

ENVIRONMENTAL MONITORING PLAN

8.1. Environmental Monitoring Program (EMoP)

The environmental monitoring programme is devised with the objectives to: (i) evaluate the effectiveness of the proposed mitigation measures and the protection of the ambient environment as per prescribed standards, (ii) suggest improvements in the management plans, if required (iii) verify the statutory compliance and community obligations, and, (iv) use as tool to compare the monitored data against the baseline condition collected during the study period and assess the changes in environmental quality in the project area. This will be used as performance indicators for the project. This shall not only help in assessing the change due to the project activities, but also the potential impacts due to project activities.

8.1.1. Performance Indicators and monitoring schedule

Physical, biological and environmental management components identified as of particular significance have been suggested as indicators. A comprehensive monitoring plan for all performance indicators has been prepared for all stages of project and provided in last section of this chapter. This includes parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, cost and responsibility for implementation and supervision.

8.1.2. Reporting Mechanism for Environmental Monitoring Program

Reporting system provides the necessary feedback for project management to ensure quality and timely implementation of the works. It is essential to prepare the reporting system such that flow of information from field to the SIPMIU/AMC head quarter. The rationale for a reporting system is based on accountability to ensure that the measures proposed as part of the Environmental Management Plan are implemented in the project.

Before the civil works starts, the environmental officer/engineer of Design Supervision Management Consultant shall devise format for reporting the status and progress of environmental monitoring. Format shall be designed keeping in mind the compliance conditions of environmental clearance and consent to establish also. The duly filled up

reporting form shall be submitted by the contractor on monthly basis to project management consultant except for setting up of temporary facilities which shall be submitted once before start of the road construction works. The report on pollution monitoring for air, noise, soil, and water shall be submitted quarterly as envisaged in the monitoring plan. The accident report is desirable only in case of its occurrence. The Design Supervision Management Consultant (DSMC) after verifying its compliance will send his report to Project Director. The environmental officer/engineer will monitor the effectiveness of EMP implementation.

8.1.3. Staff Requirement

The organisational and administrative structure for municipal solid waste management in a city depends upon size of the municipal agency. Landfilling activity shall be the responsibility of an independent sectional authority which should report directly to the Director/Chief Engineer/Head of Solid Waste Management Facility.

A senior engineer shall be in-charge of landfilling activity. He should be supported by assistant engineer(s), junior engineer(s), foreman, technicians and workers. The level of engineer in-charge will be dependent on the scale of work (i.e. waste received at the landfill and following is recommended).

Waste Received at landfill (MT/day)	Engineer Incharge of landfilling
Upto 200	Junior Engineer
200 to 500	Assistant Engineers
500 to 1000	Executive Engineer
Above 1000	Superintending Engineer

The number of supporting officers and staff for the engineer in-charge shall be evaluated as per CPWD norms for earthwork projects of similar magnitude. The following staff is required for Air and Water Quality Monitoring:

- Assistant Environmental Engineer/Environmental officer
- Chemist
- Technicians

They will be assisted by helper during field sampling. The staff employed for this purpose will be properly trained. The above staff will report to Assistant Engineer/Officer

(Environment), who shall report to Engineer In-charge Municipal Solid Waste of Municipal Council.

8.1.4. Institutional Arrangement

SIPMIU is basically an urban infrastructure investment programme Management Unit with the obvious major thrust in improving basic urban services in the Aizawl city. The major components of the infrastructure that have been considered are water supply, Sewerage & sanitation and municipal solid waste management.

The Govt. of India signed a loan agreement with the Asian Development Bank (Bank) to assist the State of Mizoram (The State) for implementation of project under North Eastern Region Capital City Development Investment Programm (NERCCDIP-Aizawl). One of the important components under NERCCDIP is Municipal Solid Waste Management.

State Investment Programm Management Implementation Unit (SIPMIU) implements the project through Design Supervision Management Consultants (DSMC). The contractors will be responsible for implementing all mitigation measures during the construction period, especially to mitigate all environmental impacts associated with the construction activities. The Design Supervision Management Consultant will be responsible for day-to-day supervision of the contractor for implementing the EMP and reporting the implementation of EMP on a monthly basis. The SIPMIU will review the DSMC’s reports on implementation of EMP and coordinate with other relevant Government agencies or local authorities to take necessary actions if any environmental impacts could not be mitigated as was planned in the EMP or if any additional mitigation measures are required. The DSMC will follow up by preparing annual report on implementing EMP to the relevant parties such as SPCB, MoEF regional offices etc.

Though, SIPMIU does not have an environment department, the higher officials are conscious of project related environmental impacts and committed to mitigate them. It is proposed to appoint an Environmental Officer or designate one of the Engineer as environmental officer after due training. This officer will coordinate with DSMC for compliance to environmental requirement and will report to Project. If required the

environmental officer can take help of subject expert who have to be hired on specific problem solving.

8.2. Environmental and social Enhancement measures

SIPMIU will take environmental and social enhancement measures as a part of the project development activities which are aimed to (i) improve visual qualities of project site by providing aesthetically pleasing landscape features (ii) integrate the project corridor with surrounding views and landforms (iii) improve the environment setting around the project site (iv) To integrate local communities with the project by development community properties.

8.2.1. Methodology

Following procedures will be followed for Environment Enhancement Measures in chronological order;

- a. Selection of Sites:** The sites for environment enhancement measures will be selected on the basis of defined criteria for different type of properties.
- b. Discussion with concerned authorities of proposed sites:** The discussion with authorities of selected sites will be done to know their views, requirements and willingness to undertake enhancement.
- c. Development of concept and preparation of conceptual drawings:** On the basis of discussions, objective of environment enhancement, requirements of community design concepts will be developed for enhancement of sites. Based on these design concepts conceptual drawings will be finalised.
- d. Discussion and finalization of drawing with SIPMIU:** The conceptual drawings along with other inputs used like selection criteria, Design concepts and discussion with communities / site authorities will be discussed with SIPMIU officials for their approval.
- e. Discussion with Authorities of concern site:** The conceptual drawings approved by RUIDP will be shared with the community/ Authorities and explained in detail rationale behind it. The doubts if will be clarified; Suggestions if any will be taken and incorporated.
- f. Revision of Drawings:** The conceptual drawings will be revised based on the observations if any and then working drawings will be prepared.
- g. Integration of cost with project cost estimate:** The Enhancement component will be included in the Bills of Quantities and Cost estimates.

Environmental Monitoring Plan , Budget & Responsibility

Env. Indicators	Project Stage	Parameters	Method/ Guidelines	Location	Frequency and Duration	Standards	Approximate cost (Rs)	Implementation	Supervision
Air Quality	Construction stage	SPM, RSPM, SO ₂ , NO _x , CO, HC	High volume sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis	Construction/ earthwork sites as suggested by SC (Total 4 Locations)	24 hr continuous, 3/year for 1years	Air quality standard by CPCB	4x10000x3x1 =Rs120000	Contractor through approved monitoring agency	SIPMIU/DSMC
	Operation stage		High volume sampler to be located 50 m from the selected locations in the downwind direction. Use method specified by CPCB for analysis	Within land fill facility area , as suggested by SC Residential area (2Locations)	24 hr continuous, 3/year for 3 year	Air quality standard by CPCB	2x10000x3X3 =Rs 180000	Municipal Council through approved monitoring agency	Municipal Council
Water Quality	Construction stage	Ground water: (IS: 10500:1991) and Surface water for Class D and Class E (Propagation of Fishes) as Prescribed by CPCB and for vector borne diseases	Grab sample collected from source and analyse as per Standard Methods for Examination of Water and Wastewater	Groundwater at Construction Camps/site and Surface water of Drain (2 Samples)	3/year for 1 years	Water quality standard by CPCB	2x 6000x3x1 =Rs36000	Contractor through approved monitoring agency	SIPMIU/DSMC
	Operation stage			Groundwater at 4 locations and surface water at 2 locations and stagnant water bodies developed due to construction activity	3/year for 3 year	Water quality standard by CPCB	4x3x6000x3 =Rs 216000	Municipal Council through approved monitoring agency	Municipal Council
Siltation in Water Bodies	Construction	Visual Checks for presence of construction debris/waste and blockade of drainage channels		Nearby drain/streams/drainage channels and other water in around the project site .	Once during rainy seasons of the construction period.	Guidelines from water resources department	Routine work of Engineering Team	Routine work of Engineering Team	SIPMIU/DSMC
	Operation				Once during operation of 1st year	Guidelines from water resources department	Routine work of Engineering Team	Routine work of Engineering Team	Municipal Council
Noise levels	Construction stage	Equivalent Noise levels on dB (A) scale for day and night	Free field at 1 m from the equipment whose noise levels are being determined.	Construction sites, approach road (2 Locations)	24 hr continuous, 3*/year for 1 years	As per National Ambient Noise Standard	2x2500x3x1 =Rs.15,000	Contractor through approved monitoring agency	SIPMIU/DSMC

Env. Indicators	Project Stage	Parameters	Method/ Guidelines	Location	Frequency and Duration	Standards	Approximate cost (Rs)	Implementation	Supervision
	Operation stage		Equivalent Noise levels using an integrated noise level meter kept at a distance of 15 m from edge of Pavement	Within vicinity of project site (2Locations)	3 / year for 1 year	specified in Environmental Protection Act, 1986 amended 2002	2x2500x3x1 =Rs 15, 000	Municipal Council through approved monitoring agency	Municipal Council
Soil Quality	Construction Stage	NPK (ICAR standard) and heavy metals for dredging sites	As specified by the site engineer / DSMC	One agricultural land and at each dredging locations if dredging is involved and HMP sites	Once during whole construction stage	CPCB standard and NPK as per ICAR standard	12,000	Contractor through approved monitoring agency	SIPMIU/DSMC
	Operation stage	Oil and grease		At oil spillage locations and other probable soil contamination location	Once for the first year of operation	CPCB standard	12,000	PIU through approved agency	Municipal Council
Soil Erosion	Construction Stage	Visual check for Soil erosion and siltation		Within the Project vicinity especially near drain/nallah	After first rain	Visual Checks	Part of routine action of engineering team	Contractor	SIPMIU/DSMC
	Operation Stage				Once during operation of 1st year	Visual Checks	Part of routine action of engineering team	Engineering Team of SIPMIU/ Municipal Council	Municipal Council
Drainage Congestion	Construction stage	Visual Checks		Within the landfill facility site	Once in a year before rainy season	None Specific	Part of routine action of engineering team	Part of routine action of engineering team	SIPMIU/DSMC
	Operation Stage				Once in a year before rainy season for 3 yrs	None Specific	Part of routine action of engineering team	SIPMIU Engineering Team/Municipal Council	Municipal Council
Construction Sites and Labour Camp	Construction stage	Storage Area, Construction Sites for Hygiene, drainage Medical Facilities Etc.	Rapid audit as per reporting format	Construction Sites and Camp	Quarterly during construction period	As per relevant I S guidelines and to the satisfaction of EO, SIPMIU	Part of the regular monitoring	Contractor with approval from PDSMC, JSIPMIU	DSMC, SIPMIU
Tree Plantation	Construction Stage	Surveillance monitoring of trees felling		Within the vicinity of project site	After site clearance in monsoon period of construction phase	As suggested by DoF/ SIPMIU/DSMC.	Rs.500000 (Lump sum)	SIPMIU/DSMC	SIPMIU/DSMC

Env. Indicators	Project Stage	Parameters	Method/ Guidelines	Location	Frequency and Duration	Standards	Approximate cost (Rs)	Implementation	Supervision
	Operation stage	Audit for survival rate of trees plantation		Within the vicinity of project site	Once in a year for years		Included in overall plantation Cost	The site Engineer will be responsible for monitoring up to the Defect Liability Period in any particular stretch. After this period the Municipal Council will be responsible for monitoring	Municipal Council
Monitoring Costs: 11.06 lakhs (Eleven lakhs six Thousand)							1106000		

SIPMIU:- State Investment Programm Management Unit, EO: Environmental Officer, DSMC –Design Supervision Management Consultant; IS - India Standard; NOx - Nitrogen Oxide; RPM - Respirable Particulate Matter; SO₂ - Sulfur Dioxide; SPM - Suspended Particulate Matter, RPM - Respirable Particulate Matter