



GENERAL CONSULTANTS
MAHARASHTRA METRO RAIL CORPORATION LTD
(Nagpur Metro Rail Project)

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No. GC/NMRP/PDO/ENV/DPO/2018/1059

Date: 05.03.2017

To,
Director Projects
Maharashtra Metro Rail Corporation Ltd,
Metro House, 28/2 Anand Nagar
C.K. Naidu Road, Civil Lines
NAGPUR-440001

Sub: Reach Specific Environmental & Social Management Plan for Reach 3 Viaduct & Stations
Ref: Maha-Metro letter No: Maha-Metro/NMRP/Env/ESMP/40 dated 27.02.2018 (recd on 27.02.18)

Dear Sir,

In reference to letter received from Maha-Metro dated 27th Feb-2018 regarding the subject matter, we are submitting the Environmental & Social Management Plan (ESMP) for Reach 3 Alignment of Nagpur Metro Rail Project.

This ESMP (for Reach 3 Alignment) is based on ESMP approved for Nagpur Metro Rail project by KFW during December 2016.

Thanking You,
Yours faithfully,

Mohamed Hassan Zazou
Project Director
GC for NMRP
AMY/SKG


Encl: As above

Cc: Sr. DGM/Environment/Maha-Metro.



Environment & Social Management Plan
(ESMP) for Reach 3 (Station & Viaduct
contracts) of Nagpur Metro Rail Project

March -2018

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1.0 INTRODUCTION

Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) documents, issued to contractors/bidders along with tender document are integral part of the project documentation and are submitted to various authorities and presented at various forums in context of this project. The environmental/social management plans are primarily devised from environmental and social impact assessment reports and SHE Manual prepared and approved for this project.

The EIA and SIA documents specifically discuss the environmental and social impacts for Reach 3 alignment of the project during the design, construction and operational phases of the project. It identifies the positive and negative impacts on environmental and social receptors identified along Reach -3 alignment during different phases of project and also proposes the measures to minimize the impacts. After identification of impacts and proposing mitigation measures it also proposes the monitoring plan to monitor the suitability of implemented mitigation measures during construction and operational phases of project. Mitigation measures and monitoring plan for a particular impact combinely termed as Environmental Management Plan (EMP) or Social Management Plant (SMP) for that particular impact.

The SHE manual is a document for safety, health and environmental management during construction phase of the project. SHE Manual for Nagpur Metro Rail Project is prepared based on the experience gathered from similar projects all around India. The present document outlines the Environment and Social Management Plan (ESMP) for Reach -3 of Nagpur Metro Rail Project (NMRP) for design, construction and operational phases of the project. This document is applicable for station and viaduct and depots of Reach -3.

While applying this document it is noted that environmental & social issues during design and operational phases are considered for complete alignment are identified and addressed. Whereas during construction phase '*significance*'¹ of impact on identified environmental and social issues on account of construction activities of station contract and viaduct varies spatially. It is expected that

¹ 'Significant' impact is characterised by potential of activity to cause the environmental & social harm and frequency of activity within a given duration.

contractor's project team in the leadership of Environmental Manager/Social Expert shall prepare an aspect impact of each activity and accordingly shall adopt the mitigation measures and monitoring plan.

The contractors/bidders should consider this document as guidebook for environment/social management during construction and operational phases of the project. In case further reference/discussion is required over any issue given in this document, provisions of EIA/SIA reports, SHE manual and tender/contract document shall prevail.

During the operational phase, Maha-metro will hold the responsibility of implementation of ESMP. It may be possible that separate manual could be prepared for environmental and social management during the operational phase of the Reach 3 to suit the as built conditions.

During the construction phase Implementation of ESMP is responsibility of the civil contractor throughout the period of construction till the handover of the unit to Maha-metro.

1.1 ESMP for Reach 3 of Nagpur Metro Rail Project

Table 1 and Table 2 given below presents the environment and social management plans respectively for the Reach 3 alignment during design, construction and operational phases of project. It identifies various environmental and social aspects/receptors which are likely to be impacted on account of Reach 3 alignment during these phases and proposes the management and monitoring plan for each of them.

Various environmental and social issues which could be faced during construction and operational phases of Reach 3 alignment were anticipated during design phase and suitable provisions were made in design to mitigate the issues. These design provisions are incorporated in the tender document.

The environmental and social impacts anticipated during the construction and operational phases of the Reach 3 alignment and management/monitoring plan for its mitigation are presented in the Table 1 and Table 2 of this document. It is expected that contractor shall be primarily responsible for implementation of ESMP during construction phase whereas Maha-metro shall be primarily responsible for

implementation of ESMP during operational phase. Whereas, it is proposed that Maha-metro shall devise its plan for compliance with ESMP for operational phase at suitable time of project. The contractor/bidders shall provide their plan for compliance with the ESMP during construction phase for review of GC/Maha-metro.

1.2 Organization Structure – Operational Phase

During the operational phase, it is likely that Maha-metro may execute the ESMP through the Operational and Maintenance (O & M) team for the project. The organizational structure for O & M team could be formed under the leadership of Managing Director, Maha-metro which would include social and environmental expert along with O&M team.

1.3 Organization Structure – Construction Phase

During Construction phase, implementation of ESMP at Reach 3 sites shall be supervised by contractor's SHE organization. To implement ESMP contractor shall employ adequate number of skilled SHE staff/professionals throughout the construction period of the project.

Number of staff required at various levels of contractor's SHE organization depends on value of contract awarded to contractor. Educational qualifications required for key SHE staff and number of SHE personnel required is given in **clause 70 of SHE Manual**. The proposed structure for contractor's SHE Organization is given below.

Chart 1 –SHE Organization for Construction Phase for ESMP Implementation



Table 1- Environmental Management Plan – Design, Construction & Operation Phase (Reach 3 Alignment)

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
Environmental Management - Design Phase							
1.	Alignment	<p>The total length of the Reach 3 alignment consist of 10.5 km. The selected alignment covers all the important locations such as commercial hubs, corporate hubs, residential colonies etc. of Nagpur Town.</p> <p>The alignment of Reach 3 comprises of 10 no. elevated metro stations including viaduct Viz; Lokmanya Nagar, Bansi Nagra, Vasudev Nagar, Rachana Ring Road, Subhash Nagar Junction, Ambazari Lake view, LAD College Square, Institute of Engineers, Jhansi Rani Square, Sitabuldi (Interchange) on the East West Corridor.</p> <p>The proposed project alignment</p>	Issue addressed during DPR stage	Design Consultant/Alignment expert	Maha-metro	--	Design Consideration

¹ Cost given here indicate tentative cost for environmental monitoring. Cost of EMP implementation is included in civil contract and for operational phase, included in O&M contract.

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		does not passes through archaeological sites, temples and other environmentally sensitive areas.					
2	Soil Erosion	<p>Temporary and permanent drainage systems are available throughout the alignment. Hence, the soil erosion on account of surface run-off is not anticipated for the project.</p> <p>Soil erosion is expected during muck/ soil disposal. Suitable contractual provisions regarding soil erosion control during soil disposal shall be made.</p> <p>The chemical used as a soil stabilizers during the piling works shall be environmentally acceptable. The MSDS for such material shall be submitted to GC/Maha-metro for review before using such material onsite.</p> <p>The impact on the water bodies</p>	<p>Issue addressed during design phase.</p> <p>Suitable provisions incorporated in tender document</p>	Design Consultant	Maha-metro	--	Detailed Engineering

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		will be minimized by avoiding dumping of the excess excavated soil at earmarked areas away from water bodies.					
3	Cultural Relics	<p>No protected areas under international conventions, national or local legislation for their Archaeological importance, landscape, cultural or other related valuable are envisaged in the proposed alignment.</p> <p>The alignment is passing out of toe of earthen bund of Ambazari Lake. For the construction of this stretch following shall be ensured during design phase:</p> <p>Locations and Designs of structural elements of the alignment shall be such that main slope of embankment will not be cut;</p> <p>All necessary precautionary measures to safeguard the dam</p>	Issue addressed during DPR stage	Design Consultant	Archaeological dept.	-	Detailed Engineering

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>from environmental impacts during construction & operation phase of the project shall be ensured;</p> <p>Technical study will be undertaken for ensuring the dam safety during construction & Operation phases of the project;</p> <p>The recommendations/suggestions of the study shall be followed for protection of bund;</p>					
4	Flood	<p>No major bridges and culverts are present at across the project alignment of Reach 3.</p> <p>Care shall be taken for the purpose of free flow of flood discharge during construction and operational phases in project alignment by making suitable contractual provisions for monsoon preparedness and suitable site drainage.</p>	Issue addressed during design phase. Suitable provisions incorporated in tender document	Design Consultant	Maha-metro	-	Detailed Engineering

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
5	Adequate design provision for safety against seismological hazard	Even though entire project area falls under seismic zone II, Maha-metro shall ensure that design provides for safety of structures against worst combination of forces in the probability of an earthquake	Issue addressed in tender document	Design Consultant	Maha-metro	-	Detailed Engineering
6	Water requirement	The requirement of water for construction purpose etc., shall be planned and arranged from Municipal water supply/ Ground water. Ground water could be extracted during construction and operational phases, subject to permission from competent authorities by the contractor and Maha-metro respectively.	Issue addressed in contract	Design Consultant	Maha-metro	-	Detailed Engineering
7	Disposal of final treated effluent from treatment plant	Different options for final disposal shall be studied and the suitable disposal route shall be decided carefully to minimize the impact of receiving bodies.	Issue addressed in tender/contract	Contractor	Maha-metro	-	Responsibility of Contractor and should be a part of Civil Contract

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>The effluent treatment plant provided in Hingna depot shall have oil and grease separation as a primary treatment.</p> <p>Provision of bio-digesters shall be made for construction and operational phases sanitary facilities.</p> <p>DRDO Technology based Bio-digester shall be provided at Stations, Hingna depot (operational phase) and at labor camp facilities (construction phase).</p> <p>Contractors (for construction phase) and Maha-metro (for operational phase) shall ensure that statutory requirements for establishing the batching plant and depots respectively shall be complied.</p> <p>Consent to Establish (CTE) and Consent to Operate (CTO) shall</p>					

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>be obtained from state pollution control board for depots and batching plant.</p> <p>Contractor & Maha-metro shall provide sufficient resources, including a qualified Environmental Officer/Manager for complying with the conditions specified in in CTE/CTO permissions given to batching plant and depots.</p> <p>Suitable waste management (<i>in line with guidance given in Annex 1</i>) shall be mandated for construction and operational phases.</p> <p>Zero (Pollution) Discharge policy shall be adopted for construction and operational phase effluent discharge.</p>					
8	Vibration and Noise Control	Suitable design measures shall be provided along the route for vibration and noise control during	Issues shall be addressed in	Contractor	Maha-metro/GC	-	-

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>construction and operational phases</p> <p>Suitable height of barricades, proper maintenance of mechanical equipment, and selection of machineries shall help in controlling the construction phase noise and vibration.</p> <p>Operational phase noise and vibration levels could be controlled by using the latest technology and materials at adequate locations.</p> <p>Operational Phase vibration modeling study shall be conducted for sensitive locations.</p>	tender document				
8	Rain Water Harvesting (RWH)	<p>RWH provisions shall be made for roof top of stations, viaducts and depots.</p> <p>The quantities of runoff from rooftops & viaducts shall be estimated and accordingly RWH</p>	GC and Maha-metro during construction phase shall ensure that construction of RWH structure is as per design approved by	Contractor/Maha-metro/GC	Maha-metro/GC	INR 15 Lakhs	Design should be prepared and submitted for approval by contractor.

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		schemes shall be designed. The RWH schemes shall be approved concerned authority. (SHE Manual, Part II Environment Management Clause 66)	concerned authority, if required. Maha-metro during operational phase shall ensure that RWH pits are operational as with suitable maintenance				
9	Maintenance of storm water drainage system.	Suitable storm water run-off system shall be provided within the project utilities (depots) and shall be maintained through periodic inspections. It will be ensured that the municipal storm water system shall not be contaminated on account of project utility.	Storm water Drains shall be inspected prior to onset of monsoon.	Maha-metro	Maha-metro/Nagpur Municipal Corporation	Cost to be included in Operational phase O & M Contract	
10.	Visual Amenity	Sufficient landscaping and plantation shall be provided to enhance the aesthetic view of	-	Maha-metro shall ensure that sufficient provisions	Maha-metro/GC	-	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>station buildings and Depots.</p> <p>It shall be ensured that the station structures shall enhance the overall aesthetics of the surroundings</p>		<p>are kept for landscaping and greenery during design phase</p> <p>Station buildings shall be designed to enhance the surrounding aesthetics</p>			
Environmental Management - Construction Phase							
1.	Ambient and Workplace Air Quality	<p>Excavated materials to be disposed on a regular basis so that it does not accumulate at worksite.</p> <p>Water to be sprinkled on stored soil/sand on daily basis to avoid dust emissions; (Part- IV Environmental Management, Clause 58)</p> <p>Dust suppression shall be done at</p>	<p>Monitoring shall be conducted twice in a month at identified location (around each worksite).</p> <p>Ambient air quality shall be reviewed on monthly basis for all monitoring</p>	Contractor	Maha-metro/GC	Approx. INR 14.40	<p>Cost included in civil contract;</p> <p>Monitoring location shall be selected in such a way that it captures the impact of on-going works on ambient</p>

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>sensitive locations minimum 3-4 times in a day.</p> <p>Height of heaps of accumulated excavated materials should not be more than height of barricade.</p> <p>If for some reason soil is stored on site for more than 72 hours it has to be covered to avoid dust emissions;</p> <p>Diesel Generators operated within the sites to be suitably maintained at regular intervals;</p> <p>Internal Combustion Engine equipment operated within site shall comply with minimum Bharat Stage III emission standards.</p>	<p>locations.</p> <p>Mitigation measures to be applied on daily basis.</p>				<p>environment.</p> <p>The monitoring location shall be reviewed by GC or Maha-metro prior to start of monitoring campaign.</p> <p>Without prior consent of GC/Maha-metro for monitoring location, contractor shall not conduct air quality monitoring.</p>
2	Ambient and Workplace Noise Quality	<p>Impact piling should not be allowed for piling works other than in very hard rock strata;</p> <p>Internal Combustion Engine equipment operated within site</p>	<p>Monitoring shall be conducted twice in a month at identified location (around each</p>	Contractor	Maha-metro/GC	INR 11.52 Lakhs	<p>Cost included in civil contract</p> <p>Monitoring location shall be selected in such a</p>

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>must comply with Govt. of India Emission standards</p> <p>Diesel Generators to be operated with the suitable noise abating enclosures;</p> <p>Provision of earplugs for workers working within the site boundaries;</p> <p>Height of barricade needs to ensure as per standards given by Maha-metro</p> <p>Barricades to be aligned properly to minimize the dissipation of sound;</p>	<p>worksite).</p> <p>Mitigation measures to be applied on daily basis.</p>				<p>way that it captures the impact of on-going works on ambient environment.</p> <p>The monitoring location shall be reviewed by GC or Maha-metro prior to start of monitoring campaign.</p> <p>Without prior consent of GC/Maha-metro for monitoring location, contractor shall not conduct noise quality monitoring.</p>
3	Vibration Control	Latest piling technologies to be deployed by contractor to reduce	Once during piling activity;	Contractor	Maha-metro/GC	INR 20.00 Lakhs	Cost included in civil contract

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>the impacts on nearby structures;</p> <p>Impact piling should not be allowed for piling works other than in very hard rock strata;</p> <p>Regular vibration monitoring shall be conducted at sensitive locations to make sure that project vibration levels for construction phase do not exceed the permissible limits specified by relevant standard.</p>	<p>Identified sensitive locations for Reach 3 are noted in Annexure 3 of this report</p> <p>Regular Review of vibrations levels recorded during the construction phase shall done and suitable precautionary measures shall be undertaken</p> <p>Additional vibration monitoring as per the requirements shall be undertaken by the contractor, if required.</p>				<p>Contractor shall undertake the monitoring works at indicated sensitive location within 07 days after commencement of works.</p> <p>Contractor shall not undertake vibration monitoring without prior confirmation by GC/Maha-metro for the selected location.</p>
4	Waste	The Reach 3 contractors shall	Monthly review of	Contractor	Maha-	Cost included	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
	<p>Management (At Construction Site and at Utility works)</p>	<p>prepare the waste management plan and submit to the Maha-metro/GC for concurrence. The guidance for preparing the waste management plan is given in Annexure 1 of this ESMP document.</p> <p>Contractor shall dispose-off hazardous wastes as per the provisions of SHE Volume 8 Clause No. 66. For further guidance please refer to Annexure 1 of this ESMP document.</p> <p>Contractor shall dispose-off non-hazardous solid wastes, non-hazardous liquid wastes, biomedical wastes as per the provisions of SHE Volume 8 Clause No. 65. For further guidance please refer to Annexure 1 of this document.</p> <p>Contractor shall dispose-off construction and demolition wastes as per the provisions of</p>	<p>waste disposal by contractor shall be done</p>		<p>metro/GC</p>	<p>in civil contract</p>	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>SHE Volume 8 Clause No. 66. For further guidance please refer to Annexure 1 of this document.</p>					
5	<p>Disposal of Muck from sites/Soil Erosion Control Plan</p>	<p>The MSDS of the material used in soil stabilization shall be submitted to GC/Maha-metro for review. The material shall be used only after permitted by GC/Maha-metro.</p> <p>Contractor shall dispose the muck/dry soil generated at construction sites at a mutually agreed location by GC/Maha-metro and Contractor.</p> <p>The boundaries of identified and mutually agreed disposal location shall be earmarked by contractor. Initial levels of (prior to start of soil/muck disposal) disposal area has to be recorded by the contractor with the help of surveyors and to be submitted to Maha-metro/GC.</p> <p>Contractor shall monitor quantities</p>	<p>Monthly review of operating procedures adopted by contractor shall be done</p> <p>Quarterly monitoring of soil leachate and groundwater shall be conducted at disposal location</p> <p>Quarterly monitoring of onsite muck for hazardous contamination</p> <p>GC/Maha-metro shall ensure that disposal is taking</p>	Contractor	Maha-metro/GC	Cost included in Civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>of disposed soil. The data be shall submitted to Maha-metro/GC for review;</p> <p>Dry wheel wash facilities shall be provided at exit gate from where soil disposal shall be carried out.</p> <p>Sufficient staff shall be made available at site to control the disposal of muck/soil from site such as a supervisor, labors for wheel cleaning, brooms for wheel cleaning and concrete pad where wheels will be cleaned.</p> <p>The dumpers carrying the muck/dry soil has to be covered while plying on the roads on the way to disposal location.</p> <p>Resources have to be provided for road cleaning for accidental soiling of roads during muck disposal. The resources include raw water, labors, traffic marshal, brooms for</p>	<p>place as per the requirements mentioned in format, Soil Erosion Control/Muck Disposal Declaration (Refer Annexure 2).</p>				

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>road cleaning etc.</p> <p>Muck disposal shall be undertaken in confirmation with Soil Erosion Control/Muck Disposal Declaration (Refer Annexure 2).</p> <p>Contractor shall take due care that muck generated during piling works does not get contaminated with hydrocarbons or any other contaminant.</p> <p>The onsite muck shall be monitored quarterly at random location during piling works in progress. In case any polluted muck is produced, the muck shall be handled and disposed as per provisions of hazardous waste handling rules – 2008. Construction and Demolition Waste shall be disposed in accordance with the provisions of C & D waste handling rules -2016.</p>					

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
6	Tree protection/Cutting and Disposal	<p>An estimated 133 nos. of trees to be affected along the reach. Contractor shall ensure that about 665 nos. of trees to be planted as per compensatory afforestation norms.</p> <p>The indigenous plants to be planted in the project area such as Neem, Blue berry, Subabul, Gulmohar, Karanj, Pipal, Imli, Babul, Mango, Coconut palms etc.</p> <p>Contractor is only allowed to cut the trees which are falling in a ROW and which are already identified.</p> <p>For the trees which needs to be cut during construction activities but for which prior approval is not taken, necessary approval from concerned authorities shall be arranged by the Maha-metro</p> <p>Contractor shall maintain record of trees cut and shall not be allowed</p>	Monthly review of tree protection/felling by contractor shall be done	Contractor/Maha-metro	Maha-metro/GC	-	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>to store the tree remains at site for more than 15 days.</p> <p>Contractor shall protect the tree which are located within the site boundaries but which are not required to be cut during the construction phase (Part- IV Environmental Management, Clause 63).</p>					
7	Soil and Water Quality	<p>Contractor shall take all necessary precautions such that construction material, diesel, grease, waste oil, chemicals etc. does not spill on ground.</p> <p>Suitable storage area for such materials shall be prepared and equipment shall be made available for handling of these materials.</p> <p>Latest version of Hazardous waste disposal and handling rules and guidelines given in SHE Manual Clause 66 shall be referred for the storage areas and for provision of</p>	<p>Monthly review hazardous waste handling procedures by contractor shall be done</p> <p>Half Yearly review of ground and soil leachate contamination at sensitive location such as casting yard</p>	Contractor	Maha-metro/GC	INR 3.0 Lakhs for ground water quality & INR 1.2 Lakhs for soil quality	Cost included in civil contract

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>PPEs and other equipment.</p> <p>Regular monitoring of groundwater and soil leachate shall be conducted in depot areas where possibility of ground water contamination anticipated</p>					
8	Energy Management/Conservation	<p>Contractor shall try and reduce the direct consumption of fossil fuels on site through use of energy efficient equipment at their project office and at construction sites</p> <p>Construction Equipment shall be duly serviced to ensure that they are operated at optimum level of fuel efficiency;</p> <p>DGs shall be regularly serviced for energy efficient outputs;</p> <p>Five star labeled equipment by BEE/or its equivalent shall be used at project offices;</p>	Monthly review specific energy consumption by contractor shall be done	Project Manager /Site In charge/ SHE personal	Maha-metro/GC	Approx. INR 3.0 Lakhs	<p>Cost is part of Civil contract</p> <p>Every DG set shall be monitored for stack emissions on at least once in a six month.</p>
9	Water	Contractor shall try and reduce the	Quarterly review	Project	Maha-	Cost included	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
	Management/Conservation	<p>water consumption through use of energy efficient water fixtures at sites and project offices;</p> <p>Leakage of water should not be allowed through pipes and valves;</p> <p>Reuse of water used for curing and for other uses to be planned</p>	water consumption for various purposes by contractor shall be done	Manager /Site In charge/ SHE personal	metro/GC	in Civil contract	
10	Sanitation and Sewage Management at construction and utility facilities	<p>Sufficient number of urinals as given in SHE Volume 8 Clause No. 51 should be provided at camp and worksites for construction workers;</p> <p>In compliance to Clause 40.5 of SHE Volume 8, for disposal of sanitary waste generated at worker camps sanitary facilities developed by Defense Research Development Organization (DRDO), with bio-digester technology shall be adopted.</p> <p>Mobile sanitary facilities shall be deployed at construction sites for</p>	Quarterly review sanitation and sewage management practices adopted by contractor shall be done	Project Manager /Site In charge/ SHE personal	Maha-metro/GC	Cost included in Civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>workers & onsite staff;</p> <p>Authorized agencies shall be deployed for disposal Municipal solid waste generated at worker camps and construction sites;</p> <p>Contractor shall make sufficient arrangements as given in SHE Volume 8 Clause 51.4 for drinking water facilities for construction workers;</p> <p>Worker camps and canteen facilities should be protected from airborne and soil born insects and pests by taking suitable measures as described in SHE Volume 8 Clause 56. & Clause 57.0 and its subsections;</p> <p>General Housekeeping shall be carried out by the Contractor and ensured at all times at Work;</p> <p>Site, Construction Depot, Batching Plant, Labor Camp, Stores,</p>					

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>Offices and toilets / urinals;</p> <p>Towards this the Contractor shall constitute a special group of housekeeping personnel as per General Instruction Maha-metro/SHE/GI/001.</p>					
11	Drainage system	<p>All the provisions of Clause 60 of SHE Volume 8 regarding Water Quality are applicable to the contractor at all sites wherever he is performing the work.</p> <p>As per provisions of Clause 60.1 of SHE Volume 8, Contractor shall construct a drainage system at the commencement of the works, to drain off all surface water from the work site into suitable drain outlet.</p> <p>The Contractor shall provide adequate precautions to ensure that no spoil or debris of any kind is pushed, washed, falls or deposited on land adjacent to the</p>	Quarterly review sanitation and sewage management practices adopted by contractor shall be done	Project Manager /Site In charge/ SHE personal	Maha-metro/GC	Cost included in Civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>site perimeter including public roads or existing stream courses and drains within or adjacent to the site.</p> <p>In the event of any spoil or debris from construction works being deposited or any silt washed down to any area, then all such spoil, debris or material and silt shall be immediately removed and the affected land and areas restored to their natural state by the Contractor to the satisfaction of GC/Maha-metro (Clause 60.2 of SHE Manual)</p> <p>Prior to arrival of monsoon (in month of May) suitable monsoon preparedness plan shall be prepared by the contractor and suitable resources to be made available prior to onset of monsoon</p>					
12	Conservation	Arable lands should not be used	NA	Contractor	Maha-	Cost included	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
	of Eco-resources	<p>as earth borrowing whenever possible.</p> <p>If needed, the topsoil (30cm) shall be kept and refilled after construction is over to minimize the impact on ecosystem.</p> <p>Construction materials carrying vehicles should run at temporary accesses to avoid damaging arable lands and cattle-grazing lands. (SHE Manual, Part II Environment Management Clause 66)</p>			metro/GC	in Civil contract	
13	Burrow pits and Quarry sites (stone & sand)	<p>Quarrying will be carried out at approved and licensed quarries only</p> <p>While contracting the quarry for procurement of construction materials , contractor shall ensure that:</p> <ul style="list-style-type: none"> - Borrow areas shall be at least 15 m away from the 	Monthly	Contractor/Maha-metro/GC	Maha-metro	Cost included in Civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>prominent surface water bodies identified along the project corridor</p> <ul style="list-style-type: none"> - Borrow areas shall be located at least 800 m away from the villages/towns - That the borrow areas contractors shall undertake the responsibility of restoring the area of borrow pit to a level which would not compromise safety and security of public and animals stray in the area. 					
14.	Visual Amenity	Landscaping and plantation shall be developed by contractor as per the contract	Quarterly review of landscaping plan and visual inspection by Maha-metro/GC	Contractor	Maha-metro/GC	Cost included in Civil contract	--

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
Environmental Management - Operation Phase							
1	Noise level	<p>The impact of noise due to metro-rail will be studied by modeling the operational phase cumulative noise levels and its impacts on receptors.</p> <p>Suitable preventive measures, including noise barriers as recommended by the experts based on the modeling study shall be installed.</p> <p>Periodic monitoring of ambient noise levels at identified sensitive locations through-out the stretch will be conducted.</p>	Periodic monitoring at sensitive locations along the alignments	Third Party Agency for Noise Monitoring	Maha-metro	INR 1.0 Lakhs per annum (assumed 4 locations PM)	Noise modeling study for operational phase will be undertaken by Maha-metro at suitable time of project.
2	Vibration level	Periodic monitoring of vibration levels at Identified sensitive locations through-out the stretch shall be conducted.	Half yearly monitoring of vibrations and review shall be done	Third Party Agency for Vibration Monitoring shall be deployed	Maha-metro	INR 4 Lakhs per annum (assumed 4 locations)	
3	Air Quality	It is anticipated that, on account of project, there will be considerable	Quarterly at various locations	Third Agency for Air	Maha-metro	INR 1.8 Lakhs per annum	Suitable locations are defined as the

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>reduction in use of fossil fuel as there will be a modal shift in transport choice of general public. This will considerably reduce the GHG emissions and related fugitive dust emission within the city, which will improve the air quality.</p> <p>Periodic monitoring of ambient air quality at 'suitable locations' will be undertaken during the operational phase to study the impact of project on the Ambient Air Quality.</p>	along the alignments	Quality Monitoring		(assumed 4 locations)	<p>locations which are:</p> <ul style="list-style-type: none"> ➤ Recorded in EIA as baseline air quality monitoring locations. ➤ In vicinity of sensitive locations listed in Annexure 3 of this report ➤ Locations where cross section of road is narrowed by metro alignment
4	Groundwater and Soil quality at Depot	Provisions for controlling oil spills & trapping oil & grease contamination in washwater shall be made at depots.	Half yearly	Third Party Agency for Ground Quality/Soil Monitoring,	Maha-metro	INR 0.50 Lakhs Per annum for ground water quality & INR	-

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		<p>Use of bio-degradable detergents for car wash shall be ensured.</p> <p>Regular monitoring of groundwater and soil leachate shall be conducted in depot areas where possibility of ground water contamination anticipated.</p>		by NABL accredited laboratory		0.50 Lakhs per annum for soil quality (assumed 2 locations for soil and GW collection)	
6	Road safety and traffic management	<p>Traffic diversions on account of metro utilities shall be planned in consultation with traffic police.</p> <p>Adequate number of road signs with clear visibility shall be installed around metro stations. Drivers and Public will be educated about the Road Safety and traffic rules.</p>	Quarterly	Maha-metro/ Traffic Police dept.	Maha-metro /NHAI/ Traffic Police dept.	Cost shall included in Operational phase O & M Contract	-
7	Oil and Grease pollution	<p>Suitable treatment shall be taken for treatment of oil and grease before discharging the wastewater, especially in depot areas.</p> <p>Oil & Grease (O&G) traps shall be</p>	Quarterly monitoring of influent and effluent of ETP provided at depots	Maha-metro.	Maha-metro/Maharashtra pollution control board	INR 1.00 Lakhs Per annum for lab analysis for influent and effluent from ETP	-

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		constructed at depots. The generated O&G shall be disposed with the help of authorized recyclers.				(assumed 8 samples for influent and effluent per annum)	
8	Water supply, sanitation and final disposal of waste.	<p>Sufficient quantity of water to be supplied at Stations and Depot for various purposes.</p> <p>The water shall be supplied either by Municipal Corporation/bore wells.</p> <p>Municipal solid wastes generated at stations shall be collected in color coded bins with suitable sizes for dry wastes (recyclable) and bio-degradable wastes and disposed/handled accordingly.</p> <p>Bio-digesters shall be provided for onsite treatment of sewage and grey water generated at stations, depots and other related utilities. As far as possible 'Zero Discharge</p>	Quarterly	Maha-metro	Maha-metro/Nagpur Municipal Corporation/ MPCB	<p>INR 1.00 Lakhs Per annum for lab analysis for influent and effluent from bio-digesters (assumed 4 samples for influent and effluent per annum)</p> <p>Installation of bio-digester shall be part of civil contract.</p>	-

Sr. No	Project-related E&S issues	Action to be taken	Frequency of Monitoring	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh) ¹	Remarks
		Rule' shall be adopted. Public facilities shall be provided at Stations and shall be maintained through enough number of regular/contractual housekeeping					
9	Safety and noise disturbances	Public utilities (schools, hospitals) sensitive to noise shall not be planned within 200 meters of carriageway.	-	Maha-metro	Maha-metro/Nagpur Municipal Corporation	NA	Maha-metro shall communicate this requirement to City planning department.
10.	Visual Amenity	Landscaping and plantation shall be maintained to enhance the structural elevation of station buildings and overall aesthetics of the surroundings	Periodic Visual inspections	Maha-metro/Third Party Agency	Maha-metro	Cost included in O & M Contract	-

Table 2- Social Management Plan – Design, Construction & Operation Phase

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
Social Management - Design Phase							
1	Acquisition of Land from Land and structure owners	Land and structures to be acquired by direct purchase method by paying 250% ¹ of Market value as per Maharashtra State Govt. GR	Once	Revenue Department of State Govt.	Maha-metro	7222	The cost is tentative & depend upon actual Land Acquisition. (Land department)
2	Gender Action Plan	<p>Ensure that women's needs are equally met through Resettlement Plan;</p> <p>The separate sanitary facilities in adequate numbers at stations and other utilities of Reach 3 alignment shall be provided.</p> <p>Adequate number of signboards shall be provided to show the location of sanitary facilities available at station and other utilities;</p> <p>Separate seating arrangement for</p>	Once	Maha-metro	Maha-metro	--	Part of DPR

¹ This land compensation of 250% includes cost element of R&R also.

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		women and children, priority seating for pregnant woman and elderly women shall be provided in coaches.					
3	Elders and with people disability	<p>It shall be ensured that train contains fully accessible carriages. Staff shall be trained in methods of assistance and be at hand on request.</p> <p>Stations for all levels should be fully accessible with wide entrances and shall be accessible by wheelchair</p> <p>For persons with hearing impairments, an electronic sign board shall be displayed on each platform at noticeable locations</p> <p>For persons with visual impairments audio system announcing the station names and door location shall be available</p> <p>Identification signage shall be provided on the doors of wheelchair accessible coach</p>	Once	Contractor	GC/ Maha-metro	--	Part of DPR

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>Space for a wheel chair should be available at the side of the door.</p> <p>The space shall be indicated inside and outside the car by using the international symbol of access;</p> <p>Wheel stoppers and ring-strap or other appropriate safety grip shall be provided for wheelchair users</p> <p>An appropriate number of designated seats for passengers with disabilities and elderly people shall be provided near the doors.</p> <p>Approach route shall not have level differences. If the station is not on the same level as the walkway or pathway, it shall have ramp. Walkway surfaces shall be non-slippery.</p> <p>Approach walkway should have tactile pavements for persons with visual impairments.</p> <p>The counters shall have pictographic</p>					

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>maps indicating all the services offered at the counter and at least one of the counter staff should be sign language literate.</p> <p>At least one of the ticket gates shall be minimum 900 mm wide to allow a wheelchair user through and have a continuous line of guiding paver for people with visual impairments</p> <p>The Platforms shall:</p> <p>Have a row of warning paver installed before the track edge and shall have non-slip and level flooring;</p> <p>All platforms shall inter-connect by means of an accessible routes or lifts and way finding references shall be available at decision points.</p> <p>Color shall be used to identify routes and provide assistance in locating doors, walls and hazards.</p> <p>Structural elements such as columns</p>					

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		shall be color contrasted or brightly marked to assist visually impaired					
Social Management - Construction Phase							
1	Labor Camps Providing safe habitation to workers.	<p>Providing safe habitation to workers. Contractor shall make sufficient arrangements as given in <i>SHE Volume 8 Clause 51.4</i> for drinking water facilities for construction workers</p> <p>Worker camps and canteen facilities shall be protected from airborne and soil born insects and pests by taking suitable measures as described in <i>SHE Volume 8 Clause 56. & Clause 57.0</i> and its subsections</p>	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and Maha-metro	Cost included in civil contract	
2	Sanitation, Sewerage and waste disposal in worker's camp. Providing hygienic conditions in Labor camps	<p>Sufficient number of urinals as given in <i>SHE Volume 8 Clause No. 51</i> should be provided at camp and worksites for construction workers;</p> <p>In compliance to <i>Clause 40.5 of SHE Volume 8</i>, for disposal of sanitary waste generated at worker camps</p>	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and Maha-metro	Cost included in civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
	and adequate Housekeeping in Labor camps	<p>sanitary facilities developed by Defense Research Development Organization (DRDO), with bio-digester technology shall be adopted.</p> <p>Mobile sanitary facilities shall be deployed at construction sites for workers & onsite staff;</p> <p>Authorized agencies shall be deployed for disposal Municipal solid waste generated at worker camps and construction sites;</p> <p>Contractor shall make sufficient arrangements as given in SHE Volume 8 Clause 51.4 for drinking water facilities for construction workers;</p> <p>Worker camps and canteen facilities should be protected from airborne and soil born insects and pests by taking suitable measures as described in SHE Volume 8 Clause 56. & Clause 57.0 and its subsections;</p>					

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>General Housekeeping shall be carried out by the Contractor and ensured at all times at Work;</p> <p>Site, Construction Depot, Batching Plant, Labor Camp, Stores, Offices and toilets / urinals;</p> <p>Towards this the Contractor shall constitute a special group of housekeeping personnel as per General Instruction Maha-metro/SHE/GI/001.</p>					
2	General Housekeeping	<p>Contractor shall provide sufficient resources (personnel and equipment) for general housekeeping at sites, utilities, and labor camps</p> <p>Barricades shall be erected around the site in order to prevent the surrounding area from excavated soil, rubbish etc., which may cause inconvenience to and endanger the public.</p> <p>The barricade especially those</p>	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and Maha-metro	Cost included in civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>exposed to public shall be aesthetically maintained by regular cleaning and painting as directed by the Employer. These shall be maintained in one line and level</p> <p>All stairways, passageways and walkways shall be maintained without any blockages or obstructions. All emergency exits passageways, exits fire doors, break-glass alarm points, fire-fighting equipment, first aid stations, and other emergency stations shall be kept clean, unobstructed and in good working order</p> <p>Water logging or spillage on roads shall not be allowed</p> <p>Proper and safe stacking of material at sites shall be ensured</p>					
3	Wastage of water. To ensure that best practices are	Contractor shall try and reduce the water consumption through use of water efficient sanitary fixtures at sites	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and NMRP, Maha-metro	Cost included in civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
	adopted during construction phase to optimize water consumption	and project offices Leakage of water shall not be allowed through pipes and valves Reuse of water for dust suppression and plantation shall be planned					
4	Traffic management Avoid and minimize inconvenience to public due to congestion and traffic jams during construction	Location specific Traffic management plan shall be prepared to handle traffic flow particularly during peak hours. Co-ordination with traffic control shall be done for securing assistance from local police Traffic marshals shall be available at construction sites/ barricade openings to manage and assist traffic and movement of site vehicles Safety measures shall be undertaken by installing road signs and markings for safe and smooth movement of traffic. Communication shall be done with public through radio, TV & newspaper	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and NMRP, Maha-metro	Cost included in civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		announcements regarding the construction activities causing disruptions or access restrictions in advance to minimize public inconvenience and smooth construction activities.					
5	Occupation Health & Safety and Safety with vehicles, people and livestock and signage	Workers shall be equipped with proper safety gears like helmets, gloves and gum boots. Periodic health checkup shall be conducted for construction workers Contractor shall take adequate precautions as per part I clauses 4 , and its subsections of SHE Manual	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and NMRP, Maha-metro	Cost included in civil contract	
6	Gender Action Plan	Safe lighting at work place and worker's colony along with separate access to female/male toilets and waiting areas shall be ensured if women workforce deployed at site; First aid medical facilities at the working sites for pregnant women, elderly women and children shall be	Continuous throughout construction	Project Manager/PME Head/SHE Personnel	GC and Maha-metro	Cost included in civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>ensured if women workforce deployed at site;</p> <p>It will be ensured that women workers are paid at par with male workers</p> <p>Adherence to provision of labor law shall be ensured for civil contracts</p> <p>Information shall be disseminated on potential negative impacts of construction activities through awareness building programs</p> <p>If women workers are deployed at sites then day crèche facilities shall be provided to facilitate the women with infants working on site;</p>					
7	Access Restriction for shop/business	<p>Co-ordination with traffic control shall be for securing assistance from local police</p> <p>Traffic marshals shall be available at construction to manage and assist traffic and movement of site vehicles</p> <p>Safety measures shall be undertaken</p>	Continuous throughout construction	Contractor	GC and Maha-metro	Cost included in civil contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>by installing road signs and markings for safe and smooth movement of traffic.</p> <p>Maha-metro shall co-ordinate with NMC for providing short at designated parking places in by lanes</p> <p>Communication shall be done with public through radio, TV & newspaper announcements & social media regarding the construction activities causing disruptions or access restrictions in advance to minimize public inconvenience and smooth construction activities.</p>					
8	Non-monetary Support Arrangements for PAPs	<p>Maha-metro shall extend following support to PAPs:</p> <ul style="list-style-type: none"> ➤ Support for getting compensation from revenue department ➤ Co-ordination with NMC for providing designated places for short term parking in by lanes 	Continuous throughout construction	Maha-metro	Maha-metro/GC	-	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		➤ Advisory for getting compensation and grievance redressal					
Social Management - Operation Phase							
1	Sanitation and Housekeeping at Stations	<p>Sufficient quantity of water to be supplied at Stations and Depot for various purposes.</p> <p>The water shall be supplied either by Municipal Corporation/bore wells.</p> <p>Municipal solid wastes generated at stations shall be collected in color coded bins with suitable sizes for dry wastes (recyclable) and bio-degradable wastes and disposed/handled accordingly.</p> <p>Bio-digesters shall be provided for onsite treatment of sewage and grey water generated at stations, depots and other related utilities. As far as possible 'Zero Discharge Rule' shall be adopted.</p> <p>Public facilities shall be provided at</p>	Continuous during Operations	Station Manager	Maha-metro	Cost shall be included in O&M contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		Stations and shall be maintained through enough number of regular/contractual housekeeping					
2	Gender Action Plan	<p>It will be ensured that women, children and elderly people accessible facilities shall be provided at stations.</p> <p>Provision of separate Queues for women for buying tickets for travel in Metro. Shall be ensured, if required.</p> <p>Separate seating for women and, priority seating for pregnant women and elderly citizens will be provided in the coaches.</p> <p>Emergency intercom and video surveillance shall be part of metro operating system</p> <p>Separate toilets for men and women at stations shall be provided;</p> <p>Patrolling of platforms during night hours by security personnel shall be ensured</p> <p>Ladies security personnel to be</p>	Continuous during Operations	Station Manager	Maha-metro	Cost shall be included in O&M contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>deployed for frisking women passengers;</p> <p>Promote women's employment in the metro services sector.</p>					
3	Elders and peoples with disability	<p>Staff shall be trained in methods of assistance and shall be available at hand on request</p> <p>Good illumination shall be ensured at stations to ensure the comfort of visually impaired</p> <p>Automated kiosks shall be accessible for wheelchair users. And shall be clearly marked with international symbol of accessibility.</p> <p>Braille buttons and audio announcement system shall be ensured for persons with vision impairments.</p> <p>It will be ensured that station operations shall be easy to understand and operate for persons with learning disabilities, intellectual disabilities, and elderly persons.</p>	Continuous during Operations	Station Manager	Maha-metro	Cost shall be included in O&M contract	

Sr. No	Project-related E&S issues	Action to be taken	Frequency	Implementation Agency/ Authority	Supervision Agency	Cost (Lakh)	Remarks
		<p>Information or help desks shall be close to the station entrance, and highly visible upon entering the station.</p> <p>In addition, they should be clearly identifiable and accessible to wheelchairs bound and normal users</p> <p>Help desks shall have a map of the facility and attendants can view with passengers, when providing information</p> <p>Staff manning the counters shall know sign language.</p>					

1.4 General Conditions for Environment and Social Welfare

In addition to implementation of EMP as outlined in the Table 1 , contractor is expected to comply with the general conditions outlined under various clauses of SHE Conditions Volume 8 of tender document. The general conditions and reference SHE clauses are listed below:

Table 3 – General Conditions for Environment and Social Welfare

Sr. No.	General Condition	Reference from SHE manual of Maha-metro	Responsibility
1	The Contractor as per Rule 69 of the MBOCW shall formulate a Safety & Health policy and get it approved by Chief Inspector and display it at conspicuous places at work sites in Hindi and Marathi i.e. languages understood by the majority of construction workers.	PART I SHE Management Clause 4.0 and its subsections	Corporate SHE Head/Project Manager
2	Contractor shall set the goals for environmental performance for certain periods of project duration and shall develop the plans to improve the performance and monitor it	PART I SHE Management Clause 2.0 and its subsections	Corporate SHE Head/Project Manager/SHE Head
3	Contractor shall prepare the method statement for major activities which will be undertaken at sites. It should be ensured that environmental risk assessment should be done for every activity and suitable plan is developed to mitigate the impact.	PART I SHE Management Clause 3.0 and its subsections	Project Manager/SHE Head/Quality Head
4	Contractor shall ensure that designer (appointed by the contractor) shall include/prepare designs in a way that minimize the risk to health and safety of those who are going to construct, maintain, clean, repair, dismantle or demolish the structures and anyone else like adjoining road users/general public, who might be affected by the work.	PART I SHE Management Clause 5.0 and its subsections	Project Manager/Designed /SHE Head
5	The Contractor shall appoint the required SHE personnel as prescribed in General Instruction Maha-metro/SHE/GI/001 based upon the statutory requirement and establish the safety organization based upon the Contract value. The minimum educational qualification and the work experience are given in General Instruction Maha-metro/SHE/GI/002.	PART I SHE Management Clause 6.0 and its subsections	Corporate SHE Head/Project Manager/SHE Head

Sr. No.	General Condition	Reference from SHE manual of Maha-metro	Responsibility
6	The Contractor shall ensure the formation and monitor the functioning of Contractor SHE committees. All employees should be able to participate in the making and monitoring of arrangements for safety, industrial health and environment at their place of work. .	PART I SHE Management Clause 7.0 and its subsections	Corporate SHE Head/Project Manager/SHE Head
7	The Contractor shall ensure that all personnel working at the site receive an induction SHE training explaining the nature of the work, the hazards that may be encountered during the site work and the particular hazards attached to their own function within the operation. The training shall cover the contents as given in the General Instruction Maha-metro/SHE/GI/004.	PART I SHE Management Clause 8.0 and its subsections	Corporate SHE Head/Project Manager/SHE Head
8	The Contractor shall organize SHE training to engage managers, supervisors and other personnel in behavioral change and improve safety performance. The environmental training module shall be approved by Maha-metro/GC.	PART I SHE Management Clause 9.0 and its subsections	Corporate SHE Head/Project Manager/SHE Head
9	The Contractor shall evolve and administer a system of conducting environmental inspections twice in a month. Contractor key personnel including the project manager shall attend the site environmental inspections and necessary compliance shall be arranged for GC/Maha-metro observations	PART I SHE Management Clause 10 and its subsections	Project Manager/SHE Head
10	Monthly environmental report shall be submitted by the contractor to GC/Maha-metro on or before 10th of day of every month. The report shall track the progress in brief, compliance status of observations given by GC/Maha-metro during site visits, general compliance with ESMP/EMP, monitoring records and other notable environmental issues related to site. The report shall include the demonstrative site photographs of the to highlight the issue.	PART I SHE Management Clause 11 and its subsections	Project Manager/SHE Head
11	Contractor shall develop the work permit system such that it considers the environmental aspects of major activities carried on site.	PART I SHE Management Clause 11 and its subsections	Project Manager/SHE Head

Sr. No.	General Condition	Reference from SHE manual of Maha-metro	Responsibility
12	<p>The Contractor shall take every effort to communicate the Environment management measures through posters campaigns / billboards / banners / glow signs being displayed around the work site as part of the effort to raise environmental/social awareness amongst the work force. Posters should be in Hindi, English, and other suitable language as deemed appropriate. Posters / billboards / banners/ glow signs should be changed at least once in a month to maintain the impact. The Contractor shall also observe important days as listed in General Instruction Maha-metro/SHE/GI/008 and printing and displaying safety signage and posters as listed in General Instruction Maha-metro/SHE/GI/009</p>	<p>PART I SHE Management Clause 11 and its subsections</p>	<p>Project Manager/SHE Head</p>
13	<p>Contractor shall report significant environmental incidents to Maha-metro/GC within 8hrs of event and shall necessary measures to rectify it as soon as possible. The environmental incident shall include but not limited to excessive road soiling, excessive oil spills, excessive dust generation etc.</p>	<p>PART I SHE Management Clause 14 and its subsections</p>	

Annexure 1 – General Guidelines for Waste Management

Waste Category	Waste Type	Example of Waste Items	Storage Methods	Disposal Method
Solid Waste	Hazardous Solid Waste	Waste Oil, Used Batteries, Oil Contaminated Clothes, used filters etc.	Dedicated storage area as per provisions of Hazardous Waste Handling and Disposal rules issued by MoEF	To be disposed with the help of authorized (by MPCB) recyclers.
	Non-Hazardous Solid Waste	Scrap Steel, Wooden Material Steel Material etc.	Earmarked open storage within site boundaries	To be given to recyclers
	Construction and Demolition Waste	Concrete Debris, broken bricks etc.	Earmarked open storage within site boundaries	To be recycled with Maha-metro authorized recyclers
	Domestic Waste	Tea Cups, Refreshment packets, biomass	Color Coded waste bins to be provided for storage Biomass could be stored at earmarked open/shaded storage within site boundaries	Domestic waste to be disposed with help of NMC approved waste disposal agency Biomass to be delivered free of cost to symmetry's operated by NMCs
Liquid Waste	Process Water	Wash water, curing water, seepage from muck	Should be collected through a suitable collection system within site boundaries. Reuse after primary treatment, if possible	Could be disposed to public drain only if, after primary treatment water complies with municipal standards of disposal to public drains
	Surface Runoff	Wash water , seepage from	Should be collected through a suitable drainage system within	

		muck, rainwater runoff	site boundaries.	
	Domestic Effluent	Liquid Domestic Waste generated from urinals and toilet boxes	Should be collected through a suitable drainage system within site boundaries. Reuse after primary treatment, if possible	Could be disposed to public drain only if, after primary treatment water complies with municipal standards of disposal to public drains
Biomedical Wastes	First Aid Wastes	Chemically contaminated cottons, syringes, bandages etc	Should be stored in color coded storage bin at first aid facility	Could be disposed with the help of hospitals who have tied up with authorized biomedical wastes disposers

Annexure 2 – Soil Erosion Control /Muck Disposal Declarations

Nagpur Metro Rail Project/Env/Mngt/ Version 01 Format II/Civil/Oct -16

Soil Erosion Control/ Disposal of Muck Declarations ⁴

(To be filled by the Contractor)

At Site		
1.1	Are/Is there dedicated civil personnel/SHE for controlling the muck disposal? (P)	Yes/No
1.2	Are there sufficient labours at exit gates for dry cleaning the wheel of dumpers? (P)	Yes/No
1.3	Are there sufficient resources for dry cleaning the wheel of dumpers (brooms, steel rods etc.)? (P)	Yes/No
1.4	Is it ensured that the dumpers deployed for soil disposal worthy of carrying dry/wet soil? ⁵ (P)	Yes/No
1.5	Is the route for disposal location defined? (D)	Yes/No
1.6	Is there arrangement for ensuring that designated route is followed to disposal location? (D)	Yes/No
1.7	Is there arrangement for route cleaning if there is accidental soil spillage on the road? (P)	Yes/No

At Disposal Location		
1.1	Location of Dumping site (D)	<i>Please attached location map, or give co-ordinates</i>
1.2	Is this location approved by NMRCL/GC for soil Disposal? (D)	Yes/No
1.3	What is estimated capacity of dumping site? (D)Cubic meter
1.4	Weather levels recorded before start of soil disposal? (D)	Yes/No
1.5	What is used volume of dumping site? (D)Cubic meter
1.6	Is there civil or safety supervisor deployed at disposal location to control dumping? (D)	Yes/No
1.7	Are vehicle log books maintained at disposal location? (D) ⁶	Yes/No
1.8	Main road leading to disposal location is clear of muck? (P)	Yes/No

⁴ P – Photographic Evidence, D –Documentary Evidence |

⁵ Dumper safety checklist to be filled for every dumper before leaving the site

⁶ Number of dumpers leaving the site and received at disposal location to be matched

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Month -		
Prepared by:	Checked By:	Received by : GC/NMRCL
Name -	Name -	Name -
Designation -	Designation -	Designation -
Date -	Date -	Date -
Organization -	Organization -	Organization -
Sign -	Sign -	Sign -

Reach 1 Page 2 of 2 NCC

Annexure 3 – Identified Sensitive Locations for Vibration Monitoring

Sr. No.	Reach	Landmark Location Name	Co-ordinates	Distance from Metro Alignment	Nearest Metro Station
1	R3	Matru Sewa Sangh	21° 8'28.34"N, 79° 4'42.88"E	Approx. 70 m	Jhansi Rani Square
2	R3	Wokhardt Super Specialty Hospital	21° 8'4.51"N, 79° 3'30.35"E	Approx. 70 m	Shankar Nagar
3	R3	Wokhardt Heart Hospital	21° 7'55.96"N, 79° 3'15.07"E	Approx. 70 m	Lad Chowk
4	R3	Ambazari Lake/Earthen Dam	21° 7'43.19"N, 79° 2'45.10"E	Approx. 20 m	Ambazari