

Environmental Monitoring Report

February 2017
Project Number: 36330-023

IND: Railway Sector Investment Program

Prepared by the Ministry of Railways, Government of India for 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**

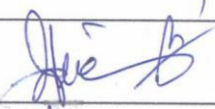
**Environmental Monitoring Report
Semi Annual Report: April 2016 - September 2016**

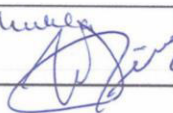


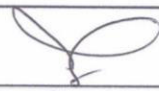
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	Track Doubling and Electrification on Critical Routes
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Abbreviations

ADB	Asian Development Bank
AIDS	Acquired Immuno Deficiency Syndrome
CtE	Consent to Establish
CtO	Consent to Operate
EMP	Environmental Management Plan
FFA	Framework Financing Agreement
GC	General Consultant
GoI	Government of India
HIV	Human Immunodeficiency Virus
IA	Implementing Agency
IEE	Initial Environmental Examination
IPP	Indigenous Peoples Plan
MFF	Multitranche Financing Facility
MoR	Ministry of Railways
NOC	No Objection Certificate
PMC	Project Management Consultant
RP	Resettlement Plan
RSIP	Railway Sector Investment Program
RVNL	Rail Vikas Nigam Limited
SPS	Safeguard Policy Statement
STD	Sexually Transmitted Diseases

Executive Summary

The present report is the 7th semi-annual environmental monitoring report on implementation of Environmental Management Plan (EMP) in 5 railway up gradation projects taken up under the Railway sector Program (RSIP) by the Government of India with financial assistance from Asian Development Bank. Rail Vikas Nigam Limited (RVNL) is the Implementing Agency. The following projects have been included 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 - Guntakal

The above projects are further divided into 17 construction packages. The contracts of 15 construction packages have been awarded and the construction were in progress in 14 packages in the beginning of the period. In the month of June 2016 contracts of three construction packages of RT-1, RT-3 and HT-2 have been terminated because of continuous nonperformance.

The present semiannual report highlights the compliance status on environmental safeguards as per contract agreement and specifications in packages where works are in progress for the period from April 2016 to September 2016. It covers the status of compliance with environmental loan covenants, compliance with environmental regulations of the Government and policies of ADB, implementation of provisions of EMP stipulated in the contract specifications, and the performance of the safeguards measures.

During the reporting period no significant noncompliance has been observed with respect to implementation of environmental safeguards. The pollution control measures at different locations are found to be satisfactory. It has been ensured that the contractors comply with the conditions of the regulatory authorities as well as the EMP. Some lapses have been observed in different projects especially with respect to workers safety, labour camp facilities, and borrow area management, debris management and non-availability/inadequate monitoring by Environmental Officers of PMCs.

The status of statutory permissions and licenses are being continuously monitored. In most of the packages the contractors have obtained all the requisite licenses and permits except for a few batching plants where No Objection Certificate (NOC) is required from Pollution Control Board. (The contractors have already applied for NOC but follow up is required for getting them from Pollution Control Board).

The Contractors have shown some improvements in worker's safety and safe working conditions at site compared to the last reporting period. Still few safety lapses have also been recorded especially by sub-contractors. This aspect requires proper attention. With efforts from PMC and RVNL, improvements in labour camp facilities such as toilets with septic tank and soak pits, drainage system, collection and disposal facilities of wastes and general housekeeping at most of the camp sites have been observed. However general housekeeping and sanitation arrangements require improvement in few of the camp sites.

Periodical health checkups and HIV/AIDS awareness camps have been initiated in all the construction packages, but some contractors are not maintaining the periodicity of the HIV/AIDS awareness programme as per conditions of the contract.

Regarding borrow areas and quarries, the compliances with the safeguard requirements have been ensured in all the packages. Special attention has been given towards restoration of all the borrow areas after use. For the terminated projects, the PMC should verify all the restoration works at borrow areas, plant site, campsites and other allied sites and take appropriate action for completion of restoration works in consultation with RVNL.

There is specific position of environmental officer in all packages of PMC. However, some PMC could not deploy their environmental officer during the period.

Monitoring of environmental attributes in terms of Air, Water and Noise quality was conducted as per environmental monitoring plan in most of the construction packages. The test results reflect that there is no significant load of pollution on these attributes due to project construction during the reporting period.

The officers and staff of RVNL, PMCs and contractors of several projects have been given refresher training on implementation of environmental safeguards by the General Consultant during April.

1. Background

1.1 Railway Sector Investment Programme and Multi Tranche Financing Facility

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. 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 8th 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:

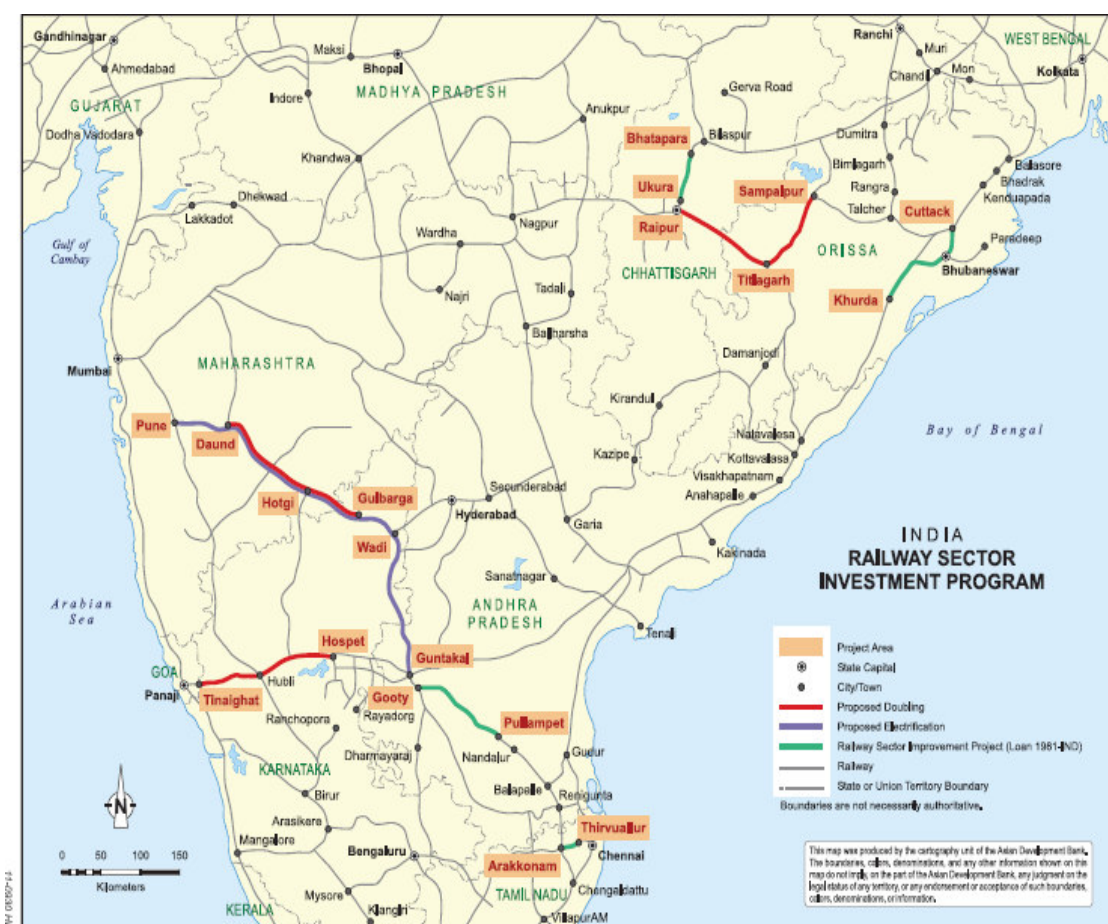


Figure 1: Map of India showing Track Doubling and Electrification Projects

These projects have been further divided into 17 construction packages. The details of projects and subprojects (construction packages) and their locations are presented in the following table:

S No.	Project	Length (km)	Package	State
i.	Doubling of Daund - Gulbarga (DG)	224	DG-1: Bhigwan-Mohol DG-2: Hotgi-Gulbarga	Maharashtra and Karnataka
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-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 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.

1.2 Active contracts

The works contracts have been awarded for 15 packages out of 17. The contracts for packages PG-4 and PG-5 of Electrification of Pune-Guntakal are expected to be awarded in the first quarter of 2017. For each construction package, a PMC has been engaged for monitoring of contractor's activities. A list of contractors and PMCs along with dates of commencement of works in each package is presented in Table 2. Following termination of the first contractor, a new contractor has been mobilised in package DG-2 in the month of April 2016. Further, during the period, the non performing contracts of RT-1, RT-3 and HT-2 have been terminated.

Most of PMCs are mobilized and functional.

	Projects/Packages	Contractor	PMC	Date of start of Construction works
A. Daund-Gulabarga project				
(i)	DG-1: Bhigwan - Mohol	IL & FS - Kalindee (JV)	SOWIL	15/06/2012
(ii)	DG-2: Hotgi - Gulbarga	SMSIL-MBPL-BRAPL (JV)	Voyants Solutions	16/04/2016
B. Sambalpur-Titlagarh project				
(i)	ST-1: Major Bridges	Rahee-Agrawal	CDM Smith	16/08/2012
(ii)	ST-2: Sambalpur-Barapalli	Larsen and Toubro	STUP Consultants	20/04/2014
(iii)	ST-3: Barapalli-Bolangir	Larsen and Toubro	CDM Smith	20/04/2014
(iv)	ST-4: Bolangir-Titlagarh	Larsen and Toubro	BARSYL	20/04/2014
C. Raipur-Titlagarh project				
(i)	RT-1: Titlagarh-Lakhana	IVRCL-MRT (JV) terminated on 13/06/2016.	URS Scott Wilson	22/08/2012
(ii)	RT-2: Lakhana-Arand	ARSS Infrastructure Projects	STUP Consultants	09/02/2015
(iii)	RT-3: Arand-Raipur	Railone-Tarmat-Durga (JV) terminated on 21/06/2016	URS Scott Wilson	22/08/2012
D. Hospet-Tinaighat project				
(i)	HT-1: Hospet-Harlapur	Larsen and Toubro	Voyants Solutions	05/08/2012
(ii)	HT-2: Harlapur-Dharwad	Railone-Tarmat-Durga (JV) terminated on 17/06/2016	Voyants Solutions	05/08/2012
(iii)	HT-3: Kambarganavi-Tinaighat	GVR-GEW (JV)	STUP Consultants	01/08/2012
E. Pune-Guntakal electrification project				
(i)	PG-1: Pune-Bhigwan & Gulbarga-Wadi	KEC International Ltd. - KIEL (JV)	Voyants Solutions	12/09/2012

	Projects/Packages	Contractor	PMC	Date of start of Construction works
(ii)	PG-2: Wadi-Raichur	Larsen and Toubro-Bharat Rail Autom (JV)	Voyants Solutions	24/10/2012
(iii)	PG-3 : Raichur - Guntakal	Larsen and Toubro-Bharat Rail Autom (JV)	Voyants Solutions	24/10/2012
(iv)	PG-4: Bhigwan-Solapur	Yet to be awarded		
(v)	PG-5: Solapur-Gulbarga	Yet to be awarded		

Table 2: List of contractors and PMCs along with dates of commencement

Egis India, Egis Rail and TUC RAIL (JV) has been appointed by RVNL as General Consultant to oversee the overall progress and compliance of the project.

1.3 Site activities during the reporting period

Following table depicts the status of progress of major activities during the reporting:

Packages	Major works in progress
A. Daund-Gulbarga project	
DG-1	<ul style="list-style-type: none"> ○ Earthwork for yard works at Angar, Malikpet and Vakav completed except for locations for points and crossings that are required to be connected with existing system. ○ Ballast supply between Mohol to Vakav for the commissioning. ○ Minor bridge works between Wasinge to Kurduvadi nearing completion. Works started for the subsections from Kurduvadi to Kem. ○ Earthwork in cuttings between Washimbe and Bhigwan has been started and is in advance stage of completion. ○ All the works between Vakav and Wadshinge are nearing completion except S&T works in progress ○ Ballast supply between Vakav and Wadshinge subsection. ○ Works started for the subsections from Kurduvadi to Bhalwani. ○ General electrical works at Angar, Malikpet and Vakav nearing completion. ○ Signalling Works: <ul style="list-style-type: none"> - Mohol: Wiring and installation of relay room including alteration to existing control panel to suit the operation of double track (as the other side i.e., Mohol to Solapur is already a double line). - Works in progress at Malikpeth, Angar and Vakav stations. All the works related to relay room viz., relay base, indoor wiring is completed.

Packages	Major works in progress
	<ul style="list-style-type: none"> - Pre-NI works have been completed for indoor S&T works and testing of track signals/point-machine signals is in progress between Mohol – Vakav (milestone-1) of DG-1. - Block-instrument testing has been completed in Mohol – Vakav (milestone-1) of DG-1.
DG-2	<ul style="list-style-type: none"> o Angle fencing between Akalkot and Nagansur. o Earthwork in progress between Akalkot and Nagansur. o Earthwork and blanketing in progress between Akalkot and Kulali. o Construction of unfinished minor bridges leftover by previous contractor has been completed. o Collection of ballast between Akalkot and Gulbarga started. o Good progress of transportation of sleepers between Nagansur and Gulbarga. o Station building work nearing completion in Gulbarga.
B. Hospet-Tinaighat project	
HT-1	<ul style="list-style-type: none"> o Major Bridge 104: Launching of all girders including load testing completed, protection works is in progress. o Major Bridge no. 63: completed o Bhanapur station yard: completed the construction of platform, passenger-shelter shed, S&T service buildings and S&T outdoor cabling works including cable termination and testing. o Koppal station yard: earth work in progress. o Consolidation of ballast for the track between Banikoppa to Bhanapur subsection: 2nd round ballast tamping completed by ballast-tamping machine. o S&T outdoor cabling works completed at Bannikoppa station and in progress at Bhanapur station. o S&T service buildings in progress at Bhanapur and Koppal station yards. o BPAC (Block Proving Axle Counter) commissioning completed at Harlapur, Sompur and Bannikoppa station yards. o About 25km cable laying completed at Bhanapur yard
HT-2	The contract has been terminated in June 2016 due to poor performance of the contractor.
HT-3	<ul style="list-style-type: none"> o Engine rolling done for 8.5 km from Londa to Tinaight station. o Commissioning of Kambarganvi to Kashanatti and Kashanatti to Alnavar subsections done on 30/4/2016. o Construction of side-drains in Shivathan to Devarayi subsection is in progress. o Construction of Staff Quarters near Londa station: Flooring work completed. o Stressing of girders for major bridge no. 03 completed

Packages	Major works in progress
	<ul style="list-style-type: none"> Completed civil works for S&T buildings and assembling of points and crossings is in progress at Londa and Tinaighat station yards. Work of insertion of Switch Expansion Joints (SEJ) for new track at km: 557/300 - 400 Shifting of S&T Location Boxes completed at km: 558/150.
C. Raipur-Titlagarh project	
RT-1	The contract has been terminated in June 2016
RT-2	<ul style="list-style-type: none"> Earthwork in filling and blanketing are in progress in subsections from Khariar Rd to Nawapara and Nawapara to Lakhna. Minor bridges in all subsections between Bhimkhoj and Lakhana stations. Major bridge no. 124: raft (open) foundations for piers and abutments is in progress. Major bridge no.161 (Jonkriver): pile-foundation and pile-shaft works in progress. Major bridges: Piling for foundation of bridge no. 116 and bridge no. 124 are in progress. Ballast supply in Bagbahara-Komakhan subsection and from Khariar Road to Nawapara. Track linking in progress in Arand to Bhimkhoj and Bhimkhoj to Bagbahara subsections Laying of sleepers in the subsection from Bhimkhoj to Bagbahara.
RT-3	The contract has been terminated in June 2016
D. Sambalpur-Titlagarh project	
ST-1	<ul style="list-style-type: none"> Steel girder fabrication work: 5263 MT structural steel(82%)have been procured up to September end. Road over Bridges: bridge no. 358A – RCC box and return-wall shaft completed; bridge no. 439A – substructure completed except casting of bed-blocks and return wall shaft is in progress, Bridge no. 76: 10 nos. girder erection completed out of 25 nos. total required. Bed-block for Pier-15 and Pier-16 completed; Pier-shaft for Pier-21 to Pier-24 are in progress. Bridge no 239: Erection of girders completed, pending fixation of bearings Bridge no 293: Pier-cap for pier-10, pier-11 and pier-14 completed and concreting for pier-shafts of pier-12 and pier-13 completed. Erection of girders for span-8 to span-12 and span-15 completed during this period(in total, girders for 12 spans erected out of total scope of 15 spans Bridge no. 331: Piling for pier-3 completed (with this, all piling foundations are completed for all pier and abutments). Substructure for pier-3 and pier-6 completed (with this, only pier-1 is to be started while pier-2 and pier-4

Packages	Major works in progress
	<p>are in progress and both abutments completed).</p> <ul style="list-style-type: none"> ○ Bridge no. 406: pile-cap for pier-1, 2, 3, 5 and 7 completed during this period. Substructure for pier-6 and abutment-1 completed during this period. With this all substructure work is completed. Girder erection completed for span-4, span-7, span-8 and span-10 completed and that for span-6 is in progress (with this erection of 5 spans completed out of total 10 spans in scope). ○ Bridge no. 438: pile-foundations for pier-5 to pier-13 excluding pier-8 (total 72 pile-foundations completed till date out of 180 to be done) ○ Road over Bridges: bridge no. 423A-abutment A1 completed and A2 is under progress. ○ Bridge no. 438: pile-foundations completed for pier-12 and abutment, A2 and their substructure work is in progress. (total 75 pile-foundations completed till date out of 180 to be done).
ST-2	<ul style="list-style-type: none"> ○ Earthwork in cutting is in progress in Godbhaga to Attabira and Bargah Road to Barapali subsections. ○ Earthwork in filling is in progress for the subsection from Godbhaga to Attabira. ○ Blanketing work is in progress in Godbhaga to Attabira, Attabira to Suktapali and Bargah Road to Barapali subsections. ○ Construction of major bridge no. 116 completed. ○ Major bridge no. 160: Pile-cap for abutment, A1 and pier-5 completed. Pier-shaft for pier-1 completed including pier-cap. ○ Piling work started for major bridge no. 198 – 17 piles completed. ○ Foundations for FOB at Godbhaga station is in progress ○ Fabrication of steel for FOB at Godbhaga, Attabira and Suktapalli stations is in progress. ○ Dressing and turfing of formation slopes in Hirakud to Godbhaga and Godbhaga to Attabira subsections. ○ Load test for superstructure of major bridge no. 92 in Hirakud to Godbhaga subsection. ○ Pile-cap completed and pile-shaft in progress for pier-2 at major bridge 160 in Suktapalli to Bargah subsection ○ Piling works in progress for abutments at major bridge 198 in Bargah to Barapali subsection ○ Construction of relay-room and S&T end-hutments are in progress at Hirakud, Godbhaga, Attabira and Suktapalli stations.
ST-3	<ul style="list-style-type: none"> ○ Earthwork in cutting, filling and blanketing works are in progress in all subsections of the project. ○ Hard rock in cutting is in progress in Dungripali to Khalipali subsection. ○ Blanketing in progress from Khaliapali to Losingha ○ Dungripali station yard: construction of station building completed except

Packages	Major works in progress
	<p>for general electrical works and sanitary fittings. Columns above plinth beam and brick-masonry work is in progress for S&T-end building at Titlagarh end.</p> <ul style="list-style-type: none"> ○ Turfing of formation slopes is in progress in Barpali to Dunggripali subsection and from Khaliapali to Losingha. ○ bridge no. 220 : bridge protection works is in progress ○ bridge no. 235: launching of pre-cast PSC girders completed and casting of deck-slab completed for span-1 and for span-4 to span-6. ○ Major bridge no. 306A: casting of raft slab for one of twin RCC boxes. ○ Major bridge no. 306A: casting of raft slab for one of twin RCC boxes ○ Construction of minor bridges in Barpali to Dunggripali subsection are in progress nearing completion for bridge no. 221, 229 to 234, 238, 246, 248, 249, 251, 252, 257, 258, 260, 261 and 262. ○ S&T works: No major activities except for construction of foundation and erection of location boxes required for telecom works ○ Construction of side drain is in progress near level crossing no. JT-66.
ST-4	<ul style="list-style-type: none"> ○ Earthwork in cutting, filling, blanketing, minor bridge and side-drain construction works in Balangir to Deogan Road subsection. ○ Hard rock cutting in Balangir to Deogan Road subsection. ○ Major bridges: <ul style="list-style-type: none"> - bridge no. 363: casting of precast ballast-retainer and PSC slabs are in progress. - bridge no. 387: concreting for abutment-shaft lifts in both the abutments, A1 and A2 and also the return wall construction is in progress. ○ Construction of S&T Relay rooms and Station-end service buildings are in progress at Deogaon Road yard. ○ The work of diversion of existing and working S&T cables infringing the proposed new double track started near level crossing, JT-107, in Deogaon to Saintala subsection
E. Pune-Guntakal electrification project	
PG-1	<ul style="list-style-type: none"> ○ CRS inspection completed on 30/09/2016 for Pune-Daund Section. That section is commissioned. ○ Construction of TSS/Daund: Cable termination works for the provision of remote control operation with SCADA under progress. ○ Switching stations at Ghopuri, Loni, Uruli, Kedgaon, Patas and Daund-A between Pune to Daund subsection are nearing completion and running of feeder wire and jumper connections are pending. ○ Installation of section insulators, bracket adjustment, attending mast alignments, cut-insulators, dismantling of isolators and re-erection and super mast erection at Patas and Hadapsar stations

Packages	Major works in progress
	<ul style="list-style-type: none"> ○ Daund Yard: Earthing installation, large span boom erection, erection of masts from Km 251 to Km 254 and installation of 410mts feeder wire ○ Polytetrafluoroethylene (PTFE) insulators installation at Yavat and Kedgaon, tree trimming in the section ○ Fixing of earthing flats, caution boards and danger boards, etc. are in progress in view of submission for approval by Electrical Inspector to the ○ Construction of Tower-Car Shed is in progress at Loni. ○ Construction of building for OHE depot and Power supply Installations (PSI) in progress at Gulbarga. ○ Construction of type-II staff quarters completed at Pune, Loni, Urli, Kodegaon and Daund. ○ TSS at Daund completed including inspection by EIG. Also construction of building for S&T, OHE depot and Power supply Installations (PSI) completed at Daund and Loni station yards. ○ Running room meant to serve as rest room for train drivers and guards in progress at Daund.
PG-2	<ul style="list-style-type: none"> ○ TSS at Krishna completed including joint inspection with Railways and EIG, ready for commissioning. Metering bay equipment for incoming power has been erected. ○ Staff Quarters at Krishna: Roof slab casted for first floor of balance 2 block units. ○ The works in the subsections from Wadi to Chiksugur section has been inspected by CRS on 20/09/2016 including successful trial run. Total 93.15 route Km/219 track KM charged successfully.
PG-3	<ul style="list-style-type: none"> ○ TSS at Mantralayam Road: Control room construction is in progress. Transformers erected on plinth, foundation works for remaining equipment and works of incoming power line by local state electricity department is in progress. ○ Staff Quarters at Mantralayam Road: Excavation for foundation completed and construction of foundation columns is in progress. ○ Adoni Yard: Tower Car Shed – construction of structure for inspection pit completed and brick masonry wall is in progress. Construction of buildings for staff quarters, OHE Depot and Power Supply Installations completed and minor finishing works in progress. ○ Raichur Yard: Tower Car Shed – construction of structure for inspection pit and brick masonry walls completed. Roofing, flooring and track works to be done. Construction of building for OHE Depot and Power Supply Installations completed.

Table 3: Major works in progress

This period has seen completion/commissioning of few sections and subsections: Hotgi-Tilati at DG-2, Harlapur-Bannikoppa at HT-1, Kambarganvi-Alnavar at HT-3, Pune to Daund at PG-1, Wadi to Krishna and Krishna to Chisugur at PG-2.

During the period, the non performing contracts of RT-1, RT-3 and HT-2 have been terminated. However, JV partner of RT-1 has been allowed to complete balance work of signaling. Now, RVNL is going to complete the balance work of terminated contracts through a combination of small contracts and new main tenders. In all terminated packages RVNL has already started awarding small contracts by calling single or limited tenders. New main tenders for work of terminated packages are expected to be awarded in first quarter of next year.

Most of PMCs looking after the works are mobilized and functional. Existing PMC for DG-1 whose contract expired on 30/09/16 has got its 4th extension up to 30/11/16. Further, existing PMC for DG-2 has also been granted extension up to 15/12/16 to complete the balance work of old contract. New PMC for DG-1 is expected to be mobilized by the end of next quarter. For DG-2 new PMC is functional since August 2016.

2. Environmental Categorisation of the projects

All 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. In category-B projects, the proposed project’s potential adverse environmental impacts are site specific. The different project activities have potentials of small to medium scale localized impacts on different environmental components that can be mitigated with implementation of suitable mitigation measures. Being Category-B projects, all projects require only Initial Environmental Examination (IEE) for meeting the environmental requirements under ADB’s policy. Separate IEE report has been prepared for each Project covered under RSIP and Environmental mitigation and monitoring plan have been formulated based on the findings of the environmental study with respect to the anticipated potential environmental impacts. 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

This semi-annual report describes the compliance status on environmental safeguards during project execution as per contract agreement and specifications in all the construction packages where works are in progress for the period from April 2016 to September 2016. The scope of this report is mainly to present the compliance status on environmental safeguards during construction in all the 15 construction packages in progress covering compliance with statutory requirements of each project, conditions of EMP stipulated in contract conditions and assessment of performance and effectiveness of implementation as well as monitoring of environmental attributes at different representative sites. The information presented in this report is mainly based on observations made during field inspections jointly carried out by the employer, the engineer and the contractor, and periodical in sections by the General Consultant as well as the records provided by the PMC and contractor of respective construction package.

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

The monitoring of compliance of EMP and its performance is carried out through following tasks:

- (i) Site inspections by Environmental Officers of PMC, Environmental Expert of GC and Nodal Officers of PIU
- (ii) Review of Contractor’s and PMC’s documents related to implementation of Environmental safeguards
- (iii) The status reports submitted by the PMC’s on environmental compliance
- (iv) Monitoring of selected environmental parameters identified as indicators

4.1 Institutional Arrangement for EMP Implementation

Following key players are involved in ensuring environmental compliance in the project at different levels:

- The contractor
- Project Management Consultant (PMC)
- Project Implementation Unit (PIU) of RVNL
- General Consultant
- RVNL Head quarter

The monitoring of environmental safeguards at site during construction is being undertaken at different levels. The contractors are responsible for implementation of environmental safeguard measures at site during construction on day to day basis following the contract specifications on Environmental mitigation measures.

Each contractor has appointed its EHS expert to ensure implementation of environmental safeguards measures as stipulated in the EMP and contract documents.

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 there is provision of Environmental Officers 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 technical guidance to the contractor for implementation of the EMP and preparation of checklists/formats/reports etc.
- Provide feedback and recommendations to Project Manager
- Reporting and recording keeping on environmental safeguards issues

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

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

The General Consultant has appointed Dr Surjit Singh Deepak as their Environmental Expert.

The Environmental Expert of General Consultant conducts periodical site inspection and reviews environmental progress based on actual site visit and information supplied by the PMC. Time to time training workshops on Environmental implementation have been conducted for PMC and the contractors as capacity building measures on effective implementation and monitoring of EMP in the project during construction.

Records of all persons of RVNL, PMC and contractors who attended training workshop on environment conducted by General Consultant have been maintained.

Reporting formats have been developed which are to be filled up by the contractor and PMC 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 and addressing the public grievances on environmental issues.

4.2 Deployment of Environment Officers of PMCs

The Environmental Officers of PMC undertake inspections and monitoring of environmental activities on regular basis. For monitoring and reporting related to environmental activities various checklists and formats are being used.

For the PMC contracts signed before 2016, the input of the Environmental Officer of PMC is intermittent. It will be full time for the new contracts. The list of PMC's Environmental Officers in different construction packages and their status of mobilization at the end of September 2016 is provided in the following table:

Project	Package	Name of PMC	Name of Environmental Officer of PMC	Remarks
Pune–Guntakal (PG)	PG-1	Voyants Solutions	Mr. Srikant Ahire	Spending on average 5 to 7 days at this site. In addition to PG-1 he is now engaged for HT-1, HT-2 and HT-3
	PG-2	Voyants Solutions	-	Mr B. Asif Basha, Environmental Officer looking after PG-2 and PG-3 packages, left the project in the month of August 2016. Since then no Environmental Officer of PMC is available at site.
	PG-3	Voyants Solutions	-	
Daund-Gulbarga (DG)	DG-1	Sowil	-	No Environmental Officer of PMC is available at site. (The PMC claims that they have signed an agreement in December with Mr. Rakesh Katdare as their Environmental Officer but the environmental Officer has been rarely seen at the site).

Project	Package	Name of PMC	Name of Environmental Officer of PMC	Remarks
	DG-2	Voyants Solutions	Mr. P. Suresh Babu	New PMC mobilized at site in the month of August 2016. The input of Environmental Officer of PMC is on continuous basis in the new contract.
Hospet-Tinaighat (HT)	HT-1	Voyants Solutions	Mr. Srikant Ahire	
	HT-2	Voyants Solutions	Mr. Srikant Ahire	
	HT-3	STUP Consultants	Mr. Srikant Ahire	
Raipur-Titlagarh (RT)	RT-1	URS Scott Wilson	-	No Environmental Officer available after August 2015. Penalty has been imposed on PMC. RVNL is planning to employ the services of Mr. Maheshwara Parida, presently engaged on RT-3, to cover RT-1.
	RT-2	STUP Consultants	Mr. Gagan Parida	Also covering the package of ST-2.
	RT-3	URS Scott Wilson	Mr. Maheshwar Parida	RVNL has directly engaged an Environmental Officer because PMC failed to mobilize their Environmental Officer. Mr Parida has been appointed on 27/08/2016.
Sambalpur-Titlagarh (ST)	ST-1	CDM Smith	Dr. Santosh Kumar Sahu	The earlier Environmental Officer Mr. Rakesh Sathpati has been replaced by Dr. Santosh Kumar Sahu in the month of September 2016.
	ST-2	STUP Consultants	Mr. Gagan Parida	-
	ST-3	CDM Smith	Dr. Santosh Kumar Sahu	The earlier Environmental Officer Mr. Rakesh Sathpati has been replaced by Dr. Santosh Kumar Sahu in the month of

Project	Package	Name of PMC	Name of Environmental Officer of PMC	Remarks
				September 2016.
	ST-4	BARSYL	-	Mobilisation of new Environmental Officer is pending after resignation of previous one in August 2015.

Table 4: List of Environmental Officers of PMC deputed at various subprojects

The PMC's Environmental Officer was not available in project packages DG-1, RT-1, RT-3, PG-2, PG-3, and ST-4 during part of the reporting period. This is affecting compliance monitoring, record keeping and reporting on environmental safeguards.

RVNL has directly engaged an Environmental Officer, Mr. Maheshwar Parida in package RT-3. RVNL has plan for engaging the same Environmental Officer in package RT-1 from the month of December.

In package DG-1, there was no Environmental Officer over several months but one is expected to be deployed in December after mobilization of new PMC.

In newly awarded contract of PMC in DG-2, there is provision of full time Environmental Officer in PMC team. Similarly it has been included in the proposed contract of PMC for DG-1. Deployment of dedicated Environmental Officer would increase the efficiency of monitoring of EMP implementation by PMC.

In construction package PG-2 and PG-3 the Environmental Officer of PMC, Mr B. Asif Basha has left the project in August 2016. A new Environmental Officer is required in these packages for ensuring effective monitoring of environmental compliance.

Since the previous environmental officer was not regularly visiting the sites in construction packages of ST-1 and ST-3, the PMC has engaged a new Environmental Officer in September.

After termination of construction packages RT-1, RT-3 and HT-2, Environmental Officer of PMC at those packages has to take on additional tasks like verification of restoration work on demobilization of plants and camps, collection and compilation of records on environmental safeguards and investigation including reporting of any safeguards issues a raised due to termination.

5. Environmental performance monitoring

As discussed in the previous section, different environmental performance indicators have been identified for assessing the effectiveness of environmental compliances. These indicators 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 and 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 and regulations

5.1.1 Compliance with covenants stipulated in the Loan Agreement

The Schedule 4 of the Framework Finance Agreement (FFA) stipulates the environmental considerations whereas the schedules 4 and 5 of Loan Agreement (Ordinary Operations) stipulates the requirements of environmental safeguards in RSIP under RVNL. The status of project compliance on environment safeguards as per stipulated agreement with the Government of India and ADB is presented in the following Table 5.

S.N.	Loan Covenants	Status of Compliance
A.	FRAMEWORK FINANCING AGREEMENT	
1	<p>Schedule 4 A. 1(iv):</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 ADB's 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>Initial Environmental Examination (IEE) report has been prepared for each project under RSIP 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 as per ADB's Safeguard Framework and ADB's SPS 2009. The Environmental Management and Monitoring Plan has been incorporated in bidding documents of all the projects.</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>Schedule 4 A. 1(iv):</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 including their renewals have been ensured. The status of clearances/approvals/ licenses upto September 2016 is presented in Table 3.</p>
B.	LOAN AGREEMENT (ORDINARY OPERATIONS)	
3	<p>Schedule 4 B: Approval Procedure</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 selected 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 the public on website.</p>
	<p>Schedule 4: Conditions for Award of Contract:</p> <p>Para 6: 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 work contract of all the construction packages under RSIP.</p>
4	<p><u>Schedule 5: Execution of Project; Financial Matters:</u></p> <p>Environment Para 7 (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>

S.N.	Loan Covenants	Status of Compliance
5	<p><u>Schedule 5: Execution of Project; Financial Matters:</u></p> <p>Safeguards related Provisions in Bidding Documents and Works Contract: Para 12: 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"> (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. (b) Make available a budget for all such environmental and social measures; and (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. 	<p>Complied</p> <p>Being complied.</p> <p>The compliance with the mitigation measures stipulated in the EMP is constantly monitored in each construction package and necessary corrective actions are being taken at site.</p> <p>Environmental monitoring and mitigation costs allocated/incorporated in contract agreement</p> <p>No such risks or impacts observed during the reporting period from April 2016 to September 2016</p>
6	<p><u>Schedule 5: Execution of Project; Financial Matters:</u></p> <p><u>Safeguards Monitoring and Reporting (Para 13) :</u> The Borrower shall do the following and shall cause MOR and RVNL to the following:</p> <ul style="list-style-type: none"> (a) Submit Semi-annual Safeguards Monitoring Reports to ADB and disclose relevant information from such reports to affected persons promptly upon submission. (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 	<p>The semi-annual report has been prepared as per the guidelines and submitted.</p> <p>No such unanticipated environmental risks or impacts occurred during the reporting period</p>

S.N.	Loan Covenants	Status of Compliance
	<p>detailed description of the event and proposed corrective action plan.</p> <p>(c) Report any actual or potential breach of compliance with the measures and requirements set forth in the EMP, the RO or the IPP promptly after becoming aware of the breach.</p>	<p>No breach of compliance recorded in any of the projects till date.</p>

Table 5: Compliance status with Loan Covenants

5.1.2 Compliance with state and national statutes and regulations

In the project packages where works are in progress there is the requirement of statutory permits and licenses under different acts and rules pertaining to environmental safeguards in India. None of the projects requires environmental clearance under EIA notification 2006. The permits and licenses required under the projects are mainly labour license, quarry license, NOC from State Pollution Control Board for stone crusher plant, batch mix plant, wet mix plant, permission for tree felling. The following Table 6 depicts the package wise status of required statutory permissions under different rules and regulations pertaining to environment for the reporting period. All the contractors have shown improvement in obtaining required permits and licenses pertaining to environment as required and periodically getting them renewed. In construction package ST-1 CTE batching plant at Sonegarh bridge is obtained, CtO is awaited from Pollution Control Board. CFE and CFO for new batchmix plant at Santala are required to be obtained from Pollution Control Board.

In construction package RT-2 of Raipur-Titlagarh project, the pending NOC for batching plant and wetmix at Bagbahara has been obtained by the contractor during the reporting period.

There is a requirement of Forest Clearance in construction packages ST-2 and in ST-4. The application for forest clearance has been submitted by the PIU and the final clearance is still pending with the Forest Department.

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	Env 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
Hospect-Tinaighat	HT-1	Hospet-Harlapur	NA	Obtained	Obtained and renewed	Obtained	Obtained	Obtained. Plant yet to be commissioned	Obtained
	HT-2	Contract terminated in June 2016							
	HT-3	Kambarganavi-Tinaighat	NA	Obtained	Obtained and renewed	Obtained	Obtained	Applied for renewal to Pollution Control Board, renewal awaited. Plant is not operational	Obtained
Sambalpur-Titlagarh	ST-1	Major bridges	NA	Obtained	Obtained and renewed	NA	NA	NA	Obtained for Concrete mix plants established at Hirapur camp site and Mahanadi bridge site. CTE for batching plant at Sonagarh bridge is obtained, CtO is awaited from Pollution Control Board. CFE and CFO for newbatchmix plant at Santala are

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	Env 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
									required to be obtained from Pollution Control Board.
	ST-2	Sambalpur-Barapali	Forest Clearance for temporary diversion of 0.044 ha area is in process	Obtained	Obtained and renewed	NA (The contractor is procuring materials from third party licensed quarry)	NA	The renewal of the NOC is pending (Presently the plant is temporarily handed over to contractor's own Highway Division and the crushed ballast from this plant is not in use for this package)	Obtained
	ST-3	Barapali-Bolangir	NA	Obtained	Obtained	NA	NA	NA	Obtained
	ST-4	Bolangir-Titlagarh	Forest Clearance for temporary diversion of	Obtained	Obtained and renewed	NA	NA	NA	CFO expired, renewal in process

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	Env 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
			5.768 ha area is in process						
Raipur-Titlagarh	RT-1	Contract terminated in June 2016							
	RT-2	Lakhana-Arand	NA	Obtained	Obtained	NA (Boulders are being procured from third party having valid license)	NA	NA	Obtained
	RT-3	Contract terminated in June 2016							
Daund-Gulbarga	DG-1	Bhigwan-Mohol	NA	Obtained	Obtained and renewed	Obtained	Not obtained. Presently procuring ballast from third party licensed quarry	Stone crusher plant shifted to another location at Kem village. Fresh NOC required. Applied for, NOC is awaited.	NA
	DG-2	Hotgi-Gulbarga	NA	NA	Obtained	NA	NA	NA	Obtained
Pune-Guntakal	PG-1	Pune-Bhigwan and Gulbarga-Wadi	NA	NA	Obtained and renewed	NA	NA	NA	NA

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	Env 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
	PG-2	Wadi-Raichur	NA	NA	Obtained and renewed	NA	NA	NA	NA
	PG-3	Raichur-Guntakal	NA	NA	Obtained and renewed	NA	NA	NA	NA

Table 6: Status of statutory clearance, licenses and permits pertaining to environment

5.2 Compliance with the Environmental Management Plan

EMP is an integral part of all the contract documents and the EMP provisions have been included under particular conditions of the contract of all the construction packages. The contractor has to follow the stipulated environmental safeguards as per EMP during construction activities. The compliance with the safeguards requirements is being constantly monitored by PMC and PIU at site. The performance of implementation of EMP is assessed by the General Consultant based on actual observations made at site and feedback received from the respective PMC.

During the reporting period, following major environmental issues were reviewed and the contractors were instructed to take remedial measures when required:

- Pollution control measures at all potential sources including construction and plant sites
- Borrow area/quarry operations and rehabilitation
- General safety at different sites including construction site, plant site, borrow areas, stockyards, etc.
- Maintenance of facilities and general housekeeping at each construction camp sites.
- Medical facility at camps, construction sites and plant sites
- HIV/AIDS awareness and health check up programme
- Supply and use of Personal Protection Equipment (PPE) for all the workers at all worksites
- Maintenance of general public safety.
- Periodical monitoring of environmental attributes such as air quality, water quality and, noise levels at different locations during construction

5.2.1 Compliance with pollution control measures at construction sites

Generation of dust is the major source of air pollution associated with civil construction activities. Gaseous emission is another source of air pollution which occurs due to operation of heavy machineries and construction vehicles. During the reporting period most of the works were carried out from April to June 2016. Regular water sprinkling is applied to control dust generation and this was found to be satisfactory in all the construction packages. Transportation of materials has been ensured in covered dumpers to avoid dust generation and spillage of materials along the roads. During July to September 2016 only limited works were in progress due to monsoon season, so the potential of dust generation during this period was minimum.

5.2.2 Compliance with pollution control measures at plant sites

In the track doubling projects contractors have established mainly two kinds of plants, one is a stone crusher unit and another is a batching plant/concrete mix plant. Initially own stone crusher units were established by the contractors in construction packages HT-3, DG-1, ST-2 and RT-1. The stone crusher plant is now nonfunctional in RT-1 package due to termination of the contract of contractor. The stone crusher in construction package HT-3 is not operational since 2014 due to non-availability of extension of NOC from the Pollution Control Board. In construction package ST-2 the contractor has transferred their stone crusher plant to their own Highway Division for their use. In construction

package DG-1 the contractor has shifted their stone crusher unit to Kem village, they have to obtain a fresh NOC from Pollution Control Board, and hence they have temporarily suspended the plant operation. They all are procuring the ballast from third party agencies to meet their requirement of stone materials for construction. The PMCs have been advised to collect the requisite licenses and permits of those agencies to ensure that materials are procured only from licensed agencies.

Batching plants have been established at packages HT-1 and HT-3 in Hospet-Tinaighat project, DG-1 and DG-2 in Daund-Gulbarga project, RT-2 of Raipur-Titlagarh project, ST-1, ST-2 and ST-4 in Sambalpur-Titlagarh project. The plant of HT-1 at Mahanadi bridge location is not operational due to completion of works in this section and is in the process of dismantling. The contractors have shown improvement in dust control measures at all the operational batching plants during the reporting period except for the plants located at Hirapur base camp in package ST-1, where dust control measures require improvement. All the contractors have been advised to observe suitable dust control measures as per Pollution Control Board's norms at all their plants all the time. The use of appropriate nasal masks is required be maintained all the time by the workers engaged in loading cement in batching plant as preventive measure against fine cement dust.

At all the camp and plant sites advanced noiseless diesel generator sets with low emissions have been installed. The gaseous emission and noise level have been observed to be in control.

The vehicles and equipments are maintained on regular basis to maintain emissions within permissible levels. The Pollution Under Control (PUC) certificates for all the vehicles used in the project are being monitored at regular intervals.

All the equipment service stations, storage sites of chemicals and other materials as well as labour camps are established away from water body / natural waterways to avoid chances of water contamination.

Stacking of construction materials into the waterway has been observed in package HT-3 at the contractor's main camp at Alnawar. This may block the waterway and may potentially increase the accident risks especially during heavy rains. Moreover, discharge of waste water from kitchen and bathrooms directly into the waterway adjacent to the camp site has been recorded at Alnawar base camp. The contractor has been instructed to remove all the stacked material from the waterway and to improve the drainage network by connecting it with soak pit of adequate size to avoid direct discharge of waste water into the local natural drain.

All the contractors have been instructed to clear vents at all cross drainage structures and bridge locations. Water blockage was observed in construction package RT-3 at newly constructed bridges due to rains during monsoon, but the contractor was not available for clearing the vents. RVNL took the initiative to clear all the vents in this package by engaging a third party.

At the plant sites of all the construction packages where work is in progress, it has been ensured that drums of diesel and other petroleum products are stored on impervious platforms with catch drain in order to avoid land contamination. Further, all flammable liquids are kept in secure store protected from electric sparks and open flames. The good quantity of spent oil (used mobil oil etc) are stored separately in drums for use as shuttering oil. All unused spent oil is generally sold out to vendor and not stored for long time at sites.

Earlier the contractor of ST-1 was disposing off the slurry generated during piling works for bridge construction in the river bed. However corrective measures have been taken by the contractor after instruction received from PMC.

There was no major noise generating source located at different sites.

5.2.3 Compliance with EMP Implementation at quarry site and borrow areas

Presently none of the contractors is operating their own stone quarry. All the Contractors are procuring the stone materials from third parties. Earlier a stone quarry was opened by the contractor of DG-1, but due to non-suitability of the material they stopped quarrying operations and are now procuring stone from third party licensed quarry. In construction package RT-1, the contractor had opened their own stone quarry but now the quarrying has been stopped due to termination and demobilization of the contractor.

The borrow areas for soil for embankment and granular materials for blanketing are required in doubling of track projects. As per contract conditions the contractor can operate borrow areas only after obtaining written consent of the landowners.

It has been emphasized that all the proposed borrow areas are devoid of any sensitive socio-environmental features and any adverse socio-environmental impact due to their operation is avoided. The rehabilitation of all the proposed area after completion of the material extraction has been insisted upon in order to help in enhancing the physical environmental condition of the area. The rehabilitation activities of completed borrow areas have been taken up as per landowners or community requirements. The borrow area rehabilitation activities require improvements in construction package DG-1, HT-2, RT-1 and RT-3, in which the rehabilitation of borrow area are pending for exhausted borrow areas. 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. The following Table 7 and Figure 2 reflect package wise status of borrow area operation and rehabilitation till end of September 2016.

Package	Total borrow areas identified	No. of borrow areas operational	No. of borrow areas exhausted	No. of borrow areas rehabilitated	Remarks
RT-1	Contract terminated				Contract of RT-1 has been terminated. The PMC has to verify on site and maintain the record of all the borrow areas. As per previous record, out of total 45 identified borrow areas 34 borrow areas were operated and out of which only 23 borrow area were

Package	Total borrow areas identified	No. of borrow areas operational	No. of borrow areas exhausted	No. of borrow areas rehabilitated	Remarks
					rehabilitated as per landowner's requirement.
RT-2	55	5	50	50	
RT-3	Contract terminated				Out of 11 identified borrow areas, 3 were found unsuitable, 5 were not operated and 2 have been exhausted and 1 was left out due to rock boulders inside the borrow area. The contract has been terminated. The PMC has to verify on site and maintain the record of all the borrow areas.
ST-1	Not required				
ST-2	46	1	45	45	
ST-3	116	0	116	116	The PMC has to submit verification report.
ST-4	31	8	23	23	
HT-1	11	1	10	6	
HT-2	Contract terminated				The contract has been terminated. The PMC has to verify on site and maintain the record of all the borrow areas
HT-3	39	1	32	32	Only 33 borrow areas operated
DG-1	46	1	22	13	Out of total 46 borrow area identified, 10 have been not used. Out of 36 borrow area, 13 have been rehabilitated, 9 are pending rehabilitation and

Package	Total borrow areas identified	No. of borrow areas operational	No. of borrow areas exhausted	No. of borrow areas rehabilitated	Remarks
					out of balance 14 only 1 is operational.
DG-2	6	6	-	-	-
PG-1	-				Soil has been utilized for filling to raise the level of the area for TSS building and foundation for transformers in Martur. Earth extracted from borrow areas has not been declared by the contractor.
PG-2	Not required				
PG-3	-				At Mantralyam soil has been utilized for filling to raise the level of the area for TSS building and foundation for transformers. Earth extracted from borrow areas has not been declared by the contractor.

Table 7: Status of borrow areas operations and rehabilitation

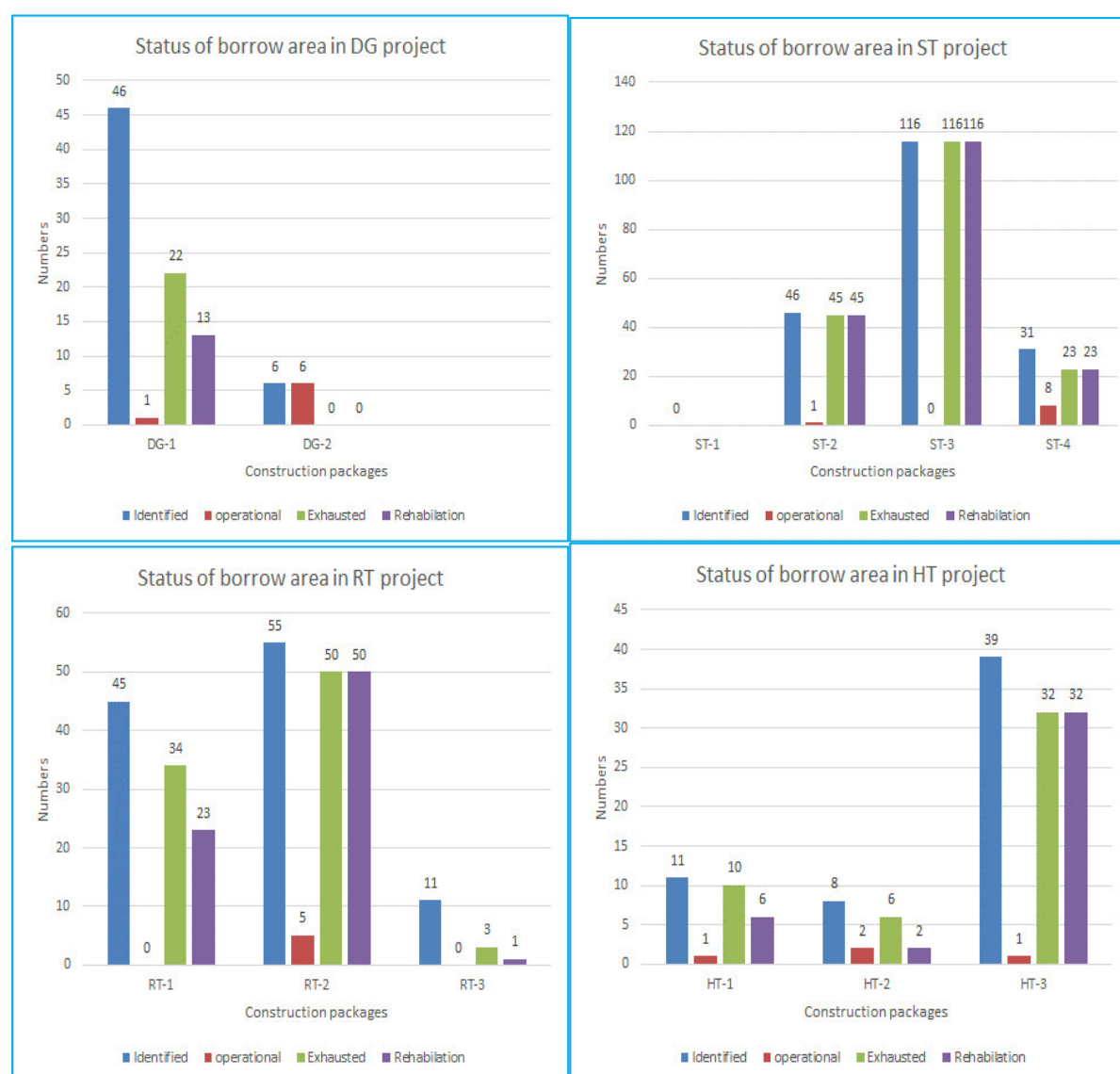


Figure 2: Status of borrow area operation and rehabilitation in different projects

It is evident from the above table and figure that the contractor has not completed the rehabilitation works for all the exhausted borrow area in DG-1, HT-1, HT-2, RT-1 and RT-3.

The construction contracts of packages RT-1, RT-3 and HT-2 have been terminated. Earlier the PMCs of these construction packages were advised to verify the restoration status of utilized borrow areas and to collect documents in order to avoid conflict. The PMCs of packages RT-1 and RT-3 have initiated verification of the borrow areas for the status of restoration activities. Due to monsoon season some of the borrow areas were inaccessible, so the completion of verification is possible only after monsoon.

As per Notification of Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India, borrow area for minor mineral including ordinary soil and metals, require environmental clearance from state level committee. They have directed the state governments to constitute District Level Environment Committees to deal with environmental clearance of borrow areas having

an area of less than 5 ha. This requirement has been highlighted during environmental training by General Consultant. Environmental clearance for proposed borrow area has been obtained only in DG-1, DG-2 and HT-1 packages. No environmental clearance for any of the borrow areas has been obtained in remaining packages.

In package RT-2 a total number of 55 borrow areas have been utilized for earth till end of the September 2016. Out of 55 material extraction is over in 50 borrow areas and all the exhausted borrow areas have been rehabilitated as per landowner's requirement. Material extraction from remaining 5 borrow areas is in progress.

In package DG-1 a total number of 46 borrow areas had been identified by the contractor for borrowing of earth for the project. Out of 46 borrow areas identified, 10 borrow areas have not been utilized. Out of 36 utilized borrow areas, 13 have been rehabilitated, 9 are pending for rehabilitation and 1 is operational for extraction of material. The contractor has kept one borrow area at Wadachi Wadi near Kurduwadi on hold for future use. The contractor has obtained satisfactory certificate from landowner for the rehabilitated borrow areas after handing over the land back to the landowner.

As reported by the PMC, in construction package HT-1 restoration of only 6 exhausted borrow areas has been completed. Restoration work of 2 borrow areas could not be completed due cultivation around the borrow areas. The borrow area located at Tungbhadra Dam area where the material extraction is over, bottom sloping is required to be completed as per the requirement of Dam Authority.

In HT-3 package, a total number of 32 borrow areas have been used for meeting the earth requirement. Material extraction from 32 borrow areas is completed and they have been rehabilitated as per landowner's requirement. One borrow area is operational.

In all packages of ST, record of statutory permissions and landowner's consent letter is required to be collected by PMC. As per information provided by the PMC, in ST-2, out of 46 identified borrow areas 45 borrow areas are exhausted and rehabilitated. PMC has started collecting satisfaction letter from the landowners after completion of rehabilitation works for all those closed borrow areas. In ST-3 package, as informed by PMC, a total number of 116 borrow areas have been operated for earth extraction and all of them have been rehabilitated. General Consultant has found that there is inconsistency in borrow area detailing and not matching with the actual site conditions. The PMC does not have statutory documents and land agreements of most of the borrow areas operated by the contractor. There is no record of monitoring of borrow areas by PMC in package ST-3. As informed by PMC of ST-4, a total number of 31 borrow areas have been identified out of which 23 borrow areas have exhausted and rehabilitated as per landowner's requirement. Material extraction from remaining 8 borrow areas is in progress.

In packages PG-1 and PG-3, soil has been used for raising the ground level for construction of Traction substation (TSS) near Martur and Mantralaya Railway Stations respectively. In both the packages the contractors have not declared the source of materials/borrow area. The PMC of these packages are also not aware about the material source.

5.2.4 Compliance with safety requirements at site

In general all the contractors have shown improvement towards workers safety. However the safety arrangements and their monitoring for sub contractor's labourers are still an issue. The PMC is required to be more vigilant on this issue. The workers safety at site is generally satisfactory in construction packages PG-1, PG-2, PG-3, DG-2 and HT-1. This aspect requires improvement in DG-1, ST-1, ST-3 and RT-2. Beside use of appropriate PPEs during works, it is equally important to provide safe access to the work zone and a safe working platform. Provision of safe ladders and boarded platform has been made at Mahanadi bridge and Ong bridge after instruction was received by the contractor. However it requires improvement in construction sites of Sukhtal bridge (Bridge No. 331) and Sonegarh Bridge in ST-1. The arrangement of safe access to work zone in HT-1 and HT-3 and all the construction packages of PG is found to be good.

Adequate firefighting arrangements and safe storage of materials have also been ensured at all the work sites, fabricating yards, workshops and other allied sites in most of the construction packages. Refilling of existing fire extinguisher cylinders has been completed in all the construction packages during the reporting period.

All the contractors have shown improvement in providing First Aid kits and their maintenance with all essential items at different locations, including construction sites, workshops, stockyard, camp site and plant sites.

In almost all construction packages safety awareness training is held on regular basis to make the workers aware about the importance of the safety while working adjacent to live railway.

5.2.5 Traffic and Public Safety

Since doubling work involves construction of new track adjacent to a live one, safety fencing has been provided along existing track in all projects. However, there is need of regular maintenance of fencing at most of packages. Keeping in view the damage and theft of fencing materials, barbed wire fencing has been provided in the new contract of DG-2, which has been found to be very effective.

In addition to safety fencing presence of flagman, look outs, hooters and warning sign boards at level crossings, curves and approaches of major bridges has been ensured. Suitable barriers have been installed across the new embankment adjoining the manned/unmanned level crossings in most packages to regulate the entry of vehicles during the working hours. In ST-1 near ROB at Ch 439 at Pujarpada village safety signboards and barricading are required to be provided at junctions of temporary approach and public roads.

In PG-2 barricadings of building construction at Krishna railway colony is required as habitations are located around the site and movement of children within the construction area has been observed. Similarly construction site of staff quarter at Raichur in PG-2 requires proper access as well as barricading.

5.2.6 Compliances of EMP at workers/labour camps

In all the packages local labourers are preferred except for the labourers requiring special skills. During the reporting period labour camps were operational in packages DG-1, DG-2, RT-2 and in all ST packages. In HT-1 the labour camp has been dismantled from the Tungbhadra bridge location as the work is completed in this section.

During the reporting period mainly local labourers have been engaged in HT-3 for various works. One camp is located at batching plant complex with dwelling units for plant and vehicular operators.

The earlier camp at Malikpet in construction package DG-1 has been removed. At other two locations a camp has been provided with all the basic facilities. In DG-2 package the contractor has provided prefabricated camps for their labourers and operators at Sawalgi and Nathansoor and they are found to be in good conditions. The contractor has provided number of toilets and bathroom units, drainage system with septic tank and soakpits, safe drinking water supply, lighting arrangements, cots for workers staying in camp, etc.

In package ST-1 labour camps have been provided at four locations. In general the facilities provided in labour camps are found to be satisfactory. The waste collection and disposal facilities have improved at these labour camps compared to last reporting period. In ST-2 package a labour camp has been provided at Suktapali batching plant. No improvement has been recorded in general hygienic conditions, waste collection and disposal. This requires improvement at this camp. Water facility at toilets and bathrooms must be provided. In package ST-3 a labour camp has been provided at plant site. Requirement of improvement in general hygienic conditions including sanitation facilities such as toilets and bathroom units with septic tank and soak pit was highlighted in the previous reporting period. The contractor has not shown any improvement in this aspect. In package ST-4 the labour camp situated at Saintala requires improvement in respect of sanitation and other basic amenities.

In PG-1, PG-2 and PG-3 the contractors keep their migrant labourers (operators and other skilled labourers) in rented houses in the town area. Mobile toilets have also been provided for labourers in packages PG-1, PG-2 and PG-3 at work sites.

Periodical cleaning of all water storage tanks particularly for drinking water at labour camps, office premises and Engineer's quarters as well as periodical application of insecticides and pesticides in and around the camp sites have been ensured in packages ST-1, ST-2, ST-4, HT-1 and HT-3.

In general garbage generated at the camp sites are spread here and there despite of installation of garbage bins causing littering of surrounding land as well as creating unhygienic conditions in the camps. The contractors have been advised to sensitize the residents of the camps and improve general hygienic condition.

5.2.7 Other Environmental Safeguards Measures:

a. Rainwater Harvesting Facility:

There is provision of rainwater harvesting system in the station buildings and staff quarters in all the project packages. Rainwater harvesting system has been provided in construction package HT-1 at Sompur Road Railway Station building and in Alnawar Railway Station building in HT-3. In other projects where construction of staff quarters and station buildings are under progress the PMC has been advised to ensure similar system for rain water harvesting.

b. Tree Plantation:

As per contract specifications, 6500 trees are required to be planted by the contractors in packages of DG-1 and DG-2. In DG-1 about 1400 trees have been planted against the required number of 6500 trees and the survival of merely 30% of planted tree has been recorded. Similarly in DG-2, total 6500 tree are required to be planted, but plantation activity is pending. In HT-1 out of required 7000 trees as per BOQ, only 1048 trees have been planted. In HT-3 only 2600 trees have been planted against total required number of 8000 trees. Tree plantation has been included also in construction packages RT-2, ST-2, ST-3 and ST-4. In RT-2 and ST-4 packages no plantation has been done whereas the required number of tree plantation in these packages is 3447 and 14396 respectively. In package ST-2 the contractor has planted 10000 trees against a target of 15058, whereas in package ST-3 only 10719 trees has been planted against BOQ number of 130366 trees. None of the contractors has submitted their action plan for plantation. The PMC has been advised to ensure plantation as on going process and to monitor survival rates of all the planted trees. The contractors of all the packages have been instructed to submit their action plan for plantation and maintenance within contract period.

c. Celebration of World Environment Day:

On 5th June 2016 world environment day was celebrated in packages PG-2, PG-3, HT-1 and DG-2. During the celebration tree plantation and environmental awareness programme were organized by the contractor.

d. Wildlife Conservation Measures:

The Alnawar-Londa-Tinaighat stretch of railway line passes through dense forest of Western Ghat. This forest provides habitat for various wild life animals like wild dog, bison, elephant and king cobra. Death of a few wild animals over railway track has been reported during the last years. Keeping in view the increased risk of accidents due to track doubling the Chief Conservator of Forests (CCF) has requested to provide some measures in the project which include:

- "Whistle free" notice in forest stretch at identified animal crossing locations
- Construction of animal underpasses
- Cutting of weeds from railway track

- Construction of barricading at identified locations (3 locations from km 550/200 to 300; km 537/500 to 600 and km 533/800 to 900)
- Display of sign boards
- Reduction of speed in this forest stretch
- Provision of dust bins in railway coaches

The Railways have already taken some actions, as per request of the Chief Conservator of Forests (CCF), such as installation of signboards at different locations, speed reduction in the forest stretch from 100 Kmph to 65 kmph, instruction to trackman for clearing the weeds, defining “Whistle free” areas. However, identification of location of animal underpasses is required to be finalized in consultation with the CCF. Those under passes will be provided after finalization of locations. It is also proposed to provide water holes on either side of the track in the forest area so that movement of wild animals across the track in search of water may be minimized.

5.2.8 Debris management

The debris generated while excavating for roadbed consist mainly of good earth suitable for formation work. Generally the excavated earth is stacked on adjacent ground within the railway land for reuse in embankment slopes, temporary access road, horticulture purpose and for backfilling of borrow areas.

In ST-1 the contractor has shown improvement in controlling the problem of disposal of muck and rock debris generated during piling process. The contractor has been instructed to store debris and muck in separate site away from river bed. The contractor has shown some improvement in package HT-3 towards waste management and stockyard at main camp compared to previous reporting period. Soak pit near the kitchen and contractor’s main camp has been provided to control the flow of waste water. However garbage management at camp site requires improvement to avoid mixing of waste into water channel. The contractor has been instructed to take additional measures for collection and disposal of wastes at camp site.

In HT-2, removal of debris from the substantially completed section is still pending. Similarly, in package RT-3 debris has been found at many locations along construction zone including dismantled materials around minor bridge sections. The abandoned labour huts and debris have also been observed around Mahanadi Bridge site. No action has been taken during the reporting period as both the contracts have been terminated and no contractor were available at site. The debris from the forest area at camp site and laboratory of package ST-3 has been cleared during the quarter ending in September 2016. Disposal of waste materials from labour camps in the adjacent land is still observed in DG-1 and ST-1. This requires proper attention to avoid contamination of land beyond the boundary of labour camps.

5.2.9 Health check-up and AIDS awareness camps for workers

As per contract specification HIV/AIDS awareness camps are required to be organized by the contractor in all the construction packages every two months. Such programme has been started in all the construction packages, however maintaining periodicity as per specification is required. During the reporting period HIV/AIDS awareness programmes were organized in HT-1, HT-3, RT-2,

ST-1, ST-3, ST-4, PG-2, and PG-3. The PMCs should monitor this activity by the contractors to ensure the periodicity of such camps in accordance with the contract specifications. No case of HIV/AIDS has been reported from any site.

In most of the construction packages the contractor is also organizing health checkups for their workers jointly with the HIV/AIDS awareness programme. During the medical checkups general blood tests, blood pressure measurement and distribution of medicines were carried out. This helps in confidence building among the workers.

5.3 Monitoring of environmental quality attributes

In order to assess the additional pollution load on environmental components due to various construction activities, monitoring of environmental attributes in terms of air quality, water quality and noise levels has been carried out by the contractor as per agreed environmental monitoring plan. The monitoring results reflect that the project activities do not have any significant additional load on pollution in the area.

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, HT-1, HT-3, RT-2, ST-1, ST-2, ST-4 and in all the packages of Pune–Guntakal project. The environmental monitoring has not been initiated in newly awarded contract of DG-2. In construction packages RT-1, RT-3 and HT-2 the monitoring was not done due to termination of the contract. In construction package HT-2 last monitoring was carried out in June 2015. In construction package ST-4, as confirmed by the PMC the environmental monitoring has been carried out in June 2016 but the test results have not yet been submitted by the contractor. Following table depicts the period of monitoring carried out in different construction packages during six months:

S. No	Project/ Construction Package	Monitoring of Environmental Components			Monitoring Agency
		Air Quality	Water Quality	Noise Level	
1.	Daund-Gulbarga Doubling Project				
(i)	DG-1	Air quality monitoring was conducted in the month of July 2016 at 3 locations.	water quality monitoring was conducted in the month of July 2016 at two locations	Noise level monitoring was carried out at three location in July 2016.	Care Labs, Hyderabad
(ii)	DG-2	No monitoring initiated in the reporting quarter			
2.	Hospet-Tinaighat Doubling Project				
(i)	HT-1	Air quality monitoring was carried out in August at one location.	Water quality monitoring was carried out in August at one location.	Noise level monitoring was carried out at one location in August 2016.	Sri Krishna Aqua Engineering Works, Hubli

S. No	Project/ Construction Package	Monitoring of Environmental Components			Monitoring Agency
		Air Quality	Water Quality	Noise Level	
(ii)	HT-2	Contract Terminated			
(iii)	HT-3	Monitoring of Ambient Air Quality has been carried out on monthly basis at 3 locations in April, May and June 2016. Monitoring of Ambient Air Quality was not conducted during next quarter due to heavy monsoon.	Water quality monitoring was carried out on monthly basis for the borewell water at crusher plant site in the month of April May and June 2016. Monitoring of water Quality was not conducted during reporting quarter due to heavy monsoon.	Monitoring of Noise level has been carried out at 3 locations on monthly basis in April, May and June, 2016. Monitoring of Noise level was not conducted during reporting quarter due to heavy monsoon.	Altus Eco Management Private Limited, Bangalore
3.	Raipur-Titlagarh Doubling Project				
(i)	RT-1	Contract terminated			
(ii)	RT-2	Air quality monitoring was conducted in the month of July 2016 at 3 locations.	water quality monitoring was conducted in the month of July 2016 at 3 locations.	Noise level monitoring was carried out in July, 2016 at 3 locations	Global Tech Enviro Experts Pvt. Ltd., Bhubaneswar
(iii)	RT-3	Contract Terminated			
4.	Sambalpur-Titlagarh Doubling Project				
(i)	ST-1	Ambient air quality monitoring was carried out in the month of May, 2016 at 2 locations.	Water quality monitoring was carried out in the month of May, 2016 at 2 locations.	Noise level monitoring was carried out in the month of May, 2016 at 2 locations	Visiontek Consultancy Services Pvt. Ltd., Bhubaneswar
(ii)	ST-2	Air quality monitoring was carried out in the month of August 2016 at 4 locations	Water quality monitoring was carried out in the month of August 2016 at 4 locations	Noise level monitoring was carried out in the month of August 2016 at 4 locations	Centre for Envitech and Management Consultancy Pvt. Ltd., Bhubaneswar

S. No	Project/ Construction Package	Monitoring of Environmental Components			Monitoring Agency
		Air Quality	Water Quality	Noise Level	
(iii)	ST-3	No monitoring has been carried out after January 2016.	No monitoring was conducted after January 2016.	No monitoring was conducted after January 2016.	Centre for Envitech and Management Consultancy Pvt. Ltd., Bhubaneswar
(iv)	ST-4	Ambient air quality monitoring was carried out in the month of June, 2016 at 4 locations. Test results not submitted	Water quality monitoring was carried out in the month of June, 2016 at 4 locations. Test results not submitted	Noise level monitoring was carried out in the month of June, 2016 at 4 locations. Test results not submitted	Centre for Envitech and Management Consultancy Pvt. Ltd., Bhubaneswar
5.	Pune-Guntakal Railway Electrification				
(i)	PG-1	Monitoring of Ambient Air Quality has been carried out on in May 2016 at 3 locations.	Monitoring of Water Quality has been carried out on in May 2016 at 3 locations.	Monitoring of noise level has been carried out on in May 2016 at 3 locations.	Enviro Analysts and Engineers Pvt. Ltd., Mumbai.
(ii)	PG-2	The ambient air quality monitoring has been carried out in the month of April 2016 at two locations.	Water quality monitoring has been conducted in the month of April 2016 at 2 locations.	Noise level monitoring has been carried out in April 2016 at 2 locations.	S.V. Analytical Laboratories, Bellary.
(iii)	PG-3	The ambient air quality monitoring has been carried out in the month of April 2016 at two locations	Water quality monitoring has been conducted in the month of April 2016 at 2 locations.	Noise level monitoring has been carried out in April 2016 at 2 locations.	S.V. Analytical Laboratories, Bellary.

Table 8: Status of Monitoring of Environmental Attributes during last 6 months

5.3.1 Ambient Air Quality Monitoring:

The monitoring results 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 ⁻³)	PM10 (µgm ⁻³)	PM2.5 (µgm ⁻³)	SO2 (µgm ⁻³)	NOx (µgm ⁻³)	CO (mgm ⁻³)
i. Daund-Gulbarga Project								
Package DG-1								
(i)	Kurduvadi batching plant	21/07/2016	115	72	-	-	42	0.570
(ii)	Kalinde batching plant		74	45	-	-	27	0.510
(iii)	Vakas station		172	79	-	-	46	0.720
ii. Hospet-Tinaighatproject								
1. Package HT-1								
(i)	Banavapur Railway Station CH-103+300	09/08/2016	-	42.1	19.2	12.5	10.9	-
2. Package HT-3								
(i)	Near the crusher	05/04/2016	-	76	-	18	10	-
(ii)	Near Alnavar Railway Station		-	60	-	18	10	-
(iii)	RMC plant yard		-	63	-	11	8	-
(iv)	Near the crusher	15/05/2016	-	80	-	24	14	-
(v)	Near Alnavar Railway Station		-	50	-	18	14	-
(vi)	RMC plant yard		-	60	-	22	16	-
(vii)	Near the crusher	11/06/2016	-	60	-	18	8	-
(viii)	Near Alnavar Railway Station		-	63	-	56	16	-
(ix)	RMC plant yard		-	66	-	57	18	-
iii. Raipur-Titlagarh Project								
1. Package RT-2								

(i)	Bagbahar Office Complex	25/07/2016	-	56.4	31.2	10.2	14.7	-
(ii)	Near Batching Plant		-	61.2	35.7	10.1	13.9	-
(iii)	Near bridge 161		-	67.8	39.4	10.7	16.2	-
iv. Sambalpur–Titlagarh Project								
1. Package ST-1								
(i)	Near PMC Office at Hirapur base camp	19/05/2016	351	82	-	4.8	31.4	0.48
(ii)	Near Batching Plant at Hirapur Camp		473.8	102.4	-	5.1	34.4	0.5
2. Package ST-2								
(i)	Near batching plant	09/08/2016	-	60.3	36.8	13.8	18.2	<0.1
(ii)	Near Godabhaga		-	54.1	31.4	13.2	17.6	<0.1
(iii)	Near Attabira Railway Station		-	80.2	46.5	14.4	18.8	<0.1
(iv)	Near Suktapalli Railway Station building		-	71.2	42.4	12.6	16.4	<0.1
v. Pune Guntakal Electrification Project								
1. Package PG-1								
(i)	Near Office	31/05/2016	215	63.4	31.3	9.5	19.2	0.114
(ii)	At work place area		226	68.4	34.9	8.3	26.7	0.161
(iii)	At Wadi store		208	61.0	30.3	9.8	23.8	0.147
2. Package PG-2								
(i)	Yadagiri TSS Building	22/04/2016	-	55.3	21.8	7.0	10.5	BDL
(ii)	Yadagiri OHE Depot		-	56.4	22.4	8.3	11.6	BDL
3. Package PG-3								
(i)	Kupgal Railway Station	21/04/2016	-	53.3	20.5	6.7	9.9	BDL
(ii)	Iranagallu Railway Station		-	50.5	21.8	8.0	11.3	BDL

Table 9: Construction package-wise ambient air quality at different locations

The concentration of Suspended Particulate Matters (SPM) was monitored in construction packages DG-1, ST-1 and PG-1. The concentration of SPM was found in the range of $74 \mu\text{gm}^{-3}$ in DG-1 to $473.8 \mu\text{gm}^{-3}$ in ST-1. Among the three construction packages maximum concentration of SPM was observed in construction package-ST-1. Maximum concentration of $473.8 \mu\text{gm}^{-3}$ was recorded at Batching plant located at Hirapur base camp.

The PM₁₀ in ambient air was measured in DG-1, HT-1, HT-3, RT-2, ST-2, PG-1, PG-2 and PG-3 packages. The concentration of PM₁₀ was found within the permissible limit at all the measured locations except at Batching Plant established at Hirapur Camp. Overall the concentration of PM₁₀ varied between $42.1 \mu\text{gm}^{-3}$ at Banavapur Railway station in HT-1 to $102.4 \mu\text{gm}^{-3}$ at Batching plant in Hirapur Base Camp of ST-1. At Batching plant at Hirapur camp the concentration of PM₁₀ exceeded the permissible limit of $100 \mu\text{gm}^{-3}$. However the corrective action for controlling the dust at the plant site has been taken. Regular sprinkling of water at this location has been ensured to curb fugitive dust.

The PM_{2.5} was monitored in construction packages HT-1, RT-2, ST-2, PG-1, PG-2 and PG-3.

The concentration of PM_{2.5} at all the measured locations varied between $19.2 \mu\text{gm}^{-3}$ in at Banavapur Railway Station in HT-1 to maximum $46.5 \mu\text{gm}^{-3}$ in ST-2 near Attabira Railway station. The concentrations of PM_{2.5} at all the measured locations were found within the permissible level of $60 \mu\text{gm}^{-3}$.

The concentration of other measures parameters (SO₂, NO_x and carbon monoxide) were well within the permissible limit. Overall the concentration SO₂ in the air was found in the range from $5.1 \mu\text{gm}^{-3}$ to $57 \mu\text{gm}^{-3}$, whereas those of NO_x was observed in the range from $8 \mu\text{gm}^{-3}$ to $46 \mu\text{gm}^{-3}$.

5.3.2 Water quality Monitoring

The samples of water from different sources were collected and tested for physico chemical characteristics in different construction packages as described in the previous section 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. However the total hardness exceeded the desirable limit but within permissible limit in the borewell water samples of construction packages HT-1, HT-3, PG-1, PG-2 and PG-3. The total dissolved solids (TDS) was also observed exceeding the desirable limit of 500 mg/l in the borewell samples taken from concentration packages PG-1, PG-2 and PG-3 but was found within the permissible level as per IS 10500:2012. The packagewise water quality monitoring results are presented in following tables.

Parameters	Unit	Sampling locations(DG-1, date of sampling: 21/07/2016)		Standards as per IS: 10500:2012
		Kurduwadi office drinking water	Kalindi Camp Drinking water	
PH	-	6.8	6.6	6.5-8.5
Color	Hazen	1.0	1.0	Max. 5.0
Odour	--	Agreeable	Agreeable	Agreeable
Taste	--	Agreeable	Agreeable	Agreeable
Turbidity	NTU	<0.1	<0.1	Max. 1.0
Total Dissolved Solids	mg/l	26	54	Max. 500
Total Hardness as CaCO ₃	mg/l	15	20	Max. 200
Chlorides as Cl	mg/l	5.0	10	Max. 250
Iron as Fe	mg/l	<0.01	<0.01	Max. 0.3
Residual free chlorine	mg/l	<0.1	<0.1	Max. 0.2
Coli forms	MPN/100 ml	<2/Absent	<2/Absent	Absent/100ml
Escherichia Coli	--	<2/Absent	<2/Absent	Absent/100ml

Table 10: Waterquality monitoring data of package DG-1

Parameters	Unit	Sampling location(HT-1, date of sampling: 10/08/2016)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bhanapur Railway Yard		
pH		7.81	6.5-8.5	6.5-8.5
Odour		Agreeable	Agreeable	Agreeable
Turbidity	NTU	0.76	1	5
Colour	Hazen	<5	5	15
Electrical conductivity	µS/cm	784	Not Specified	Not Specified
Total Dissolved Solids	mg/l	389	500	2000
Total Hardness (as CaCO ₃)	mg/l	338	200	600
Total Alkalinity (as CaCO ₃)	mg/l	306	200	600
Calcium (as Ca)	mg/l	82.4	75	200
Chloride (as Cl)	mg/l	23.9	250	1000
Magnesium (as Mg)	mg/l	32.07	30	100
Sulphate (as SO ₄)	mg/l	51.2	200	400
Nitrate (as NO ₃ -N)	mg/l	8.6	45	No relaxation
Fluoride (as F)	mg/l	0.91	1	1.5

Table 11: Water Quality monitoring data of package HT-1

Parameters	Unit	Borewell at Stone Crusher Plant of HT-3			Standards IS 10500-2012	
		06/04/2016	09/05/2016	09/06/2016	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
pH		7.55	7.8	7.6	6.5-8.5	No relaxation
Color	Hazen units	4.0	4.0	4.0	5	15
Odour	-	Odourless	Odourless	Odourless	Unobjectionable	Unobjectionable
Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity	NTU	4.3	4.8	3.6	1	5
Total Hardness	mg/l	235	268	260	200	600

Parameters	Unit	Borewell at Stone Crusher Plant of HT-3			Standards IS 10500-2012	
		06/04/2016	09/05/2016	09/06/2016	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
Total Dissolved Solids	Mg/l	66	68	66	500	2000
Total Alkalinity	Mg/l	18	20	26	200	600
Iron as (Fe)	mg/l	0.2	0.2	0.2	0.3	No relaxation
Chloride as Cl	mg/l	12	12	12	250	1000
Calcium as Ca	mg/l	15	16	15	75	200
Copper (as Cu)	mg/l	0.02	0.02	0.02	0.05	1.5
Sulphate (as SO ₄)	mg/l	0.5	0.5	0.5	200	400
Nitrate (as NO ₃)	mg/l	0.25	0.26	0.25	45	No relaxation
Fluoride (as F)	mg/l	0.01	0.01	0.01	1.0	1.5
Total Chromium (as Cr ⁺⁶)	mg/l	<0.03	<0.03	<0.03	0.05	No relaxation

Table 12: Water Quality monitoring data of package HT-3

Parameters	Unit	Sampling locations (RT-2, date of sampling: 25/07/2016)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bagbahar office Complex (Bore well)	Near bridge 161 (Bore well)	Near Nawapara Station Building (Tube well)		
Temperature	°C	31.7	30.9	32.1	-	-
Appearance	-	Colorless	Colorless	Colorless	-	-
Turbidity	NTU	1.0	1.2	1.2	1	5
pH	-	6.61	7.11	6.87	6.5-8.5	6.5-8.5
Conductivity	µmhos/cm	307	452	407	-	-
Total Solids	mg/l	174.5	253.9	230.7	-	-
Suspended Solids	-	5.1	5.3	6.4	-	-

Parameters	Unit	Sampling locations (RT-2, date of sampling: 25/07/2016)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bagbahar office Complex (Bore well)	Near bridge 161 (Bore well)	Near Nawapara Station Building (Tube well)		
Total Dissolved Solids	mg/l	169.4	248.6	224.3	500	2000
Chloride (as Cl)	-	11.3	19.5	42.2	250	1000
Ammonical Nitrogen (NH ₃ -N)	mg/l	ND	ND	ND	-	-
Nitrite Nitrogen (NO ₂ -N)	-	2.3	2.6	3.2	-	-
Nitrate Nitrogen (NO ₃ -N)	-	ND	ND	ND	45	No relaxation
Dissolved Oxygen	-	4.2	4.0	4.2	-	-
C.O.D	-	2.0	2.8	3.2	-	-
Oil & grease	mg/l	ND	ND	ND	0.01	0.03
Phosphate (as PO ₄)	-	ND	0.03	ND		
Sulphate (as SO ₄)	-	6.9	21.7	25.2	200	400
Fluoride (as F)	-	0.11	0.17	0.12	1.0	1.5
B.O.D. (3-days at 27 deg C)	-	0.4	0.4	0.4	-	-
Coliform	-	ND	ND	ND	Absent	Absent
Kjeldhal Nitrogen	mg/l	0.09	0.16	0.12	-	-
Sodium	-	9.4	21.5	24.7	-	-
Potassium	-	0.5	1.1	1.6	-	-
Total Alkalinity	-	76	112	116	200	600
Total Hardness (as CaCO ₃)	-	98	108	117	200	600

Parameters	Unit	Sampling locations (RT-2, date of sampling: 25/07/2016)			Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Bagbahar office Complex (Bore well)	Near bridge 161 (Bore well)	Near Nawapara Station Building (Tube well)		
Calcium Hardness (as CaCO ₃)	-	81	82	98	200	600
Magnesium Hardness (as CaCO ₃)	-	17	26	19	30	100

Table 13: Waterquality monitoring data of package RT-2

Parameters	Unit	Sampling locations (ST-2, date of sampling: 09/08/2016)				Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Batching plant (Bore well)	Batching plant in front of Q.C Lab	God Bhaga Railway Station	Attabira Railway Station		
Colour	Hazen	<5	<5	<5	<5	5	15
Odour	-	AL	AL	AL	AL	Agreeable	Agreeable
Taste	-	AL	AL	AL	AL	Agreeable	Agreeable
Turbidity	NTU	<0.05	<0.05	<0.05	<0.05	1	5
pH Value	-	6.8	6.5	7.8	7.7	6.5-8.5	6.5-8.5
Total Hardness (as CaCO ₃)	mg/l	120	88	90	96	300	600
Iron (as Fe)	mg/l	0.15	0.13	0.22	<0.05	0.3	No relaxation
Chloride (as Cl)	mg/l	55	32	50	28	250	1000
Residual, free Chlorine	mg/l	ND	ND	ND	ND	0.2	1.0
Total Dissolved Solids	mg/l	424.4	171.6	214.5	232.7	500	2000
Calcium (as Ca)	mg/l	32.1	24.0	28.0	29.6	75	200

Magnesium (as Mg)	mg/l	9.7	6.8	4.9	5.3	30	100
Copper (as Cu)	mg/l	<0.03	<0.03	<0.03	<0.03	0.05	1.5
Manganese (as Mn)	mg/l	<0.005	<0.005	<0.005	<0.005	0.1	No relaxation
Sulphate (as SO ₄)	mg/l	22.2	18.4	12.7	10.2	200	400
Nitrate (as NO ₃)	mg/l	2.6	1.8	5.2	1.7	45	No relaxation
Fluoride (as F)	mg/l	0.2	0.15	0.12	0.17	1	1.5
Phenolic Compounds (as C ₆ H ₅ OH)	mg/l	<0.001	<0.001	<0.001	<0.001	0.001	No relaxation
Mercury (as Hg)	mg/l	<0.001	<0.001	<0.001	<0.001	0.001	No relaxation
Cadmium (as Cd)	mg/l	<0.003	<0.003	<0.003	<0.003	0.01	No relaxation
Selenium (as Se)	mg/l	<0.001	<0.001	<0.001	<0.001	0.01	No relaxation
Arsenic (as As)	mg/l	<0.001	<0.001	<0.001	<0.001	0.01	0.05
Cyanide (as CN)	mg/l	ND	ND	ND	ND	0.05	No relaxation
Lead (as Pb)	mg/l	<0.1	<0.1	<0.1	<0.1	0.05	No relaxation
Zinc (as Zn)	mg/l	<0.05	<0.05	<0.05	<0.05	5	15
Chromium (as Cr+6)	mg/l	<0.05	<0.05	<0.05	<0.05	0.05	No relaxation
Mineral Oil	mg/l	<0.05	<0.05	<0.05	<0.05	0.01	No relaxation
Total Alkalinity (as CaCO ₃)	mg/l	60	40	160	150	200	600
Aluminium (as Al)	mg/l	<0.01	<0.01	<0.03	<0.03	0.03	No relaxation
Boron (as B)	mg/l	<0.2	<0.2	<0.2	<0.2	1	No relaxation

Table 14: Waterquality monitoring data of package ST-2

Parameters	Unit	Package PG-1 Sampling locations (Date of sampling: 31/05/2016)			Standards IS 10500-2012	
		Daund Office (Drinking water)	Project site Loni (Drinking water)	Wadi Store Area (Drinking water)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
Color	Hazen units	0.2	0.1	0.1	5	15
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
Turbidity	NTU	0.1	0.02	0.01	1	5
Total Dissolved Solid	mg/l	942	910	930	500	2000
Electrical conductivity	μS/cm	1452	1520	1464	-	-
Total Alkalinity (as CaCO ₃)	mg/l	272	196	212	200	600
pH value at 25 deg C	-	7.75	7.20	7.35	6.5 to 8.5	No relaxation
Total Hardness as CaCO ₃	mg/l	592	584	592	200	600
Calcium as Ca	mg/l	124.2	136.2	138.2	75	200
Magnesium (as Mg)	mg/l	68.4	59.2	59.9	30	100
Copper (as Cu)	mg/l	<0.01	<0.01	<0.01	0.05	1.5
Iron as (Fe)	mg/l	0.12	0.15	0.10	0.3	No relaxation
Manganese (as Mn)	mg/l	<0.01	<0.01	<0.01	0.1	0.3
Chloride as Cl	mg/l	248	228.4	238	250	1000
Sulphate (as SO ₄)	mg/l	166	117.3	112	200	400
Nitrate (as NO ₃)	mg/l	5.3	5.4	6.2	45	No relaxation
Fluoride (as F)	mg/l	0.90	0.50	0.55	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

Parameters	Unit	Package PG-1 Sampling locations (Date of sampling: 31/05/2016)			Standards IS 10500-2012	
		Daund Office (Drinking water)	Project site Loni (Drinking water)	Wadi Store Area (Drinking water)	Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
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	0.20	1.05	0.95	5	15
Total Chromium (as Cr ⁺⁶)	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	<0.10	<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

Table 15: Water Quality monitoring data of package PG-1

Parameters	Unit	Sampling locations				Standards IS 10500-2012	
		Construction Package PG-2 (22/04/2015)		Construction Package PG-3 (21/04/2016)		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Yadgir OHE Depot	Yadgir TSS Building	Kupgal Railway Station	Iranagallu Railway Station		
Color	-	Colourless	Colourless	Colourless	Colourless	5	15
Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable

Parameters	Unit	Sampling locations				Standards IS 10500-2012	
		Construction Package PG-2 (22/04/2015)		Construction Package PG-3 (21/04/2016)		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Yadgir OHE Depot	Yadgir TSS Building	Kupgal Railway Station	Iranagallu Railway Station		
pH	-	7.46	7.8	7.92	7.45	6.5-8.5	6.5-8.5
Turbidity	NTU	0.4	0.5	0.6	0.4	1	5
Alkalinity (as CaCO ₃)	mg/l	402	391.8	343.4	100.5	200	600
Total Dissolved Solid	mg/l	1198	1242	754	488	500	2000
Total Hardness as CaCO ₃	mg/l	434.5	428.4	326.4	303	200	600
Calcium as Ca	Mg/l	120	127.2	71.8	69.6	75	200
Magnesium (as Mg)	mg/l	32.6	26.8	35.6	34.3	30	100
Sulphate (as SO ₄)	mg/l	158	230	72.0	41.6	200	400
Chloride as Cl	mg/l	344.3	329.2	129.8	67.0	250	1000
Nitrate (as NO ₃)	mg/l	2.3	5.0	1.68	1.3	45	No relaxation
Iron as (Fe)	mg/l	BDL	BDL	BDL	BDL	0.3	No relaxation
Fluoride (as F)	mg/l	0.95	0.97	0.68	0.98	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 ⁺⁶)	mg/l	BDL	BDL	BDL	BDL	0.05	No relaxation
Selenium (as Se)	mg/l	BDL	BDL	BDL	BDL	0.01	No relaxation

Parameters	Unit	Sampling locations				Standards IS 10500-2012	
		Construction Package PG-2 (22/04/2015)		Construction Package PG-3 (21/04/2016)		Desirable Limit IS 10500-2012	Permissible Limit in absence of Alternate Source IS 10500-2012
		Yadgir OHE Depot	Yadgir TSS Building	Kupgal Railway Station	Iranagallu Railway Station		
Zinc (as Zn)	mg/l	BDL	BDL	BDL	BDL	5	15
Coliform	CFU	BDL	BDL	BDL	BDL	1/100 ml	-

Table 16: Waterquality monitoring data of package PG-2 and PG-3

5.3.3 Noise level monitoring:

The noise pollution level has been recorded at different locations in construction packages DG-1, HT-1, HT-3, RT-2 and ST-1, ST-2, ST-4, PG-1, PG-2 and PG-3 during reporting period. The test results of ST-4 has not been submitted by the Contractor. The average equivalent noise level at different locations is presented in following table:

S. No	Project/ packages	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							
1	Package DG-1	Kurduvadi batching plant	21/07/2016	52.31	48.63	75	70
		Kalindi batching plant		69.74	62.73	75	70
		Vakas station		50.84	45.62	75	70
II. Hospet-Tinaighatproject							
1.	Package HT-1	Banavapur Railway Station CH-103+300	09/08/2016	54.2	42.5	75	70
2.	Package HT-3	Near the RMC plant yard Khanapur	05/04/2016	55	-	75	70
		Near the crusher area Uttar Kannada		70	-	75	70
		Near Alnavar Railway Station		59	-	75	70
		Near the RMC plant yard Khanapur	15.05.2016	60	-	75	70
		Near the crusher area Uttar Kannada		50	-	75	70
		Near Alnavar Railway Station		60	-	75	70
		Near the RMC plant yard Khanapur	11.06.2016	64	-	75	70
		Near the crusher area Uttar Kannada		59	-	75	70

S. No	Project/ packages	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
		Near Alnavar Railway Station		58	-	75	70
III. Raipur-Titlagarh project							
1	Package RT-2	Near steel fabrication yard	25/07/2016	52.9	-	75	70
		Near batching plant		53.0	-	75	70
		Near Bagbahar office complex		50.9	-	75	70
IV. Sambalpur-Titlagarh project							
1	Package ST-1	Near PMC Office	19.5.2016	65.5	51.3	75	70
		Near Batching Plant at Hirapur		74.1	61.2	75	70
1.	Package ST-2	Near batching plant	08/08/2016 and 09/08/2016	64.7	54.6	75	70
		Near Godabhaga Railway Station		64.5	54.2	75	70
		Near Attabira Railway Station		64.9	54.9	75	70
		NearSuktapalli Railway Station Building		64.7	54.8	75	70
V. Pune Guntakal Electrification project							
1	Package PG-1	Near Office	31/05/2016	48.8	42.4	75	70
		At work place area		50.2	43.2	75	70
		At Wadi store		49.7	42.8	75	70
2.	Package PG-2	Yadgiri TSS Building	22/04/2016	46.7	37.2	75	70
		Yadgiri OHE Depot		46.2	37.3	75	70
3.	Package PG-3	Kupgal Railway Station	21/04/2016	46.6	36.8	75	70

S. No	Project/packages	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
		Iranagallu Railway Station		47.5	36.7	75	70

Table 17: Ambient noise levels at different construction packages

The results reflect that during the monitoring period the daytime noise levels varied between minimum 46.2 dBAeq at Yadgiri OHE Depot in PG-2 to maximum 74.1 dB Leq at batching plant at Hirapur in ST-1. At all the measured locations, the noise levels were recorded within the prescribed limit (75 dBAeq) for industrial/ commercial areas. The night time noise levels were recorded in construction packages DG-1, HT-1, ST-1, ST-2 and PG-1, PG-2 and PG-3. No nighttime noise levels were recorded in construction package HT-3 and RT-2. The nighttime noise level were recorded in the range from minimum 36.7 dBAeq to maximum 62.73 dBAeq which are lower than the prescribed limit of 70 dBAeq.

6. Environmental and Safety training

a. Training on EMP Implementation

In continuation to the previous environmental training programmes, during the reporting period training on Environmental Safeguards and Safety Implementation was organized by the Environmental Expert of General Consultant at PIU Hubli for construction packages of Hospet-Tinaighat project on 1st April 2016 and Solapur for construction packages of DG-2, PG-2 and PG-3 on 27th April 2016. In the training program the importance of environmental safeguards in projects, ADB's policy on environmental safeguards and provisions of EMP as well as contract agreement, best construction practices on EMP implementations, records keeping and reporting were explained. The general observations on EMP implementations in different project packages were also shared in the training along with necessary corrective measures.

b. Safety Training:

The contractors of packages HT-1, ST-1, ST-2, ST-3, ST-4 PG-2 and PG-3 organize regular trainings on different aspects of safety at different locations for their staff and labourers.

7. Public complaints on environmental and safety issues of project

Grievance Redress Committees (GRCs) have been established by RVNL to look into any public complaint during construction work with respect to environmental issues of the project. The public information signboards have been installed at strategic locations in all the construction packages for receiving the public complains. During the reporting period a public complain was received with respect to blockage of waterway and subsequent flooding of the surround agriculture field at cross

drainage structures in RT-3. As the contract had been terminated and contractor was not available at site, the PIU, RVNL addressed the issue by engaging third party agency to get all the blocked vent clear off obstruction.

8. Environmental performance rating

Based on the periodical site inspections by GC and PMC, PMC's report on EMP compliance status, assessment of compliance to the requirement of EMP of the contract, overall performance rating on performance on EMP implementation has been done for the project which is indicated below:

Sl. No.	Activity	Performance rating	Remarks
Compliance with Statutory Rules and Regulations			
1	Action plan for EMP compliance	Satisfactory in PG-2, PG-3, DG-1, HT-1, HT-3 and ST-1. Requires improvement in remaining packages.	
2	Licenses and permits for plants and equipments and quarry	Good	
3	Labour licenses	Good	
4	Site selection / clearance	Satisfactory	
Construction Related Compliance			
5	Public/Traffic safety measures	Requires improvement in DG-1 and RT-2. Satisfactory in rest of the packages	Caution/Warning Singboards and barricading required near cross roads
6	Housekeeping and hygiene at construction sites	Require improvement in DG-1, ST-3, ST-4. Satisfactory in all other packages	Garbage collection and disposal as well as debris removal from site required in these packages.
7	Labour/construction camps and facilities	General hygienic conditions are good in DG-2 and ST-2. Need improvement in all other labour camps.	Special attention required in DG-1, HT-3, and ST-3.
8	Medical facilities and health checkups of workers	Satisfactory in all the packages	
9	Dust Control:		

Sl. No.	Activity	Performance rating	Remarks
	(A) At plant site	Satisfactory in all the construction packages	Most of the plants were non functional due to monsoon between July to September
	(B) At construction sites	Satisfactory in all the packages.	
10	Stock piling of topsoil	Satisfactory in DG-1, HT-1, HT-3, RT-2 and ST-2. Require improvement in rest of the packages.	
11	Slope protection of high embankment and bridge approaches from soil erosion	Good in all packages	
12	First aid facilities	Satisfactory in all the construction packages	First Aid Box with all necessary first aid items required to be maintained at all time.
13	Personal Protective Equipment (PPE)	Good in PG-1, PG-2, PG-3, satisfactory in RT-2, HT-1 and HT-3. Require improvement in DG-1, ST-1, ST-4 and RT-2.	Some improvement in supply of PPEs recorded in RT-2. However, improvement required for the workers of subcontractors in most of the packages. The main contractor has to ensure workers safety for sub-contractor's too. Special attention is required at all Important and Major bridges for proper usage of hard hat, safety belts, safety jackets and safety boots etc.
14	Proper storage and handling of chemicals and waste oils	Satisfactory	
15	Sanitation and waste management	Require improvement in all the construction packages	Debris removal from site in substantially completed sections especially in DG-1, HT-1, HT-3, PG-1, PG-2 and PG-3 is required before commissioning. The

Sl. No.	Activity	Performance rating	Remarks
			contractor has to submit his disposal plan alongwith identification of disposal sites.
16	Employment for local villagers / residents	Good.	Mostly local labourers are engaged in the project except for the labourers requiring special skills.
17	Safety measures during execution of works	Satisfactory in HT-1, DG-2, PG-1, PG-2 and PG-3. Needs improvement in remaining packages	Some improvement in ST-1 with respect to safe access at Mahanadi Bridge and Ong Bridge, improvement required in rest of the work sites.
18	Emergency response system	Require improvement in ST-3, and RT-2. Satisfactory in remaining packages	Display of Emergency contact numbers, training of staff to deal with emergency situation, and emergency vehicles required to be deployed.
19	Borrow area operation and rehabilitation	Good in DG-1, ST-2, ST-3, ST-4, RT-2 and HT-3. Require improvement in HT-1, HT-2, RT-1, RT-3. In ST-1 and PG project packages no borrow area required.	PMC has to verify the correctness of information submitted by the contractor especially in RT-1, RT-3, DG-1, ST-3, ST-4 and HT-2.
20	Debris clearance from site	Require improvement in DG-1, ST-1, ST-3, HT-2 and RT-3 Satisfactory in remaining packages	The contracts of RT-1, RT-3 and HT-2 have been terminated. The PMC and PIU, RVNL must take appropriate action for removal of debris from construction sites
21	Awareness programme on HIV/AIDS and other STD for workers	Good in DG-1, ST-1, ST-2, ST-4, HT-1, Pg-2 and PG-3. In remaining packages the awareness camps are required to be organized periodically as per the contract conditions	Bimonthly schedule required to be maintained as per contract specification.

Sl. No.	Activity	Performance rating	Remarks
22	Monitoring of environmental attributes	Satisfactory in HT-1, DG-1, RT-2. Require improvement in packages ST-1, ST-2 and ST-3, ST-4, PG-1, PG-2 and PG-3	Periodicity of environmental monitoring is required to be ensured by the PMC. The monitoring schedule for air, water and noise for packages ST-1, ST-2, ST-3 and ST-4 has been six months, which is not inconsistent with the specified environmental monitoring plan specified in the contract.
23	Mobilisation status of Environmental Officer of PMC	<p>The Environmental Officer of PMC was available in all the packages except in DG-1, RT-3, and ST-4. In PG-2 and PG-3 the Environmental Officer left the project in August 2016</p> <p>The duration and frequency of site visits by PMC's Environmental officer is good in DG-2, PG-1, HT-1, HT-2, HT-3 and ST-2. However in remaining packages this requires improvement</p>	
24	Appointment of focal environmental officer at corporate level and PIU level	Good	
25	Record Keeping and Reporting of PMC	Satisfactory in RT-2, HT-1, HT-2 HT-3 and ST-2. Require improvement in remaining packages	The record keeping and reporting on environmental compliance has deteriorated in construction packages PG-2 and PG-3 after leaving of PMC's Environmental Officer in this package. Similarly proper record keeping and reporting require improvement in Packages RT-1, RT-3, ST-3

Sl. No.	Activity	Performance rating	Remarks
			and ST-4.

Table 18: Performance Rating on Compliance with the Environmental Management Plan

Some site photographs indicating mitigation measures being implemented and also examples of good practices and bad practices has been provided as Annexure I.

9. Significant non-compliances

During the reporting period no major non-compliance has been observed except for the non availability of PMC's Environmental Officer in package RT-1, DG-1 and ST-4. General house-keeping in labour camps require improvement in almost all construction packages especially with respect to waste collection and disposal. It has been found that the contractors of most of the packages are lagging behind their plantation target. Trees are required to be planted in large numbers in most of packages to comply with the EMP and contract conditions. The Contractors have to maintain the tree plantation for one year to give requisite survival rate.

The living conditions in some labour camps are poor and this requires urgent improvement especially in package DG-1 in Malikpet camp and package ST-3. General house keeping and hygiene require improvement in all the labour camps.

Inadequate monitoring of environmental compliance during construction by PMC is a concern and this requires proper attention.

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

No additional environmental issues and impacts observed during the reporting period.

11. Conclusion and recommendations

During the reporting period most of the stipulated safeguards measures have been implemented satisfactorily except for few measures which require proper attention. During the period from July to September only limited works were undertaken by the contractors due to monsoon season. The contractors have shown some sign of improvement in implementation of environmental safeguards compared to last reporting period. In general the environmental and social safeguards of the projects are being implemented in compliance with the loan covenants, project agreement and contractors are complying with the mitigation measures described in the Environmental Management Plan (EMP).

With continuous effort of PMC and PIU, the contractors have improved the living conditions at labour camps. The safety aspects, however, require continuous monitoring both by the contractor's supervisory staff and the PMC. Provision of safe access and appropriate PPE is required to be ensured in all the project packages where works are in progress. The safety of workers of sub-contractors and safety arrangement at site of the subcontractors require more attention as most of the safety lapses observed are with sub-contractor's activities. Ensuring safety of all the personnel including the sub-contractor's staff is the responsibility of the main contractor.

The statutory/regulatory requirements are being strictly monitored for their compliance by the contractors. Efforts are being made to ensure that the contractor obtains all necessary licenses and permits from concerned agencies, including renewal when required.

The contractors have shown improvement in borrow area operation and management. Discrepancy in borrow area detailing has been recorded in construction package ST-3. The contractors have started collecting consent letter from the landowners. The contractors of construction packages DG-1, DG-2 and HT-1 have obtained environmental clearance for borrow areas. In other project packages the borrow areas are operational without environmental clearance. This aspect require proper attention PMCs in their respective package.

During the reporting period the management of air pollution in terms of dust control was found to be satisfactory in all the projects. Adequate measures have been taken at different sites to prevent water contamination and siltation of water bodies. It was ensured that all the vents are cleared before rains. Obstruction in water flow was recorded in construction package RT-3 at newly constructed cross water structures during rains. This was addressed by the PIU by engaging third party agency as the construction contract of RT-3 had been terminated and the contractor was demobilized from the site.

Absence of PMC's Environmental Officer in packages DG-1, RT-1, PG-2, PG-3 and ST-4 remain an issue. RVNL has taken initiative to engage Environmental Officer directly in package RT-3 and similar action is expected for package RT-1 as the PMCs of these packages failed to mobilize their Environmental Officer for last one year even after repeated instructions. The absence of PMC's Environmental Officer or irregular site inspection by PMC's Environmental Officer affect the overall monitoring, record keeping and reporting on implementation of environmental safeguards at site.

Haphazard stacking of debris materials has been observed in many packages. All the debris are required to be removed from sites especially those of substantially completed sections before commissioning. All the contractors has been instructed to submit their action plan for restoration of sites and debris removal indicating reuse plan, disposal site, etc. and remove all the debris as per schedule. Due to termination of construction packages RT-1, RT-3 and HT-2 the PMC has to verify and take appropriate action in consultation with PIU to clear the site from debris.

Monitoring of environmental attributes have been undertaken during the reporting period by the contractor in all the construction packages, except in DG-2, HT-2, RT-1, RT-3, and ST-3. The contract of DG-2 is newly awarded and the contractor has not initiated the periodical monitoring during reporting period. The contracts of RT-1, RT-3 and HT-2 have been terminated. In ST-1, ST-2, ST-3 and ST-4 air, water and noise quality monitoring has been scheduled for once in six month, which is not consistent with the specified environmental monitoring plan specified in the contract.

The quantum of tree plantation done in all packages so far have been inadequate when compared to the quantities mentioned in respective BOQs. The contractors have been instructed to submit their action plan for initiating phase wise plantation during contract period. This aspect is required to be monitored closely by the PMC and PIU, RVNL.

Provision of rainwater harvesting structures in building construction is an important component stipulated in the contracts. Till the reporting period such structures have been provided only in HT-1 at Sompur Road Railway Station building and in Alnawar Railway Station building in HT-3.

The HIV/AIDS awareness camps are organized in all the construction packages, however the periodicity of these programmes are required to be maintained as per contract specifications in some of the packages.

Annexure I

Photographs indicating EMP Compliance Status in different projects



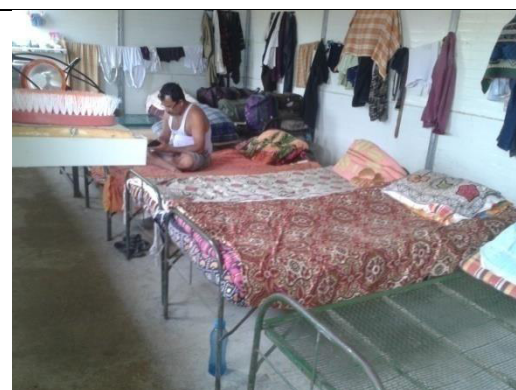
Air Quality Monitoring at Bhanapur Railway Station in HT-1



Noise level Monitoring at Bhanapur Railway Station in HT-1



Base camp and workers camp at Sawalgi in DG-2



Cots for workers at camp site in DG-2



Toilets and bathroom units at camp site at Sawalgi in DG-2



Fire fighting arrangement at Sawalgi camp in DG-2



New labour camp established in DG-1



Display of Emergency contacts and fire fighting arrangements at new labour camp in DG-1



Toilet units with septic tank under construction at new labour camp in DG-1



Labour camp at Bridge No 160 requiring basic facilities in ST-2



Sanitation conditions at labour camp require improvement in ST-3



Dismantling and site restoration done at abandoned labour camp at Alnawar in HT-3



Stacked construction materials blocking the natural waterway at Alnawar camp site in HT-3, require shifting



Abandoned Labour camp near Mahanadi River in RT-3 requiring dismantling and restoration



Dismantling and site restoration required at abandoned labour camp in HT-2



Borrow area no.6 in operation at Boroti village in DG-2



Borrow area operation at Tungbhadra Dam in HT-1



Borrow area converted to agriculture field in RT-1



Abandoned quarry near stone crusher unit in RT-1



Clearing of blocked water way at bridge No. 113 (Ch. 543/700) in HT-3



Vent clearance at bridge No. 99 in ST-2



Flooding of surrounding area due to blockage of vent at Bridge No.63 ch.32 in RT-3.



Batching plant at Sawalgi in DG-2



Batching plant at contractors base camp in ST-3



Barbed wire safety fencing provided along Railway Track in DG-2



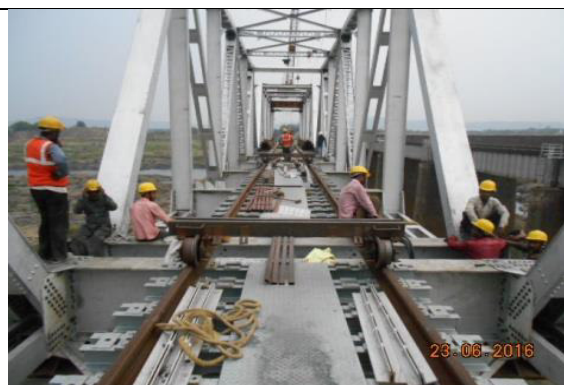
Safety Fencing along railway track at Ch. 625 in ST-2



Deployment of Flag man at Unmanned Railway crossing in ST-2



Safety signboard at public road at Dharwad section in HT-2



Safe working platform and access at bridge construction across Mahanadi river in ST-1



Safe working platform required at Sukhtal (Bridge No. 331) in ST-1



Workers with PPE at bridge No. 160 in ST-2



Workers with PPE at fabrication yard at Hirapur base camp in ST-1



Debris lying along the rail bed in RT-3 near ch: 32 require removal



Completed track at Ch: 517/300 in HT-3 without any debris



Track linking completed, needs removal of debris in HT-2



Haphazard stacking of materials at stockyard in HT-2



Rainwater harvesting at New Sompur Railway Station building in HT-1



Staff quarters in PG-1 waiting for rain water harvesting system installment



Trial run at Wadi-Chiksugur section at PG-2



TSS building completed at Daund in PG-1

	
<p>Construction of Gabion Wall for Slope protection in HT-3</p>	<p>Slope protection work (turfing) in progress at RT-2</p>
	
<p>Plantation at Malikpet Railway Station in DG-1</p>	<p>Plantation in progress at Hospet Railway station in HT-1</p>
	
<p>Health and HIV awareness camp organized in RT-2</p>	<p>Health camp organized in ST-4</p>



HIV/AIDS awareness programme conducted in April 2016 in ST-4



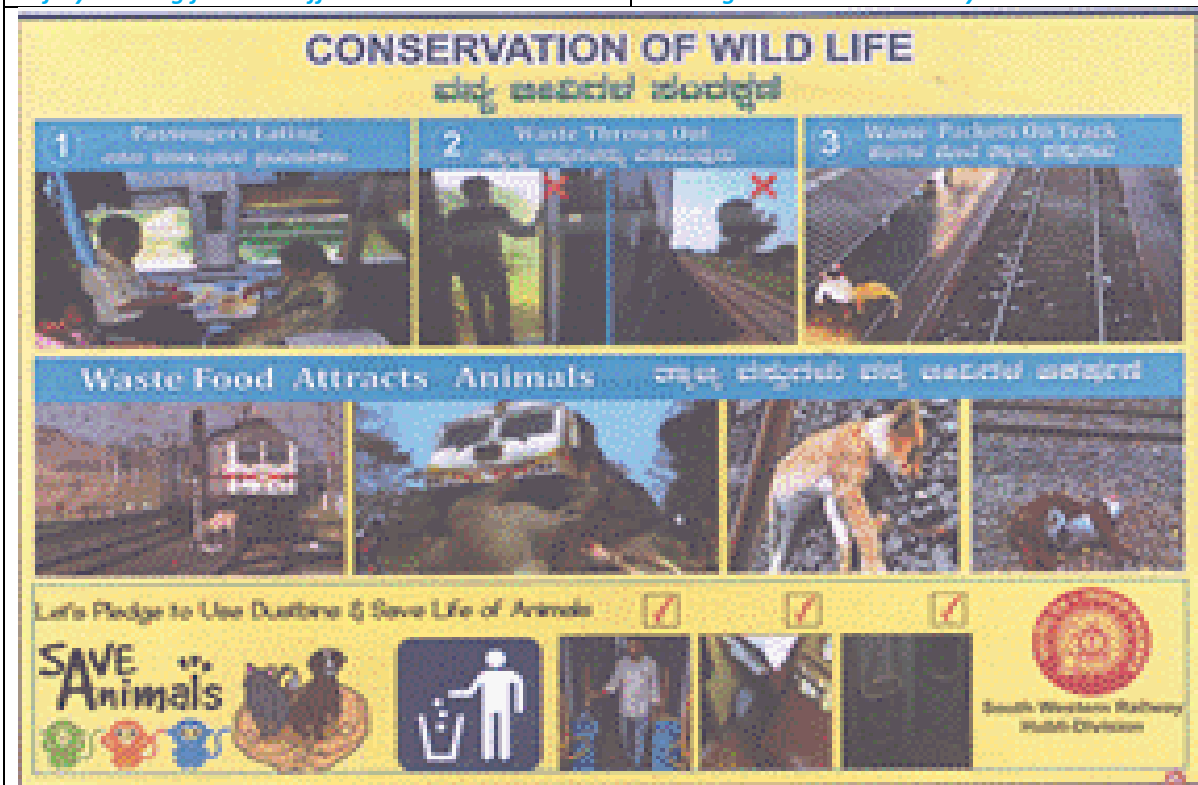
Health checkup and HIV/AIDS awareness camp organized at Alnawar base camp in HT-3



Safety Training for site staff in ST-2



Training on environmental by General Consultant



Display board by Zonal Railway for conservation of wild life