



Environmental Monitoring Report

Project Number: 32298
December 2009

IND: Madhya Pradesh Power Sector Investment Program

Prepared by

Madhya Pradesh Power Transmission Company Limited, Government of Madhya Pradesh

For

Implementing Agencies

Madhya Pradesh Power Transmission Company Limited

Executing Agency

Madhya Pradesh Power Transmission Company Limited

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Asian Development Bank

Environmental Monitoring Report

Project No. : 32298

Loan No : 2323 & 2346

Reporting Period : July 2009 to September 2009.

India : Madhya Pradesh Power Sector Investment Program

Prepared By : Madhya Pradesh Power Transmission Co. Ltd., Govt. of MP.

Implementing Agency : Madhya Pradesh Power Transmission Co. Ltd.

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1. Introduction

MPPTCL is implementing the Madhya Pradesh Power Sector Investment Program (Tranche-I & Tranche-III) under Multi-trench Financing Facility (MFF) of ADB for building of sufficient capacity for absorption of power from the existing and planned power stations & sub stations and delivering power in a reliable manner and efficiently to Discoms & HT consumers. The program comprises of the construction of 400kV, 220kV, 132kV transmission lines and substations in the state of Madhya Pradesh. These new transmission lines and substations will remove constraints to power flow and will provide additional flexibility to "TRANSCO" in its role as independent transmission system operator in Madhya Pradesh.

The project including loan No. 2323, 2346 along with their saving components covers construction of 2 circuit km of 400kV line, 2043 circuit km of 220kV lines and 1807 circuit km of 132kV lines along with 1 No. 400/220kV substation, 8 Nos. 220/132kV substations, 10 Nos. 132/33kV substations, 10 Nos. 160MVA additional transformers, 1 No. 100MVA additional transformer, 13 Nos. 63/40MVA additional transformers and capacity augmentation at 20 Nos. 132/33kV substations.

Project Objectives:-

- a) Implementation of this scheme will improve operational efficiency, voltage profile and power delivery capacity of Madhya Pradesh Power Transmission System.
- b) MPPTCL will be able to meet various parameters as defined in Grid Code issued by Madhya Pradesh Electricity Regulatory Commission after implementation of this scheme.
- c) New 220kV substations and 132kV substations and associated transmission lines will reduce overloading on 132kV system and 33kV system and improve voltage profile.

Environmental Category:-

In accordance with the environment policy – 2002 of the Asian Development Bank the project covered under the above program is categorized as "B". However, since transmission line projects are environmentally clean and do not involve any disposal of solid waste, effluents and hazardous substances in land air and water they

are kept out of the purview of Environment (Protection) Act, 1986. Tests are being conducted for checking the air quality, water quality and noise level at various substation sites, through the appropriate agency that has the necessary infrastructure.

Environment performance indicators:-

The environmental issues of the project during preconstruction, construction and Post construction (operation and maintenance) phases were monitored according to the environmental management plan. The following key sectors were identified to monitor indicators of possible adverse environmental impacts.

- i. **Route selection:-** To minimize the effects on natural and socio culture resources, such as endangered species, natural habitat of wild life, species, specific trees, crop, historical/cultural monuments, personal land and properties.
- ii. **Equipment specifications and design parameters :-** To minimize the air, water and noise pollution.
- iii. **Air quality :-** To minimize air pollution during the construction activity.
- iv. **Surface / groundwater :-** To avoid contamination of water by construction activity such as oil spills, disposal of solid waste, spoil, construction material and waste water.
- v. **Noise / ground vibration :-** To minimize the noise emission due to construction activity and ground vibration / air blast over pressure due to blasting and compaction activity.
- vi. **Exploitation/handling, transportation and storage :-** To minimize the Impact of Exploitation, handling, transportation & storage of construction/project materials.
- vii. **Social Impact :-** social disturbances and indirect impacts of dust, noise and vibration effects to the people close to R.O.W.

Over all project progress, agreed mile stones and implementation schedule:-

The project was approved in April, 2007 and to be completed by end of June 2011. The present over all progress of the project is about 77% and project is expected to be completed within the stipulated time frame.

2. Compliance status with National/State/Local Statutory environmental requirements:-

National/State/Local Statutory environmental requirement	Status of compliance
1. Environmental clearance under environment protection act 1986.	Under this act, the necessary clearance from MOEF for power transmission project need to be obtained only for the lines passing through 2 district viz Alwar in Rajasthan & Gurgaon in Haryana. The activities of the projects are limited to the State Boundary of Madhya Pradesh, therefore, the clearance under this act are not required.
2. Batteries (Management & handling rule 2001)	MPPTCL ensure that the lead acid station batteries after use are disposed through auction to registered dealers/recyclers to avoid pollution from waste batteries.
3. Hazardous wastes (Management & handling) amendments rules 2003)	As per standard practices adopted by MPPTCL, all used oil is auctioned/sold to registered recyclers or reused by the distribution companies, in distribution X'mers after recycle.
4. Ozone depleting substances (Regulation and control) rules 2000	None of the equipments installed for lines and EHV substations use C.F.C., therefore, this rule is not applicable to MPPTCL.

<p>5. The Biological diversity Act 2002</p>	<p>The selection of route alignment of transmission lines and the sites for establishment of EHV substations covered in the project has been done completely avoiding the biosphere reserves.</p>
<p>6. Forest clearance under the forest conservation act 1980.</p>	<p>The route selection of transmission lines and the site selection for establishment of EHV substations covered in the project has been done avoiding the involvement of reserved forest except for the following 5 lines:-</p> <ul style="list-style-type: none"> i. LILO of one circuit of 220kV Amarkantak to Birsinghpur line at 400kV substation Sukha (Jabalpur) <ul style="list-style-type: none"> - Forest involvement 0.958 hectare. ii. Maheshwar to Pithampur 220kV line <ul style="list-style-type: none"> - Forest involvement 18.488 hectare. iii. Sironj to Maksudhangarh 132kV line <ul style="list-style-type: none"> - Forest involvement 18.91 hectare. iv. Neapanagar to Badgaon 132kV line <ul style="list-style-type: none"> - Forest involvement - 10.206 hectare v. Sidhi to Deosar 132kV line <ul style="list-style-type: none"> - Forest involvement 4.16 hectare. <p>Out of the above 5 lines, the final approval has been received for Neapanagar-Badgaon 132kV line and in principal approval has been received for other 3 lines except for Sidhi-Deosar 132kV line, for which forest proposal is under process with forest authorities for approval.</p>

3. Compliance status with the environmental covenants as stipulated in the Loan Agreement:-

As agreed under the Schedule-5 of the agreement MP Transco has submitted the Initial Environmental Examination Report (IEE), Resettlement plan (RP), Environmental Assessment & Review Framework (EARF), Resettlement Framework (RF) & Indigenous Peoples Development Framework (IPDF) in the month of Nov. 2006 to ADB. Subsequently, the IEE for saving component-I and saving component-II is submitted to ADB in the month of September, 2007 and November, 2008 respectively.

As stipulated in the loan agreement, in accordance with the environment policy (2002) of Asian Development Bank, MP TRANSCO has prepared the environmental Management Plan and has already been submitted to ADB and a copy is enclosed as Annexure -1.

4. Compliance status with the environmental management and monitoring of plans as stipulated in the environmental documentation as agreed with ADB.

The compliance status of environmental management plan for the period July 09 to September 09 prepared by MP TRANSCO is enclosed as Annexure - 1.

5. An Approach & Methodology engaged for environmental monitoring of the project.

Projects covered under the scheme are strictly monitored for the performance indicated as detailed in the Environment Management Plan. The sample selection is associated to actual execution of the work and the monitoring locations where restricted to the adjoining areas of the route of the lines.

The environmental receptors/attributes for monitoring are selected in accordance with the schedule-5 of the loan agreement and the Initial Environmental Examination Report submitted by MPPTCL as agreed upon.

Since, the transmission lines and substations projects are environmentally clear and do not involve any disposal of solid waste, effluents and hazardous substances in land, air and water; they are kept out of the purview of environmental (Protection) Act

1986. Therefore, these projects are not directly linked with the environmental performances indicators except that the forest clearance for the portion of the lines passing through the reserved forest.

As stipulated in the EMP, the projects are monitored during the three phases viz. design, construction and operation.

6. Monitoring of the environmental receptors/attributes (e.g. ambient air, surface water, ground water, land, ecological aspect, noise, hazardous/toxic wastes etc.).

Route selection:

For selection of optimum route the methodology taken into consideration is as follows:

- The route of the proposed transmission lines does not involve any human rehabilitation.
- Any monument of cultural or historical importance is not affected by the route of the transmission line.
- The proposed route of transmission line does not create any threat to the survival of any community with special reference to Tribal Community.
- The proposed route of transmission line does not affect any public utility services like playgrounds, schools, other establishments etc.
- The line route does not pass through any sanctuaries, National Park etc.
- The line route does not infringe with area of natural resources.
- As such as possible the forest areas are avoided by selecting the alternative route.

The monitoring of this attribute is taken up ones during the preconstruction period.

The chains, Theodolite, dumpy levels, toposheets published by Survey of India and forest maps published by the forest department of GOMP are used for the route selection of the lines.

Out of the 2148.5 km of route length of all the lines the selection is done in such a way that only 18.584 km of the lines is passing through the reserved forest area for which the appropriate clearances have been obtained from the forest department except Sidhi-Deosar 132kV line for which the proposal for forest clearance is under process with forest department for approval.

Sub station land selection:

The piece of land used for construction of a new substation is permanently acquired. Generally the GOMP allots this piece of land from its Revenue land bank free of cost in favour of MPPTCL at a nominal annual rent Rs.1.00 where suitable revenue land is not available a suitable piece of land belonging to private ownership may also be selected after consultation with the owner and then the proposal is forwarded to District Magistrate for acquisition of land and deciding the amount of compensation to be paid to the land owner. The amount of compensation awarded by the District Magistrate is paid by MPPTCL to the land owner (PAF) prior to taking up possession. The due care is taken while selecting the land for construction of new substations that it should be free from forest land and any encroachment. For this project out of 20 new substations proposed, the land acquired for 17 substations is Govt. land where as for remaining 3 substations the total land / part of the land is acquired from the private land owners. The complete detail for land acquisition and compensation paid is given in the Annexure-2.

Equipment specifications and design parameters:

The equipment specifications and designs are monitored for air, water and noise pollution.

The attribute is monitored once at the time of tendering.

Tenders are strictly monitored for exclusion of PCB's in substation transformer or other project facilities or equipments. It is also ensured that there is no use of CFC including it's halon in any process, equipments or system design in use for construction or O&M of transmission lines and substations.

Surface/Ground water:

The construction activities are strictly monitored to avoid contamination of water due to oil spill, disposal of solid wastes, spoil, construction materials and waste water.

Monitoring of this attribute is done once after the construction (during operation period).

Noise/Ground vibration:

This attribute is monitored to minimize the noise emission due to the construction activities and ground vibration/air blast, over pressure, due to blasting and compacting activities.

This is also monitored during the preconstruction for designing of equipments and during the post construction (operation period) for the disturbance to the neighbouring persons and properties.

During the preconstruction period this attribute is monitored at the time of tendering once, to minimize the noise level of the equipments during operation. During the construction period this attribute is monitored for the performance of machineries, dust/noise quality to avoid nuisance to near by communities. During the operation this attribute is monitored at the boundary of the substation nearest to properties in consultation with the affected parties once if any complaint is received .

Exploitation, handling, transportation and storage:

This attribute is monitored to minimize the impact of exploitation, handling, transportation and storage of the construction and the projects materials on the persons & properties in the area of construction.

These attributes are monitored to avoid damages to the properties and field crops during the construction period.

Social impact:

This attribute is monitored to minimize social disturbances and indirect impact of construction activities and movement of machinery and material in the day to day life of the persons residing near the construction site.

This attribute is monitored during the construction period and during the post construction, this attribute is monitored as and when there is any complaint received.

7. Any other environmental aspects, impacts observed during implementation which were not covered earlier:

No other environmental aspects/impacts observed during implementation of the project.

8. Details of Grievance Redress Committee and complaints received from public and action taken thereof to resolve.

As per the Loan Agreement (LA), TRANSCO was required to establish an Environment and Social Management Unit (ESMU). TRANSCO has established ESMU headed by Executive Director (T&P-PMU) supported by seven officers which is responsible for implementation and monitoring of Environmental Management Plan (EMP). The present setup is adequate to implement and monitor the EMP and hence does not require any external agency for the settlement of the issues related with the Environment and Social Management. However if the need arises in the future, TRANSCO agrees to form the Grievance Redress Committee and appoint the appropriate external agency for the purpose.

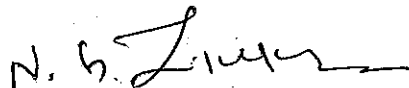
9. Follow-up actions and conclusions:-

From the above details it would be seen that the careful route selection for the transmission lines and land selection for substations have avoided the ecologically sensitive areas such as natural parks, sanctuaries and other protected areas. The care has also been taken that the line must not pass through the areas rich in physical

resources. Out of the 2148.5 km of route length only 18.584 km is passing through the reserved forest area for which the proper compensation is paid to the forest department as per the MOEF norms. The clearances from the statutory agencies have also been obtained prior to the commencement of the work. The maximum care has been taken before during and after implementation of the work that no activity should violate the norms set for protection of environment, natural and socio cultural resources.

Signed by:

Monitoring Agency:



Shri N. G. Tikekar

OSD(Transmission), MPPTCL, Jabalpur.

Date 18.11.2009.

(Name, Tittle,Date)

Authorized signatory from Implementing Agency / Executing Agency:

Shri N. G. Tikekar

OSD(Transmission), MPPTCL, Jabalpur.

Date 18.11.2009.

(Name, Tittle,Date)

Table-5.1 Environment Management Plan

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Pre-construction							
Location of transmission towers and transmission line alignment and design	Exposure to safety related risks	Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and the regulation of supervision at sites.	Tower location and line alignment selection with respect to nearest dwellings	Setback distances to nearest houses – once	MPPTCL	Part of tower siting survey and detailed alignment survey and design	Setback of dwellings to overhead line route designed in accordance with permitted level of power frequency and the regulation of supervision at sites as per the guidelines of I.E.Rule-1956.
Equipment specifications and design parameters	Release of chemicals and gases in receptors (air, water, land)	PCBs not used in substation transformers or other project facilities or equipment.	Transformer design	Exclusion of PCBs in transformers stated in tender specification - once	MPPTCL	Part of tender specifications for the equipment	Exclusion of PCBs in substation transformers or other project facilities or equipment has been ensured in tender specifications.
		Processes, equipment and systems not to use chlorofluorocarbons (CFCs), including halon, and their use, if any, in existing processes and systems should be phased out and to be disposed of in a manner consistent with the requirements of the Government	Process, equipment and system design	There is no process, equipment & system design in use in construction & O&M of transmission lines and Substations in MPPTCL	MPPTCL	There is no use of CFCs including halon in any process, equipment or system design in use for construction or O&M of Transmission line and sub station in MPPTCL.	There is no use of CFCs including its halon in any process, equipment or system design in use for construction or O&M of Transmission line and sub station in MPPTCL.
				Phase out schedule to be prepared in case still in use – once		Part of equipment and process design	Ensured in equipment and process design.

Project activity /stage	Potential Impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Transmission line design	Exposure to electromagnetic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Electromagnetic field strength for proposed line design	Line design compliance with relevant standards. Once	MPPTCL	Part of detailed alignment survey and design	Setback of dwellings to overhead line route designed and tower designed in accordance with permitted level of power frequency Electromagnetic field strength.
Substation location and design	Exposure to noise	Design of plant enclosures to comply with noise regulations.	Expected noise emissions based on substation design	Compliance with regulations - once Six monthly	MPPTCL	The equipments installed at substation are static and are so designed that the noise level remains within the permissible limit i.e. 85 db as per Indian & Internationally accepted standard 7194.	The equipments installed at substation have been so designed that the noise level always remains within the permissible limit i.e. 85 db as per Indian & Internationally accepted standard 7194.
Location of transmission towers and transmission line alignment and design	Impact on water bodies and land	Consideration of tower location avoiding water bodies or agricultural land.	Tower location and line alignment selection (distance to water and/or agricultural land)	Consultation with local authorities and land owners. Once	MPPTCL	Part of tower siting survey and detailed alignment survey and design	Tower locations and line alignment are such selected that the construction or O&M of line avoids water bodies and as far as possible agricultural activities.
	Social inequities	Careful route selection to avoid existing settlements	Tower location and line alignment selection (distance to nearest dwellings or social institutions)	Consultation with local authorities and land owners. Once	MPPTCL	Part of detailed tower siting and alignment survey and design	Ensured careful route selection to avoid existing settlements.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Involuntary resettlement or land acquisition	The present scheme does not involve any existing settlement. Hence involuntary resettlement is not an issue.	Minimise need to acquire agricultural land	Tower location and line alignment selection (distance to agricultural land)	Consultation with local authorities and land owners. Once	MPPTCL	Part of detailed tower siting and alignment survey and design	No agricultural land is acquired for construction of lines.
Encroachment into precious ecological areas	Loss of precious ecological values/ damage to precious species	Avoid encroachment by careful site and alignment selection	Tower location and line alignment selection (distance to nearest designated ecological protection area)	Consultation with local forest authorities. Once	MPPTCL	Part of detailed siting and alignment survey /design	Encroachment is always avoided by careful site and alignment selection.
Transmission line through forestland	Deforestation and loss of biodiversity	Avoid encroachment by careful site and alignment selection Minimise the need by using existing towers, tall towers and RoW, wherever possible	Tower location and line alignment selection (distance to nearest protected or reserved forest)	Consultation with local authorities. Once Consultation with local authorities and design engineers. Once	MPPTCL	Part of detailed siting and alignment survey/design No forest land is involved enroute the transmission line and for construction of substation	No forest land is involved enroute the transmission line except for 5 lines (details are given on page 6 of the report), and for construction of substation, no forest land is acquired.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Temporary Encroachment into farmland	Loss of agricultural productivity	Obtain statutory clearances from the Government	Statutory approvals from Government	Compliance with regulations – once for each subproject	MPPTCL	Part of detailed alignment survey and design	No agricultural land is acquired for construction of lines.
		Use existing tower footings/towers wherever possible	Tower location and line alignment selection	Consultation with local authorities and design engineers – once		Part of detailed siting and alignment survey /design	
		Avoid siting new towers on farmland wherever feasible	Tower location and line alignment selection	Consultation with local authorities and design engineers – once		Prior to construction phase	Statutory approvals for tree trimming /removal have been obtained from competent authorities.
		Farmers compensated for any permanent loss of productive land	Design of Implementation of Crop Compensation (based on affected area)	Consultation with affected parties – once in a quarter		Prior to construction phase	
		There is no permanent loss of land	Design of Tree compensation (estimated area to be trimmed/removed)	Consultation with affected parties – once in a quarter		Part of detailed siting and alignment survey /design	
		Farmers/landowners compensated for significant trees that need to be trimmed/ removed along ROW.	Statutory approvals for tree trimming /removal	Compliance with regulations – once for each subproject			

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Noise related	Nuisance to neighbouring properties	Substations sited and designed to ensure noise will not be a nuisance.	Noise levels	Noise levels to be specified in tender documents - once	MPPTCL	Part of detailed equipment design	Noise levels have been specified in tender documents.
Interference with drainage patterns/irrigation channels	Flooding hazards/loss of agricultural production	Appropriate siting of towers to avoid channel interference	Tower location and line alignment selection (distance to nearest flood zone)	Consultation with local authorities and design engineers - once	MPPTCL	Part of detailed alignment survey and design	Tower location and line alignment selection are made in such a way that interference with drainage patterns/irrigation channels avoided.
Escape of polluting materials	Environmental pollution	Transformers designed with oil spill containment systems, and purpose-built oil, lubricant and fuel storage system, complete with spill cleanup equipment.	Equipment specifications with respect to potential pollutants	Tender document to mention specifications - once	MPPTCL	Part of detailed equipment design /drawings	Specifications have been mentioned in the Tender documents.
Explosions/Fire	Hazards to life	Substations to include drainage and sewage disposal systems to avoid offsite land and water pollution.	Substation sewage design	Tender document to mention detailed specifications - once	MPPTCL	Part of detailed substation layout and design /drawings	In the Tender documents the specifications have been included for drainage and sewage disposal systems for substations to avoid offsite land and water pollution
		Design of substations to include modern fire control systems/firewalls. Provision of fire fighting equipment to be located close to transformers.	Substation design compliance with fire prevention and control codes	Tender document to mention detailed specifications - once	MPPTCL	Part of detailed substation layout and design /drawings	In the Tender documents the specifications have been included for drainage and sewage disposal systems for substations to avoid offsite land and water pollution Fire fighting equipment has been located close to transformers.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Construction							
Equipment layout and installation	Noise and vibrations	Construction techniques and machinery selection seeking to minimize sound disturbance.	Construction techniques and machinery	Construction techniques and machinery creating minimal sound disturbance - once at the start of each construction phase	MPPTCL (Contractor through contract provisions)	Construction period	Latest construction techniques and machineries creating minimal sound disturbance have been used during construction.
Physical construction	Disturbed farming activity	Construction activities on cropping land timed to avoid disturbance of field crops (within one month of harvest wherever possible).	Timing of start of construction	Crop disturbance - Post harvest as soon as possible but before next crop - once per site	MPPTCL (Contractor through contract provisions)	Construction period If there is any crop damage the same is compensated prior to taking up construction work.	Construction activities have been scheduled in such a way that damages to crops are least and if there is any crop damage the same is compensated.
Mechanized construction	Noise, vibration and operator safety, efficient operation	Construction equipment to be well maintained.	Construction equipment - estimated noise emissions	Complaints received by local authorities - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	No complaints have been received against noise & vibrations by local authorities during construction.
	Noise, vibration, equipment wear and tear	Turning off plant not in use.	Construction equipment - estimated noise emissions and operating schedules	Complaints received by local authorities - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Effectively monitored the optimised utilization of construction equipments and plants.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Construction of roads for accessibility	Increase in airborne dust particles	Existing roads and tracks used for construction and maintenance access to the line wherever possible.	Access roads, routes (length and width of new access roads to be constructed)	Use of established roads wherever possible - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Existing roads and tracks have been used for construction activities wherever possible to minimize air born dust particles.
	Increased land requirement for temporary accessibility	New access ways restricted to a single carriageway width within the ROW.	Access width (meters)	Access restricted to single carriageway width within ROW - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Access ways used, wherever required during construction, have been restricted to single carriageway width within ROW
Temporary blockage of utilities	Overflows, reduced discharge	Temporary placement of fill in drains/canals not permitted.	Temporary fill placement (m ³)	Absence of fill in sensitive drainage areas - every 4 weeks	MPPTCL (Contractor through contract provisions)	Construction period	No temporary placement of fill in drains/canals has been done.
Site clearance	Vegetation	Marking of vegetation to be removed prior to clearance, and strict control on clearing activities to ensure minimal clearance.	Vegetation marking and clearance control (area in m ²)	Clearance strictly limited to target vegetation - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Vegetation has been marked for removal prior to construction and strict control on clearing activities to ensure minimal clearance is followed.
Trimming/cutting of trees within ROW	Fire hazards	Trees allowed growing up to a height within the ROW by maintaining adequate clearance between the top of tree and the conductor as per the regulations.	Species-specific tree retention as approved by statutory authorities (average and maximum tree height at maturity, in meters)	Presence of target species in ROW following vegetation clearance - once per site	MPPTCL (Contractor through contract provisions)	Construction period	Species-specific tree retention and vegetation clearance in ROW, as approved by statutory authorities, have been maintained.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
	Loss of vegetation and deforestation	Trees that can survive pruning to comply should be pruned instead of cleared. Felled trees and other cleared or pruned vegetation to be disposed of as authorized by the statutory bodies.	Species-specific tree retention as approved by statutory authorities	Presence of target species in ROW following vegetation clearance – once per site	MPPTCL (Contractor through contract provisions)	Construction period	Species-specific tree retention, as approved by statutory authorities, has been ensured.
Wood/vegetation harvesting	Loss of vegetation and deforestation	Construction workers prohibited from harvesting wood in the project area (apart from locally employed staff continuing current legal activities).	Disposal of cleared vegetation as approved by the statutory authorities (area cleared in m ²) Illegal wood /vegetation harvesting (area in m ² , number of incidents reported)	Use or intended use of vegetation as approved by the statutory authorities – once per site Complaints by local people or other evidence of illegal harvesting - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Felled trees and other cleared or pruned vegetation have been disposed off or handed over to concern, as approved by statutory authorities. Ensured advance arrangement of Fuel and shelters to construction workers to discourage from harvesting wood. No complaints by local people or other evidence of illegal harvesting have been noticed.
Surplus earthwork/soil	Runoff to cause water pollution, solid waste disposal	Soil excavated from tower footings disposed of by placement along roadsides, or at nearby house blocks if requested by landowners.	Soil disposal locations and volume (m ³)	Acceptable soil disposal sites - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Runoff to cause water pollution has been avoided by appropriate & acceptable disposal of soil excavated from tower footings.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual implementation
Site clearance	Vegetation	Tree clearances for easement establishment to only involve cutting trees off at ground level or pruning as appropriate, with tree stumps and roots left in place and ground cover left undisturbed.	Ground disturbance during vegetation clearance (area, m ²) Statutory approvals	Amount of ground disturbance - every 4 weeks Statutory approvals for tree clearances - once for each site	MPPTCL (Contractor through contract provisions) MPPTCL (Contractor through contract provisions)	Construction period Construction period	Tree stumps and roots have been left in place and ground cover has been left undisturbed. Tree clearances have ensured in accordance to statutory approvals.
Tower construction - disposal of surplus earthwork/fill	Waste disposal	Excess fill from tower foundation excavation disposed of next to roads or around houses, in agreement with the local community or landowner.	Location and amount (m ³) of fill disposal	Appropriate fill disposal locations - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Excess fill from tower foundation excavation have been disposed of next to locations, as agreed by local community or landowners.
Storage of chemicals and materials	Contamination of receptors (land, water, air)	Fuel and other hazardous materials securely stored above high flood level.	Location of hazardous material storage; spill reports (type of material spilled, amount (kg or m ³) and action taken to control and clean up spill)	Fuel storage in appropriate locations and receptacles - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Locations and receptacles for storage of fuel and other hazardous material have been closely monitored and no case of contamination of receptors has been identified so far.
Construction schedules	Noise nuisance to neighbouring properties	Construction activities only undertaken during the day and local communities informed of the construction schedule.	Timing of construction (noise emissions, [dB(a)])	Daytime construction only - every 2 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Construction activities have been limited to daytime only.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Provision of facilities for construction workers	Contamination of receptors (land, water, air)	Construction workforce facilities to include proper sanitation, water supply and waste disposal facilities.	Amenities for Workforce facilities	Presence of proper sanitation, water supply and waste disposal facilities - once each new facility	MPPTCL (Contractor through contract provisions)	Construction period	Proper sanitation, water supply and waste disposal facilities have been provided to Construction workforce.
		Use existing access roads wherever possible	Usage of existing utilities	Complaints received by local people /authorities - every 4 weeks	MPPTCL (Contractor through contract provisions)	Construction period	Loss of agricultural productivity have been minimized by using existing access roads, maintaining existing irrigation facilities, reinstate topsoil and damaged buds after construction completed. No Complaints received so far.
Temporary Encroachment into farmland	Loss of agricultural productivity	Ensure existing irrigation facilities are maintained in working condition	Status of existing facilities	Consultation with affected parties - once in a quarter	MPPTCL	Prior to construction	Compensations, as approved by competent authority, for temporary loss in agricultural production have been paid.
		Protect /preserve topsoil and reinstate after construction completed	Status of facilities (earthwork in m ³)				
		Repair /reinstate damaged bunds etc after construction completed	Status of facilities (earthwork in m ³)				
	Social inequities	Compensation for temporary loss in agricultural production	Implementation of Crop compensation (amount paid, dates, etc.)				

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Uncontrolled erosion/silt runoff	Soil loss, downstream siltation;	Need for access tracks minimised, use of existing roads.	Design basis and construction procedures (suspended solids in receiving waters; area re-vegetated in m ² ; amount of bunds constructed [length in meter, area in m ² , or volume in m ³])	Incorporating good design and construction management practices – once for each site	MPPTCL (Contractor through contract provisions)	Construction period	Design basis and construction procedures have been controlled in such a way that possibility of uncontrolled soil erosion/silt runoff totally avoided. Regeneration of vegetation to work area on work completion is allowed.
		Limit site clearing to work areas					
Nuisance to nearby properties	Losses to neighbouring land uses/values	Regeneration of vegetation to stabilise works areas on completion (where applicable)	Contract clauses specifying careful construction practices.	Incorporating good construction management practices – once for each site	MPPTCL (Contractor through contract provisions)	Construction period	Losses to neighbouring lands have not been reported so far. Adequate compensation for actual damages shall be paid as per statutory order
		Avoidance of excavation in wet season					
		Water courses protected from siltation through use of bunds and sediment ponds	Design basis and layout	Incorporating good design engineering practices – once for each site			As possible existing roads have been used for construction.
		Contract clauses specifying careful construction practices.					
		As much as possible existing access ways will be used.					

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
		Productive land will be reinstated following completion of construction	Reinstatement of land status (area affected, m ²)	Consultation with affected parties – twice – immediately after completion of construction and after the first harvest			Affected lands have been reinstated in consultation with affected parties immediately after completion of construction. No complaints so far made by affected parties.
	Social inequities	Compensation will be paid for loss of production, if any.	Implementation of Tree/Crop compensation (amount paid)	Consultation with affected parties – once in a quarter	MPPTCL	Prior to construction	Loss of Trees / Crops during construction, have been compensated by paying compensations as approved by competent authorities.
Inadequate siting of borrow areas	Loss of land values	Existing borrow sites will be used to source aggregates, therefore, no need to develop new sources of aggregates	Contract clauses	Incorporating good construction management practices – once for each site	MPPTCL (Contractor through contract provisions)	Construction period	Good construction management practices have been incorporated.
Health and safety	Injury and sickness of workers and members of the public	Contract provisions specifying minimum requirements for construction camps	Contract clauses (number of incidents and total lost-work days caused by injuries and sickness)	Contract clauses compliance – once every quarter	MPPTCL (Contractor through contract provisions)	Construction period	Contract Clauses has been included specifying establishing the construction & implementation of health and safety plan and training, maintaining records relating to injuries, in prescribed format.
		Contractor to prepare and implement a health and safety plan. Contractor to arrange for health and safety training sessions					

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation	
Inadequate construction stage monitoring	Likely to maximise damages	Training of MPPPTCL environmental monitoring personnel	Training schedules	Number of programs attended by each person – once a year	MPPPTCL	Routinely throughout construction period	Construction stage activities have been closely monitored at higher levels meetings.	
		Implementation of effective environmental monitoring and reporting system using checklist of all contractual environmental requirements	Respective contract checklists and remedial actions taken thereof.	Submission of duly completed checklists of all contracts for each site - once				Implemented effective environmental monitoring and reporting system using standard practices of construction and remedial actions have been taken thereof.
		Appropriate contract clauses to ensure satisfactory implementation of contractual environmental mitigation measures.	Compliance report related to environmental aspects for the contract	Submission of duly completed compliance report for each contract – once				Standard practices of construction have been adopted to ensure satisfactory implementation of environmental aspects for contracts.
Ambient Air/ Noise nuisance	Likely impacts on water quality, health impacts on nearby communities and construction	Controlled construction activities and maintenance of machineries, timely scheduling of construction activities to avoid nuisance to nearby communities.	Construction activities, performance of machineries, dust / noise quality	Dust / particulate matter emission, routine maintenance of machineries, time of construction activities.	MPPTCL / Contractor	During Construction	Construction activities, performance of machineries, dust / noise quality have controlled in specified limits. Tests are being conducted for checking the air quality, water quality and noise level at various substation sites, through the appropriate agency that has the necessary infrastructure.	

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Operation and Maintenance							
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.	Compliance with setback distances ("as-built" diagrams)	Setback distances to nearest houses -- once in quarter	MPPTCL	During operations	Setback distances to nearest objects shall be verified and maintained during routine patrolling.
Equipment submerged under flood	Contamination of receptors (land, water)	Equipment installed above the high flood level (HFL) by raising the foundation pad.	Substation design to account for HFL ("as-built" diagrams)	Base height as per flood design - once	MPPTCL	During operations	Substation has been designed to account for HFL of the area. Maintenance of drainage system done in routine to avoid water logging.
Oil spillage	Contamination of land/nearby water bodies	Substation transformers located within secure and impervious sump areas with a storage capacity of at least 100% of the capacity of oil in transformers and associated reserve tanks.	Substation bunding (Oil sump) ("as-built" diagrams)	Bunding (Oil sump) capacity and permeability - once	MPPTCL	During operations	Spillage oil from any equipment installed in the substation is not allowed, as it is prone to fire hazard. However for storage of oil, appropriate storage tanks are provided to avoid contamination of land / nearby water body.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation	
Inadequate provision of staff/workers health and safety during operations	Injury and sickness of staff /workers	Careful design using appropriate technologies to minimise hazards	Usage of appropriate technologies (lost work days due to illness and injuries)	Preparedness level for using these technologies in crisis – once each year	MPPTCL	Design and operation	Careful design using appropriate technologies has been adopted to minimise hazards. Records related to illness and injuries are being maintained.	
		Safety awareness raising for staff.	Training / awareness programs and mock drills	Number of programs and percent of staff /workers covered – once each year				Training/awareness programs and mock drills for safety and emergency action plan are being organised at field level.
		Preparation of fire emergency action plan and training given to staff on implementing emergency action plan	Provision of facilities	Complaints received from staff /workers every 2 weeks				Staffs have been trained yearly on implementing fire emergency action plan.
		Provide adequate sanitation and water supply facilities	Usage of appropriate technologies (number of injury incidents, lost work days)	Preparedness level for using these technologies in crisis – once a month				Adequate weightage to comply complaints received from staff/workers has been given.
Electric Shock Hazards	Injury/mortality to staff and public	Careful design using appropriate technologies to minimise hazards	Maintenance of fences	Report on maintenance – every 2 weeks	MPPTCL	Design and Operation	Appropriate design and routine maintenance have organized to minimise hazards	
		Security fences around substations	Maintenance of barriers	Maintenance of Anti Climbing Devices is done in routine.				

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
		Appropriate warning signs on facilities	Maintenance of warning signs				Warning signs used on towers are maintenance free.
		Electricity safety awareness raising in project areas	Training /awareness programs and mock drills for all concerned parties	Number of programs and percent of total persons covered – once each year			Training /awareness programs and mock drills have been arranged in routine.
Fire hazards during operation phase	Hazardous to lives and loss of valuable assets	Proper maintenance of line and substation equipments, adequate clearances, clear ROW	Routine checks and maintenance of line and s/s equipments, Trimming of trees & clearing of bush and grass in flash over zone.	Fort-nightly, Monthly, Half yearly and annual maintenance	MPPTCL	Operation	Proper maintenance of line and substation equipments, adequate clearances and clear ROW has been ensured by defined maintenance schedule.
Operations and maintenance staff skills less than acceptable	Unnecessary environmental losses of various types	Adequate training in O&M to all relevant staff of substations and transmission line maintenance crews. Preparation and training in the use of O&M manuals and standard operating practices.	Training/awareness programs and mock drills for all relevant staff	Number of programs and percent of staff covered – once each year	MPPTCL	Operation	Yearly Training/awareness programs and mock drills for all relevant staff have been organized locally at field levels. Yearly Training related with O&M manuals and standard operating practices have been organized at division levels.
Inadequate periodic environmental monitoring.	Diminished ecological and social values.	MPPTCL staff to receive training in environmental monitoring of project operations and maintenance activities.	Training/awareness programs and mock drills for all relevant staff	Number of programs and percent of staff covered – once each year	MPPTCL	Operation	Yearly Training/awareness programs and mock drills for all relevant staff have been organized at circle levels.

Project activity /stage	Potential impact	Proposed mitigation measure	Parameter to be monitored	Measurement and frequency	Institutional responsibility	Implementation Schedule	Actual Implementation
Equipment specifications and design parameters	Release of chemicals and gases in receptors (air, water, land)	Processes, equipment and systems using chloro fluoro carbons (CFCs), including halon, should be phased out and to be disposed of in a manner consistent with the requirements of the Government.	Process, equipment and system design	Phase out schedule to be prepared in case still in use – once in a quarter	MPPTCL	Operations	There is no use of CFCs including its halon in any process, equipment or system design in use for construction or O&M of Transmission line and sub station in MPPTCL.
Transmission line maintenance	Exposure to electromagnetic interference	Transmission line design to comply with the limits of electromagnetic interference from overhead power lines	Required ground clearance (meters)	Ground clearance - Once	MPPTCL	Operations	Setback of dwellings to overhead line route and tower are being maintained in accordance with design to limit power frequency EME.
Noise related	Nuisance to neighbouring properties	Substations sited and designed to ensure noise will not be a nuisance.	Noise levels (dB(a))	Noise levels at boundary nearest to properties and consultation with affected parties if any - once	MPPTCL	Operations	Noise level has been kept within specified limit by appropriate maintenance of S/S equipments. Tests are being conducted for checking the air quality, water quality and noise level at various substation sites, through the appropriate agency that has the necessary infrastructure

DETAILS OF CROP/TREE COMPENSATION PAID/PENDING TO THE CULTIVATORS WHOSE CROP DAMAGED/TREE CUT DURING CONSTRUCTION OF TRANSMISSION LINES

Sr. No.	Name of Transmission line	Total cases where crop damaged / free cut		Cases where crop/tree compensation paid		Cases where crop/tree compensation being paid	
		No. of cultivators	Total crop compensation fixed (Rs. in lacs)	No. of cultivators	Amount paid (Rs. in lacs)	No. of cultivators	Amount to be paid (Rs. in lacs)
AJ LOAN NO. 2323							
1	220kV Jabalpur-Narsinghpur line	448	39.70	300	26.14	148	13.56
2	220kV Jabalpur-Itarsi line	25	1.92	10	1.14	15	0.78
3	220kV Bhopal-Astha	295	7.51	288	7.31	7	0.20
4	220kV Bhopal-Ashta line	1 (Mango Tree)	0.07	1	0.07	NIL	NIL
5	220kV Shujalpur-Rajgarh	291	6.14	286	6.12	5	0.02
6	220kV Betul-Chhindwara	12	0.69	12	0.69	-	-
7	LILO of 1st circuit of 220kV Damoh-Bina line for 220kV S/s Sagar	24	0.69	21	0.64	3	0.05
8	LILO of 2nd circuit of 220kV Bina-Damoh for 220kV S/s Sagar	60	2.01	60	2.01	-	-
9	Re-routing of 220kV Makronia Traction line through 220kV S/s Sagar	6	0.46	6	0.46	-	-
10	LILO of one circuit of 220kV Satpura-Itarsi for Handia	107	13.28	107	13.28	-	-
11	220kV LILO Ujjain-Kota-Modak	23	0.79	23	0.79	-	-
12	220kV LILO for Badod	7	0.29	7	0.29	-	-
13	220kV LILO Pithampur-Ratlam for Badnagar	2	0.10	2	0.10	-	-
14	220kV Chhegaon-Nimrani line	308	12.79	308	12.79	-	-
15	220kV Astha-Berchha-Shajapur	50	1.75	-	-	50	1.75
SUB TOTAL (A)		1659	88.192	1431	71.832	228	16.36
BJ LOAN NO. 2346							
1	132kV Prithvipur-Jatara line	38	1.35	-	-	38	1.35
2	132kV Rajgarh-Biora	38	0.64	36	0.63	2	0.01
3	132kV Maksudangarh-Biora	79	1.58	73	1.52	6	0.06
4	132kV Rajgarh-Raghogarh	3	0.04	3	0.04	-	-
5	2nd circuit of 132kV Shujalpur-Srangpur line	31	0.58	31	0.58	-	-
6	132kV Harda-Khirkiya-Chhanera line	253	12.83	253	12.83	-	-
7	132kV indore-II-Depalpur	29		Pending with Revenue Authorities			
8	132kV Pithampur-Betma	48	3.93	-	-	48	3.93
9	132kV Pithampur-Bagdi	87	5.89	27	2.13	60	3.76
10	132kV Nimrani-Kasrawad	22	0.56	22	0.56	-	-
11	132kV Nimrani-Julwania	135	3.26	128	3.08	7	0.18
12	132kV Nimrani-Badwani	80	2.58	-	-	80	2.58
13	132kV LILO of Ujjain-Gandhisagar	34	3.83	34	3.83	-	-
14	132kV Nimrani-Manawar line	2	0.25	2	0.25	-	-
SUB TOTAL (B)		879	37.32	609	25.45	241	11.87
CJ LOAN NO. 2323 SAVING COMPONENT - I							
1	132kV Satna-Pawai line	138	6.29	137	6.25	1	0.04
2	LILO of 220kV Birsinghpur-Amkantak line up to 220kV S/s Sukha	24	0.50	19	0.41	5	0.09
SUB TOTAL (C)		162	6.79	156	6.66	6	0.13
TOTAL		2700	132.302	2196	103.942	475	28.36