

# Environmental Monitoring Report

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Semiannual Report  
August 2015

## IND: Railway Sector Investment Program

Prepared by Ministry of Railways for the Government of India and the Asian Development Bank.

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# Indian Government Ministry of Railways Asian Development Bank

Multitranche Financing Facility No. 0060-IND  
Loan No. 2793-IND, 3108-IND  
Railway Sector Investment Program  
Track Doubling and Electrification on Critical Routes

Environmental Monitoring Report  
Semi Annual Report: October 2014 - March 2015

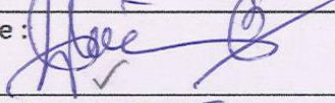


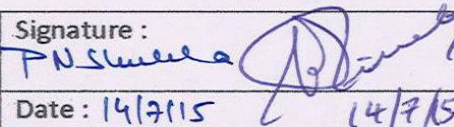


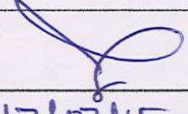
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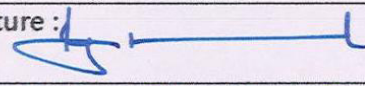
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**Abbreviations**

ADB	Asian Development Bank
AIDS	Acquired Immuno Deficiency Syndrome
CtE	Consent to Establish
CtO	Consent to Operate
DG	Daund-Gulbarga
EHS	Environmental Health and Safety
EMP	Environmental Management Plan
FFA	Framework Financing Agreement
GC	General Consultant
HIV	Human Immunodeficiency Virus
HT	Hospet-Tinaighat
IEE	Initial Environmental Examination
IPP	Indigenous Peoples Plan
MoR	Ministry of Railways
NOC	No Objection Certificate
PCB	Pollution Control Board
PG	Pune-Guntakal
PIU	Project Implementation Unit
PMC	Project Management Consultant
PPE	Personal Protective Equipment
RP	Resettlement Plan
RSIP	Railway Sector Investment Program
RT	Raipur-Titlagarh
RVNL	Rail Vikas Nigam Limited
ST	Sambalpur-Titlagarh
STD	Sexually Transmitted Diseases

## Executive Summary

This report is the 4<sup>th</sup> semi-annual report on environmental safeguards compliance of the five projects under the Railway sector Program (RSIP) under Multitranche Financing Facility No.0060-IND:

1. Doubling of Daund - Gulbarga
2. Doubling of Sambalpur - Titlagarh
3. Doubling of Raipur - Titlagarh
4. Doubling of Hospet - Tinaighat
5. Electrification of Pune - Wadi - Guntakal

The above projects are further divided into 17 construction packages. The contracts of 15 construction packages have been awarded and the construction are in progress on those 15.

The present report is a summary of Environmental Management Plan (EMP) implementation in the different construction packages. The reporting period is from October 2014 to March 2015. This report reviews the status of EMP implementation, compliance with environmental regulations of the Government and policies of ADB, compliance with environmental loan covenants, complaints received and their redressal.

The responsibility for implementing environmental safeguards during construction lies primarily with the contractors whereas the Project Management Consultant (PMC) has got a supervisory role including monitoring of compliance of environmental safeguard measures by the contractor. Monitoring of compliance with EMP is a continuous activity carried out by the PMC and Project Implementation Unit (PIU).

In general, the contractors are complying with most of the mitigation measures described in EMP and the contract specifications.

During the reporting period no significant noncompliance has been observed with respect to implementation of environmental safeguards. There has been no report of any major accident from usage of materials, working conditions or work process. It was ensured that all deep trenches at work sites are shored and fenced and borrow pits are rehabilitated as per EMP. Emphasis has been given to the use of Personal Protective Equipments (PPEs) by all construction workers particularly those of sub-contractors. With respect to the labour camps, general conditions have improved in all the packages compared to the last reporting period. However, attention is required in some packages, especially in sub-contractor's labour camps. The periodical monitoring of environmental attributes with respect to air quality, water quality and noise levels has been undertaken and meets the requirement of relevant standards.

Periodical informal and formal training on environmental and safety issues have been undertaken for motivating the workers towards importance of environment and safety and effective implementation of environmental safeguard measures at various locations. Periodical safety, AIDS/HIV awareness and health camps have been organized by the contractors from time to time in all the packages.



## 1. Project background

The Ministry of Railway (MoR), Government of India has taken up 5 projects of doubling of existing single railway track and electrification under Railway Sector Investment Programme (RSIP) with financial assistance of Asian Development Bank (ADB) under Multi Tranche Financing Facility No. 0060-IND. The total track length involved is about 1500 km spread across the states of Maharashtra, Karnataka, Andhra Pradesh, Chhattisgarh and Odisha. Under this programme, 4 doubling projects and 1 electrification project have been included.

A Framework Financing Agreement was signed on 8<sup>th</sup> July 2011 between Government of India through the MoR and ADB for the implementation of the RSIP. The total cost of the RSIP covered by this framework agreement is expected to be 1,144.6 million equivalents USD, out of which 500 million USD (43.7%) will be financed by ADB and remaining 644.6 million USD by India.

Rail Vikas Nigam Limited (RVNL) is the Implementing Agency for those projects.

The location of the projects is shown as red and blue in the map (Figure 1) here under:

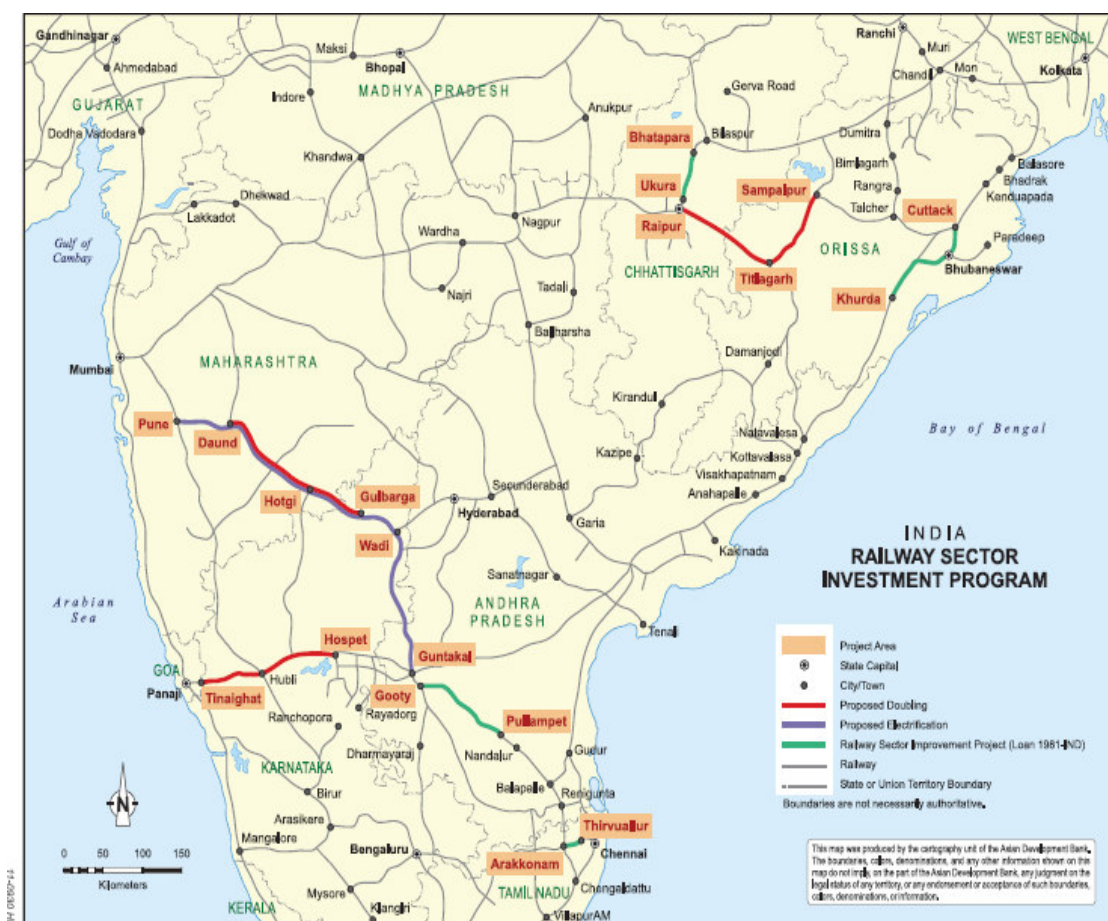


Figure 1: Map of India showing Track Doubling and Electrification Projects

These projects have been further divided into 17 construction packages and 15 package wise contracts have already been awarded to contractors. The details of projects and subprojects (construction packages) and their locations are presented in the following table:

No.	Project Name	Length (km)	Subproject	Location
i.	Doubling of Daund - Gulbarga (DG)	224	DG-1: Bhigwan-Mohol DG-2: Hotgi-Gulbarga	Maharashtra, Karnataka and Andhra Pradesh
ii.	Doubling of Sambalpur - Titlagarh (ST)	182	ST-1: All Major Bridges ST-2: Sambalpur-Barapali ST-3: Barapali-Bolangir ST-4: Bolangir-Titlagarh	Odisha
iii.	Doubling of Raipur - Titlagarh (RT)	203	RT-1: Titlagarh-Lakhana RT-2: Lakhana-Arand RT-3: Arand-Raipur	Odisha and Chhattisgarh
iv.	Doubling of Hospet - Tinaighat (HT)	229	HT-1: Hospet-Hariapur HT-2: Harlapur-Dharwar HT-3: Kambarganavi-Tinaighat	Karnataka
v.	Electrification of Pune - Wadi - Guntakal (PG)	641	PG-1: Pune-Bhigwan & Gulbarga-Wadi PG-2: Wadi-Raichur PG-3: Raichur-Guntakal PG-4: Bhigwan-Mohol PG-5: Mohol-Gulbarga	Maharashtra, Karnataka and Andhra Pradesh

**Table 1: List of Track Doubling and Electrification Sub-Projects**

The scope of projects (i) to (iv) above is to provide a second line along the existing single line by constructing the roadbed and either extending or constructing new bridges, providing facilities for passenger and staff, laying track, signalling and telecommunications and general electrical works. For project number (v) the scope is to provide overhead Railway electrification.

The key activities involved are laying of formation for double track, construction of new bridges including Rail under Bridges (RUB) and Rail over Bridges(ROB). Other important activities are:

- Gradient and curve improvement,
- Construction of side drains,
- Shifting of existing roads at certain locations and construction of approach roads near bridge locations,
- Dismantling, renovation or new construction of platforms,
- Dismantling/ construction of foot over bridges,



- Dismantling /building of loops,
- Construction of quarters for staffs with all basic amenities.
- Temporary workshops, offices and construction camps.

The works have been awarded for 15 packages and construction activities are under progress. The contract package RT-2 of Raipur-Titlagarh project, which was earlier terminated due to non performance of the contractor, has been re-awarded to different contractor in the month of February and the contract is in initial stage of mobilisation. The contract packages PG-4 and PG-5 of Electrification of Pune-Wadi-Guntakal project will be awarded once the doubling of track is in a more advance stage.

## **2. Environmental categorisation of the projects**

The 5 projects have been classified under “Category- B” projects in accordance with the ADB categorization criteria based on ADB’s Environmental Assessment Guidelines 2003, and Safeguard Policy Statement 2009. The project components will only have small-scale, localized impacts on the environment, and can be mitigated with implementation of suitable mitigation measures. So the projects required only Initial Environmental Examination (IEE) for meeting the environmental requirements under the ADB’s policy. For each project under RSIP, a separate IEE report has been prepared, and based on the findings of the study with respect to the anticipated environmental impacts, an Environmental Management Plan (EMP) has been formulated for mitigating and managing the anticipated adverse environmental impacts and enhancing the efficiency of environmental components wherever it is possible. This IEE report was prepared on the basis of detailed screening and analysis of all environmental parameters, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation per ADB’s Safeguard Policy Statement 2009. The recommended EMP has been included in the bidding and contract documents of each construction package. A separate budgetary allocation for implementation of EMP has also been included in the contracts.

## **3. Scope of the present report**

The present report is a consolidated report on status of implementation of Environmental Management Plan (EMP) from October, 2014 to March 2015, and is prepared in compliance with the ADB policies. The report covers the status of compliance with environmental regulations of the government and policies of ADB, compliance with environmental loan covenants, complaints received and their redressal and compliance with various aspects of EMP as stated in the IEE report. The information presented in this report is mainly based on observations made during field inspections jointly carried out by RVNL, the PMC and the contractor, and periodical inspection of the General Consultant (GC) as well as the records provided by the contractor through the PMC.

## **4. Approach and methodology adopted for monitoring of compliance with EMP**

The responsibility for implementing environmental safeguards at site during construction lies primarily with the contractors. Each contractor has appointed their EHS experts in their respective construction package to ensure implementation of environmental safeguards measures as stipulated in the EMP and contract documents.

For ensuring effective implementation of environmental safeguards and monitoring the compliances with the requirements stipulated in EMP and the contract, RVNL has appointed a Project Management Consultant (PMC) for each construction package with supervisory role including monitoring of compliance of environmental safeguard measures implemented by the contractor as per conditions of Contract Agreement, EMP and prevailing environmental statutes and regulations.

In PMC teams Environmental Officers have been appointed in each construction package whose primary responsibilities are to:

- Serve as the primary point of contact for environmental matters
- Manage the development, evaluation and oversight of the EMP implementation
- Provide feedback and recommendations to Project Manager
- Reporting and recording keeping

The Environmental Officers of PMC undertakes inspection and monitoring of environmental activities along with quality control activities on regular basis. For monitoring and reporting related to environmental activities various checklists and formats are being used.

It is also to be ensured that the monitoring of components such as ambient air quality, water quality and noise levels are being carried out in accordance with environmental monitoring plans provided in the EMP.

RVNL has appointed a General Consultant (GC) to monitor the overall progress of the projects including performance of safeguard measures related to environmental protection. There is provision of an Environmental Expert in the GC team with following responsibility:

- Overall progress monitoring on EMP implementation,
- Review the compliance with statutory requirements,
- Preparation of quarterly and semiannual reports,
- Providing trainings for capacity enhancement of RVNL, PMC and Contractors staff on environmental issues.

A guideline on general construction Environmental Health and Safety (EHS) measures to be followed / implemented based on EMP requirements in the RSIP projects has been prepared and issued by the General Consultant to the Contractors and PMCs. Reporting formats have been developed which are to be filled up by the Contractor and PMC on compliance with EMP to compile information on safeguards on a monthly basis to maintain effectiveness of monitoring as well as uniformity in reporting in all the construction packages.

RVNL has nominated Environmental Focal Persons both at corporate level as well as at all the 5 PIUs to oversee the implementation of environmental safeguards, coordination with stakeholders, government officials and regulatory authorities on environmental issues, addressing the public grievances on environmental issues.

## **5. Environmental monitoring performance**

For effective monitoring of environmental compliance, environmental performance indicators have been identified which are assessed qualitatively and quantitatively on periodic basis during project execution. The various environmental indicators selected are based on physical, chemical and biological parameters. The parameters selected as performance indicators are as follows:

- (i) Compliance with loan covenants
- (ii) Compliance with state and national statutes & regulations
- (iii) Compliance with the Environmental Management Plan

- (iv) Monitoring of environmental quality in terms of air, water and noise quality at critical locations and comparison with baseline environmental quality and state/National Standards

## 5.1 Compliance with loan covenants, state and national statutes & regulations

### a) Compliance the Covenants stipulated in the Loan Agreement

The Framework Finance Agreement (FFA) was signed between the Government of India and ADB on 8th July, 2011.

The Schedule 4 of the FFA stipulates the environmental considerations whereas the Schedules 4 and 5 of Loan Agreement (Ordinary Operations) stipulates the requirements of environmental safeguards. The project's compliance to requirements on environment safeguards is as follows:

S.N.	Loan Covenants	Status of Compliance
A.	<b>FRAMEWORK FINANCING AGREEMENT</b>	
1	<p><b>Schedule 4 A. 1(iv):</b></p> <p>The project will also be environmentally and socially sound and include measures to mitigate any possible environment and social impacts in accordance with the safeguard framework-1 prepared (Schedule 5) and Safeguard Policy Statement (SPS) 2009. For each project, a poverty and social analysis will be conducted in accordance with ADBs guidelines on poverty and social assessment. Similarly, an environmental assessment will be carried out for each project in accordance with the SPS 2009.</p> <p>All measures and requirements set forth in the respective initial environmental examination. ("IEE"), environment impact assessment ("EIA") and environmental management plan ("EMP"), and any corrective or preventative actions set forth in a safeguards monitoring report, MOR and RVNL shall ensure that all bidding documents and contracts for works contain provisions that require contractors to comply with the measures and requirements relevant to the contractor set forth in the IEE/EIA, the EMP, the RP and the IPP (to the extent they concern impacts on affected people during construction), and any corrective or preventative actions set out in the safeguards monitoring report.</p>	<p>Complied.</p> <p>For each project IEE has been prepared on the basis of detailed screening and analysis of all environmental parameters, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation per ADB's Safeguard Policy Statement 2009. The Environmental Management and Monitoring Plans have been formulated for all the projects and are the part of tender documents.</p> <p>During construction it has been ensured that all the necessary permits/ approvals/ licenses are obtained. Adequate actions on environmental safeguard have been undertaken during construction in accordance with the EMP.</p>



S.N.	Loan Covenants	Status of Compliance
2	<p><b>Schedule 4 A. 1(iv):</b></p> <p>For each project, all necessary government approvals will be obtained, including MOR, ministry of environment and forest, pollution control boards, and other relevant agencies, as applicable.</p>	<p>Complied</p> <p>The necessary approvals and licenses in each project have been ensured. The status of clearances/approvals/ licenses as up to March, 2015 is presented in Table 3</p>
<b>B.</b>	<b>LOAN AGREEMENT (ORDINARY OPERATIONS)</b>	
3	<p><b>Schedule 4 B: Approval Procedure</b></p> <p>2. All projects will be prepared and processed in accordance with the procedures set out below.</p> <p>(i) MOR will select a possible project from railway priority, which is part of the existing network implemented by the MOR. MOR will then conduct a feasibility study for the project including its cost estimate, technical and economic analysis. MOR will also prepare (a) an initial poverty and social assessment (IPSA) and fill out a checklist for (b) involuntary resettlement; (c) indigenous people; and (d) complete the Rapid Environmental Assessment (REA) checklist for screening of environmental issues.</p>	<p>Rapid Environmental Assessment has been prepared for all the projects and accordingly categorization of all the 5 projects has been done. The projects have been categorized as “Category-B” projects based on environmental issues and hence only IEE was required for the projects. The IEE reports have been approved by ADB and disclosed to public on website.</p>
	<p><b>Schedule 4: Conditions for Award of Contract:</b></p> <p><b>Para 6:</b> The borrower shall not award any works contract for any part of the project which involves environmental impacts until RVNL has</p> <p>(a) Obtained the final approval of the IEE from the relevant Environment Authority of the Borrower</p> <p>(b) Incorporated the relevant provisions from the EMP into the Works contract.</p>	<p>Complied</p> <p>The approved EMP has been incorporated into all the contract agreements for all the construction packages.</p>
4	<p><b><u>Schedule 5: Execution of Project; Financial Matters:</u></b></p> <p><b>Environment Para 7 (b)</b> The Borrower shall ensure, and cause to MOR and RVNL to ensure, that works under a contract shall not be commenced in the relevant section, until forestry clearance and permits from Pollution Control Boards for Operation of Hot Mix Plants are obtained.</p>	<p>Complied</p> <p>No Hot Mix Plant has been installed in any of the Contract packages.</p>
5	<p><b><u>Schedule 5: Execution of Project; Financial Matters:</u></b></p>	

S.N.	Loan Covenants	Status of Compliance
	<p><b>Safeguards related Provisions in Bidding Documents and Works Contract: Para 12:</b> The borrower shall ensure, and cause MOR and RVNL to ensure that all bidding documents and contracts for works contain provisions that require contractors to</p> <ul style="list-style-type: none"> <li>(a) Comply with the measures and requirements relevant to the contractor set forth in the IEE, the EMP, the RP and the IPP (to the extent they concern impacts on affected people during construction), and any corrective or preventive actions set out in a Safeguard Monitoring Report.</li> <li>(b) Make available a budget for all such environmental and social measures; and</li> <li>(c) Provide the Borrower and ADB with a written notice of any unanticipated environmental, resettlement or indigenous people risks or impacts that arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP, the RP or the IPP.</li> </ul>	<p>Being complied with</p> <p>Environmental monitoring and mitigation costs allocated/incorporated in contract agreement.</p> <p>No such incidence has appeared till date.</p>
6	<p><b><u>Schedule 5: Execution of Project; Financial Matters:</u></b></p> <p><b><u>Safeguards Monitoring and Reporting (Para 13) :</u></b> The Borrower shall do the following and shall cause MOR and RVNL to the following:</p> <ul style="list-style-type: none"> <li>(a) Submit semi-annual Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission.</li> <li>(b) If any unanticipated environmental and/or social risk and impacts arise during construction, implementation or operation of the Project that were not considered in the IEE, the EMP, the RP or the IPP promptly inform ADB of the occurrence of such risks or impacts, with detailed description of the event and proposed corrective action plan.</li> <li>(c) Report any actual or potential breach of compliance with the measures and</li> </ul>	<p>The semi-annual report has been prepared as per the guidelines.</p> <p>No such environmental risk has been encountered in any of the projects. Will be complied in case such unanticipated incidence appears in future.</p> <p>No breach of compliance recorded in any of the projects till date.</p>

S.N.	Loan Covenants	Status of Compliance
	requirements set forth in the EMP, the RO or the IPP promptly after becoming aware of the breach.	

Table 2: Compliance status with Loan Covenants

**b) Compliance with state and national statutes & regulations:**

The requirement of statutory permits/clearances and the status of compliance with state and national statutes and regulations in each package of all the 5 projects till the reporting period are presented in Table 3.

Name of the project	Sub project	Section	Clearance for Diversion of Forest land Under Forest Conservation Act, 1980	Permission for Tree Felling Under Forest Conservation Act, 1980	Labour License Under Labour Rules	Quarry License From Department of Mines and Geology	Environmental Clearance for Quarry Under (Environment Protection) Act	NOC For Stone Crusher Plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974	NOC for Batching plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974
<b>Hospect-Tinaighat</b>	HT-1	Hospet-Harlapur	NA	Obtained	Obtained and renewed	Obtained	Obtained	Obtained. Plant yet to be commissioned	Obtained
	HT-2	Harlapur-Dharwar	NA	NA	Obtained and renewed	Not obtained (The contractor is presently not operating their own quarry and is procuring the materials from third party licensed quarry)	Not obtained (The contractor is presently not operating their own quarry and is procuring the materials from third party licensed quarry)	Not yet obtained (The plant erected by the contractor is presently non operational and is procuring the materials from third party)	Contractor using mobile batch mixers for concrete work not requiring NOC from PCB
	HT-3	Kambargana vi-Tinaighat	NA	Obtained	Obtained	Obtained	Obtained	Obtained	Obtained
<b>Sambalpur-Titlagarh</b>	ST-1	Important bridges	NA	Obtained	Obtained	NA	NA	NA	Obtained for 1 plant, application in



Name of the project	Sub project	Section	Clearance for Diversion of Forest land Under Forest Conservation Act, 1980	Permission for Tree Felling Under Forest Conservation Act, 1980	Labour License Under Labour Rules	Quarry License From Department of Mines and Geology	Environmental Clearance for Quarry Under (Environment Protection) Act	NOC For Stone Crusher Plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974	NOC for Batching plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974
									process for rest two plants.
	ST-2	Sambalpur-Barapali	NA	Obtained	Obtained	NA	NA	CtE obtained, applied for CtO for plant at Katapali	CtE obtained for plant at Suktapali. CtO in progress
	ST-3	Barapali-Bolangir	NA	Obtained	Obtained	NA	NA	NA	CtE & CtO obtained for plant at Bendra, Loisingha
	ST-4	Bolangir-Titlagarh	NA	Obtained	Obtained	NA	NA	NA	CtE & CtO obtained for Batch Mix and Wet Mix Plant Saintala station
<b>Raipur-Titlagarh</b>	RT-1	Titlagarh-Lakhana	NA	Obtained	Obtained	Obtained	Obtained	Obtained	Contractor using mobile

Name of the project	Sub project	Section	Clearance for Diversion of Forest land Under Forest Conservation Act, 1980	Permission for Tree Felling Under Forest Conservation Act, 1980	Labour License Under Labour Rules	Quarry License From Department of Mines and Geology	Environmental Clearance for Quarry Under (Environment Protection) Act	NOC For Stone Crusher Plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974	NOC for Batching plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974
									concrete batch mixers for concrete work not requiring NOC from PCB
	RT-2	Contract awarded on 9 <sup>th</sup> February, 2015. The Contractor is in the initial stage of mobilization.							
	RT-3	Arand-Raipur	NA	Obtained	Obtained	NA	NA	NA	Obtained
Daund-Gulbarga	DG-1	Bhigwan-Mohol	NA	Obtained	Renewed	Obtained	Obtained	Obtained	Contractor using mobile concrete batch mixers for concrete work not requiring NOC from PCB
	DG-2	Hotgi-Gulbarga	NA	Obtained	Obtained	Under process	Obtained	Obtained	Contractor using mobile concrete

Name of the project	Sub project	Section	Clearance for Diversion of Forest land Under Forest Conservation Act, 1980	Permission for Tree Felling Under Forest Conservation Act, 1980	Labour License Under Labour Rules	Quarry License From Department of Mines and Geology	Environmental Clearance for Quarry Under (Environment Protection) Act	NOC For Stone Crusher Plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974	NOC for Batching plant from PCB under Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974
									batch mixers for concrete work not requiring NOC from PCB
Pune-Guntakal	PG-1	Pune-Bhigwan and Gulbarga-Wadi	NA	NA	Obtained	NA	NA	NA	NA
	PG-2	Wadi-Raichur	NA	NA	Obtained	NA	NA	NA	NA
	PG-3	Raichur-Guntakal	NA	NA	Obtained	NA	NA	NA	NA

Table 3: Package wise status of compliance with state and national statutes &amp; regulations

## 5.2 Compliance with the Environmental Management Plan

An EMP which addresses the potential impacts and risks identified by the environmental assessment has been included in the IEE report. The level of details and complexity of the EMP and the priority of the identified measures and actions are commensurate with the project's impact and risks. The EMP is part of bidding and contract documents. The contractor has to comply with the environmental safeguards measures stipulated in the EMP.

During the reporting period, the following major environmental issues were reviewed:

- Pollution control measures at all potential source
- Borrow area/ quarry operations and rehabilitation
- General safety at different sites (construction site, plant site, borrow areas, stockyards, etc.)
- Maintenance of facilities and general housekeeping at each construction camp site.
- Medical facility at camps, construction sites and plant sites
- HIV/AIDS awareness and health check up programme
- Supply and use of Personal Protection Equipments (PPE) for all the workers at all worksites
- Maintenance of general public safety.

### 5.2.1 Compliance with pollution control measures at construction and plant sites:

In the projects the dust generation and gaseous emission due to operation of heavy machineries and construction vehicles are the main source of air pollution. In doubling project packages there are mainly two types of mechanical plants in use: stone crusher units and batching/concrete mix plants. Stone crusher units have been established in construction package HT-2, HT-3 of Hospet-Tinaighat project, DG-1, DG-2 of Daund-Gulbarga project, ST-2 of Sambalpur-Titlagarh project and RT-1 in Raipur-Titlagarh project. Batching plants have been established in construction packages HT-1, and HT-3 of Hospet-Tinaighat project, RT-3 of Raipur-Titlagarh project, all packages of Sambalpur-Titlagarh project. On other subprojects concrete mobile batch mixers are being used.

The dust control measures in all the construction packages at different locations have been found to be satisfactory. Regular water sprinkling in all the construction zones are being ensured to control dust generation effectively. In construction packages, where stone crusher plants and batching plants are installed, installation of dust suppression system at plant and their maintenance to worthy conditions have been ensured. Regular sprinkling of water within the plant premises and earthen roads is carried out to control dust emission. The dust control measures at stone crusher and batching plant have been found to be satisfactory in all the packages. All the Contractors have been advised to observe the dust control measures as per Pollution Control Board's norms at all their plant all the time. For ensuring emission control from heavy construction vehicles, the contractor are instructed to get valid Pollution Under Control (PUC) certificates on periodical basis.

The gensets installed at all these plants are advance units with noiseless equipments. The gaseous emission and noise level have been observed to be in control.

It has been ensured that no debris is disposed of and no construction material is placed on waterways at bridges under construction. Also, contractors have been instructed to dispose of



bentonite waste in a proper manner during execution of bored cast in situ piles while construction of major bridges to avoid pollution of the river.

At campsite septic tank with soak pits have been provided. Drains are connected with soak pits in all the construction camps which are situated near natural water ways. The labour camp in package RT-3 which was established at the river bank, has been shifted in order to avoid any chance of contamination of water. In construction package ST-1 improvement is required in removal of debris from the bridge construction sites.

It has also been ensured that the drums of diesel and other petroleum products are stored on impervious platforms in order to avoid land contamination.

### **5.2.2 Compliance with EMP implementation at quarry sites and borrow areas:**

It is being ensured that the proposed quarry sites and borrow areas are devoid of any sensitive socio-environmental features and that any adverse socio-environmental impact due to their operation is avoided. No borrow area is operational without written consent of the land owner. The selection and operation of the borrow area is in accordance with the guidelines provided in the EMP as well as the Ministry of Environment and Forest (MoEF). Emphasis has been given to suitably rehabilitate the proposed area after completion of the material extraction and thereby helping in enhancing the physical environmental condition of the area producing overall socio-economic benefits. Contractors are being continuously motivated to comply with such requirement of EMP. The measures taken for controlling fugitive dust emission during the excavation, loading and transportation of materials at all the operational quarries and borrow areas are satisfactory.

Special emphasis has been given on rehabilitation of borrow areas after completion of extraction of materials. It has been ensured all borrow area lying near community area are not left abandoned to be filled with water during monsoon resulting in multiplication of mosquitos and other water borne hazards. In all the construction packages the rehabilitation activities as per land owner's requirement have been taken up by the contractor before handing over the land back to the land owner.

### **5.2.3 Compliance with safety requirements at site:**

The implementation of safety measures at all the construction and plant sites has improved due to continuous efforts of PMC and PIU as well as sensitization by the General Consultant's team from time to time. It has been ensured that in all the construction packages the contractors have supplied sufficient quantities of PPEs to their workers as per requirement. The contractors organize periodical in house safety awareness training for motivating and encouraging their workers to use the PPEs during works. The problem of personnel safety in local labours still persist and there is frequent change in local labours. Some safety lapses in execution of works have been observed in the sections where sub-contractors are working. This requires proper attention to address this issue in an effective manner. Such type of problem is prominent in sub-contractor's section of construction packages DG-1, DG-2, HT-2, HT-3, ST-1 and ST-3. The contractors using tripod rigs for installation of piles for construction of major bridges as observed in ST-1 package must ensure necessary safety measures like periodical checking of pulley, rope slings and proper guarding of flywheels.

#### 5.2.4 Traffic and public safety:

Traffic and public safety arrangements at different sites specially near the track, level crossing, cross roads, etc. have been maintained satisfactorily in all the construction packages. The safety fencing along the track has been restored at most of the places except in some patches of DG-2, HT-2 and RT-3. However, regular maintenance of safety fencing along the railway track is required throughout the construction period. Additional safety measures have been provided in the form of advance warning like safety signboards, flag man at the blind junctions of temporary construction roads and traffic roads (such as near Railway Crossings on main road), another at temporary access road used for crossing the main road mainly by construction vehicle.

#### 5.2.5 Compliance with EMP at workers/labour camps:

Mostly local labours have been engaged. There are labour camps for migrant labours in DG-1, DG-2, HT-1, HT-2, HT-3, RT-1 and ST-1 packages. In packages ST-1, ST-2, ST-3 and ST-4 the contractor has provided labor camp of prefabricated materials. The camps have been provided with adequate toilets and bathrooms, drainage system, septic tanks with soak pits and facility for garbage collection and disposal. Similar facilities for labour camps have been provided in package RT-1, HT-1 and HT-3. In other construction packages the dwelling units for labor is either made up of galvanized iron sheet or polythene huts. In PG-2 and PG-3 mainly local labours have been engaged and the contractor has hired flats in the town area for their operators and other skilled labours. In PG-1 containers have been provided with all facilities for workers. Mobile toilets have also been provided for labours in construction package PG-1. In general lack of collection and disposal facilities for garbage and other wastes has been observed in almost all the camps. In packages HT-3, RT-1, DG-1 and DG-2, both male and female labours are living in labour camps. In packages HT-3, RT-1 and DG-2 separate toilets and bathroom facilities for male and female labourers have been provided. However in package DG-1 separate toilets for male and female labours are required to be provided.

Special emphasis has been given on maintaining proper hygienic condition at all the campsite and the same were monitored on regular basis. It has been ensured that at all camp sites all blocked drainage are being cleared, water is drained out from water logged area, weeds grown due to rains are cleared from the premises and bleaching powder and insecticides are sprayed periodically at all the potential sites of spreading of diseases and breeding of mosquitoes. However attention is required for further improvement in living conditions for labours in the labours camps in construction camps of HT-2 and sub-contractor's camp in package DG-1. The contractors of these packages have been requested to provide and maintain all the basic facilities at camps in accordance with the EMP and statutory norms.

#### 5.2.6 Debris management

The debris generated due to construction activities mainly consist of good earth suitable for formation work. The excavated earth during the excavation has been stacked on adjacent ground within the railway land for reuse in embankment slopes, temporary access road, horticulture purpose and for backfilling of borrow areas.

#### 5.2.7 Medical facility at camps, construction sites and plant sites

It is being ensured that at all the worksites including construction zones, camp and plant sites first aid kit is always available. It has also been advised to have a contract with local hospitals/health

centers to provide immediate medical assistance to the workers in case of accidents or sickness. This facility has been now been established in all the construction packages.

### 5.2.8 Health check-up and AIDS awareness for workers

During reporting period health checkups and Aids/HIV awareness camps were organized in all the construction packages. So far no HIV/AIDS positive case has been reported.

### 5.2.9 Environmental Training

Environment Officer of PMC and Environmental Expert of General Consultant explained EMP items and their monitoring to the EHS Officer, Project Manager of Contractor and RE during their site visits. The documentation and maintenance of records of Environmental safeguard measures have improved during the reporting period.

## 5.3 Monitoring of environmental quality attributes

Periodical environmental quality measurements are being undertaken in terms of air, water and noise quality at critical locations as per Environmental Monitoring Plan in each construction package to compare with baseline environmental quality and state/national standards. This is done with the objective to assess the additional pollution load on environmental components due to construction of the project.

During the reporting period monitoring of Environmental Quality in terms of air, water and noise levels have been carried out in construction packages DG-1, RT-1, RT-2, RT-3, ST-2, ST-3, ST-4, PG-1, PG-2 and PG-3 to assess the additional load on pollution due to construction activities.

Following Table depicts the period of monitoring carried out in different construction packages:

S. No.	Project/ Construction Package	Monitoring of Environmental Components		
		Air Quality	Water Quality	Noise Level
<b>1.</b>	<b>Daund-Gulbarga Doubling Project</b>			
(i)	<b>DG-1</b>	Air quality monitoring was carried out in the month of January, 2015 at 4 locations with respect to SPM, RSPM, NOx and CO.	Water quality monitoring was carried out in the month of January, 2015 at 5 locations.	Noise monitoring was carried out in the month of January, 2015 at 5 locations.
(ii)	<b>DG-2</b>	Last monitoring was carried out in the month of September, 2014. The monitoring of air was not carried out during the report period.	Last monitoring was carried out in the month of September, 2014. No monitoring carried out during reporting period.	Last monitoring was carried out in the month of September, 2014. No monitoring carried out during reporting period.
<b>2.</b>	<b>Hospet-Tinaighat Doubling Project</b>			
(i)	<b>HT-1</b>	No monitoring carried out during reporting period, rescheduled to April.	No monitoring carried out during reporting period, rescheduled to	No monitoring carried out during reporting period,

S. No.	Project/ Construction Package	Monitoring of Environmental Components		
		Air Quality	Water Quality	Noise Level
			April.	rescheduled to April.
(ii)	HT-2	No monitoring carried out during reporting period.	No monitoring carried out during reporting period.	No monitoring carried out during reporting period.
(iii)	HT-3	No monitoring carried out during reporting period.	No monitoring carried out during reporting period.	No monitoring carried out during reporting period.
<b>3. Raipur-Titlagarh Doubling Project</b>				
(i)	RT-1	The air quality monitoring was carried out in the month of December, 2014.	The water quality monitoring was carried out in the month of December, 2014.	No monitoring carried out during reporting period.
(ii)	RT-2	The air quality monitoring was carried out in the month of January, 2015 by RVNL.	The water quality monitoring was carried out in the month of January, 2015 by RVNL.	The noise level monitoring was carried out in the month of January, 2015 by RVNL.
(iii)	RT-3	The monitoring of air was not carried out during the report period.	The water quality monitoring was carried out in the month of January, 2015.	The noise level monitoring was carried out in the month of January, 2015.
<b>4. Sambalpur-Titlagarh Doubling Project</b>				
(i)	ST-1	No monitoring has been carried out during reporting period.	No monitoring has been carried out during reporting period.	No monitoring has been carried out during reporting period.
(ii)	ST-2	Ambient Air quality monitoring was carried out in the month of December, 2014 at 4 locations.	Water quality monitoring was carried out in the month of December, 2014 at 4 locations.	Noise level monitoring was carried out in the month of December, 2014 at 4 locations.
(iii)	ST-3	Ambient Air quality monitoring was carried out in the month of January, 2015 at 4 locations.	Water monitoring was carried out in the month of January, 2015 from bore well water near batching plant.	Noise level monitoring was carried out in the month of January, 2015 at 4 locations.
(iv)	ST-4	The monitoring was carried out in the month of January, 2015.	The monitoring was carried out in the month of January, 2015.	The monitoring was carried out in the month of January, 2015.
<b>5. Pune-Guntakal Railway Electrification</b>				



S. No.	Project/ Construction Package	Monitoring of Environmental Components		
		Air Quality	Water Quality	Noise Level
(i)	PG-1	Air quality monitoring was carried out at 5 locations in the month of February, 2015 and diesel generator emission monitoring done at Daund and Solapur Camps.	Water quality monitoring was carried out in the month of February, 2015 at three locations.	Noise level monitoring was carried out in the month of February, 2015 at 5 locations.
(ii)	PG-2	Air quality monitoring was carried out in the month of October, 2014 and January, 2015 at 2 locations each time.	Water quality monitoring was carried out in the month of October, 2014 and January, 2015 at 2 locations each time.	Noise level monitoring was carried out in the month of October, 2014 and January, 2015 at 2 locations each time.
(iii)	PG-3	Air quality monitoring was carried out in the month of October, 2014 and January, 2015 at 2 locations each time.	Water quality monitoring was carried out in the month of October, 2014 and January, 2015 at 2 locations each time.	Noise level monitoring was carried out in the month of October, 2014 and January, 2015 at 2 locations each time.

Table 4: Status of monitoring of environmental attributes during last 6 months

**(a) Air quality monitoring results:**

The monitoring results of these packages reflect that the project activities do not have any significant additional load on pollution in the area. Package wise test results of air quality monitoring are presented in following table:

S. No.	Project/Subproject	Date of Sampling	Concentration of air quality parameters					
			SPM (µgm <sup>-3</sup> )	PM10 (µgm <sup>-3</sup> )	PM2.5 (µgm <sup>-3</sup> )	SO2 (µgm <sup>-3</sup> )	NOx (µgm <sup>-3</sup> )	CO (mgm <sup>-3</sup> )
i. Daund-Gulbarga Project								
1. Subproject DG-1								
(i)	Near Angar Station 407/1	31.01.2015	156	87	-	-	69	502
(ii)	LC Gate No. 45C-408/300		95	58	-	-	30	431
(iii)	Near Madha Batching Plant 390/2		144	59	-	-	48	450
(iv)	Bharshi Crusher		139	76	-	-	43	441
ii. Sambalpur-Titlagarh Project								
2. Subproject ST-2								
(i)	Camp site at Attabira Railway Station,	22.12.2014	-	54.2	32.2	16.8	24.2	<1
(ii)	Near Batching Plant		-	66.8	40.1	13.4	18.3	<1
(iii)	Near Godabhaga Railway station		-	50.4	30.2	15.2	18.3	<1
(iv)	Near stone crusher plant		-	72.6	43.2	12.6	17.6	<1
1. Subproject ST-3								
(i)	Near JT-77 Batching Plant	27.01.2015/ 28.01.2015	-	62.8	41.3	15.8	18.6	<1
(ii)	Near Dunguripali Railway Stn.		-	49.6	27.6	13.6	18.6	<1
(iii)	Near JT-65 Bridge Construction site		-	54.8	32.5	14.2	17.9	<1
(iv)	Near JT-92		-	73.2	45.4	16.4	20.1	<1
2. Subproject ST-4								
(i)	Near JT-114	30.01.2015	-	61.2	30.5	18.2	23.2	<1

S. No.	Project/Subproject	Date of Sampling	Concentration of air quality parameters					
			SPM ( $\mu\text{gm}^{-3}$ )	PM10 ( $\mu\text{gm}^{-3}$ )	PM2.5 ( $\mu\text{gm}^{-3}$ )	SO2 ( $\mu\text{gm}^{-3}$ )	NOx ( $\mu\text{gm}^{-3}$ )	CO ( $\text{mgm}^{-3}$ )
	(CEMC/15/196A)							
(ii)	Near Saintala Railway Over Bridge (CEMC/15/197A)		-	49.1	26.8	13.2	17.2	<1
(iii)	Near Saintala Batching Plant (CEMC/15/198A)		-	75.0	34.8	16.8	20.6	<1
(iv)	Near LC-107 (CEMC/15/199A)	30.01.2015	-	55.6	29.4	14.2	15.4	<1
<b>iii. Raipur-Titlagarh Project</b>								
<b>1. Subproject RT-1</b>								
(i)	Office Complex, Kantabanji	27.12.2014	-	71.2	40.8	10.2	14.4	461
(ii)	Crusher Plant at Harisankar Road	25.12.2014	-	67.3	37.5	11.3	13.1	411
(iii)	Near Turekela Railway Station	25.12.2014	-	60.2	33.4	11.5	12.4	398
(iv)	Major Bridge 325 at Ch: 199+690 (Titlagarh)	26.12.2014	-	72.5	41.2	11.8	13.8	419
(v)	Harisankar Railway Station	25.12.2014	-	78.4	46.3	12.1	15.2	507
(vi)	Near Muribahal Railway Station	26.12.2014	-	68.6	35.9	11.7	13.6	412
(vii)	Near Rehenbhata Railway Station	26.12.2014	-	69.8	40.1	11.9	14.1	432
<b>2. Subproject RT-2</b>								
(i)	Near office proposed Campus site East-West direction	23.01.2015	320.59	81.84	-	22.41	37.16	-
(ii)	Near Railway Bridge RMC Batching Plant South direction	19.01.2015	311.28	76.91	-	18.89	32.51	-
<b>iv. Pune-Guntakal Electrification Project</b>								
<b>1. Subproject PG-1</b>								

S. No.	Project/Subproject	Date of Sampling	Concentration of air quality parameters					
			SPM (µgm <sup>-3</sup> )	PM10 (µgm <sup>-3</sup> )	PM2.5 (µgm <sup>-3</sup> )	SO2 (µgm <sup>-3</sup> )	NOx (µgm <sup>-3</sup> )	CO (mgm <sup>-3</sup> )
(i)	Near Office	26.02.2015	182	57	26	9.7	18.4	112
(ii)	Camp Site		164	48	22	7.8	17.4	106
(iii)	Near TSS		186	60	28	9.2	20.6	130
(iv)	Near Store Area	27.02.2015	214	68.4	35.0	8.5	20.7	110
(v)	TSS Buildings		173	57	25	9.1	19.3	122
(vi)	Near Store Area		214	68.4	35.0	8.5	20.7	110
2. Subproject PG-2								
(i)	Yadgir TSS Building	13.10.2014	-	44.8	17.7	6.6	10.5	BDL
(ii)	Krishna TSS Building		-	54.1	22.4	7.6	11.0	BDL
(i)	SSP Gate, Lingiri	30.01.2015	-	57.2	21.5	6.7	9.6	BDL
(ii)	SP Building, Wadi		-	52.9	22.4	7.2	9.8	BDL
3. Subproject PG-3								
(i)	Nagarur TSS Building	13.10.2014	-	45.7	21.8	7.9	11.0	BDL
(ii)	Kuppagal Railway Station		-	47.8	21.0	7.5	10.6	BDL
(i)	Raichur Railway station – Near Indian Oil Tank	29.01.2015	-	55.4	21.8	7.0	9.6	BDL
(ii)	Kosigi Railway Station - Adoni		-	48.9	21.3	6.6	9.7	BDL
	Standard Limit (As per CPCB)	-	-	100	60	80	80	2.0

**(b) Water quality monitoring results**

The samples of water from different sources were collected and tested for physico chemical characteristics in subprojects DG-1, ST-2, ST-3, ST-4, RT-1, RT-2, RT-3, PG-1, PG-2 and PG-3 during reporting period as per environmental monitoring plan. The test results reflect that all the measured parameters were within the permissible limit as per IS 10500-2012. The package wise water quality monitoring results are presented in following tables.

Parameters	Unit	Sampling locations (DG-1, date of sampling: 30.01.2015)		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Kurduwadi Base Camp R.O drinking water	Kumbag Gate @402 drinking water		
pH	-	7.8	7.1	6.5-8.5	6.5-8.5
Color	Hazen	<1.0	<1.0	5.0	15
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable
Taste	-	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity	NTU	<1.0	<1.0	1	5
Total Dissolved Solid	mg/l	482	99	500	2000
Total Hardness as CaCO <sub>3</sub>	mg/l	190	60	200	600
Chlorides as Cl	mg/l	145	42	250	1000
Iron as Fe	mg/l	0.01	<0.01	0.3	No relaxation
Residual free Chlorine		<0.2	<0.2	0.2	1.0
Coli forms	MPN/100 ml	Absent	Absent	Absent	Absent
Escherichia, Coli	-	Absent	Absent	Absent	Absent

Parameters	Unit	Sampling locations (ST-2, date of sampling: 25.12.2014)				Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Tap water at Attabira Railway Station	Borewell water at near Batching Plant	Tap water at Godabhaga Railway station	Borewell water near stone crusher		
pH	-	7.2	7.0	7.1	7.3	6.5-8.5	6.5-8.5
Turbidity, NTU	NTU	<0.05	<0.05	<0.05	<0.05	1	5
Total Dissolved Solid	mg/l	232	363	246	182	500	2000
Total	mg/l	90	160	100	64	200	600

Parameters	Unit	Sampling locations (ST-2, date of sampling: 25.12.2014)				Desirable Limit IS 10500- 2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Tap water at Attabira Railway Station	Borewell water at near Batching Plant	Tap water at Godabhaga Railway station	Borewell water near stone crusher		
Hardness as CaCO <sub>3</sub>							
Calcium as Ca	mg/l	26.5	45.7	26.5	16.83	75	200
Magnesium (as Mg)	mg/l	7.3	11.18	8.26	5.35	30	100
Chlorides as Cl	mg/l	16	66	6	2	250	1000
Sulphate (as SO <sub>4</sub> )	mg/l	10.8	14.2	3	<1	200	400
Manganese (as Mn)	mg/l	<0.005	<0.005	<0.005	<0.005	0.1	0.3
Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	0.05	1.5
Alkalinity (as CaCO <sub>3</sub> )	mg/l	130	70	160	100	200	600
Fluoride (as F)	mg/l	0.17	0.16	0.72	0.28	1.0	1.5
Nitrate (as NO <sub>3</sub> )	mg/l	1.25	9.6	0.14	0.27	45	No relaxation
Iron as Fe	mg/l	<0.01	0.62	<0.01	<0.01	0.3	No relaxation
Chromium as Cr <sup>+6</sup>	mg/l	<0.05	<0/05	<0.05	<0/05	0.05	No relaxation
Lead as Pb	mg/l	<0.07	<0.07	<0.07	<0.07	0.01	No relaxation
Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	5	15
Arsenic (as As)	mg/l	<0.007	<0.007	<0.007	<0.007	0.01	No relaxation
Mercury (as Hg)	mg/l	<0.001	<0.001	<0.001	<0.001	0.001	No relaxation
Cadmium (as Cd)	mg/l	<0.01	<0.01	<0.01	<0.01	0.01	No relaxation
Selenium (as Se)	mg/l	<0.001	<0.001	<0.001	<0.001	0.01	No relaxation
Aluminium (as Al)	mg/l	<0.006	<0.006	<0.006	<0.006	0.03	No relaxation
Boron (As B)	mg/l	<0.2	<0.2	<0.2	<0.2	1	No



Parameters	Unit	Sampling locations (ST-2, date of sampling: 25.12.2014)				Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Tap water at Attabira Railway Station	Borewell water at near Batching Plant	Tap water at Godabhaga Railway station	Borewell water near stone crusher		
							relaxation
Cyanide (as CN)	mg/l	ND	ND	ND	ND	0.05	No relaxation
Phenolic compounds (As CH <sub>6</sub> H <sub>5</sub> OH)	mg/l	<0.001	<0.001	<0.001	<0.001	0.001	No relaxation

Parameters	Unit	Sampling locations (ST-3, date of sampling: 28.01.2015)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Batching Plant (Bore well) (CEMC/15/266W)		
Colour	Hazen	Clear	5	15
Odour	-	U/O	Agreeable	Agreeable
Taste	-	Agreeable	Agreeable	Agreeable
Turbidity	NTU	<0.5	1	5
pH Value	-	6.8	6.5-8.5	6.5-8.5
Total Hardness (as CaCO <sub>3</sub> )	mg/l	164	300	600
Iron (as Fe)	mg/l	0.2	0.3	No relaxation
Chloride (as Cl)	mg/l	40	250	1000
Residual, free Chlorine	mg/l	ND	0.2	1.0
Total Dissolved Solids	mg/l	406.0	500	2000
Calcium (as Ca)	mg/l	36.9	75	200
Magnesium (as Mg)	mg/l	17.5	30	100
Copper (as Cu)	mg/l	<0.03	0.05	1.5
Manganese (as Mn)	mg/l	<0.005	0.1	No relaxation
Sulphate (as SO <sub>4</sub> )	mg/l	20.6	200	400

Parameters	Unit	Sampling locations (ST-3, date of sampling: 28.01.2015)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Batching Plant (Bore well) (CEMC/15/266W)		
Nitrate (as NO <sub>3</sub> )	mg/l	0.2	45	No relaxation
Fluoride (as F)	mg/l	0.54	1	1.5
Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	<0.001	0.001	No relaxation
Mercury (as Hg)	mg/l	<0.001	0.001	No relaxation
Cadmium (as Cd)	mg/l	<0.01	0.01	No relaxation
Selenium (as Se)	mg/l	<0.001	0.01	No relaxation
Arsenic (as As)	mg/l	<0.001	0.01	0.05
Cyanide (as CN)	mg/l	ND	0.05	No relaxation
Lead (as Pb)	mg/l	<0.05	0.05	No relaxation
Zinc (as Zn)	mg/l	<0.05	5	15
Chromium (as Cr+6)	mg/l	<0.05	0.05	No relaxation
Mineral Oil	mg/l	<0.01	0.01	No relaxation
Alkalinity	mg/l	90	200	600
Aluminium (as Al)	mg/l	<0.006	0.03	No relaxation
Boron (as B)	mg/l	<0.2	1	No relaxation

Parameters	Unit	Sampling locations (ST-4, date of sampling: 29.01.2015)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Batching Plant (Bore well) (CEMC/15/266W)		
Colour	Hazen	Clear	5	15
Odour	-	U/O	Agreeable	Agreeable
Taste	-	Agreeable	Agreeable	Agreeable
Turbidity	NTU	<0.05	1	5
pH Value	-	6.6	6.5-8.5	6.5-8.5
Total Hardness (as CaCO <sub>3</sub> )	mg/l	282	300	600
Iron (as Fe)	mg/l	0.02	0.3	No relaxation

Parameters	Unit	Sampling locations (ST-4, date of sampling: 29.01.2015)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Batching Plant (Bore well) (CEMC/15/266W)		
Chloride (as Cl)	mg/l	39	250	1000
Residual, free Chlorine	mg/l	ND	0.2	1.0
Total Dissolved Solids	mg/l	426	500	2000
Calcium (as Ca)	mg/l	65.54	75	200
Magnesium (as Mg)	mg/l	27.63	30	100
Copper (as Cu)	mg/l	<0.03	0.05	1.5
Manganese (as Mn)	mg/l	<0.005	0.1	No relaxation
Sulphate (as SO <sub>4</sub> )	mg/l	3.1	200	400
Nitrate (as NO <sub>3</sub> )	mg/l	1.8	45	No relaxation
Fluoride (as F)	mg/l	0.4	1	1.5
Phenolic Compounds (as C <sub>6</sub> H <sub>5</sub> OH)	mg/l	<0.001	0.001	No relaxation
Mercury (as Hg)	mg/l	<0.001	0.001	No relaxation
Cadmium (as Cd)	mg/l	<0.01	0.01	No relaxation
Selenium (as Se)	mg/l	<0.001	0.01	No relaxation
Arsenic (as As)	mg/l	<0.001	0.01	0.05
Cyanide (as CN)	mg/l	ND	0.05	No relaxation
Lead (as Pb)	mg/l	<0.05	0.05	No relaxation
Zinc (as Zn)	mg/l	<0.05	5	15
Chromium (as Cr+6)	mg/l	<0.05	0.05	No relaxation
Mineral Oil	mg/l	<0.01	0.01	No relaxation
Alkalinity	mg/l	175	200	600
Aluminium (as Al)	mg/l	<0.006	0.03	No relaxation
Boron (as B)	mg/l	<0.2	1	No relaxation

Parameters	Unit	Sampling locations (RT-1, date of sampling: 25.12.2014)					Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Turekela Railway Station (Tube well)	Rehenbata Railway Station (Tube well)	Titlagarh Major Bridge 325 (Tanker)	Muribahal Railway Station (Tube well)	Harisankar Road Railway Station (Tube well)		
Temperature	°C	15.9	16.6	17.2	16.4	16.2	-	-
Appearance	-	Colorless	Colorless	Colorless	Colorless	Colorless	-	-
Turbidity	NTU	2.2	1.5	1.2	1.1	1.5	1	5
pH	-	6.56	7.25	7.57	6.86	6.95	6.5-8.5	6.5-8.5
Conductivity	μ mhos/cm	350	480	110	370	1280	-	-
Total Solids	mg/l	212	274	79	212	725	-	-
Suspended Solids	-	16	6	17	8.6	9.0	-	-
Total Dissolved Solids	mg/l	196	268	62	203.4	716	500	2000
Chloride (as Cl)	-	57.0	80.9	19.0	64.9	224.9	250	1000
Ammonical Nitrogen (NH <sub>3</sub> -N)	mg/l	ND	ND	ND	ND	ND		
Nitrite Nitrogen (NO <sub>2</sub> -N)	-	2.4	2.1	1.2	2.8	2.2	-	-
Nitrate Nitrogen (NO <sub>3</sub> -N)	-	ND	ND	ND	ND	ND	45	No relaxation
Dissolved Oxygen	-	3.8	3.6	4.0	4.0	4.0	-	-
C.O.D	-	4.6	4.4	4.6	4.8	5.2	-	-
Oil & grease	mg/l	ND	ND	ND	ND	ND	0.01	0.03
Phosphate (as PO <sub>4</sub> )	-	ND	ND	ND	0.06	0.008		
Sulphate (as SO <sub>4</sub> )	-	5.2	5.8	2.4	6.4	35.4	200	400
Fluoride (as F)	-	0.35	0.68	0.32	1.1	0.91	1.0	1.5
B.O.D. (3-days at 27 deg C)	-	0.8	0.9	0.4	0.8	1.2	-	-

Parameters	Unit	Sampling locations (RT-1, date of sampling: 25.12.2014)					Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Turekela Railway Station (Tube well)	Rehenbata Railway Station (Tube well)	Titlagarh Major Bridge 325 (Tanker)	Muribahal Railway Station (Tube well)	Harisankar Road Railway Station (Tube well)		
Coliform	-	Absent	Absent	Absent	ND	ND	Absent	Absent
Kjeldhal Nitrogen	mg/l	0.24	0.22	0.20	0.18	0.27	-	-
Sodium	-	11.3	16.2	7.8	8.6	36.5	-	-
Potassium	-	0.62	0.57	0.48	0.84	2.9	-	-
Total Alkalinity	-	110	124	36	96	184	200	600
Total Hardness (as CaCO <sub>3</sub> )	-	140	182	40	138	370	200	600
Calcium Hardness (as CaCO <sub>3</sub> )	-	51.3	67.3	12.1	48.9	141	200	600
Magnesium Hardness (as CaCO <sub>3</sub> )	-	2.9	3.4	2.4	3.8	4.3	30	100

Parameters	Unit	Sampling locations (RT-2, date of sampling: 23.01.2015)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bore well water at campus site Arang to Lakhna 63 km. Baghbahra Dist, Mahasamund	Bore well water at Batching plant near village Temari (Jonk river) 102/13 km. Dist, Mahasamund	Bore well water at village Hadabandh Bagbahara, Near railway cabin, Dist Mahasamund		
Temperature	°C	24.0	24.0	24.5	-	-
Appearance	-	Clear	Clear	Clear	-	-
Odour	-	Odourless	Odourless	Odourless	-	-
pH	-	7.54	7.88	7.8	6.5-8.5	6.5-8.5
Conductivity	μ Mhos/cm	349.0	403.0	426.0	-	-
Turbidity	NTU	5.0	4.0	3.0	1	5
Total Solids	Mg/Liter	154.0	172.0	188.0	-	-

Parameters	Unit	Sampling locations (RT-2, date of sampling: 23.01.2015)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bore well water at campus site Arang to Lakhna 63 km. BaghbahraDist, Mahasamund	Bore well water at Batching plant bear village Temari (Jonk river) 102/13 km. Dist, Mahasamund	Bore well water at village Hadabandh Bagbahara, Near railway cabin, DistMahasamund		
Total Dissolved Solids	Mg/Liter	144.0	165.0	182.0	500	2000
Suspended Solids	-	10.0	7.0	6.0	-	-
Ammonia Nitrogen	-	ND	0.4	0.3	0.5	No relaxation
Nitrite Nitrogen (NO <sub>2</sub> -N)	-	0.004	0.003	0.003	-	-
Nitrate Nitrogen (NO <sub>3</sub> N)	-	0.03	0.02	0.02	45	No relaxation
Dissolved Oxygen	-	0.5	0.4	0.3	-	-
B.O.D. (3-days at 27 deg C)	-	ND	ND	ND	-	-
C.O.D	-	3.0	3.0	3.0	-	-
Total Alkalinity	-	156.0	166.0	160.0	200	600
Total Hardness (as CaCO <sub>3</sub> )	-	158.0	172.0	164.0	200	600
Calcium Hardness (as CaCO <sub>3</sub> )	-	122.0	134.0	130.0	200	600
Magnesium Hardness (asCaCO <sub>3</sub> )	-	36.0	38.0	34.0	30	100
Sulphate (as SO <sub>4</sub> )	-	14.0	18.0	20.0	200	400
Phosphate (as PO <sub>4</sub> )	-	0.7	0.5	0.4		
Fluoride (as F)	-	0.18	0.21	0.14	1.0	1.5



Parameters	Unit	Sampling locations (RT-2, date of sampling: 23.01.2015)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bore well water at campus site Arang to Lakhna 63 km. BaghbahraDist, Mahasamund	Bore well water at Batching plant bear village Temari (Jonk river) 102/13 km. Dist, Mahasamund	Bore well water at village Hadabandh Bagbahara, Near railway cabin, DistMahasamund		
Chloride (as Cl)	-	52.0	58.0	68.0	250	1000
Sodium	-	24.0	18.0	24.0	-	-
Potassium	-	7.0	6.0	8.0	-	-
Oil & Grease	-	ND	ND	ND	-	-
Total Coliform	-	<2.0	3.0	3.0	Absent	Absent

Parameters	Unit	Sampling locations (RT-3, date of sampling: 19.01.2015)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bore well water at Railway Station, Belsonda, Dist, Mahasamund	Bore well water at Site office, Arang, Dist, Raipur	Tap water at Lakholi Village Panchayat supply water, DistRaipur		
Temperature	°C	22.0	22.5	22.5	-	-
Appearance	-	Clear	Clear	Clear	-	-
Odour	-	Odourless	Odourless	Odourless	-	-
pH	-	7.82	7.96	7.86	6.5-8.5	6.5-8.5
Conductivity	μ Mhos/cm	354.0	576.0	578.0	-	-
Turbidity	NTU	3.0	4.0	6.0	1	5
Total Solids	Mg/Liter	171.0	276.0	274.0	-	-
Total Dissolved Solids	Mg/Liter	164.0	268.0	265.0	500	2000
Suspended Solids	-	7.0	8.0	9.0	-	-

Parameters	Unit	Sampling locations (RT-3, date of sampling: 19.01.2015)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bore well water at Railway Station, Belsonda, Dist, Mahasamund	Bore well water at Site office, Arang, Dist, Raipur	Tap water at Lakholi Village Panchayat supply water, Dist Raipur		
Ammonia Nitrogen	-	ND	ND	ND	0.5	No relaxation
Nitrite Nitrogen (NO <sub>2</sub> -N)	-	0.003	0.006	0.002	-	-
Nitrate Nitrogen (NO <sub>3</sub> -N)	-	0.02	0.07	0.02	45	No relaxation
Dissolved Oxygen	-	0.2	0.3	0.4	-	-
B.O.D. (3-days at 27 deg C)	-	ND	ND	ND	-	-
C.O.D	-	3.0	3.0	3.0	-	-
Total Alkalinity	-	158.0	176.0	196.0	200	600
Total Hardness (as CaCO <sub>3</sub> )	-	166.0	260.0	264.0	200	600
Calcium Hardness (as CaCO <sub>3</sub> )	-	132.0	222.0	224.0	200	600
Magnesium Hardness (as CaCO <sub>3</sub> )	-	34.0	38.0	40.0	30	100
Sulphate (as SO <sub>4</sub> )	-	14.0	16.0	18.0	200	400
Phosphate (as PO <sub>4</sub> )	-	0.6	0.4	0.2	-	-
Fluoride (as F)	-	0.12	0.016	0.14	1.0	1.5
Chloride (as Cl)	-	44.0	66.0	60.0	250	1000
Sodium	-	28.0	24.0	22.0	-	-
Potassium	-	8.0	9.0	7.0	-	-
Oil & Grease	-	ND	ND	ND	-	-

Parameters	Unit	Sampling locations (RT-3, date of sampling: 19.01.2015)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bore well water at Railway Station, Belsonda, Dist, Mahasamund	Bore well water at Site office, Arang, Dist, Raipur	Tap water at Lakholi Village Panchayat supply water, Dist Raipur		
Coliform	-	<2.0	2.0	<2.0	-	-

Parameters	Unit	Sampling locations (PG-1, Date of sampling: 26.02.2015)			Standards IS 10500-2012	
		Tap Water sample collected from Loni Camp	Drinking Water collected from Daund Office	Drinking Water collected from Wadi store area	Acceptable Limit IS 10500-2012	Permissible Limit IS 10500-2012
Apparent Colour	Hazen	0.4	1.0	1.0	5	15
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity NTU	NTU	0.1	0.3	0.5	1	5
Total Dissolved Solid	mg/l	652	877	886	500	2000
Electrical Conductivity	μS/cm	1290	1692	1780	-	-
Total Alkalinity	mg/l	294	184	242	200	600
pH value	-	8.20 at 25 ° C	7.30 at 25 ° C	7.95 at 25 ° C	6.5 to 8.5	No relaxation
Total Hardness (CaCO <sub>3</sub> )	mg/l	310	685	658	200	600
Calcium (as Ca)	mg/l	51.8	110.2	154	75	200
Magnesium (as Mg)	mg/l	43.9	99.5	66.3	30	100
Copper as (Cu)	mg/l	<0.01	<0.01	<0.01	0.05	1.5
Iron (as Fe)	mg/l	0.09	0.20	0.22	0.3	No relaxation
Manganese as (Mn)	mg/l	<0.01	<0.01	<0.01	0.1	0.3
Chlorides (as Cl)	mg/l	142	182	248	250	1000

Parameters	Unit	Sampling locations (PG-1, Date of sampling: 26.02.2015)			Standards IS 10500-2012	
		Tap Water sample collected from Loni Camp	Drinking Water collected from Daund Office	Drinking Water collected from Wadi store area	Acceptable Limit IS 10500-2012	Permissible Limit IS 10500-2012
Sulphate (as SO <sub>4</sub> )	mg/l	87.4	145	97.5	200	400
Nitrates (as NO <sub>3</sub> )	mg/l	6.7	8.5	4.5	45	No relaxation
Fluoride (as F)	mg/l	1.40	1.25	1.25	1.0	1.5
Phenolic Compounds	mg/l	<0.001	<0.001	<0.001	0.001	0.002
Mercury as (Hg)	mg/l	<0.0005	<0.0005	<0.0005	0.001	No relaxation
Cadmium as (Cd)	mg/l	<0.001	<0.001	<0.001	0.003	No relaxation
Selenium as (Se)	mg/l	<0.001	<0.001	<0.001	0.01	No relaxation
Arsenic as (As)	mg/l	<0.01	<0.01	<0.01	0.01	0.05
Cyanide as (CN)	mg/l	<0.005	<0.005	<0.005	0.05	No relaxation
Lead as (Pb)	mg/l	<0.001	<0.001	<0.001	0.01	No relaxation
Zinc as (Zn)	mg/l	0.25	0.30	0.20	5	15
Total Chromium as (Cr)	mg/l	<0.03	<0.03	<0.03	0.05	No relaxation
Mineral Oil	mg/l	<0.01	<0.01	<0.01	0.05	No relaxation
Residual Chlorine	mg/l	0.20	0.20	<0.10	0.2	1.0
Total Coliform	MPN/100 ml	Absent	Absent	Absent	Absent	Absent
E Coli	Nos/100 ml	Absent	Absent	Absent	Absent	Absent

Parameters	Unit	Sampling locations (Date of sampling: 13.10.2014)				Standards IS 10500-2012	
		Construction Package PG-2		Construction Package PG-3		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Borewell Water at Yadgir TSS Building	Borewell Water at Krishna Workshop	Nagarur Tank Water	Kuppagal Tank Water		
pH		8.09	8.01	7.58	7.91	6.5-8.5	6.5-8.5
Turbidity,	NTU	0.3	0.5	0.3	0.4	1	5
Total Dissolved Solid	mg/l	649	492	59.6	706	500	2000
Total Hardness as CaCO <sub>3</sub>	mg/l	279.1	166.3	229.7	207.9	200	600
Calcium as Ca	Mg/l	44.3	28.5	34.8	22.1	75	200
Magnesium (as Mg)	mg/l	40.5	23.1	34.6	37	30	100
Chlorides as Cl	mg/l	121.2	80.6	44.3	113.3	250	1000
Sulphate (as SO <sub>4</sub> )	mg/l	38.6	79.1	35.6	35.4	200	400
Alkalinity (as CaCO <sub>3</sub> )	mg/l	223.2	113.6	356.7	382.2	200	600
Fluoride (as F)	mg/l	0.2	0.13	0.18	0.12	1.0	1.5
Nitrate (as NO <sub>3</sub> )	mg/l	1.2	2.8	2.2	BDL	45	No relaxation
Iron as (Fe)	mg/l	BDL	BDL	BDL	1.6	0.3	No relaxation
Copper (as Cu)	mg/l	BDL	BDL	BDL	BDL	0.05	1.5
Manganese (as Mn)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation
Mercury (as Hg)	mg/l	BDL	BDL	BDL	BDL	0.001	No relaxation
Cadmium (as Cd)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation
Lead (as Pb)	mg/l	BDL	BDL	BDL	BDL	0.05	No relaxation
Chromium (as Cr <sup>+6</sup> )	mg/l	BDL	BDL	BDL	BDL	0.05	No relaxation
Selenium (as Se)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation
Zinc (as Zn)	mg/l	BDL	BDL	BDL	BDL	5	15
Total Coliform	MPN/100 ml	Absent	Absent	Absent	Absent	1/100 ml	-

Parameters	Unit	Sampling locations (Date of sampling: 29.01.2015)				Standards IS 10500-2012	
		Construction Package PG-2		Construction Package PG-3		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Lingiri SSP Gate	Wadi SP Building	Kosigi Railway Station – Adoni	Raichur Railway Station – Near Indian Oil Tank		
Color	-	Colorless	Colorless	Colorless	Colorless	5	15
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
pH	-	7.69	7.57	7.15	7.57	6.5-8.5	6.5-8.5
Turbidity	NTU	0.4	0.2	0.7	0.4	1	5
Alkalinity (as CaCO <sub>3</sub> )	mg/l	336	364.3	338.5	142.5	200	600
Total Dissolved Solid	mg/l	418	712	1086	478	500	2000
Total Hardness as CaCO <sub>3</sub>	mg/l	128.7	338.5	479.1	219.7	200	600
Calcium as Ca	Mg/l	45.9	130.6	156.8	55.4	75	200
Magnesium (as Mg)	mg/l	3.4	2.9	21.1	19.7	30	100
Sulphate (as SO <sub>4</sub> )	mg/l	16	118.6	94.6	39.7	200	400
Chloride as Cl	mg/l	32.2	32.2	264.1	97.8	250	1000
Nitrate (as NO <sub>3</sub> )	mg/l	2.3	1.8	5.8	1.5	45	No relaxation
Iron as (Fe)	mg/l	BDL	BDL	BDL	BDL	0.3	No relaxation
Fluoride (as F)	mg/l	0.12	0.18	0.22	0.6	1.0	1.5
Copper (as Cu)	mg/l	BDL	BDL	BDL	BDL	0.05	1.5
Manganese (as Mn)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation
Mercury (as Hg)	mg/l	BDL	BDL	BDL	BDL	0.001	No relaxation
Cadmium (as Cd)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation
Lead (as Pb)	mg/l	BDL	BDL	BDL	BDL	0.05	No relaxation
Chromium (as Cr <sup>+6</sup> )	mg/l	BDL	BDL	BDL	BDL	0.05	No relaxation



Parameters	Unit	Sampling locations (Date of sampling: 29.01.2015)				Standards IS 10500-2012	
		Construction Package PG-2		Construction Package PG-3		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Lingiri SSP Gate	Wadi SP Building	Kosigi Railway Station – Adoni	Raichur Railway Station – Near Indian Oil Tank		
Selenium (as Se)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation
Zinc (as Zn)	mg/l	BDL	BDL	BDL	BDL	5	15
Total Coliform	MPN/100 ml	Absent	Absent	Absent	Absent	1/100 ml	-

**(c) Noise level monitoring results**

The noise pollution level has been recorded at different locations in construction packages DG-1, ST-2, ST-3, ST-4, RT-2, RT-3, PG-1, PG-2 and PG-3 during reporting period. At all the locations the noise levels were found within the permissible limit for the industrial area except for the stone crusher unit of DG-1, where the daytime noise level exceeded the permissible level during the quarter ending March, 2015. The measurement of noise has been carried out at a distance of 5 m from the crushing unit, which may be the reason for high noise level. However, it is imperative to provide ear muffs to the workers working near the plant. Additional measurement of noise is also recommended at the periphery of the plant premises to check the ambient noise pollution status at the periphery of the plant site.

The average noise levels at different locations in different subprojects is presented in following table:

S. No	Project/Subprojects	Location	Date of monitoring	Equivalent Noise level (day time)LeqdB(A)	Equivalent Noise level (nighttime) LeqdB(A)	Prescribed limit LeqdB(A)	
						Day time	Night time
I. Daund-Gulbarga Project (DG)							
1.	Subproject DG-1	Near Angar Rly Stn Ch. 407/1	30.1.2015	65.6	56.6	75	70
		LC Gate No. 45C Ch. 408/300		62.3	54.7	75	70
		Madha Batching Plant Ch. 309/2		57.2	55.0	75	70
		Stone Crusher Plant at Barshi		78.2	69.3	75	70
II. Sambalpur-Titlagarh Project (ST)							
1.	Subproject ST-2	Near Attabira Railway Station	22.12.2014	52.5	43.1	75	70
		Near Batching Plant	22.12.2014	60.2	48.3	75	70
		Near Godabhaga Railway Station	22.12.2014	49.5	45.2	75	70
		Near StoneCrusher plant	22.12.2014	54.8	54.8	75	70
2.	Subproject ST-3	Near JT-77	27/28.1.2015	58.8	43.1	75	70

S. No	Project/Subprojects	Location	Date of monitoring	Equivalent Noise level (day time)LeqdB(A)	Equivalent Noise level (nighttime) LeqdB(A)	Prescribed limit LeqdB(A)	
						Day time	Night time
		Batching Plant					
		Near Dunguripali Railway Station		50.6	40.8	75	70
		Near JT-65 Bridge No.-237		51.8	41.2	75	70
		Near JT-92		63.2	50.8	75	70
3.	Subproject ST-4	Near JT-114	29/30.1.2015	59.2	40.5	75	70
		Near Saintala Railway Over Bridge		48.1	36.8	75	70
		Near Saintala Batching Plant		63.0	44.8	75	70
		Near LC-107		52.6	39.4	75	70
III. Raipur-Titlagarh Project							
1.	Subproject RT-2	Batching Plant	23.01.2015	65.0	55.0	75	70
2.	Subproject RT-3	Near Railway Bridge RMC Batching Plant	23.01.2015	65.0	55.0	75	70
IV. Pune-Guntakal Electrification Project (PG)							
1.	Subproject PG-1	Work place at TSS	26.02.2015	57.5	43.4	75	70
		Near office	26.02.2015	49.2	40.7	75	70
		TSS building	26.02.2015	47.4	40.0	75	70
		Near camp	27.02.2015	49.6	41.2	75	70
		Near store area	27.02.2015	49.0	40.7	75	70
2	Subproject PG-2	TSS Building Construction site at Yadgir	24.07.2014	46.8	40.9	75	70
		Krishna Railway Station Workshop	25.07.2014	48.7	40.1	75	70

S. No	Project/Subprojects	Location	Date of monitoring	Equivalent Noise level (day time)LeqdB(A)	Equivalent Noise level (nighttime) LeqdB(A)	Prescribed limit LeqdB(A)	
						Day time	Night time
		Wadi SP building	30.01.2015	47.7	40.9	75	70
		Lingiri SSP gate		48.7	40.1	75	70
3.	Subproject PG-3	Nagarur Railway Station	15.10.2014	47.7	39.4	75	70
		Kuppagal Railway Station		48.5	40.1	75	70
		Kosigi Railway station - Adoni	29.01.2015	47.1	37.7	75	70
		Raichur Railway station -Near Indian Oil tank		55.2	40.7	75	70

## 6. Public complaints on environmental and safety issues of project

RVNL has established Environmental Grievance Redressal Mechanism for addressing public complains with respect to environmental and safety issues of the project. In each construction package informatory signboards have been installed for receiving public complains/ suggestions as a part of Environmental Grievance Redressal Mechanism. A register for Grievance Redressal has been kept at all the construction packages for registering the public complain/grievance on environmental issues. During the reporting period no public complain with respect to environmental issues has been received in any of the construction packages.

## 7. Environmental performance rating:

Based on the site inspections by GC, PMC's report on EMP compliance status, assessment of compliance to the requirement of EMP of the contract, overall performance rating has been evaluated:

Sl. No.	Activity	Performance Rating
<b>Compliance with Statutory Rules and Regulations</b>		
1	Construction schedule integrating EMP	Satisfactory.
2	Licenses and permits for plants and equipments and quarry	Good.
3	Labour licenses	Good.
4	Site selection /clearance	Satisfactory.
<b>Construction Related Compliance</b>		
5	Traffic safety measures	Satisfactory.
6	Construction camps	Satisfactory.
7	Labour camps and facilities	Needs improvement in construction packages DG-1, DG-2 and HT-2. Satisfactory in other construction packages.
8	Medical facilities and health checkups of workers	Good.
9	Dust Control:	
	(A) At plant site	Satisfactory.
	(B) At construction sites	Satisfactory.
10	Stock pilling of topsoil	Satisfactory.
11	First Aid Facilities	Satisfactory.
12	Safety equipment for labour and other	Good in PG-2, PG-3, ST-2, ST-4. Satisfactory in PG-1, RT-1, RT-3, HT-1 and HT-3. Requires

Sl. No.	Activity	Performance Rating
	staff	improvement in HT-2, DG-1, DG-2 and ST-3. Improvement required for the workers of subcontractors.
13	Proper storage and handling of chemicals and waste oils	Satisfactory.
14	Sanitation and waste management	Satisfactory in all the packages except for DG-1 and HT-2 where improvement is needed at subcontractor's campsites.
15	Employment for local villagers/residents	Satisfactory.
16	Safety measures during execution of works	Satisfactory in HT-1, HT-3, RT-1, RT-3, PG-1, PG-2, PG-3, ST-2, ST-3 and ST-4. Needs improvement in DG-1, DG-2 and HT-2 and ST-1.
17	Emergency response system	Satisfactory.
18	Borrow area operation and rehabilitation	Satisfactory.
19	Debris clearance from site	Good in DG, PG, HT-1, HT-3, ST-2, ST-3, ST-4 and RT. Requires improvement in HT-2 and ST-1.
20	Awareness programme on HIV/AIDS and other STD for workers	Good.
21	Monitoring of Environmental Quality	Satisfactory in all the construction packages except HT-2 and RT-3. In HT-1, HT-2 and HT-3 the schedule of monitoring must be maintained. In RT-1 and RT-3 the environmental monitoring activities has started.
22	Appointment of environmental and safety officer (by Contractor and PMC)	The PMC has appointed their Environmental Officer in all the packages. The contractors have nominated their EHS Experts in all the packages.
23	Appointment of focal environmental officer at corporate level and PIU level	Very Good.

*Note: The construction packages RT-2, has been awarded in the month of February, 2015 and the contractor is in the initial stage of mobilization, so this package has not been included for performance rating*

**Table 5: Performance rating on compliance with the environmental management plan in different construction packages**

## 8. Significant noncompliances

During the reporting period no major noncompliance has been observed.

In DG-2 and HT-2 subprojects, the contractor has stopped the operation of stone crusher plant and is procuring the ballast from third party having licensed stone crusher as well as stone quarry. The process of permission from the regulatory body for the stone quarry and stone crusher plant of contractor of package DG-2 is in progress. The contractor has been strictly advised to obtain requisite permits and NOC for future operation of his plant, if planned.

In general, all the contractors of the different construction packages where work is in progress, have shown improvement in implementation of environmental safeguard measures at all the locations. The contractors are complying with most of the proposed mitigation measures described in Environmental Management Plan and the contract specification.

## 9. Any additional environmental issue and impact observed during implementation which were not covered earlier in IEE

No additional environmental issue or impact that was not covered earlier was observed in any of the subprojects in progress till date.

## 10. Environmental enhancement measures

During the report period following additional activities have been carried out in different construction package packages as enhancement measures:

- Safety awareness training provided to local railway workers, line man and other staff in PG-1.
- Safety Week celebrated in packages PG-1, PG-2, PG-3, DG-1 and DG-2.

## 11. Conclusion and recommendations

The overall EMP compliance in all the construction packages of the project is satisfactory. Continual improvement has been encouraged.

Almost all the contractors are maintaining adequate supply of PPEs for the workers and their usage by construction workers at different work sites is improving. However this requires improvement for subcontractor's.

Periodical monitoring of air, water and noise quality has been carried out in all the projects, however regular sampling at different locations of activities must be maintained as per environmental monitoring plan in construction packages HT-1, HT-2, HT-3 and ST-1. In the sub-projects where environmental pollution monitoring was conducted during the reporting period the monitoring results reflect that the monitored quality parameters were within the prescribed limit and there is not significant increase in pollution due to construction activities.

The PMCs have mobilized their Environmental Officer in their respective packages to ensure effective monitoring of implementation of EMP at site, identification of additional environmental issues as well as record keeping on environmental safeguards.



The HIV/AIDS awareness camps were organized periodically during the reporting period. In most of packages induction training are given to new workers before reporting at respective place of work.

In few construction packages the contractors in association with PMC has taken up environmental enhancement measures in the form of awareness campaign for workers, and safety week celebrations and health checkup camps.

RVNL has established an Environmental Grievance Redressal Mechanism in the project as per ADB guidelines. The informatory signboards have been installed in all the construction packages for receiving complains as a part of Environmental Grievance Redressal Mechanism. No public complaint has been received with respect to environmental matters during the reporting period.

There are some important areas of environmental safeguards that require further attention which include NOC from Pollution Control Board for stone crusher plants in DG project, CtO for batching plants in subproject ST-1, improvement of labour camp facilities such as toilets with septic tank, soak pits, drainage system, collection and disposal facilities of wastes and general housekeeping at camp sites of DG-1, DG-2, HT-2 and RT-3. Contractors are required to dispose of bentonite waste regularly while doing bored cast piles at Major bridges to avoid any pollution of river. Further, care should be taken to not obstruct water way of rivers by placing excavated or construction material at riverbed during construction of bridges. It must be ensured by contractor that all borrow areas lying near community areas are not left abandoned to fill with water during monsoon resulting in spread of mosquitos and other water borne hazards.

## Annexure

## Photographs indicating EMP compliance status in different projects

	
<p><i>Borrow area developed as agriculture field at DG-1</i></p>	<p><i>Use of PPEs at bridge no. 390/2 at DG-1</i></p>
	
<p><i>Safe access at bridge construction site at DG-1</i></p>	<p><i>Labour huts requiring basic facilities near Malikpet Railway Station at DG-1</i></p>
	
<p><i>Drum with petroleum products placed over raised impervious platform at DG-2</i></p>	<p><i>Toilet units at Tilati camp in DG-2</i></p>





*Septic tanks with soakpit at camp site at Mahanadi bridge site in ST-1*



*Labour camp at Mahanadi bridge site at ST-1*



*Overhead tanks and washing platform at ST-1*



*Mobile stone crusher at Kantapali at ST-2*



*Air quality monitoring at batching plant at ST-2*



*Air quality monitoring at stone crusher plant at ST-2*

*Safety fencing at ST-2**Noise level monitoring at batching plant at ST-2**Dust suppression by water sprinkling at stone crusher plant in ST-2**Safety training of workers at ST-2**Flagman at Railway Crossing (LC-41) in ST-2**Borrow area rehabilitation at ST-2*



	
<p><i>Display of Environmental Grievance Redressal signboard at Suktapali in ST-2</i></p>	<p><i>Health check-up and HIV/AIDS awareness camp at Suktapali in ST-2</i></p>
	
<p><i>Safety lapses (No PPEs) at bridge no. 289 in ST-3</i></p>	<p><i>Restored safety fencing at RT-1</i></p>
	
<p><i>Labour camp at RT-1</i></p>	<p><i>Air quality monitoring at RT-1</i></p>





*Collection of solid wastes at labour camp at RT-1*



*Fire fighting arrangements at batching plant area at RT-1*



*AIDS/HIV awareness camp at Kantabanji base camp in RT-1*



*Water quality monitoring at RT-1*



*Fire fighting arrangements at batching plant area at RT-1*



*Air quality monitoring at plant site in RT-3*

*Plantation at HT-1**Health monitoring camp at PG-1**Workers wearing safety belts during bracket erection in PG-1**Safety training to workers at PG-1**Pledge during safety awareness camp at PG-2**Use of PPEs at construction site in PG-2*





*Use of PPEs at construction site in PG-2*



*Safety awareness training at PG-3*



*Use of PPEs at construction site in PG-3*



*AIDS/HIV awareness and health checkup camp at PG-3*