning off plant not in use.	emissions and operating schedules	maintained. Pollution under control certificate available		norms.	practice up to completion up to project.	
Construction of roads for accessibility	Increase in airborne dust particles Increased land requirement for temporary accessibility	Existing roads and tracks used for construction and maintenance access to the site wherever possible. New access ways restricted to a single carriageway width within the Row.	Access roads, routes (length and width of access roads)	Existing road/path only used for the construction activity. Any new access path used is only one carriageway width for tractor, JCB machine and other machines.	F – 260 E – 239	Only existing path is used for construction activity	Need to maintain same practice up to completion up to project	RRVPNL/TPL
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	Water and Air Quality	Dropping material in the road collected. Construction material stored at high level ground level at construction site. Construction waste removed from the	Always	Non	Non	RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		areas to ensure protection from dust, emissions and such materials should be bundled in environment friendly and nuisance free manner		construction site after workcompletion Construction material - sand will be covered at top to avoid air pollution near houses, and stacked top soil to be also covered at top to avoid blowing duringwindy conditions				
Trimming/cutting of trees within RoW	Fire hazards Loss of vegetation and deforestation	Trees allowed growing up to a height within the RoW by maintaining adequate clearance between the top of tree and the conductor as per the regulations. Trees that can survive trimming to comply with statutory distance should be lopped and not felled Felled trees and other cleared or pruned vegetation to be disposed of as authorised by the statutory bodies.	Species-specific tree retention asapproved bystatutory authorities (average and maximum tree height at maturity, in metres) Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m^2)	The tree and bushes coming within the 26 Meter either side of centra. line has to be trimmed up height required for the clearance. No vegetation filed involved during the construction activity.	Always	Compensation of same should be given in time		RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Health and safety ADD PPE	Injury and sickness of workers and members of the public	Contract provisions specifying minimum requirements for construction camps from water bodies, reserved areas etc. Contractor to prepare and implement a health and safety plan and provide workers with required personal protective equipment (PPE) at site. Contractor to arrange for health and safety awareness programmes	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)	Conducting training courses and meeting for the workers on safety and environmental hygienic Providing personal safety devices for workers safety boots, helmet ,gloves, mask and protective cloths	Always	All work is carrying out with PPE	Nor	RRVPNL/TPL
Nuisance to nearby properties	Losses to neighbouring land uses/ values	Contract clauses specifying careful construction practices. As much as possible existing access ways will be used. Productive land will be reinstated following completion of construction Compensation will be paid for loss of production, if any.	Contract clauses Design basis and layout Reinstatement of land status (area affected, m^2) Implementation of Tree/Crop compensation (amount paid)	Excavated material is used for filling ground itself. Access roads always used for construction activity. Compensation paid against the crop damaged to farmers.	Completely	NA		RRVPNL/TPL
Operation and Maintenance Phase								
Electric shock	Death or injury	Security fences	Proper maintenance		Not			

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
	to the workers and public	around substation Establishment of warning signs Careful design using appropriate technologies to minimise hazards	of fences and sign boards Usage of appropriate technologies (lost work days due to illness and injuries)		Applicable			
Noise generation	Nuisance to the community around the site	Provision of noise barriers near substation sites	Noise level		Not Applicable			
Soil Erosion	Removal of top soil	Planting of buffer zone species suitable for arid climate.	Turbidity of water (Visual Inspection)		Not Applicable			
Maintenance of Transmission line	Exposure to electromagnetic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Required ground clearance (metres)					
Substation maintenance	Exposure to electromagnetic interference	Substation design to comply with the limits of electromagnetic interference within floor area	Required vibrations level, instrumentation		Not Applicable			
Oil spillage	Contamination of land/nearby water bodies	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bounding ('as-built' diagrams)		Not Applicable			
Operation of	Leakage of	Record of all	Switchgear casings		Not			

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Switchgear	SF6 gas	substation switchgear located within secure casings	and Substation bounding		Applicable			

B.3.2 Environment Monitoring Plan and Status on Implementation

Environmental component	Project stage	Parameters to be monitored	Sampling Location	Monitoring Frequency	Regulatory Standards for parameter	Agency responsible for implementation	Agency responsible for supervision	Test Results	Observations/Comments	Actions for Compliance	Further follow-up required
1.Air Quality	A. Pre-construction stage (Baseline development)	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	One time	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5]	RVPNL					
	B. Construction Stage	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	Every one month of construction period	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5	TPL	Reports shall be submitted by Sep'2016	RRVPNL			Reports shall be submitted by Sep'2016
	C. Operation Stage (Testing and Commissioning)	PM_{10}, $PM_{2.5}$, SO_2, NOx, SPM, CO (Visible dust)	Boundary of substation	One time during commissioning	Spot check using field portable instrument sNational Air quality standards of CPCB PM10 or PM2.5	RVPNL					
2.Water	A. Pre-	EC,	Nearest	One time	National	RVPNL					

Quality	construction stage (Baseline development)	TSS, DO, BOD, P^{-1} Oil and grease. Pb.	well near substatio ns		water quality standards of CPCB		
						TPL	Reports shall be submitted by Sep'2016
	B. Construction Stage	EC, TSS, DO, BOD, P^{-1} Oil and grease, Pb.	Nearest well near substatio ns	One time during cable laying	National water quality standards of CPCB		
	C. Operation Stage	EC, TSS, DO. BOD, P^{-1} Oil and grease, Pb.	Nearest well near substatio ns	One time during commissioni ng	National water quality standards of CPCB	RVPNL	
3.Noise/ Vibration	A. Pre-construction stage (Baseline development)	Noise level [dB(A)]	Boundar y of substatio n	One time	CPCB standards for Noise and vibrations	RVPNL	
	B. Construction Stage	Noise level [dB(A)]	Boundar y of substatio n	Every one month of construction period	CPCB standards for Noise and vibrations	TPL	Reports shall be submitted by Sep'2016
	C. Operation Stage	Noise level [dB(A)]	Boundar y of substatio n	One time during commissioni ng	CPCB standards for Noise and vibrations	RVPNL	

	A. Pre-construction stage (Baseline development)	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time	Hazardous Waste Management rules	RVPNL	
4. Soil	B. Construction Stage	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time	Hazardous Waste Management rules	TPI	Reports shall be submitted by Sep 2016
	C. Operation Stage	Visible spills and/or soil staining, Oil & grease	1 location inside substation	One time during commissioning	Hazardous Waste Management rules	RVPNL	
SF6	Operation Stage	Volumetric loss from GIS equipment	Substation equipment, circuit breakers	Online monitoring by data loggers	As per Approved Specifications of Equipment	Not Applicable	

Abbreviations:

SO_2- Sulphur Dioxide; NO_2 - Nitrogen Dioxide; CO- Carbon Monoxide; EC – Electric Conductivity;
Pb – Lead; $PM_{2.5}$ Particulate Matter <2.5; PM_{10} - Particulate Matter <10; TSPM- Total suspended Particulate Matter;
EC - Electrical Conductivity; DO - Dissolved Oxygen; TSS - Total Suspended Solids;
SF_6 – Sulphur Hexafluoride gas
BOD - Biological Oxygen Demand; ORP – Oxidation Reduction Potential
NAAQS - National Ambient Air Quality Standards specified by CPCB, GoI;
NWQS - National Water Quality Standards specified by CPCB, GoI.

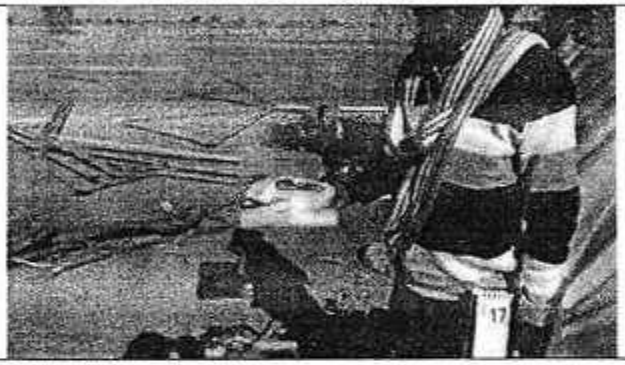
Annexure 1: Photographs regarding EMP issues

Photographs taken during the visit of ADB Consultant Team review

1.1 General terrain along the tower line. Usage of village cart roads

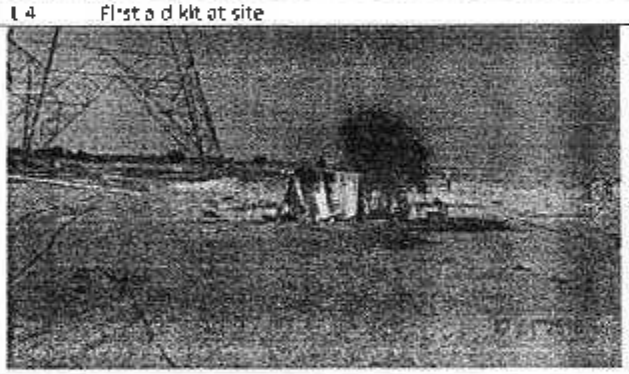
1.2 Temporary drinking water and camp site for day time

1.3 Use of firewood collected from nearby areas



1.4 First aid kit at site

1.5 Safety Net and other accessories

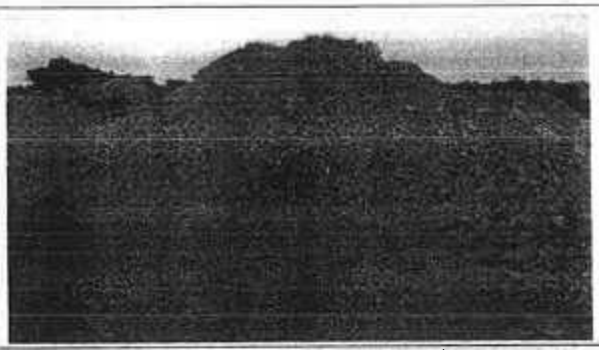


1.6 Temporary camp at tower erection site for tools etc.

1.7 Use of PPE during tower erection

1.8 Display of Safety Boards at construction site.

1.9 After construction of foundation of tower foundation before leg erection



1.10 Stacked topsoil besides a tower foundation pit very near to the edge.

Annexure 2:
RVPNL Letter dated 19.02.2016 regarding EMP issues

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED
OFFICE OF THE SUPTDG. ENGINEER (P&P)
Corporate Identity Number(CIN): U 40109RJ2000SGC016485
Regd. Office: Vidyut Bhawan, Janpath, Jaipur, Rajasthan (India)-302005
Tel: 91-141-2740373 2740381 Ext1336, Fax: 91 141 2740794
E-Mail: se_p&p@rvpn.co.in

NO.RVPN/SE(P&P)/XEN(ADB-II)/ICB-5/D - 3087 Dated 19-02-16

M/s Tata Project Ltd.,
Ground Floor, Tower-B,
Green Boulevard, Plot No. B-9/A,
Sector-62, Noida-201 307 (U.P.)

E-mail: tpl@tataprojects.com,
ritasingh@tataprojects.com
Fax: 91-120 6199990
Phone :- 91-120 6199939

Sub:- To furnish information of environmental and social aspects in various ADB funded projects.(ICB-5)

Dear Sir(s)

The ADB consultant team for social & environmental monitoring have visited your site and have advised you certain improvement in your work activities which are essential to meet the ADB's social & environmental safeguard requirements.

You are advised to take note of the following:-

1. Gas is used by all sub-contractors instead of fire wood which is not allowed.
2. Stacking of loose soil/rocks should be at least one meter away from the foundation pit otherwise it may fall on the working staff.
3. Ensure that temporary toilets are available for sub contractor staff.
4. Besides strict compliance of environment management plan (EMP) provided in the monitoring format by the ADB team be ensured.

The ADB mission from Delhi office shall be visiting the respective sites to review the adherence of the activities at site in compliance with their social & environmental safeguard policy. Kindly ensure strict compliance of the above.

(A.K. Sharma)
Superintending Engineer (P&P)
RVPN, Jaipur

Copy submitted to The Superintending Engineer (400 KV (GSS) ,RVPN Jaisalmer for kind information.

Superintending Engineer (P&P)

Annexure 3
Baseline Test Reports (Tests done during IEE assessment in 2011-2012)

Location of Sampling along the associated Grid Substations (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 (RRVPNL), 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.8), 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, Tehsil: Ramgarh, District Jaisalmer
			SS – 3	Water sample collected from Govt. Bore well Inside 400 KVA GSS (RRVPNL), 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, Tehsil: Ramgarh, District Jaisalmer
			SS – 3	Soil sample collected from the land of proposed GSS 400 KVA (RRVPNL), Village: Aka , Post: Jodha, Jaisalmer
			SS – 4	Soil sample collected from the land of Proposed GSS 400 KVA, Village: Kakani, Post and Tehsil: Luni, Jodhpur

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: JajiwalGehlotan, Post: Jajiwal via Mandor, District Jodhpur
			Sample No. 2	Village and Post: Jinad Nagar, Tehsil: Osiyan, District Jodhpur
			Sample No. 3	Near 44 No. Railway crossing Bhikamkhor, Tehsil: Osiyan, District Jodhpur
			Sample No.4	Village: Amla (Near Kichan), Post and Tehsil: Phalodi, District Jodhpur
			Sample No.5	Village: Khirwa, Post: HidalGol, Tehsil: Phalodi, District Jodhpur)
			Sample No.6	Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur)
			Sample No. 7	(Village and Post: Askandra, Tehsil: Pokharan, 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: BhaguKaGaon, District Jaisalmer
3	Water Analysis	7	Sample No. 1	Water sample collected from Pond, Village: JajiwalGehlotan, Post: Jajiwal via Mandor, District Jodhpur
			Sample No. 2	Water sample collected from Bore well of Sukh Ram S/o Shri BhagirathRam, Village: Simandi, Post and Tehsil: Osiyan, District Jodhpur
			Sample No. 3	Water sample collected from Bore well of Manish S/o Shri Panna La. Ji. Village: Amla, Post and Tehsil: Phalodi, District Jodhpur
			Sample No.4	Water sample collected from Govt. Bore well, Village and Post: Askandra, Tehsil: Pokharan, 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: Jashiyan (Hadda), Post: Kanod, Tehsil and District: Jaisalmer
			Sample No.7	Water sample collected from Govt. Bore well, Village and Post: BhaguKaGaon, Tehsil and District: Jaisalmer
4	Soil Analysis	7	Sample No. 1	Soil sample collected from the Pond of Village: JajiwalGehlotan, Post: Jajiwal via Mandor, District Jodhpur
			Sample No. 2	Soil sample collected from the land of Sukh Ram S/o Shri Bhagirath Ram, Village: Simandi, Post and Tehsil: Osiyan, 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 Pacam Singh S/o Shri Chenaar 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 Mangleram Ji Village: Hadda, Post: Kanod, Tehsil and District Jaisalmer
			Sample No.7	Soil sample collected from the land of Barkat Khan S/o Shri Jaku Khan, Village and Post: BhagatKaBaon, Tehsil and District: Jaisalmer

A. AMBIENT AIR QUALITY MONITORING REPORT

I. Ambient Air Quality Monitoring Report for Grid Substations (November 2011)

Sample No	Site	Particulate Matter (PM 2.5)	Particulate Matter (PM 10)	Sulphur Dioxide (SO2)	Oxide of Nitrogen (NOX)	Carbon Monoxide as (CO)
SS - 1	CSS Sub Station Land, Khasara No. 8, Village: Bhadlu, Post: Nura Ki Burj, Tehsil: Phalodi, District Jodhpur	24.1 µg / m3	47.5 µg / m3	6.0 µg / m3	9.0 µg / m3	373 µg / m3
SS - 2	400 KVA GSS Site, Village: Meyon Ki Dhani, Post: Ramgarh, Jaisalmer	27.3 µg / m3	57.7 µg / m3	5.5 µg / m3	9.3 µg / m3	573 µg / m3
SS - 3	Near SE office 400 KVA (RRVPN.) Village: Akal, Post: Jodha, Jaisalmer	32.6 µg / m3	65.5 µg / m3	6.3 µg / m3	9.7 µg / m3	687 µg / m3
SS - 4	GSS 400 kVA Site, Village: Kakani, Post and Tehsil. Luni, Jodhpur	20.5 µg / m3	44.0 µg / m3	6.0 µg / m3	9.0 µg / m3	458 µg / m3
	Standard Value	60 µg / m3	100 µg / m3	80 µg / m3	80 µg / m3	2000 µg / m3
	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 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 (SO2)	Oxide of Nitrogen (NOX)	Carbon Monoxide as (CO)
1	Near NageshwarMahadev Temple, Village: Jajiwa Gehlotan, Post: JajiwalviaMandor, District Jodhpur	33.6 µg / m3	65.5 µg / m3	6.3 µg / m3	9.7 µg / m3	458 µg / m3
2	Near 33 KVA Sub Station, Village and Post: Umed Nagar, Tehsil: Osiyan, District Jodhpur	36.2 µg / m3	70.5 µg / m3	6.6 µg / m3	9.8 µg / m3	573 µg / m3
3	Near 44 No. Railway crossing, Bhikamkhor, Tehsil: Osiyan, District Jodhpur	39.5 µg / m3	62.3 µg / m3	6.8 µg / m3	10.1 µg / m3	687 µg / m3
4	Near house of Manish S/o Shri Panna Lal Ji, Village: Amla (Near Kichan), Post and Tehsil: Phalodi, District Jodhpur	24.1 µg / m3	52.3 µg / m3	6.2 µg / m3	9.5 µg / m3	458 µg / m3
5	Near NayaTalab, Village: Kiriwa, Post: HidalGol, Tehsil: Phalodi, District Jodhpur)	22.6 µg / m3	47.6 µg / m3	6.1 µg / m3	9.3 µg / m3	458 µg / m3
6	(Near house of Gopal S/o Shri Prem Pa Vishnoi, Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur)	30.5 µg / m3	62.3 µg / m3	6.3 µg / m3	9.8 µg / m3	573 µg / m3
7	Crossing point at Askandra – Nachna Road Village and Post: Askandra, Tehsil: Pokharan, District Jaisalmer	41.5 µg / m3	76.6 µg / m3	7.5 µg / m3	11.9 µg / m3	887 µg / m3
8	Near Stone Quarry, Nachna – Tadana Road, Village and Post: Tadana, Tehsil and District Jaisalmer)	24.0 µg / m3	52.6 µg / m3	6.7 µg / m3	9.6 µg / m3	458 µg / m3
9	Near Nirudeen Ki Dhani, District Jaisalmer)	18.6 µg / m3	41.4 µg / m3	6.0 µg / m3	9.0 µg / m3	344 µg / m3
10	Near PandiDungari, Village: Nehdal, District Jaisalmer	21.8 µg / m3	49.4 µg / m3	6.1 µg / m3	9.3 µg / m3	344 µg / m3
11	Near house of Babu Singh S/o Shri Bagh Singh, Village: Tanusar, District Jaisalmer	23.0 µg / m3	52.4 µg / m3	6.2 µg / m3	9.6 µg / m3	458 µg / m3
12	Village: Joga, Post: Sauiwa, Tehsil and District Jaisalmer	25.7 µg / m3	59.8 µg / m3	6.2 µg / m3	9.5 µg / m3	458 µg / m3
13	Near Tulsiram Ki Dhani, Village:	28.0 µg / m3	62.4 µg / m3	6.5 µg / m3	9.7 µg / m3	573 µg / m3

Sam ple No	Site	Particulate Matter (PM 2.5)	Particulate Matter (PM 10)	Sulphur Dioxide (SO2)	Oxide of Nitrogen (NOX)	Carbon Monoxide as (CO)
	Parewer, Tehsil and District Jaisalmer)					
14	Near House of Fajal Khan S/o Shri Viram Khan, Village: Asda, Post: Devi, Tehsil and District Jaisalmer	32.0 µg / m3	62.5 µg / m3	6.3 µg / m3	9.8 µg / m3	573 µg / m3
15	Near Mile Stone KM. 3, Village: Hadda, Post: Kanod, Tehsil and District Jaisalmer	34.2 µg / m3	71.7 µg / m3	6.8 µg / m3	10.9 µg / m3	687 µg / m3
16	Near Hamira Rly Station, Village: Thaiyat, District Jaisalmer	31.9 µg / m3	67.1 µg / m3	6.8 µg / m3	9.7 µg / m3	573 µg / m3
17	Near House of Barkat Khan S/o Shri Jaru Khan, Village and Post: BhaguKaGaon, Tehsil and District Jaisalmer	33.0 µg / m3	66.2 µg / m3	6.3 µg / m3	9.5 µg / m3	573 µg / m3
	Standard Value	60 µg / m3	100 µg / m3	80 µg / m3	80 µg / m3	2000 µg / m3
	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 Grid Substations (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	46.46	41.00	48.16
SS - 2	400 KVA GSS Site, Village: Meyon Ki Dhani, Post: Ramgarh, Jaisalmer	48.56	41.94	50.01
SS - 3	Near SE office 400 KVA (RRVPNL), 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

ii. Ambient Noise Monitoring Report for Along the 3400 kV transmission lines (December 2011 to January 2012)

Sample No	Site	Ld (Day Equivalent)	Ln (Night Equivalent)	Ldn (Day-Night Equivalent)
1	Village: JajiwalGehlotan, Post: Jajiwal via Munder, District Jodhpur	47.78	41.61	49.20
2	Village and Post: Umed Nagar, Tehsil: Osiyan, District Jodhpur	52.22	43.64	53.11
3	Near 44 No. Railway crossing, Bhenkhor Tehsil: Osiyan, District Jodhpur	49.73	41.23	50.28
4	Village: Amla (Near Kichan), Post and Tehsil: Phalodi, District Jodhpur	54.09	42.03	53.51
5	Village: Khinva, Post: HidalGet, Tehsil: Phalod, District Jodhpur)	51.05	41.08	51.34
6	Village: Kanasar, Post: Bap, Tehsil: Phalod, District Jodhpur)	48.00	44.12	51.07
7	(Village and Post: Askandra, Tehsil: Pokharan, 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	48.94	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: BhaguKaGaon, District Jaisalmer	49.20	41.80	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 Grid Substations (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)	(µS/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 SO4	(%)	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

ii. **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 Jajiwal Gehlotan, Jodhpur	Village: Sirmandi, Jodhpur	Village: Amla, Jodhpur	Village Askandra, Jaisalmer	Village: Tanusar, Jaisalmer	Results Village: Hadda, Jaisalmer	Village: BhaguKaG aon, 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)	(µS/cm)	406	340	424	110	2920	146	1795
Moisture	(%)	2.64	2.08	2.49	3.05	1.98	0.30	0.34
Chlorides as Cl	(%)	0.007	0.016	.016	0.003	0.005	0.004	0.072
Sulphate as SO4	(%)	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	0.159	0.166	0.136	1.190	0.106	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 Along the Grid Substation Sites (November 2011)

Sample No : SS-1: Water sample collected from Bore well of Murna Ram Ji, Village: Bhadla (Khasra No.3), Post Nura Ki Dani, Tehsil: Phalodi, Distt. 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	
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	7.40	6.5 - 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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 SO4	186.34 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	7.56 Mg / L	45 Mg / L	No relaxation	IS: 3026 Part 34 - 1988
Fluoride as F	1.33 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2006
Phenolic Compounds as C6H5OH	< 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 - 1988
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
Aluminium 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, Tehsil : Ramgarh, Distt. 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	
1.1.1.1.2 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 -1994
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1994

pH	8.05	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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	1,765.00 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 SO4	113.49 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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
Aluminium 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				
Coli form 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 (RRVPNL), Village: Axal, Post: Jontha, 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	
1.1.1.1.3 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 CaCO3	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 SO4	131.75 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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	3.01 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
Aluminium 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 Champawat Village: Kelan , 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	
1.1.1.1.4 **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 CaCO3	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 Solics	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	5.98 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 SO4	27.22 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	2.79 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	0.15 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C6H5OH	< 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
Aluminium 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

ii. **Analysis Report of Water Along the 3 nos. 400 kV trasnmission lines (December 2011 to January 2012)**

iii.

Sample No. 1 (Water sample collected from: Pond, Village: JajiwalGehlotan, Post: Jajiwal 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 CaCO3	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	57.96 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	560.00 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	30.10 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 SO4	33.30 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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
Aluminium 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: Simrandi, Post and Tehsil : Osiyan, 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	
1.1.1.1.5 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	7.85	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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	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 SO4	185.06 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	15.82 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 C6H5OH	< 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
Aluminium 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: Anala, 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	
1.1.1.1.8 **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 - 1981
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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	75.60 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 SO4	77.41 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	13.66 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 C6H5OH	< 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
Aluminium 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: Pokharan, 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	
1.1.1.1.7 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	7.73	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	503.00 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	93.30 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 SO4	152.63 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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
Aluminium 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	Permissible Limit in absence of alternate source	
1.1.1.1.8 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 – 9.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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 SO4	49.37 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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	S: 3025 Part 60 - 2008
Phenolic Compounds as C6H5OH	< 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
Aluminium 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	20 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: Kanoi, 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	
1.1.1.1.9 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 CaCO3	395.00 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	45.06 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 SO4	173.52 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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
Aluminium 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: BhagukaGaon, 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	1.1.1.1.10 Permissible Limit in absence of alternate source	
1.1.1.1.11 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 CaCO3	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 58 2006
Sulphate as SO4	121.67 Mg / L	200 Mg / L	400 Mg / L	IS. 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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 C6H5OH	< 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 toxin
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 fignl 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
Aluminium as A	< 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	-

Annexure 4: Tata Projects Limited Reply to RVPNL Letter dated 19.02.2016 regarding EMP issues

Ref: TPL/RVPN/R AIDB-5i246

Date: 09.09.2016

To
The Superintending Engineer (Contracts)
RVPN-MM Building of RVPN
Old Power House Premises, Near Ram Mandir,
Bani Park, Jaipur-302006

Project: Construction of 400kV D/C Twin ACSR Moose Transmission Line from Ajmer – Ake/ Transmission Line

Reference: RVPN/SE (P&P)/XEN(ADB-II)/C6-6/D3587 Dated 19.02.2016.

Subject: Information regarding environmental and social aspects of ADB funded project

Dear Sir,

With reference to the above kindly inform that Environmental and Social Monitoring report is widely appreciated after visit of ADB delegates at our site and implemented the improvement suggested by the ADB team. We have taken the following action as suggested improvements:-

1. Gas cylinders are being used to avoid the usage of wood for cooking.
2. Loose soil/rock/excavated material is being kept minimum 1.5M away from excavated pit and proper barricading tape is being used for safety precautions
3. At Workplace like Camps, we have provided Toilet facilities to our workmen.
4. Ensure the strict adherence of Environment Management plan.

This is for your kind reference and records.

Thanking you and assuring you of our best services all times.

Yours Faithfully,
For **Tata Projects Limited**

Kommi Siva Kumar
Senior Manager (Projects)

Copy to: 1. The Superintending Engineer (T&C) RVPN Jaisalmer.

TATA PROJECTS LIMITED
Ground Floor, Tower-B, Green Boulevard, Plot No. B-9/A
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Phone: +91-120-619 9999 Fax: +91-120-619 9990

Registered Office: "Mahavir Towers", 7-1-78 to 87, Prenderghast Road, Secunderabad-500 003 (A.P.), India
Phone: +91-40-6623 5801 Fax: +91-40-6617 2535

Environmental Safeguards Document

Environment Monitoring Report

400 kV D/C LILO of Jodhpur – Merta Transmission Line to Bhadla (ICB-6)

Project Number: 45224 (IND)

Period – March 15 – March 16.

Reporting - April 2016

India: Rajasthan Renewable Energy Transmission Investment Program

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

Environment Monitoring Report

Compliance Status & Monitoring Report of Environment Safeguards

Period: March 2015 –March 2016
Submitted by: Rajasthan Rajya Vidyut Prasaran Nigam Limited, Rajasthan

Table of Contents

Abbreviations

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

Project Information

A.1. General

I	Name of Project	**Rajasthan Renewable Energy Transmission Investment Program**
II	Loan Number	Loan 3052-IND: Rajasthan Renewable Energy Transmission Investment Program - **Tranche 1**
II	Name of Monitoring/Reporting Agency and address	RRVPNL/New Power House , Jodhpur – 342003
III	Monitoring Period (Season/month)	March' 2015 to March' 2016
IV	Report No.	01
V	Report for the period	March' 2015 to March' 2016
VI	Date of reporting	6th Sep 2016.

A.2. Subproject details

	List of sub-projects	Name of the Project site
I	400 KV D/C Bhadla to Jodhpur Transmission Line. (ICB 6)	**400kV D/C TWIN ACSR Moose Transmission Line from BHADLA (Jaisalmer) to JODHPUR -MERTA LILO POINT under specification No. RRVPN / ADB / Trancha 1/ICB-6 (Supply & Service contract) to M/s Tata Projects Ltd.**

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

S No	Name of sub-project	Progress as on date of Report	Implementation Schedule
1	**Detailed Survey including Check survey.**	197 Kms	March' 2015 to January' 2016
2	**Foundation Including backfilling.**	282 Nos	May' 2015 to March'2016
3	**Erection.**	217 Nos	July' 2015 to March' 2016
4	**Stringing.**	Not started	

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

S No	Legal Requirements/Acts/Rules/Guidelines	Applicable Attributes	RRVPNL's Compliance Status
1	The Water (Prevention and Control of Pollution) Act, 1974 as amended;	Water Pollution	Preventive measures are being adopted to avoid such pollution. Report shall be submitted by September'2016.
2	The Air (Prevention and Control of Pollution) Act, 1981	Air Pollution	Preventive measures are being adopted to avoid such pollution. Report shall be submitted by Sep'2016.
3	The Environment (Protection) Act, 1986	Construction Practices	Report shall be submitted by Sep'2016.
4	The Environment Impact Assessment Notification, 1994 as amended	EMP monitoring	Report shall be submitted by Sep'2016.
5	The Hazardous Wastes (Management and Handling) Rules, 1989 as amended	Transformer Oil	Not applicable
6	The Ozone Depleting Substances (Regulation and Control) Rules, 2000	Cleaning of electrical contacts using HCFCs etc.	Not applicable
7	The Batteries (Management and Handling) Rules, 2001 as amended	Batteries	Not applicable
8	The Indian Forest Act, 1927 as amended	Reserve Forest areas, Right of way	Forest Land is not involved; we have avoided the forest area in complete Line. Line is more than 1.0 Kms away from Forest Land.
9	The Wild Life (Protection) Act, 1972 as amended	Critical habitats	No Wild life is involved in Project. Line is more than 4-5 Kms away from Forest Land.
10	The Biological Diversity Act, 2002	Wetland	No Wetland is involved.
11	The Forest (Conservation) Act, 1980 as amended	Construction work in forest areas	Forest Land is not involved; we have avoided the forest area in complete Line. Line is more than 1.0 Kms away from Forest Land
12	The National Environmental Policy, 2006 of GoI	Construction Practices	GOI norms for environmental management followed for all construction work
13	Other State Level Acts	Compensation	Compensation as per RRVPNL and state Revenue department.
14	Other International levels conventions and treaties	Biodiversity, GHG emissions	Not being affected.

B.2: General Implementation Status

B.2.1. Forest Clearance.

SNo.	Measures/ stipulation	Compliance Status
I	Sub-Project #	
1	Right of Way/ land required	23 Mtr either side of the central line, corridor width 46 mtrs, as per approved RVPNL tower schedule.
2	Clearance from trees	8.840 Kms, as per approved RVPNL tower schedule.
3	Forest area and Nos. of trees.	No Forest land is being involved. No trees being affected during the Foundation and erection work. During the stringing work no trees shall be cut, only trimming of branches shall be done.
4	Damage to forest	No damage shall be done to forest area.
5	Wild life sanctuaries	No Wild life is involved in Project. Line is more than 4-5 Kms away from Forest Land.

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

S.No.	Query/Apprehension	Commitment	Compliance Statement
I	Sub-project #		
1	Compensation for crop	As per EPC contractor bid	All seasonal cultivated crops if damaged during the work compensated as per the RVPN/State Revenue department.
2	Compensation for land damages	As per EPC contractor bid	No land is damaged during the construction of line.
3	Compensation for pathways, channels for waterway.	Restoration after erection by EPC contractor	Till date no pathways, channels for waterways have been affected during the work. If affected, they shall be restored properly.
4	Nuisance due to dust, noise, vibrations, labor during construction	As per EMP implemented by EPC contractor	Preventive actions are being adopted to avoid such nuisance. No reported dust, noise, vibrations, and labor problems currently Report shall be submitted by Sep'2016.

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

SNo.	Product Activity/Stage	Parameter to be monitored	Compliance Status
I	Sub-Project #		
	Construction		
1	Archeological site/ monument safety	Chance find	Not involved
2	Public places, schools, ponds, airport, railway etc.	Distance 500 m away	No school, ponds have been affected Proposal has been submitted to concerned authority.
3	Safeguard against critically endangered Flora and fauna.	Avoid	We have strictly avoided the Flora and Fauna.
4	Rain and Flood prone area.	Avoid	We have avoided the Flood zone area in the entire transmission line.
5	Environmental parameters for air, noise, land and water during project construction	Environmental Monitoring Plan	Report shall be submitted by Sep'2016.

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

Sr.No	Complainant Name and address	Date of receipt	Subject/Issue	Date of resolution	Remarks
	Sub-Project #				
	As on date no complaint has been received				

B.2.5. Staffing, Institutional Arrangements and Grievance Redress

S.No.	Parameters	Commitment	Compliance Statement
1	Numbers of Staff deputed/employed for environment safeguards	One at site.	01 safety Officer at 300 no of tower erection.
2	PIU established as per proposed institutional mechanism	Date	05.05.2015
3	GRC formation	Date	30.10.2015
4	Grievance Redress Mechanism followed	Proper record	No Tree cutting involved, Currently no environment related grievances received.

B.2.6. Other measures:

I	Sub-Project #
1	At Workplace like stores, we have provided Toilet facilities to our workmen.
2	Gas cylinders are being used to avoid the usage of wood for cooking.
3	Good quality water is being provided for drinking, cooking and bathing purpose.
4	Control of dust near habitats for top soil being stored near foundations using covering sheets.

B2.8 Annexures

I	Sub-Project #
1	Photographs of the following – foundation construction, tower erection, stores, toilets, drinking water, kitchen, safety workshop, training material for HSE, flora fauna etc.
2.	RVPNL Letter dated 19.02.2016 regarding EMP issues
3.	Baseline Report of Environmental Parameters (Pre-construction)
4.	Tata Projects Limited Reply to RVPNL Letter dated 19.02.2016 regarding EMP issues: Remedial measures take from Tata Projects in response to Annexure 1 and 2 above.

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

B3.1. Environment Management Plan and Status on Implementation

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Pre-construction								
Temporary use of land	Impact to the existing environment	Selection of lands adhering to local laws and regulations Construction facilities should be placed at least 500 m away from water bodies natural flow paths, important ecological habitats and residential areas	water and air quality	Route has been selected in a manner to avoid the interference of such amenities.	282	Excess soil after foundation cast on bund of fields same is regular practice at site	Need to maintain bund upto completion of project	RRVPNL
Substation location and design	Noise generation Exposure to noise, Nuisance to neighboring properties Disturbance to the adjacent lands and the people due to cut and fill operations	Substation designed to ensure noise will not be a nuisance. Maintained adequate clearance construction of retaining structures, minimise cut and fill operations adjoining to the dwellings	Expected noise emissions based on substation design, noise levels Setbacks to houses and other structures	Not Applicable				

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
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	Tower Locations have been selected to avoid the overhead crossing of households/dwellings. Line is minimum 500 Mtr away from such dwelling area.	197.107KM	46 Mtr corridor from center of tower is maintained during survey work to avoid houses & for 500 mtr for water reserve.	Need to maintain up to completion of project.	RRVPNL
	Impact on water bodies / land/ residences	Consideration of site location to avoid water bodies or agricultural land as much as possible. Careful site selection to avoid existing settlements	Site location, line alignment selection (distance to dwelling, water and/or agricultural land)	All the water bodies/dwellings are more than 500 mtrs away from the Line.	282 Nos	46 Mtr corridor from center of tower is maintained during survey work to avoid houses & for 500 mtr for water reserve	Need to maintain up to completion of project.	RRVPNL
Equipment specifications and design parameters	Release of chemicals and harmful gases in receptors (air, water, land)	PCBs free substation transformers or other project facilities or equipment.	Transformers and specifications and compliance with setback distances ("as-built" diagrams)	Not Applicable				
Encroachment into precious ecological areas	Loss of precious ecological values/ damage to precious species	Avoid encroachment by careful site and alignment selection and reconnaissance before final siting of activities. Minimise the RoW wherever possible	Floral and faunal habitats loss	Route has been selected in a manner to avoid such encroachments. No ecological area is been involved		Entire line passing away from flora & funa / forest area/ NOC had taken before starting of project.	Non	RRVPNL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
Involuntary resettlement or land acquisition	Loss of lands and structures	Compensation paid for temporary/ permanent loss of productive land	Public complaints	No land is damaged during the construction of TI Compensation shall be paid for the cultivated crop damaged		Land Acquisition not done in project for carrying out the work.	Crop compensation only paid to affected land owners	RRVPNL
Encroachment into farmland	Loss of agricultural productivity	Use existing tower footings/towers wherever possible	Tower location and line alignment selection	Compensation is implemented for the crop/tree damaged during construction activity.		282	Non	RRVPNL
		Avoid siting new towers on farmland wherever possible	Design of implementation of crop and tree compensation (based on affected area)	Avoided				
			Statutory approvals for tree trimming /removal	During foundation and erection work no trees are involved.		282	Non	RRVPNL
		Farmers compensated for any permanent loss of productive land and trees that need to be trimmed or removed along RoW.						
Interference with drainage patterns/Irrigation channels	Temporary flooding hazards/loss of agricultural production	Appropriate sighting of towers to avoid channel interference	Site location and line alignment selection	Towers are being selected/spotted in a manner to avoid such channels		282	Non	RRVPNL
		Appropriate provision of excess soil dug up from the foundations/trenches						
Explosives/Fire	Hazards to	Design of	Substation			NA		

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
	life	substations to include modern fire control systems/firewalls. Provision of firefighting equipment to be located close to transformers, power generation equipment.	design compliance with fire prevention and control codes	Not applicable				
Construction								
Removal or disturbance to other public utilities	Public inconvenience	Advance notice to the public about the time and the duration of the utility disruption Use of well trained and experienced machinery operators to reduce accidental damage to the public utilities Restore the utilities immediately to overcome public inconvenience	Disruption to other commercial and public activities / Public complaints	As on date there has been no disruption. If any, there shall be advance information published into the local newspaper for electric utility shutdown.		217	Advance published in local News papers	RRVPNL
Acquisition of cultivable lands	Loss of agricultural productivity	Avoid farming season wherever possible for the project activities Ensure existing irrigation facilities are maintained in working condition Protect/preserve	Land area of agriculture loss Usage of existing utilities Status of facilities (earthwork in	We have avoided the work for the locations where there is farming season. Where required, compensation has been provided to the farmers for the loss of cultivated crop.	282	Nil	Nil	RRVPNL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		topsoil and reinstate after construction completed Repair /reinstate damaged bunds etc. after construction completed Compensation for temporary loss in agricultural production.	m^3) Implementation of crop compensation (amount paid, dates etc.)	Top soil is restored during the back filling work.				
Temporary outage of the electricity	Loss of power supply to the local community when distribution lines crossing the new transmission line are switched off	Advance notice to the public about the time and the duration of the utility disruption Restore the utilities immediately to overcome public inconvenience	Power disruption to houses and commercial premises of power disruption	As on date there has been no disruption. If any, there shall be advance information published into the local newspaper for electric utility shutdown.	217	Nil	Ni	RRVPNL
Equipment layout and installation	Noise and vibrations	Selection of construction techniques and machinery to minimize ground disturbance.	Construction techniques and machinery	All locations are more than 600 mtr away from the residential areas and all activities have been carried out during the day time.	Foundation - 282 Erection – 217	Nil	Nil	RRVPNL/TPL
	SF6 leakage during storage and erection of Switchgear	Record of all substation switchgear, storage cylinders located with in secure casings	Switchgear casings and substation bounding	Not applicable				
Substation construction	Loss of soil	Fill for the substation foundations obtained by creating or	Borrow area sighting (area of site in m^2 and estimated	Not applicable				

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		improving local drain system.	volume in m³)					
	Interference in drainage of rain and waste water at site	Removal of silt and trash choking the drainage of the substation land	Drains choked with rain/water due to silt and trash	Not applicable				
	Water pollution	Construction activities involving significant ground disturbance (i.e. substation land forming) not undertaken during the monsoon season.	Water Quality (pH, BOD/COD Suspended solids other) during major earthworks	Not applicable				
Construction schedules	Noise nuisance to neighboring properties	Minimize construction activities undertaken during the night and local communities informed of the construction schedule.	Timing of construction (noise emissions, [dB(a)])	All Construction activities are being carried out during day time. All the locations are more than 500 mtrs away from the residential area.	T- 262 Nos E – 217 Nos	Nil	Nil	RRVPNL/TPL
Provision of facilities for construction workers	No sance to wildlife if the line construction crosses their migratory path	Restrict construction work during the known period of migration by any wildlife in the area	Timing of Construction	No wild life area involved in the TL		Nil	Nil	RRVPNL/TPL
	Contamination of receptors (land, water, air)	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities	Amenities for Workforce facilities	All workmen are provided clean water for drinking/cooking/bathing. Proper rented/tent accommodation are provided for their shelter Proper sanitation facilities are provided	Always	Nil	Nil	RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
				for all the workmen.				
Surplus earthwork/soil	Runoff to cause water pollution solid waste disposal	Excess fill from tower foundation excavation to be reused on site or disposed of next to roads or around houses, in agreement with the local community or landowners.	Location and amount (m^3) of fill disposed Soil disposal locations and volume (m^3)	Excess soil is dumped on the bund of field and also dumped to path after discussing with the local persons as per requirement.	282	Need to maintain the same practice up to completion of project.	Nil	RRVPNL/TPL
Air Pollution	Loose dust might blow in the area causing dusty conditions	Damping of dust by sprinkling of water within the work area and stack the loose soil and contain it with covers if required.	Soil stacking locations, access roads, tower locations substation site	Sprayed water to minimize dust releasing in case of windy and dry weather. Excavated earth is covered.	Always	-	-	RRVPNL/TPL
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)	LPG cylinder provided to Labor for cooking purpose.	Always			RRVPNL/TPL
	Effect on fauna	Prevent work force from disturbing the flora, fauna including hunting of animal and fishing in water bodies. Proper awareness programme regarding conservation of flora, fauna including ground	Habitat loss	Training program conducted to create awareness among the workers and staff to conserve the flora and fauna.	Always			RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		vegetation to all drivers operators and other workers.						
Site clearance	Vegetation	Marking of vegetation to be removed prior to clearance and strict control on clearing activities to ensure minimal clearance	Vegetation marking and clearance control (area in m²)	Vegetation land not involve through the TL	Always			RRVPNL/TPL
	Soil erosion and surface runoff	Construction near seasonal rivers, erosion and flood-prone areas (if any) should be restricted to the dry season Provision and maintenance of drains and retention ponds. Treat clearing and filling areas against flow acceleration and construction work should be carefully designed to minimise obstruction or destruction to natural drainage.	Soil erosion	No soil erosion involve during the construction activity of tower foundation.	Always			RRVPNL/TPL
Mechanised construction	Noise, vibration and operator safety, efficient operation Noise, vibration,	Construction equipment to be well maintained. Proper maintenance and turning off plant not in use	Construction equipment estimated noise emissions and operating schedules	Construction equipment is regularly maintained and time to time we maintain a test check of all the machineries	Always	Work carried out with the standard norms.	Need to maintain same practice up to completion of project.	RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
	equipment wear and tear							
Construction of roads for accessibility	Increase in airborne dust particles Increased land requirement for temporary accessibility	Existing roads and tracks used for construction and maintenance access to the site wherever possible. New access ways restricted to a single carriageway width with n the Row	Access roads routes (length and width of access roads)	Existing road/path only used for the construction activity.	F- 282 Nos E – 217 Nos	Only existing path is used for construction activity.	Need to maintain same practice up to completion of project	RRVPNL/TPL
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 handled in environmen	Water and Air Quality	Dropping material in the road collected. Construction material stored at high level ground level at construction site. Construction waste removed from the construction site after work completion	Always			RRVPNL/TPL

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility	
		friendly and nuisance free manner							
Trimming/cutting of trees within RoW	Fire hazards Loss of vegetation and deforestation	Trees allowed growing up to a height within the RoW by maintaining adequate clearance between the top of tree and the conductor as per the regulations. Trees that can survive trimming to comply with statutory distance should be topped and not felled Felled trees and other cleared or pruned vegetation to be disposed of as authorised by the statutory bodies.	Species-specific tree retention as approved by statutory authorities (average and maximum tree height at maturity, in metres) Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m^2)	The tree and bushes coming within the 26 Meter either side of central line has to be trimmed up height required for the clearance. No vegetation filed involved during the construction activity.	Always	Compensation of same should be given in time.	Non	RRVPNL/TPL	- RRVPNL/TPL
Health and safety ADD PPE	Injury and sickness of workers and members of the public	Contract provisions specifying minimum requirements for construction camps from water bodies, reserved areas etc Contractor to prepare and implement a health and safety	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)	Conducting training courses and inputting for the workers on safety and environmental hygienic Providing personal safety devices for workers safety boots, helmet, gloves, mask and protective cloths	Always	All work is carrying out with PPE,	Non	RRVPNL/TPL	

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
		plan and provide workers with required personal protective equipment (PPE) at site. Contractor to arrange for health and safety awareness programmes						
Nuisance to nearby properties	Losses to neighboring land uses/ values	Contract clauses specifying careful construction practices. As much as possible existing access ways will be used. Productive land will be reinstated following completion of construction Compensation will be paid for loss of production, if any.	Contract clauses Design basis and layout Reinstatement of land status (area affected, m^2) Implementation of Tree/Crop compensation (amount paid)	Excavated material is used for filling ground itself. Access roads always used for construction activity. Compensation paid against the crop damaged to farmers.	F – 282 Nos E – 217 Nos			RRVPNL/TPL
Operation and Maintenance Phase								
Electric shock	Death or injury to the workers and public	Security fences around substation Establishment of warning signs Careful design using appropriate technologies to minimise hazards	Proper maintenance of fences and sign boards Usage of appropriate technologies (lost work days due to illness	Not Applicable				

Project Activity	Potential Environmental Impact	Mitigation Action	Standards	Actions during reporting period (incl. corrective)	Cumulative Progress to date	Corrective Actions Required	Further Follow-up required	Institutional Responsibility
			and injuries)					
Noise generation	Nuisance to the community around the site	Provision of noise barriers near substation sites	Noise level	Not Applicable				
Soil Erosion	Removal of top soil	Planting of buffer zone species suitable for arid climate.	Turbidity of water (Visual Inspection)	Not Applicable				
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)	Not Applicable				
Substation maintenance	Exposure to electromagnetic interference	Substation design to comply with the limits of electromagnetic interference within floor area	Required vibrations level, instrumentation	Not Applicable				
Oil spillage	Contamination of land/nearby water bodies	Substation transformers located within secure and impervious bunded areas with a storage capacity of at least 110% of the capacity of oil in transformers and associated reserve tanks.	Substation bounding ("as-built" diagrams)	Not Applicable				
Operation of Switchgear	Leakage of SF6 gas	Record of all substation switchgear located within secure casings	Switchgear casings and Substation bounding	Not Applicable				

B.3.2 Environment Monitoring Plan and Status on Implementation

Environmental component	Project stage	Parameters to be monitored	Sampling Location	Monitoring Frequency	Regulatory Standards for parameter	Agency responsible for implementation	Agency responsible for supervision	Test Results	Observations/Comments	Actions for Compliance	Further follow-up required
1.Air Quality	A. Pre construction stage (Baseline development)	PM_{10} $PM_{2.5}$ SO_2, NOx, SPM, CO (Visible dust)	Different loc in the TL	One time	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5]	RRVPNL RRVPNL	RRVPNL RRVPNL				
	B. Construction Stage	PM_{10}, $PM_{2.5}$ SO_2, NOx, SPM, CO (Visible dust)	Different loc in the T_	Every one month of construction period	Spot check using field portable instruments National Air quality standards of CPCB [PM10 or PM2.5	TPL	RRVPNL	Reports shall be submitted by Sep'2016			
	C. Operation Stage (Testing and Commissioning)	PM_{10}, $PM_{2.5}$, SO_2 NOx, SPM, CO (Visible dust)	Different loc in the TL	One time during commissioning	Spot check using field portable instruments National Air quality standards of CPCB [PM10	RRVPNL	RRVPNL	Not Applicable			

ts

Environmental component	Project stage	Parameters to be monitored	Sampling Location	Monitoring Frequency	Regulatory Standards for parameter	Agency responsible for implementation	Agency responsible for supervision	Test Results	Observations/Comments	Actions for Compliance	Further follow-up required
					or PM2.5						
2.Water Quality	A. Pre construction stage (Baseline development)	EC, TSS, DO, BOD, P^H Oil and grease, Pb.	Nearest well along the TL	One time	National water quality standards of CPCB	RRVPNL	RRVPNL				
	B. Construction Stage	EC, TSS, DO, BOD, P^H Oil and grease, Pb,	Nearest well along the TL	One time during cable laying	National water quality standards of CPCB	TPL	RRVPNL	Reports shall be submitted by Sep'2018			
	C. Operation Stage	EC, TSS DO, BOD, P^H Oil and grease, Pb,	Nearest well along the TL	One time during commissioning	National water quality standards of CPCB	RRVPNL	RRVPNL	Not Applicable			
3.Noise/ Vibration	A. Pre construction stage (Baseline development)	Noise level [dB(A)]	Different loc in the TL	One time	CPCB standards for Noise and vibrations	RRVPNL	RRVPNL				
	B. Construction Stage	Noise level [dB(A)]	Different loc in the TL	Every one month of construction period	CPCB standards for Noise and vibrations	TPL	RRVPNL	Reports shall be submitted by Sep 2018			
	C. Operation Stage	Noise level [dB(A)]	Different loc in the TL	One time during commissioning	CPCB standards for Noise and vibrations	RRVPNL	RRVPNL	Not Applicable			
4. Soil	A. Pre	Visible	1 location	One time	Hazardous						

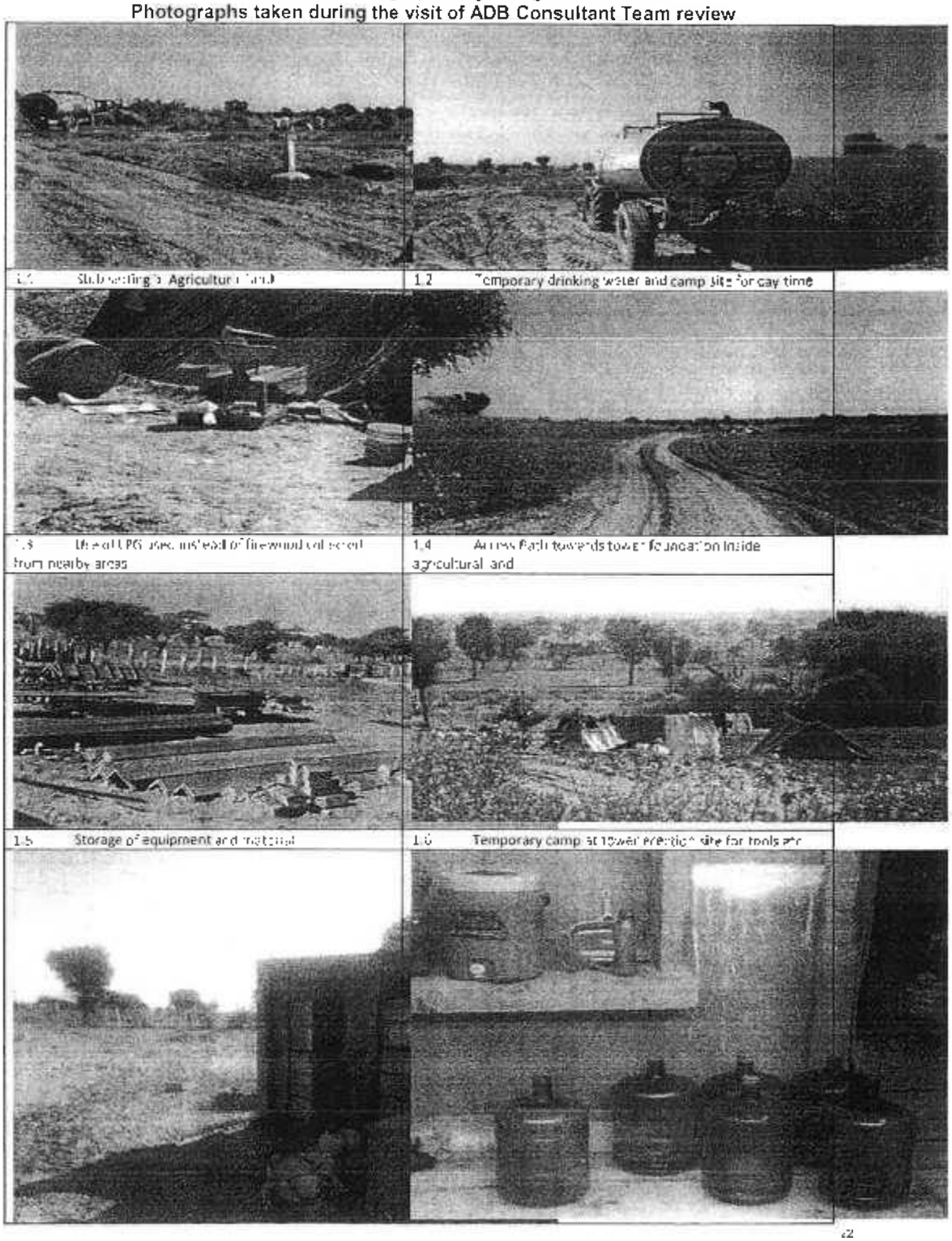
Environmental component	Project stage	Parameters to be monitored	Sampling Location	Monitoring Frequency	Regulatory Standards for parameter	Agency responsible for implementation	Agency responsible for supervision	Test Results	Observations/Comments	Actions for Compliance	Further follow-up required
	construction stage (Baseline development)	Spills and/or soil staining, Oil & grease	along the TL		Waste Management rules	RRVPNL	RRVPNL				
	B. Construction Stage	Visible spills and/or soil staining, Oil & grease	1 location along the TL	One time	Hazardous Waste Management rules	TPL	RRVPNL	Reports shall be submitted by Sep'2018			
	C. Operation Stage	Visible spills and/or soil staining Oil & grease	1 location along the TL	One time during commissioning	Hazardous Waste Management rules	RRVPNL	RRVPNL	Not Applicable			
SF6	Operation Stage	Volumetric loss from GIS equipment	Substation equipment, circuit breakers	Online monitoring by data loggers	As per Approved Specifications of Equipment	RRVPNL	RRVPNL	Not Applicable			

Abbreviations:

SO_2 - Sulphur Dioxide; NO_x - Nitrogen Dioxide; CO- Carbon Monoxide. EC – Electric Conductivity;
Pb – Lead $PM_{2.5}$ - Particulate Matter <2.5;PM_{10} - Particulate Matter <10 TSPM- Total suspended Particulate Matter;
EC - Electrical Conductivity; DO - Dissolved Oxygen; TSS - Total Suspended Solids;
SF_6 – Sulphur Hexafluoride gas
BOD - Biological Oxygen Demand; ORP – Oxidation Reduction Potential
NAAQS - National Ambient Air Quality Standards specified by CPCB, GoI;
NWQS - National Water Quality Standards specified by CPCB, GoI.

Annexure 1: Photographs regarding EMP issues

Photographs taken during the visit of ADB Consultant Team review



1.1 Stubble setting in Agricultural land

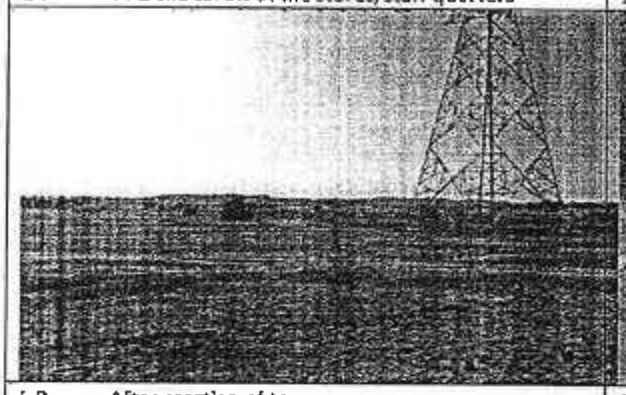
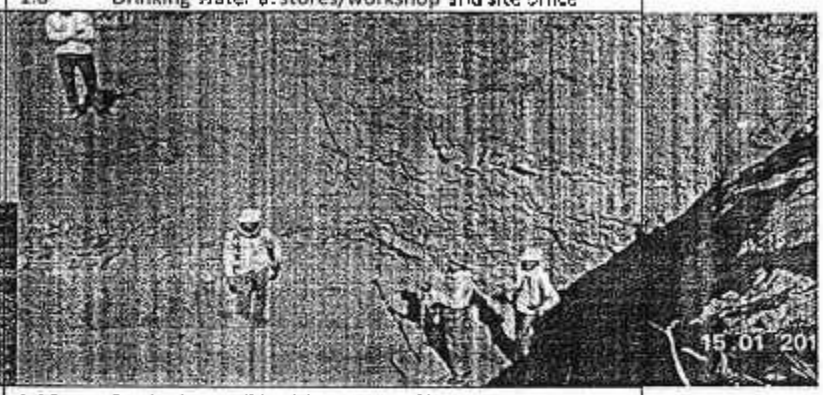
1.2 Temporary drinking water and camp site for day time

1.3 Use of LPG gas instead of firewood collected from nearby areas

1.4 Across Path towards tower location inside agricultural land

1.5 Storage of equipment and material

1.6 Temporary camp at tower erection site for tools etc

1.7 PPE and toilets at the stores/staff quarters	1.8 Drinking water at stores/workshop and site office
	
1.9 After erection of tower	1.10 Stacked topsoil besides a tower foundation pit very near to the edge.

Annexure 2:
RVPNL Letter dated 19.02.2016 regarding EMP

RAJASTHAN RAJYA VIDYUT PRASARAN NIGAM LIMITED
OFFICE OF THE SUPTDG. ENGINEER (P&P)
Corporate Identity Number(CIN): U 40109RJ2000SGC016485
Regd. Office: Vidyut Bhawan, Janpath, Jaipur, Rajasthan (India)-302005
Tel: 91-141-2740373 2740381 Ext1336, Fax: 91-141-2740794
E-Mail: se_p&p@rvpn.co.in

NO.RVPN/SE(P&P)/XEN(ADB-II)/ICB-6/D 3086 Dated 19-02-16

M/s Tata Project Ltd.,
Ground Floor, Tower-B,
Green Boulevard, Plot No: B-9/A,
Sector-62, Noida-201 307 (U.P.)

E-mail: tpl@tataprojects.com,
ritesingh@tataprojects.com
Fax: 91-120 6199990
Phone :- 91-120-6199999

Sub:- To furnish information of environmental and social aspects in various ADB funded projects.(ICB-6)

Dear Sir(s),

The ADB consultant team for social & environmental monitoring have visited your site and have advised you certain improvement in your work activities which are essential to meet the ADB's social & environmental safeguard requirements.

You are advised to take note of the following:

1. Gas is used by all sub-contractors instead of fire wood which is not allowed.
2. Stacking of loose soil/rocks should be at least one meter away from the foundation pit otherwise it may fall on the working staff.
3. Ensure that temporary toilets are available for sub contractor staff.
4. Besides strict compliance of environment management plan (EMP) provided in the monitoring format by the ADB team be ensured.

The ADB mission from Delhi office shall be visiting the respective sites to review the adherence of the activities at site in compliance with their social & environmental safeguard policy. Kindly ensure strict compliance of the above.

(A.K. Sharma)
Superintending Engineer (P&P)
RVPN, Jaipur

Copy submitted to The Superintending Engineer (TCC-IV) ,RVPN Jodhpur for kind information.

Superintending Engineer (P&P)

Annexure 3
Baseline Test Reports (Tests done during IEE assessment in 2011-2012)

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 (Mathai Khan's House) Churan Ki Basti
		6	AN - 3	GSS Bhadla Substation land
			AN - 4	Near AmrookiNadi
			AN - 5	Near PannukiNadi
			AN -6	Near Mile stone of 0 km Bhadla Pantia on Nachna – Bhikampur road
3	Water Analysis	3	WS - 1	Munna Ram's tube wel
			WS – 2	Govt. tube wel Churon Ki Basti
			WS - 3	Water tank at Kamrudeen House in SannukiBasti
4	Soil Analysis	3	SS - 1	GSS Bhadla Substation land
			SS – 2	Near AmrookiNadi
			SS - 3	Near PannukiNadi

Location of Sampling along the associated Grid Substations (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: Nura 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 (RRVPNL), 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.8), Post: Nura K. Burj, Tehsil: Phalodi, Distric, Jodhpur
			SS – 2	Water sample collected from Govt. Bore well (Nearest Bore well GSS Ramgarh), Village and Post: Sonu, Tehsil: Ramgarh, District Jaisalmer
			SS – 3	Water sample collected from Govt. Bore well inside 400 KVA GSS (RRVPNL), Village: Akal, Post: Jodha, Jaisalmer
			SS – 4	Water sample collected from Dper: Well of Dabu 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: Nura Ki Burj, Tehsil: Phalodi, District Jodhpur
			SS – 2	Soil sample collected from the proposed Ramgarh GSS 400 KVA, Village and Post: Sonu, Tehsil: Ramgarh, District Jaisalmer
			SS - 3	Soil sample collected from the land of proposed GSS 400 KVA (RRVPNL), 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

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: JajiwalGehlotan, Post: Jajiwal via Mandor, District Jodhpur
			Sample No. 2	Village and Post: Umed Nagar, Tehsil: Osiyan, District Jodhpur
			Sample No. 3	Near 44 No. Railway crossing Bhikamkhor, Tehsil: Osiyan, District Jodhpur
			Sample No.4	Village: Amla (Near Kachori), Post and Tehsil: Phalodi, District Jodhpur
			Sample No.5	Village: Khurva, Post: Hira Gol, Tehsil: Phalodi, Distrct Jodhpur)
			Sample No.6	Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur)
			Sample No. 7	(Village and Post: Askandra, Tehsil: Pokharan, District Jaisalmer)
			Sample No. 8	Village and Post: Tadana, Tehsil and District Jaisalmer)
			Sample No. 9	Village: Nirudoon Ki Dhani, District Jaisalmer)
			Sample No.10	Village: Nehdal, District Jaisalmer
			Sample No.11	Village: Tunisar, District Jaisalmer
			Sample No.12	Village: Jogo, 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: Thaiyar, District: Jaisalmer)
			Sample No.17	Village: BhaguKaGaon, District Jaisalmer
3	Water Analysis	7	Sample No. 1	Water sample collected from Pond, Village: JajiwalGehlotan, Post: JajiwalviaMandor, District Jodhpur
			Sample No. 2	Water sample collected from Bore well of Sukh Ram S/o Shr'BhagirathRam, Village: Simrandi, Post and Tehsil: Osiyan, District Jodhpur
			Sample No. 3	Water sample collected from Bore well of Manish S/o ShriPannaLalJi, Village: Amla, Post and Tehsil: Phalodi, District Jodhpur

			Sample No.4	Water sample collected from Govt. Bore well, Village and Post: Askandra, Tehsil: Pokhran, 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: Josiyan (Hadda), Post: Kanod, Tehsil and District: Jaisalmer
			Sample No.7	Water sample collected from Govt. Bore well, Village and Post: BhaguKaGaon, Tehsil and District: Jaisalmer
4	Soil Analysis	7	Sample No. 1	Soil sample collected from the Pond of Village: JajiwalGeblotan, Post: Jajiwal via Mandor, District Jodhpur
			Sample No. 2	Soil sample collected from the land of Sukh Ram S/o ShriBhagirath Ram, Village: Simandi, Post and Tehsil: Osiyan, District Jodhpur
			Sample No. 3	Soil sample collected from the land of Manish S/o ShriPannaLalJi, Village: Anta, Post and Tehsil: Phalodi, District Jodhpur
			Sample No.4	Soil sample collected from the land of Padam Singh S/o ShriChandar Singh Ji, Village and Post: Askandra, Tehsil: Pokaran, District Jaisalmer
			Sample No.5	Soil sample collected from the land of Babu Singh S/o ShriBagh Singh, Village: Tanusar, Jaisalmer
			Sample No.6	Soil sample collected from the land of BheraramJi S/o ShriMangtaramJi Village: Hadda Post: Kanod, Tehsil and District Jaisalmer
			Sample No.7	Soil sample collected from the land of Barkat Khan S/o ShriJalu Khan, Village and Post: BhaguKaGaon, 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 (SO2)	Oxide Of Nitrogen (NOX)	Carbon Monoxide as (CO)
AN-1	Near House of Ajana Ram Ji	26.5 µg / m3	53.1 µg / m3	8.2 µg / m3	9.2 µg / m3	573 µg / m3
AN-2	Near House of Mekhar Khan (Sarpanch), Chadan Ki Basti	31.4 µg / m3	59.6 µg / m3	6.3 µg / m3	9.1 µg / m3	456 µg / m3
AN-3	GSS Sub Station Land	24.1 µg / m3	47.5 µg / m3	6.0 µg / m3	9.0 µg / m3	373 µg / m3
AN-4	Amiya Ki Nadi	29.4 µg / m3	56.8 µg / m3	6.3 µg / m3	9.2 µg / m3	498 µg / m3
AN-5	Panna Ki Nadi	25.3 µg / m3	50.9 µg / m3	6.0 µg / m3	9.0 µg / m3	456 µg / m3
AN-6	0 km Mile stone of Bhadla at Badla Farda	21.4 µg / m3	43.6 µg / m3	6.0 µg / m3	9.0 µg / m3	375 µg / m3
	Standard Value	60 µg / m3	100 µg / m3	80 µg / m3	80 µg / m3	2000 µg / m3
	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 Substations (November 2011)

Sample No	Site	Particulate Matter (PM 2.5)	Particulate Matter (PM 10)	Sulphur Dioxide (SO2)	Oxide of Nitrogen (NOX)	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 / m3	47.5 µg / m3	6.0 µg / m3	9.0 µg / m3	373 µg / m3
SS - 2	400 KVA GSS Site, Village: Meyan Ki Dhani, Post: Ramgarh, Jaisalmer	27.3 µg / m3	57.7 µg / m3	6.5 µg / m3	9.3 µg / m3	572 µg / m3
SS - 3	Near SE office 400 KVA (RRVPNL), Village: Akal, Post: Jodha, Jaisalmer	32.6 µg / m3	62.9 µg / m3	6.3 µg / m3	9.7 µg / m3	687 µg / m3
SS - 4	GSS 400 KVA Site, Village: Kakani Post and Tehsil: Luni, Jodhpur	20.5 µg / m3	44.8 µg / m3	6.0 µg / m3	9.0 µg / m3	456 µg / m3
	Standard Value	60 µg / m3	100 µg / m3	80 µg / m3	80 µg / m3	2000 µg / m3
	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 (SO2)	Oxide of Nitrogen (NOX)	Carbon Monoxide as (CO)
1	Near Nageshwar Mahadev Temple Village: JajiwalGeblotar, Post: Jajiwal via Mandor, District Jodhpur	33.6 µg / m3	65.8 µg / m3	6.3 µg / m3	9.7 µg / m3	498 µg / m3
2	Near 33 KVA Sub Station, Village and Post: Umed Nagar, Tehsil: Osiyan, District Jodhpur	36.2 µg / m3	70.5 µg / m3	6.6 µg / m3	9.6 µg / m3	575 µg / m3
3	Near 44 No. Railway crossing, Shikamkhor, Tehsil: Osiyan District Jodhpur	39.5 µg / m3	62.3 µg / m3	6.9 µg / m3	10.1 µg / m3	637 µg / m3

Sample No	Site	Particulate Matter (PM 2.5)	Particulate Matter (PM 10)	Sulphur Dioxide (SO2)	Oxide of Nitrogen (NOX)	Carbon Monoxide as (CO)
4	Near house of Manish S/o Shri Pannalal Ji, Village: Amla (Near Richani), Post and Tehsil: Phalodi, District Jodhpur	24.1 µg / m3	52.3 µg / m3	8.2 µg / m3	9.0 µg / m3	456 µg / m3
5	Near Naya Talab, Village: Khiriwa, Post: Hidal Gul, Tehsil: Phalodi, District Jodhpur)	22.6 µg / m3	47.6 µg / m3	8.1 µg / m3	9.3 µg / m3	456 µg / m3
6	(Near House of Gopal S/o Shri Prem Pal Vishnoi, Village: Kanasar, Post: Bap, Tehsil: Phalodi, District Jodhpur)	33.5 µg / m3	62.3 µg / m3	6.3 µg / m3	9.8 µg / m3	573 µg / m3
7	Crossing point at Akhaniya – Nachna Road, Village and Post: Askandra, Tehsil: Pokharan, District Jaisalmer	47.5 µg / m3	78.9 µg / m3	7.5 µg / m3	11.9 µg / m3	687 µg / m3
8	Near Stone Quarry, Nachna – Tadana Road, Village and Post: Tadana, Tehsil and District Jaisalmer)	24.0 µg / m3	52.6 µg / m3	6.7 µg / m3	9.6 µg / m3	458 µg / m3
9	Near Nirudee - Ki Dhani, District Jaisalmer)	13.6 µg / m3	47.4 µg / m3	6.0 µg / m3	9.0 µg / m3	344 µg / m3
10	Near Pandi Dungari, Village: Nehdai, District Jaisalmer	21.8 µg / m3	49.4 µg / m3	6.1 µg / m3	9.3 µg / m3	344 µg / m3
11	Near house of Sabu Singh S/o Shri Bagh Singh, Village: Tanusar, District Jaisalmer	25.0 µg / m3	53.4 µg / m3	6.2 µg / m3	9.6 µg / m3	458 µg / m3
12	Village: Joga, Post: Sauwa, Tehsil and District Jaisalmer	25.7 µg / m3	59.8 µg / m3	6.2 µg / m3	9.5 µg / m3	458 µg / m3
13	Near Tulsiram Ki Dhani, Village: Parewer, Tehsil and District Jaisalmer)	28.6 µg / m3	62.4 µg / m3	6.5 µg / m3	9.7 µg / m3	573 µg / m3
14	Near house of Fajal Khan S/o Shri Wasir Khan, Village: Asda, Post: Deva, Tehsil and District Jaisalmer	32.6 µg / m3	62.5 µg / m3	6.3 µg / m3	9.6 µg / m3	573 µg / m3
15	Near Mile Stone KM. 3 Village: Hadda, Post: Kanod, Tehsil and District Jaisalmer	34.2 µg / m3	71.7 µg / m3	6.8 µg / m3	10.9 µg / m3	687 µg / m3
16	Near Hamira Rly Station, Village: Thaiyat, District Jaisalmer	31.9 µg / m3	67.1 µg / m3	6.8 µg / m3	9.7 µg / m3	573 µg / m3
17	Near house of Barkat Khan S/o Shri Jalu Khan, Village and Post: Bhagu Ka Baas, Tehsil and District Jaisalmer	23.0 µg / m3	56.2 µg / m3	6.5 µg / m3	9.5 µg / m3	573 µg / m3
	Standard Value	60 µg / m3	100 µg / m3	80 µg / m3	80 µg / m3	2000 µg / m3
	Methods of Measurement	Gravimetric Method	Gravimetric Method	Improved West and Gaeke Method	Modified Jacob and Hochheiser Method	IS: 5182 – 1975 Part X

5. **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	Amiya 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 Substations (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: Mayon Ki Dhani, Post: Ramgarh, Jaisalmer	48.58	41.94	50.07
SS - 3	Near SE office 400 KVA (RVPN), Village: Akal, Post: Jodha, Jaisalmer	52.31	42.57	52.87
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: Jajiwal Gehlotan, Post: Jajiwal via Mandor, District: Jodhpur	47.18	41.61	49.20

Sample No	Site	Ld (Day Equivalent)	Ln (Night Equivalent)	Ldn (Day-Night Equivalent)
2	Village and Post: Umed Nagar, Tehsil: Osiyan, District Jodhpur	52.82	41.64	53.11
3	Near 64 No. Railway crossing Bhikamkhor Tehsil. Osiyan, District Jodhpur	49.78	41.23	50.29
4	Village: Anita (Near Kiln and), Post and Tehsil: Phalodi, District Jodhpur	54.09	42.03	53.51
5	Village: Khirwa, Post: HidalGol, Tehsil: Phalodi, District Jodhpur)	51.05	41.08	51.34
6	Village: Kanasar, Post. Bap. Tehsil. Phalodi, District Jodhpur)	48.00	44.12	51.07
7	(Village and Post. Askandra, Tehsil: Pokharan, District Jaisalmer)	49.90	43.03	51.21
8	Village and Post Todana, Tehsil and District Jaisalmer)	52.64	42.43	52.57
9	Village: Nirudeen Ki Dhani, District Jaisalmer)	44.58	40.87	47.71
10	Village: Nohdpi, District Jaisalmer	50.58	42.06	51.14
11	Village: Tanusar District Jaisalmer	49.67	41.20	50.24
12	Village: Jaga, District Jaisalmer	47.29	41.42	49.14
13	Village: Parewar, District Jaisalmer	49.94	41.74	50.62
14	Village: Asada, District Jaisalmer	47.82	41.59	49.47
15	Village: Haddu, District Jaisalmer	45.06	41.79	49.68
16	Hamira Rly Station, Village. Thaiyat, District Jaisalmer)	52.63	42.40	52.66
17	Village: BhagaKaGaon, 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: OSS 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	7.06	7.56
Conductivity(1:5)	(µS/cm)	141	232	291
Moisture	(%)	6.1	4.8	5.3
Chlorides as Cl	(%)	0.004	0.002	0.004
Sulphate as SO4	(%)	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 Substations (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)	(µS/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 SO4	(%)	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 Jajiwal Sehl gaon, Jodhpur	Village: Simrard Jodhpur	Village: Amiti, Jodhpur	Village Akhaidan, Jaisalmer	Village: Tanot Jaisalmer	Results Village: Hadda Jaisalmer	Village: RhagaKnG aon, Jaisalmer
Color	Visual Comparison	Grey	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown	Light Brown
pH (1:5)	-	7.55	7.33	7.31	7.23	7.12	7.7	7.26
Conductivity(1:5)	(µS/cm)	405	340	434	110	2520	145	1795
Moisture	(%)	2.64	2.06	2.49	0.58	1.90	0.30	0.32
Chlorides as Cl	(%)	0.007	0.016	.016	0.003	0.005	0.004	0.272
Sulphate as SO4	(%)	0.014	0.012	0.004	0.009	0.156	0.009	0.068
Total Carbonates	(%)	15.88	1.17	6.05	2.81	21.96	11.56	22.54
Total Soluble Solids	(%)	0.201	0.159	0.165	0.156	1.196	0.109	0.706
Total Organic Matter	(%)	0.187	0.037	0.091	0.056	0.029	0.034	0.004
Nitrogen as N	(%)	0.220	0.073	0.021	0.009	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, ChurgnkiBastI

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 CaCO3	588.00 Mg /	200 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	443.96 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	2,674.70 Mg / L	500 Mg / L	2000 Mg / L	IS: 3025 Part 16 - 1984
Calcium as Ca	158.60 Mg / L	75 Mg / L	200 Mg / L	IS: 3025 Part 40 - 1991
Magnesium as Mg	150.76 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 SO4	137.03 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	8.54 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.37 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C6H5OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 ug / 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 - 1988
Cyanide as CN	< 0.05 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	< 0.009 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	50 CFU	IS: 1622 - 1981
E. Coli	Absent	Absent	Absent	IS: 1622 - 1981

Water sample collected from Cement Tank (Kharuddin S/o ShriKalu Khan, GamnokiBasti

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 CaCO3	552.00 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	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	2,692.00 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 SO4	147.94 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	9.94 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 C6-C6H	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1991
Mercury as Hg	< 0.2 ug / 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 - 1988
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	392.00 Mg / L	200 Mg / L	600 Mg / L	IS: 3025 Part 23 - 1986
Aluminum as Al	< 0.009 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 Substation Sites (November 2011)

Sample No : GS-1: Water sample collected from Bore well of Munna Ram Ji, Village: Bhadla (Khasra No.9), Post: Yuno Ki Bujj, 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	
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	7.40	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	548.00 Mg / L	300 Mg / L	600 Mg / L	IS: 3025 Part 21 - 1988
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 SO4	106.34 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 50 - 2005
Phenolic Compounds as C6H5OH	< 0.001 Mg / L	0.001 Mg / L	0.002 Mg / L	IS: 3025 Part 43 - 1992
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 - 1988
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
Aluminium 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, Tehsil: Ramgarh, 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	
1.1.1.1.2 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	8.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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	496.80 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	1785.00 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 SO4	113.49 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	12.93 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	2.47 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C6H5OH	< 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 - 1988
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
Aluminium 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 (RRVPNL), Village: Akal, Post: Jandha, District: Jaisalmer

Parameter	Concentration	Standard Drinking water Specification as per IS – 10500:1991 as amended up to 3 July 2012		Protocol (Test Method)
		Desirable Limit	Permissible Limit in absence of alternate source	
1.1.1.1.3 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 – 9.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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
Residue, 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	27.22 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 SO4	131.75 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	2.05 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	0.88 Mg / L	1.0 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C6H5OH	< 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 - 1988
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	304.00 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 Chandawat 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	
1.1.1.1.4 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 – 9.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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 SO4	27.22 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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)**

iv.

Sample No. 1 (Water sample collected from Pond, Village: JajiwalGehlotan, Post: Jajiwal 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	7.76	6.5 – 8.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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	980.00 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 SO4	33.30 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986

Nitrate as NO3	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 C6H5OH	< 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 - 1988
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: Gumandi, Post and Tehsil: Osiyan, 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	
1.1.1.1.5 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 CaCO3	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 SO4	185.06 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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 Maniah S/o ShriParnalalji, 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	
1.1.1.1.6 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 CaCO3	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	127.98 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	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 SO4	77.41 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	19.68 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 C6H5OH	< 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 - 1988
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
Aluminium 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: Pokharan, 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	
1.1.1.1.7 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 CaCO3	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	3,087.00 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 SO4	152.63 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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 /	1.0 Mg / L	APHA 5th / 0 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	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 ShriBagh 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	Permissible Limit in absence of alternate source	
1.1.1.1.8 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 CaCO3	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 SO4	49.97 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 - 1988
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 5th / 0 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: Jodhpura (Jaddla), 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	
1.1.1.1.9 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 & -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 CaCO3	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 SO4	173.52 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO4	0.74 Mg / L	45 Mg / L	No relaxation	IS: 3025 Part 34 - 1988
Fluoride as F	1.72 Mg / L	1.5 Mg / L	1.5 Mg / L	IS: 3025 Part 60 - 2008
Phenolic Compounds as C6H5OH	< 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 - 1988
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	Annex 554C C
Chromium as Cr+6	< 0.02 Mg / L	0.05 Mg / L	No relaxation	IS: 3025 Part 52 - 2003
Mineral O	< 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. Borewell, Village and Post: BhaguKaCach, 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	1.1.1.1.10 Permissible Limit in absence of alternate source	
1.1.1.1.1 Essential Characteristics-Physical Parameter				
Color, Hazen Units	< 5	5	25	IS: 3025 Part 4 - 1983
Odour	Unobjectionable	Unobjectionable	-	IS: 3025 Part 5 - 1983
Taste	Agreeable	Agreeable	-	IS: 3025 Part 7 & -1984
Turbidity, NTU	< 1	5	10	IS: 3025 Part 10 - 1984
pH	8.22	6.5 – 6.5	-	IS: 3025 Part 11 - 1984
Essential Characteristics-Chemical Parameters				
Total Hardness as CaCO3	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 SO4	121.67 Mg / L	200 Mg / L	400 Mg / L	IS: 3025 Part 24 - 1986
Nitrate as NO3	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 C6H5OH	< 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 A	< 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	28 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 C6H5OH	< 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	< 0.003 Mg / L	0.01 Mg / L	No relaxation	0.003 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	-

Annexure 4: Tata Projects Limited Reply to RVPNL Letter dated 19.02.2016 regarding EMP issues

TATA

Ref: TPL/RVPN/ICB-06/16-17/156 Date. 09.09.2016

To
The Superintending Engineer (Contracts-I)
RVPN-MM Building of RVPN
Old Power House Premises, Near Ram Mandir
Bani Park, Jaipur-302006.

Project: Construction of 400kV D/C Twin ACSR Moose Transmission Line from 400/220kV Pooling Station (Bhadla) to LILO point at 400kV S/C Jodhpur Merta line (Supply and Service Contract)

Reference: RVPN/SE(P&P)/XEN(ADB-1)/ICB-6/D3086 dated 19.02.2016

Subject: Information regarding environmental and social aspects of ADB funded project.

Dear Sir,

With reference to the above kindly inform that Environmental and Social Monitoring report is already submitted after visit of ADB delegates at our site and implemented the improvement suggested by the ADB team. We have taken the following action on suggested improvements-

1. Gas cylinders are being used to avoid the usage of wood for cooking.
2. Loose soil/rock/excavated material is being kept minimum 1.5M away from excavated pit and proper barricading tape is being used for safety precautions.
3. At Workplace like stores, we have provided Toilet facilities to our workmen.
4. Ensure the strict adherence of Environmental Management plan.

This is for your kind reference and records.

Thanking you and assuring you of our best services at times.

Yours Faithfully,
For Tata Projects Limited

Rita Singh
Senior Manager (Projects)

Copy to: 1. The Superintending Engineer (T&C- Kakani), RVPN Jodhpur

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