

October 2013



STUDY OF ENVIRONMENTAL ASPECTS OF EXISTING CARSHEDS & WORKSHOPS ON CENTRAL & WESTERN RAILWAY

EXECUTIVE SUMMARY

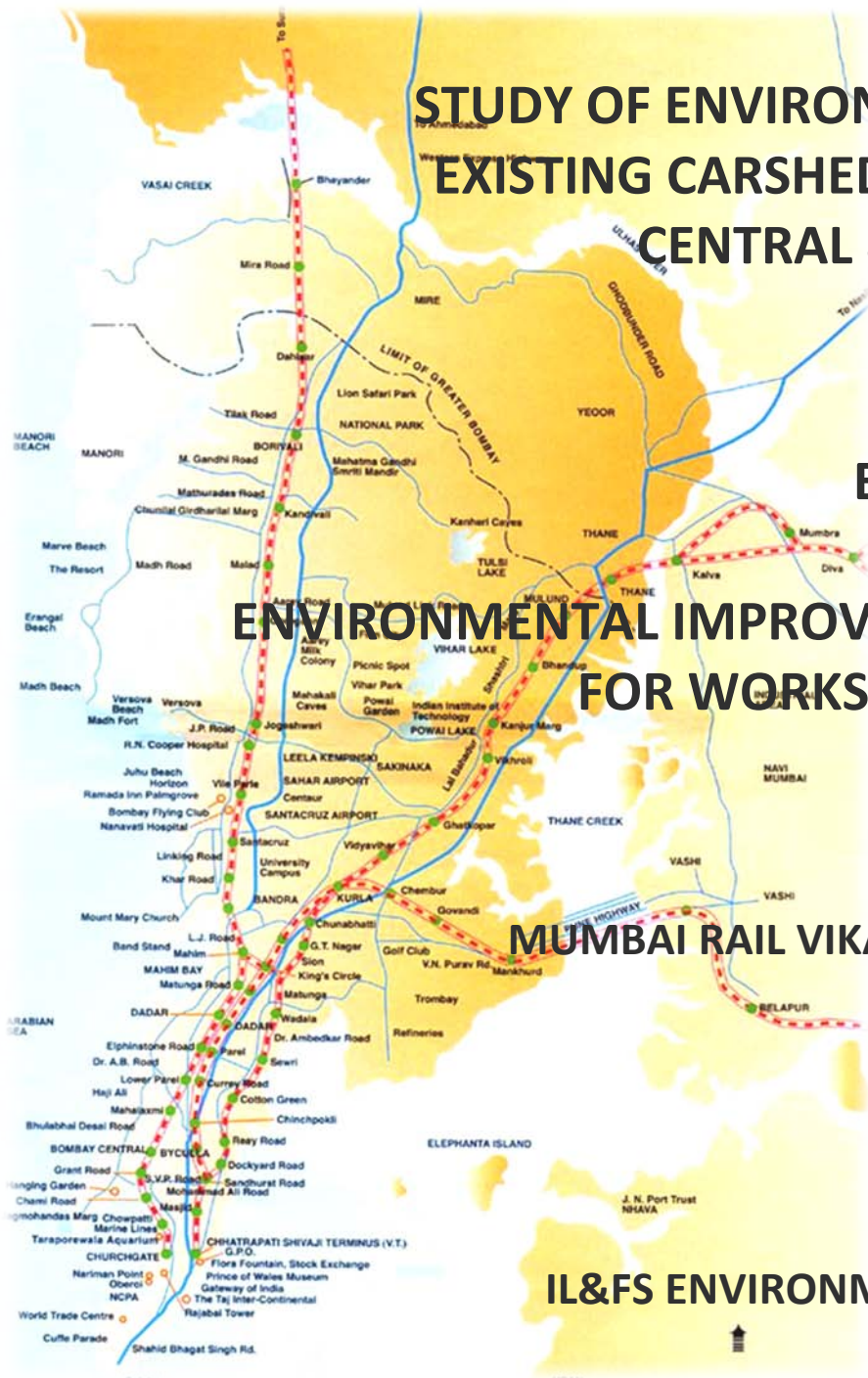
ENVIRONMENTAL IMPROVEMENT PLAN REPORT FOR WORKSHOPS AND CARSHEDS

Submitted to
MUMBAI RAIL VIKAS CORPORATION LIMITED

Prepared by



**IL&FS ENVIRONMENTAL INFRASTRUCTURE
AND SERVICES LIMITED**



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Background

Mumbai Rail Vikas Corporation (MRVC) and World Bank envisaged carrying out the 'Study of Environmental Aspects of Existing Car sheds and Workshops on Central and Western Railway' (MRVC/World Bank Project TA-07; hereafter called 'the Project / Study'), as a part of the Mumbai Urban Transport Project (MUTP). MRVC appointed IL&FS Environmental Infrastructure and Services Ltd. (IEISL) to study the state of the existing environmental conditions of the Workshops and Carsheds of the Central and Western Railways in Mumbai and to prepare an Environmental Improvement Plan (EIP) including the institutional monitoring and reporting framework to ensure implementation and sustenance of the proposed EIP. The Study was conducted at seven facilities of the Mumbai Suburban Railway network as presented in the **Table 1** below.

Table 1: List of facilities covered under the Project TA-07

Sl. No.	Division	Workshops	Carsheds
1	Central Railway	Matunga	Kurla, Kalwa, Sanpada
2	Western Railway	Mahalaxmi	Mumbai Central, Kandivali

The EIP Reports cover the current environmental situation and proposed environmental improvement measures as a part of the proposed EIP for each of the seven facilities covered under the Project. For each of the Workshops and Carsheds, the EIP Report is presented in two volumes; **Volume-I** is the Main Report, which documents the proposed environmental improvement measures as part of the proposed EIP and **Volume-II** contains the Annexures to the Main Report.

Methodology adopted for the Study

In order to understand the current environmental situation in the Workshops and Carsheds, IEISL, as a first step, carried out a detailed mapping of the area within the Workshops and Carsheds to prepare the base map. The base map was further used for conducting a detailed Transect Survey to identify the shop-wise/section-wise issues related to environmental aspects within the Workshops and Carsheds. IEISL also undertook sector-wise field assessment covering water supply, wastewater, storm water drainage, waste / scrap management, storage of consumables, energy consumption, occupational safety and health and other infrastructure facilities which include drinking water kiosks, toilets, changing rooms, lockers, rest areas, etc. Guidelines on planning, construction, operation and maintenance of Railway Workshops were also referred to understand the various activities within the Workshops and Carsheds and their impacts on the environment in the project area.

Domestic and International best practices, in terms of work / activity flow and environmental management, were reviewed to understand the various measures adopted to protect the environment in similar facilities. This included the case studies of Railway Depots of both Domestic and International Suburban Railway systems in Delhi, United Kingdom and Germany.

Present and future environmental improvement needs of the Workshops and Carsheds were established by undertaking demand–supply gap assessment. On identification and assessment of the baseline environmental concerns, the options for environmental improvement of the Workshops and Carsheds were documented based on the cost effectiveness, execution ability and the required timeframe to implement the recommended measures. Stakeholder consultations were conducted at all levels including senior officers of the MRVC, World Bank, senior officers of the Workshops and Carsheds, Shop In-charges, as well as the workers on the shop floor at each stage of the study. The EIP thus prepared, is a result of continued interaction with the key stakeholders and presents need based improvement options for the Workshops and Carsheds.

Sector-wise Identification of Issues & Suggested Alternative Improvement Measures

The studies covered following sectors, as suggested in the Scope of Work of the project:

- Water Supply and Water Conservation
- Storm water drainage (including flooding as it was observed to be a major issue at most of the Workshops and Carsheds)
- Rainwater Harvesting
- Wastewater (including sewage and trade effluent)
- Waste and Scrap Management (including municipal solid waste, hazardous waste, biomedical waste, metal and non-metallic scrap)
- Storage of Consumables
- Energy Efficiency
- Occupational Safety and Health

In addition, a study of “Other Infrastructure Facilities”, needed to improve the environment in the project area, was also included. This covered certain basic essential facilities like changing rooms, lockers, toilets, rest areas, drinking water facility, etc. for the comfort and welfare of the workers.

The voluminous information collected through the above studies was collated and analyzed to get a better understanding of the environmental, infrastructure and other issues. The issues have been identified in each of the sectors, as mentioned above, and listed for each of the shops/sections within the Workshops and Carsheds. These are presented in Volume II of the EIP Reports prepared for each Workshop and Carshed. The available alternatives for mitigation and environmental improvement were documented considering their cost effectiveness, implementation ability and timeframe for all the identified issues. The suggested environmental improvement options include two or more alternatives, for each of the improvement. Most feasible

alternatives for each sector were considered based on the series of interactions with the Senior Officers from various departments in the Workshops and Carsheds. The most suitable alternative, chosen in consultation with the Senior Management of the Workshops and Carsheds, was further considered for its detailing and preparation of the block cost estimates to implement them.

Legal and Regulatory Aspects

Environmental regulatory aspects applicable to the Workshops and Carsheds were studied. The Matunga and Mahalaxmi Workshops have obtained Consent to Operate and Authorization from Maharashtra State Pollution Control Board (MPCB). Matunga and Mahalaxmi Workshops have also established Environment Management System under ISO 14001 certification. However, it was observed that regular updating and monitoring the implementation of the environmental management system is not in place which is a requirement for the renewal of the certification.

During the environment assessment of all the Carsheds, it was observed that the Carsheds have been operating within the notified Water Pollution prevention areas, in the State of Maharashtra. However, the Carsheds do not possess the valid consents for the discharge of liquid effluents and authorization for the generation and management of hazardous wastes, as required under the present regulatory regime in the State of Maharashtra. In order that the activities carried out in these Carsheds are regulatory compliant, it is necessary for these facilities to obtain the consents under the applicable regulatory framework including the Water Act and Authorization under Hazardous Wastes (Management, Handling & Transboundary Movement) Rules, 2008 (as amended).

The Central and State Government Rules, as applicable to the Workshops and Carsheds, are listed below. It is necessary that Workshops and Carsheds comply with the regulatory regime for unhindered working of the facility. The applicable rules are:

- Water (Prevention & Control of Pollution) Act, 1974 (as amended) and Rules there made under (as amended)
- Water (Prevention & Control of Pollution) Cess Act, 1977 (as amended) and Rules made there under (as amended)
- Air (Prevention & Control of Pollution) Act, 1981 (as amended) and Rules made there under (as amended)
- National Ambient Air Quality Standards, 2009
- Noise Pollution (Regulation and Control) Rules, 2000 (as amended)
- Environment (Protection) Act, 1986 and Rules there under (as amended)
- The Manufacture, Storage and Import of Hazardous Chemicals Rules, 2000 (as amended)
- Hazardous Waste (Management, Handling and Transboundary movement) Rules, 2008 (as amended)
- The Batteries (Management and Handling) Rules, 2001 (as amended)
- Bio-medical Waste (Management and Handling) Rules, 1998 (as amended)
- Municipal Solid Waste (Management and Handling) Rules, 2000

- e-Waste (Management and Handling) Rules, 2011
- Ozone Depleting Substances (ODS) Rules, 2000 (as amended)
- Factories Act, 1948 and Maharashtra Factories Rules (as amended)

Proposed Environmental Improvement Plan (EIP)

The EIP is prepared for each of the Workshops and Carsheds in order to upgrade its work environment and make its operations more efficient and environmentally sustainable. The objective of the EIP is to improve the overall environmental status of the Workshops and Carsheds, beyond just regulatory compliance. A **Master Plan** approach, therefore, was considered during the preparation of the EIP which facilitated in preparing a comprehensive EIP to address not merely the immediate environmental issues but, also the long term environmental planning considering the future development at the Workshops and all Carsheds. Through the detailed mapping, transect survey and the sector-wise field assessments a number of issues were identified and analyzed. Through this analysis of issues, alternative improvement options were listed and opened for discussion with the Senior Officers at the facilities. Post discussion with the Senior Officers at each of the facilities, areas of intervention were finalised and taken up for further detailing. Environmental improvement measures under each of these areas of intervention are proposed in the EIP.

A comprehensive list of environmental improvement measures is proposed along with associated costs and the estimated time frame for implementation. These measures can be divided into the following three groups:

1. Good practices, that may be adopted by the Workshops and Carsheds with some procedural changes and without much cost implications
2. Those interventions, which may be implemented through the internal departments of the Workshops and Carsheds and do not require external funding
3. Major improvement measures, which would require external source of funding

Table 2 summarizes the proposed improvement measures common to all the Workshops and Carsheds. The proposed improvement measures have been identified based on regulatory requirements; the applicable regulations for each of the improvement measures are also presented in **Table 2**.

Table 2: Proposed Improvement Measures suggested in the EIP

Sr. No.	Proposed Improvement Measures	Applicable Regulations
1	WASTEWATER MANAGEMENT	
1a	Construction of separate underground conveyance system for sewage and trade effluent	MPCB Consent (<i>applicable to Carsheds after obtaining Consent from MPCB</i>)
1b	Setting up of Sewage and Effluent Treatment Plant	
1c	Construction of new toilets with double line plumbing works and rehabilitation of existing	

Sr. No.	Proposed Improvement Measures	Applicable Regulations
	toilets	
2	WATER SUPPLY	
2a	Construction of new underground water storage tanks	
2b	Installing a Fire Fighting System including underground storage tanks, water pipeline network, fire hydrants, pumps and fire extinguishers	National Building Code, 2005 Factories Act, 1948
2c	Replacement of old and dilapidated water pipelines with new GI pipes	
3	STORM WATER DRAINAGE WORKS	
3a	Widening of the existing drains	Guidelines of the Municipal Corporation of Greater Mumbai
3b	Separate out storm water drains and sewerage drains	MPCB Consent (<i>applicable to Carsheds after obtaining Consent from MPCB</i>)
4	RAIN WATER HARVESTING WORKS	
4a	Providing rainwater down take pipes for all the buildings and connecting the same to the storm water drains	
4b	Construction of underground water tank for storing of rainwater during the monsoons	
5	WASTE AND SCRAP MANAGEMENT	
5a	Procurement of equipment (such as bins, containers, forklifts, hook loaders, dumpers, trucks, etc.)	Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008
5b	Civil works for Secondary Waste Storage Area	Municipal Solid Waste (Management & Handling) Rules, 2000 e-Waste (Management & Handling) Rules, 2011
6	STORAGE OF CONSUMABLES	
6a	Clearing of existing material stored on the shop floor	
6b	Provision of safe storage cabinets within the shop	
7	ENERGY EFFICIENCY	
7a	Conducting a detailed Energy Audit	Bureau of Energy Efficiency (BEE) - Energy Conservation Building
7b	Replacement of fluorescent lamps with LED lights	

Sr. No.	Proposed Improvement Measures	Applicable Regulations
7c	LED replacement of all TFLs at all the locations	Code (ECBC)
7d	Replacement of existing pumps with energy efficient pumps	
7e	Provision of VFF Drives for cranes	
7f	Installation of additional Energy Meters at all sections	
7g	Replacement of AC & Water coolers in all facilities by BEE rated equipment in a phased manner	
7h	Installation of Solar Photovoltaic System	
8	OCCUPATIONAL HEALTH AND SAFETY	
8a	Replacement and disposal of asbestos containing roofing material with new Zinalume sheets	Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 Factories Act, 1948
8b	Providing anti-skid flooring in specific shops as per requirement	
8c	Provision of Personal Protective Equipment	
8d	Training and capacity building	
9	OTHER INFRASTRUCTURE FACILITIES	
9a	Road resurfacing and repairing works	Factories Act, 1948
9b	Renovation and provision of basic facilities like drinking water kiosks, changing rooms, standardized lockers and resting benches for the workers	

Note: Detailed improvement measures have been recommended for each of the areas of intervention listed above for each Workshop and Carshed. The same may be found in the Volume I of the EIP Reports prepared separately for each Workshop and Carshed.

The major environmental improvement measures, which would require external sources of funding, have been considered for preparation of block cost estimates. Other measures proposed in the EIP can be implemented by the Workshops and Carsheds with their in-house capabilities and available budget. A summary of the block cost estimates for all Workshops and Carsheds is presented in **Table 3**. The overall project cost for implementing these works is estimated at about **Rs. 141 Crores** (Refer **Table 3**).

Table 3: Summary of Block Cost Estimates for Workshops and Carsheds

Sr. No.	Description of Item	Block Cost Estimate in INR Lakhs						
		Matunga	Mahalaxmi	Kurla	Mumbai Central	Kandivali	Kalwa	Sanpada
1	Water Supply (including fire fighting)	254	69	90	69	66	90	0
2	Storm water drainage works	345	110	207	63	99	200	0
3	Rain Water Harvesting System	31	15	15	15	15	15	15
4	Sewage and Trade Effluent Management	399	120	82	31	39	80	0
5	Waste and Scrap Management	1023	556	408	241	216	406	409
6	Storage of Consumables	107	58	28	28	28	20	20
7	Occupational Health & Safety	1493	433	271	223	107	311	245
8	Energy Efficiency	277	94	212	180	38	74	36
9	Other infrastructure facilities	325	63	49	33	13	13	13
10	SUB-TOTAL: A	4256	1519	1363	882	622	1210	738
	Cost towards site investigation, preparation of DPR & PMC Services @ 15%	638	227	204	132	94	181	111
	SUB-TOTAL: B	4835	1747	1568	1014	715	1391	849
	Add: Physical Contingency @ 10%	489	174	156	101	71	139	84
	SUB-TOTAL: C	5384	1922	1725	1116	786	1530	934
	Add: Price Contingency @ 5%	269	96	86	56	39	77	46
	TOTAL CAPEX COST:	5654	2018	1811	1172	826	1607	981
	FACILITY-WISE BREAKUP OF TOTAL CAPEX COST (in INR Crores)	57	20	18	12	8	16	10
	YEARLY O&M COST @ 3% of A (in INR lakhs)	128	46	41	26	19	36	22
		TOTAL COST OF PROJECT NO. TA-07: in INR Crores – 141						
		i.e., Rupees One Hundred and Forty One Crores						

Note: The description of works to be undertaken and the abstract cost for each Workshop and Carshed, along with BOQ for each of the proposed works is presented in the Volume I of the EIP Reports prepared separately for each Workshop and Carshed.

Proposed Institutional Framework

MRVC is the project implementing agency for MUTP-II of which Project No. TA-07 is a part. In that role, MRVC is accountable for satisfactory completion of the project works proposed under this Project. As the project implementing agency, MRVC, on behalf of Government of Maharashtra and Indian Railways, is responsible for financing and procuring all the contracts financed by the World Bank loan, as well as for executing certain identified works in the field, with due safeguards in consultation with the Zonal Railways, i.e., Central Railways (CR) and Western Railway (WR) in this case. The time-line for procurement works or implementation of civil works and activities to be carried out by the respective agencies (i.e., MRVC, CR/WR, Workshops/Carsheds, Consultants and Contractors) will be set up between MRVC and the executing agency, i.e., the individual Workshop/Carshed Management Team.

For the implementation of the proposed projects under Project TA-07, it is proposed to have a two-level institutional framework. It is proposed to constitute an Apex Committee to oversee the overall implementation of the proposed works and a Working Level Committee to monitor the implementation of works on the ground level.

The Apex Committee shall comprise of the officials from Railway Board, MRVC, Central/Western Railway – one representative for Electrical, Mechanical, Finance, ISO/EHS Departments each and the Head of Workshop/Carshed. The Apex Committee shall be the decision and policy making body to implement the suggested environmental improvement interventions for the workshop. The Apex Committee will report the progress of the works to the World Bank on a half yearly basis, if the interventions are carried out under World Bank funding. Under the Apex Committee, it is proposed to constitute a Working Level Committee to implement the proposed works.

The Working Level Committee shall comprise of the Head of Workshop/Carshed, Senior Officials from Workshop/Carshed representing the Projects, Electrical, Mechanical, Finance, Stores and ISO/EHS Departments and Senior Sectional Engineers in-charge of various shops/sections. The Working Level Committee shall be responsible for implementation of all procurement and civil works. It shall ensure full participation of all key stakeholders and meaningful coordination in planning and time bound implementation of the suggested interventions under this Study. It shall also oversee the day to day work of all the contractors appointed under this Project and provide a quarterly progress report to the Apex Committee. The proposed institutional framework for implementing the works proposed under Project No. TA-07 is shown in **Figure 1**.

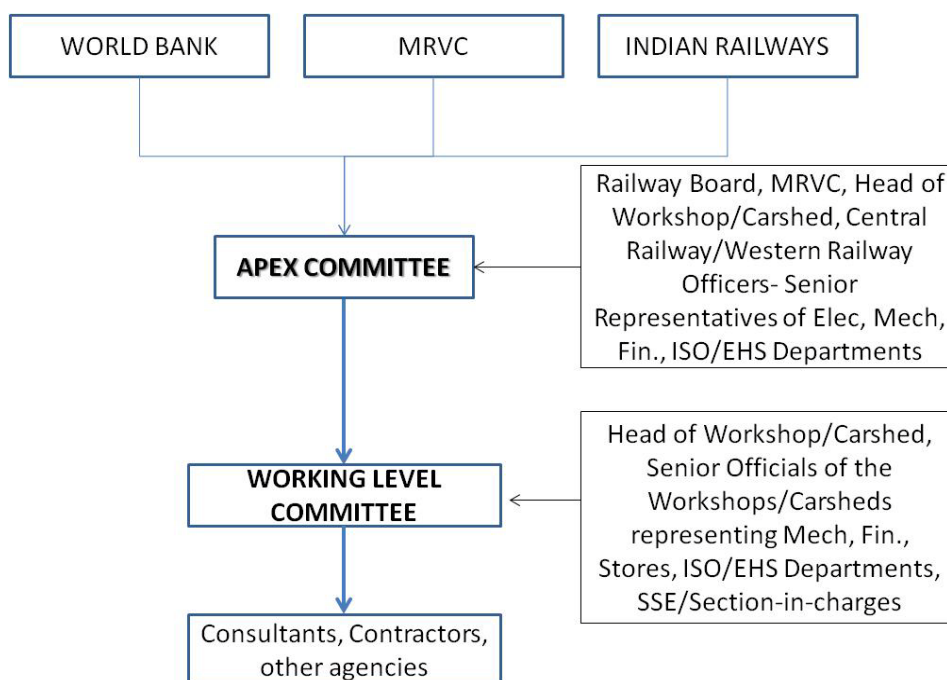


Figure 1: Proposed Institutional Framework

Proposed Implementation Schedule and Monitoring Plan

Proposed implementation time schedule is presented in **Table 4**. The time schedule for implementation of the proposed interventions is prepared taking into account the time required for the following:

1. Appointment of Project Management Consultant for each of the proposed sub-projects
2. Preparation of Detailed Project Report including detailed design, drawings and costing
3. Preparation of tender documents, bid management and selection of contractor for the various proposed works
4. Implementation of the actual on-site works
5. Seeking approvals from MRVC/Railways/World Bank at every stage

Table 4: Proposed Implementation Time Schedule

Sr. No.	Item	Estimated Time Period (in months)		
		DPR by PMC ¹	Tendering ²	Implementation ³
	Submission of Project TA-07 Report to MRVC/Railways/World Bank by IEISL (D)			
	Approval of the Project TA-07 Report by MRVC/Railways/World Bank (D+1)			
1	WATER SUPPLY			
1a	Construction of new underground water storage tanks	D+6	D+10.5	D+44
1b	Fire Fighting System including underground storage tanks, water pipeline network, fire	D+6	D+10.5	D+44

Sr. No.	Item	Estimated Time Period (in months)		
		DPR by PMC ¹	Tendering ²	Implementation ³
	hydrants, pumps and fire extinguishers			
2	WASTEWATER MANAGEMENT			
2a	Underground Sewer Network and Sewage Treatment Plant works	D+6	D+10.5	D+44
2b	Construction of new toilets with double line plumbing works and rehabilitation of existing toilets	D+6	D+10.5	D+44
2c	Underground Network for conveyance of Trade Effluent and Effluent Treatment Plant works	D+6	D+10.5	D+44
3	STORM WATER DRAINAGE WORKS	D+6	D+10.5	D+44
4	RAIN WATER HARVESTING WORKS	D+6	D+10.5	D+44
5	WASTE AND SCRAP MANAGEMENT			
5a	Procurement of equipment (including containers, forklift, hook loaders, trucks, etc.)	D+6	D+11	D+19
5b	Civil works for Secondary Waste Storage Area	D+6	D+11	D+15
6	STORAGE OF CONSUMABLES - Provision of safe storage cabinets within the shops		D+11	D+15
7	OCCUPATIONAL HEALTH AND SAFETY			
	Including replacement of asbestos containing roofing material with new Zinalume sheets, providing anti-skid flooring in specific shops, provision of PPE and training/capacity building		D+11	D+19
8	ENERGY EFFICIENCY	D+6	D+11	D+17
9	OTHER INFRASTRUCTURE FACILITIES			
9a	Road resurfacing and repairing works		D+10.5	D+44
9b	Renovation and provision of basic facilities like drinking water kiosks, changing rooms, standardized lockers and resting benches for the workers		D+11	D+19

Notes:

1. Includes time required for appointing of a Consultant to undertake Project Management Consultancy Assignment, preparation of Detailed Project Report (DPR), preparation of tender documents and approval of Railways/MRVC/World Bank at each stage (see **Table 5** for detailed breakup of the time line)

2. Includes time required for inviting bids from pre-qualified bidders, receiving of the bids, evaluation of bids, selection of the contractor and issuance of work order and signing of contract with selected contractor. (see **Table 5** for detailed breakup of the time line)
3. Includes time required for mobilization of site activities, implementation of works, defects liability period, concluding of contract and settling of final bill of the contractor. (see **Table 5** for detailed breakup of the time line)

Table 5: Proposed Timeline for Implementation of Water Supply, Wastewater, Storm water Drainage and Rainwater Harvesting Works

Sr. No.	Stages of Work until completion of works at all the Workshops and Carsheds	Time in months
1	Submission of Draft Project TA-07 Report for all railway workshops and Carsheds by IEISL to MRVC/Railways/World Bank	1.5
2	Approval of Draft Report By MRVC/Railways/World Bank, submit Final Report and get go ahead for implementation	D+1
DPR & Tender Document Preparation By PMC		
3	Invite quotes and appointment of Project Management Consultant (PMC) by MRVC/Railways/World Bank. The scope of PMC will be to carryout detailed engineering, civil, structural and mechanical and equipment designs, prepare tender documents, evaluation of bids, project management during construction phase, concluding contracts with contractors, etc. as per the latest World Bank Procurement Guidelines	D+2
4	Initiate pre-qualification of Bidders, i.e., prepare pre-bid documents with the approval of MRVC/Railways/World Bank. Short listing of selected contractors to whom tender documents will be issued. (Item No. 3 and 4 to be done in parallel)	D+4
5	Preparation of Draft DPR (including design and detailed drawings) and Tender documents for bidding	D+5
6	Approval of Draft DPR and Tender documents by MRVC/Railways/World Bank	D+6
Tendering Stage		
7	Invite Bids from pre-qualified bidders	D+7
8	Receipt of Bids	D+8.5
9	Bid Evaluation and Recommendation	D+9.5
10	Issuance of Work Order and Signing of Contract with selected Contractor	D+10.5
Implementation Stage		
11	Site Mobilization	D+11.5
12	Implementation of proposed works including work completion	D+29
13	Defects Liability Period	D+41
14	Completion of Contract-settlement of final bill of the Contractor	D+44

The success of the EIP will predominantly depend on its implementation through the trained supervisory staff, workers at the Workshops and Carsheds and the periodic monitoring of the proposed works under the EIP. A suitable monitoring plan, based

on Environmental Management Indicators (EMI) for each Workshop and Carshed, has been suggested to monitor the progress of the EIP. The monitoring plan includes monitoring frequency, reporting schedule and the responsible department for monitoring each of these indicators. Based on this plan a monitoring report can be prepared and used to carry out appropriate modifications or improvements in the EIP.