

Executive Summary of EIA Report

For

Development of Landfill Site for Aizawl City

[F. No.10-73/2010-IA-III]



For [SIPMIU (NERCCDIP) Aizawl]

Prepared by

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Proponent

1. This IEE Report has been prepared for the construction of Solid Waste Management Facility in Aizawl of a capacity of 125 MTPD. This Initial Environmental Examination (IEE) has been prepared for the Aizawl Solid Waste Management Subproject, specifically for the (i) improvement of the collection and transportation system; (ii) construction of garage and transfer station; (iii) construction of landfill and associated facilities; and (iv) development of capacity.

2. An Environmental Management Plan (EMP) is proposed as part of this report which includes (i) mitigation measures for significant environmental impacts during implementation; (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; and (iii) public consultation and information disclosure; and grievance redress mechanism.

3. The Executing Agency is the Urban Development Department (UDD) of the Government of Mizoram; and the Implementing Agency is the Investment Program Coordination cell. The Project Management and Implementation Unit of the NERCCDIP is the State-level Investment Program Management and Implementation Units (SIPMIU).

Background

4. The Government of India (GoI) has made initiative to encourage economic development in the North Eastern Region (the Region). The GoI requested the Asian Development Bank (ADB) to provide assistance for a North Eastern Region Urban Development Project. In response, ADB provided an advisory technical assistance (ADTA) for the North Eastern Region Urban Sector Profile Study (the Sector Study), which was completed in December 2003. The Sector Study assessed the socio-economic situation in all eight capital cities of the North Eastern States, outlined infrastructure development programs and identified institutional, environmental and social issues. ADB then provided the Project Preparatory Technical Assistance (PPTA) assess the feasibility of and prepare an investment program North Eastern Region Capital Cities Development Investment Program (henceforth called as NERCCIP or the Investment Program) to upgrade urban infrastructure and services and improve urban management in the five capital cities of the five states in the North Eastern region, namely Agartala (Tripura), Aizawl (Mizoram), Shillong (Meghalaya), Kohima (Nagaland), and Gangtok (Sikkim).

The North Eastern Region Capital Cities Development Investment Program (NERCCDIP) envisages achieving sustainable urban development in the Project Cities of Agartala, Aizawl, Kohima, Aizawl and Aizawl through investments in urban infrastructure sectors. NERCCDIP will be implemented over a six-year period beginning in 2010, and will be funded by a loan via the Multitranche Financing Facility (MFF) of the Asian Development Bank (ADB).

5. Detailed design began in the last quarter of 2010 and completed by March 2011. Construction will begin in End of 2011 and will take around 12 months. All civil works will be completed by End of 2012

1. The subproject covers (i) improvement of the collection and transportation system; (ii) construction of garage and transfer station; (iii) construction of landfill and associated facilities; and (iv) Capacity Development.

2. **Improvement in Collection System.** This will be done by providing dustbins and wheelbarrows and through intensive community awareness and consultation program. The components proposed include:

- (i) Introduction of house-to-house waste collection through source segregation on a pilot basis, initially to about 2,000 households within the Aizawl Municipal Council (AMC) area;
- (ii) Provision of 1,000 units of 30-litre (L) dustbins to be placed in public places;
- (iii) Provision of 250 units of wheelbarrows to be used by sweepers in the central areas of the city; and
- (iv) Provision of 35 units of 4.5 cubic meter (m³) community dustbins to be used in areas where house-to-house collection is not available.

3. **Improvement in Transportation Facilities.** This will be done by operational improvements of the existing refuse vehicles through incorporation of more vehicles with proper tipping and hydraulic loading/unloading arrangements. The components proposed include:

- (i) Provision of 10 light vehicles for collecting the wastes from house-to-house with introduction of bell ringing system (to be used in areas where access for medium truck is not possible).
- (ii) Provision of 20 medium duty tipper trucks for collecting the waste from house-to-house with introduction of bell ringing system (to be used in households along main roads). The medium tippers will be used for carrying wastes from sources to transfer stations.
- (iii) Provision of 4 new dumper placers for secondary collection. These dumper placers will also be used for carrying waste from sources to transfer station.
- (iv) Provision of 6 large tipper trucks with 8 to 10 m³ waste carrying capacities per trip. The larger tipper will be used for carrying waste from transfer stations to the landfill site.

Garage and Transfer Stations: - A transfer station will be constructed in at Bethlehem Vengthlang to increase collection vehicle trips and area of coverage. A garage for accommodation and maintenance of 40 refuse vehicles, wheelbarrows, and mechanized containers will also be constructed adjacent to the transfer station. The garage will also be used for maintenance of the wheelbarrows and mechanized containers.

Composting Facility:- Compost Plant to handle 50 MTPD of segregated organic waste of MSW will be treated in the compost plant to produce manure

Construction of Landfill. The site will be protected around by retaining walls and turfing on steep slopes. The rainwater will be collected by storm drains and then subsequently aligned to the main natural drain down the valley to control erosion and landslides. The site will also be provided with a buffer zone of 20 m wide greenbelt.

The processing complex & disposal facility (Sanitary Landfill Facility) is proposed to be set up at Tuirial site, which is approximately 20 km away from Aizawl City and along the national highway 54 (NH-54).

Capacity Development

This will consist of (i) safeguard compliance studies; (ii) community awareness programs; and (iii) private sector participation opportunities study.

REQUIREMENTS FOR ENVIRONMENTAL CLEARANCE

- a. ADB's Environment Policy :- The proposed sub project is of Category B project, projects that could have some adverse environmental impacts, but of less significance than those for category A. An Initial Environmental Examination (IEE) is required to determine whether significant impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- b. GOI Environmental Policy :- As per EIA Notification 14th Sept.2006 as amended on 1-12-2009, which replaces the EIA Notification of 1994, requires environmental clearance for certain defined activities/projects. This Sub-project is categorized as B which requires Environmental clearance from SEIAA. However as in Mizoram the SEIAA is not constituted the Sub-project is treated as Category A and Environmental Clearance from MoEF , New Delhi is required.

PROJECT ASSOCIATED FACILITY /AMENITIES

4. The associated facilities are given below.

- (i) Approach road and internal roads
- (ii) Compound wall and boundary fencing
- (iii) Main entrance gate
- (iv) Weigh bridge
- (v) Administrative office building/weighbridge operator's room
- (vi) Common toilets and septic
- (vii) Security guard's room
- (viii) Bore well with steel casing
- (ix) In addition to above an open area of about 1,200 m² is earmarked for waste segregation and recycling. Vehicle washing area and vehicle parking area are also earmarked.
- (x) Electrical works for street lighting and internal lighting.

PROJECT UTILITIES

End Products/By products

The proposed waste management facility will have a capacity to process 125 MTPD of mixed MSW. It is estimated that 30% of MSW waste will be converted to Compost, 10-15 % of waste will be segregated as recyclable waste and rest approx 50-60 % of the Municipal waste will be dumped to Landfill

Water

Estimated amount of water is approximately 10 KLD for land fill process and domestic use of workers and would be met from groundwater or surface water.

Power

Plant itself does not require much energy (electricity). For normal operation purpose such as lighting, 2 HP motor pumping for leachate treatment. The source of electricity will be Power & Electricity Department Government of Mizoram..

Road & site drainage

All roads in the plant area will be well-designed bitumen roads and will be of 4 m wide with 1m wide berm on each side. For effective storm water drainage, final finished road will have a camber of 1 in 60 and water bound macadam surface will have a camber of 1 in 40. Surface drainage will be designed based on the maximum rainfall intensity prevalent in the area. All the building would be provided with a plinth protection all round, sloped towards the side drain. The side drain will be connected to the main drain on either side of the road. MSW storage area will be provided with a slope to drain the water collected to a sump from where it will be pumped to the Leachate Storage tank.

ENVIRONMENTAL SETTING OF THE STUDY AREA

The baseline environmental status was assessed based on primary and secondary data collected through on-site field observations and obtained from agencies such as IMD, Geological Survey of India, State Ground Water Department, Central Ground Water Board, State Pollution Control Board, Census of India and Local Forest Department. The following environmental components were focused at during this study:

- Air Environment (Meteorology, Ambient Air Quality, Noise Levels, Traffic Pattern, etc.)
- Water Environment (Quality and Quantity of Surface and Groundwater sources)
- Land Environment (Geology, Hydrogeology, Landuse, Solid Waste generation and characteristics)
- Ecological Environment (Terrestrial and Aquatic Flora & Fauna)
- Socio-Economic Environment (Demographic profile, Occupational structure, Educational status, Literacy status, etc.)
- The baseline status collated from analysis of secondary and primary data is summarized in the Table 1 below.

Table-1 BASELINE ENVIRONMENTAL STATUS

SL. NO	ATTRIBUTE	BASE LINE STATUS
1.	Location of project City	Aizawl, the capital of Mizoram lies between 92°30' - 92°60' E - longitude and 21°58' - 24°85' N latitude. The city of Aizawl is located on one prominent north-south extending ridgeline, situated between 700 m to nearly 1288 m from the Mean Sea Level. Aizawl is linked with rest of India through the National Highway 54 (NH 54). The nearest air linkage is at Lengpui, 32 Km from the city.
2	Location of proposed Site	The proposed land fill site located at 23°44'28.08"N - 92° 47'41.01"E at elevation of 1143 ft.
3	Seismicity	The Capital City Aizwal falls under Seismic Zone -V . It is referred to as the Very High Damage Risk Zone.
4	Topography	Mizoram is a land of rolling hills, rivers and lakes with mainly clayey loam soil mixed with broke angular shale of varying size. The Mizo Hills, which dominate the state's topography, rise to more than 6560 ft near the Myanmar border
5		
6	Geology	Geology of Mizoram constitutes the sedimentary basin complex of Assam Shelf and Assam-Arakan. The Assam-Arakan sedimentary basin is a shelf-slope-basinal system. The shelf part of the basin spreads over the Brahmaputra valley
7	Geomorphology	Geomorphology of Mizoram region is typified by a succession of sub-parallel hill ranges and long valleys. The hill ranges reach a maximum height of around 1800m in Mizoram with most of these between 900-1200m. Thus, the general elevation increases towards east up to the Myanmar border.
8	Mineral Resources	The main mineral of Mizoram is a hard rock of tertiary period formation. This is mainly utilised as building material and for road construction work. However, several reports (both from Geological Survey of India and State Geology and Mining Wing of Industries Department) revealed that the availability of minor mineral in different places.
9	Soil	Soils vary from sandy loam and clayey loam to clay, generally mature but leached owing to steep gradient and heavy rainfall. The soils are porous with poor water holding capacity, deficient in potash, phosphorous, nitrogen and even humus due to the traditional practice of shifting cultivation called 'jhuming'. The pH shows acidic to neutral reaction due to excessive leaching (Environment & Forest Department Report 2003). Shifting cultivation principally practiced in Mizoram affects soil productivity through increase of soil acidity, lowering of surface moisture and intensifying erosion losses of soil and nutrients through runoff.
10	Climate	The climate of Mizoram is neither very hot nor very cold, but moderate throughout the year. The whole state falls under the direct influence of south-west monsoon and receives an adequate amount of rainfall. The climate of the state is humid-tropical, characterized by short winter, long summer with heavy rainfall.
11	Relative Humidity	Relative humidity in the dry season is 60 –70 % and in the monsoon period is about 90%. During southwest monsoon, February to April is comparatively dry when humidity is between 60 –70 %.

12	Temperature	The temperature in the region is quite moderate and does not experience any extreme variations both in summer as well as in winter. Winter sets in from around the end of the month of October and lasts till the end of February. The minimum winter temperature varies between 8° C to 24° C. Summer arrives in the middle of May with maximum summer temperature varying between 18° C to 32° C. The frequent rains throughout the year however serve to push the mercury down
13	Air Quality	<p>PM₁₀, :- The maximum concentration of has been observed at Present dumping site at NH-54, Tuirial (120 µg/m³) which is higher than permissible limit (100 µg/m³) due to the combined effect of NH-54 traffic as well as ongoing activity of Municipal Waste dumping The lowest concentration has been observed at Proposed Landfill Site (42 µg/m³) .</p> <p>PM_{2.5} :- The maximum concentration has been observed at present dumping site at Nh-54 , Near Landfill site, NH-54, Tuirial (67 µg/m³ which is slightly higher than permissible limit 60 µg/m³. Again the reason is the combined effect of NH-54 traffic as well as ongoing activity of Municipal Waste dumping.</p> <p>SO_x:- The daily average SO₂ concentration at different monitoring locations are in range of from 5-7 µg/m³. At monitoring location Vaitlamsam Ram Dr. Lalruanga's garden, Tuirial the concentration level is highest ie 7 µg/m³ while the lowest concentration level observed at the Proposed Landfill Site Tuirial. The reason for the lowest level at the proposed site is because it is an open area with less traffic, no population and very less man made/social activities. The data are within the limit of the NAAQS standards for residential areas (80 microgram / cum).</p> <p>NO_x:- The data shows that the average NO₂ concentration is highest at Vaitlamsam Ram Dr. Lalruanga's garden, Tuirial (40 µg/m³), and lowest concentration observed at proposed landfill site and Bamboo Link Road, Tuirial (33 µg/m³. The results are within the limit of the NAAQS standards for residential areas (80 microgram / cum).</p> <p>CO₂ :- The monitoring result show that the maximum concentration is at present Municipal dumping site at NH-54, Tuirial (250 PPM) . The plausible reason is the burning of Municipal waste by rag pickers to find valuable material. The lowest concentration is at Bamboo Link Road, Landfill site, Tuirial (155 PPM)</p> <p>CH₄ :- The maximum concentration has been observed at Airfield, Near Paper Mills, Tuirial and Near Landfill site, NH-54, Tuirial (0.4 % LEL) and the lowest concentration has been observed at Bamboo Link Road, Landfill site, Tuirial and Airfield, Near Lianthanga's residence, Tuirial (0.2 % LEL). At all monitoring location the measured value is within the permissible limit (Not to exceed 25 per cent of the lower explosive limit (equivalent to 650 mg/m³)</p>
14	Surface Water	<p>The analysis of water quality of rivers within Greater Aizawl, namely the Chite Lui and Lawibual rivers indicate that the water quality parameters are within the prescribed standard values. Low values of Turbidity, Total Dissolved Solids, non-existence of Oil & Grease and high value of Dissolved Oxygen clearly indicate that the water quality of the rivers is fairly good. However, Coliform is present in higher concentrations.</p> <p>Near Landfill site ,there are 2 small seasonal drains within the proposed landfill site for carrying surface run off (but catchment area is small). All these seasonal drains meet at a point downstream to the Tuirial river. Water quality of the river is</p>

		generally good since there are no pollution sources upstream
15	Groundwater	<p>Due to the hilly terrain with slopes more than 20%, most of the rainwater flows out as surface run off. Hence, the scope of groundwater storage is limited and is depending upon the secondary porosity and structural control in the higher elevated aquifers. The groundwater stored in these aquifers emanates in the form of springs that act as a source of water supply for the people especially in the rural areas. The ground water exploration done by the Central Ground Water Board (CGWB) indicates that there is considerable potential for exploration of ground water within a depth range of 200 m with a potential yield ranging from 120 to 330 litres per minute for draw down of 13 to 20 m. While the quality of ground water, is found to be potable from the hydro-chemical point of view, the hydro-geological conditions in Aizawl are not favorable for ground water recharge and storage.</p> <p>Groundwater is principally used for drinking in the project area except urban areas where the drinking water demand is catered through municipal supply by treated water of dam reservoirs. Groundwater samples was collected from 4 locations and analysed. Groundwater quality conforms the drinking water stand (IS:10500).</p>
16	Noise Levels	<p>As within the 4 km radius of project site there is no habitation so it is expected that nose level should be within permissible limit. Noise after a certain level can have a very disturbing effect on the people and animals exposed to it. Hence, it is important to assess the present noise quality of the area in order to predict the potential impact of future noise levels due to the proposed project. Noise monitoring was carried out at two locations. Noise measurements were done using Envirotech Sound Level Meter SLM 100. Monitoring was carried out both in the day and night time and accordingly Leq day and night were derived from the monitored data including the peak values. The results of the monitoring are provided in Table 5.13. Monitored levels were compared against Ambient Noise Standards prescribed under Gazette Notification 643 of Ministry of Environment and Forests, Government of India.</p>
	Ecological Resources	<p>Though there are sizeable areas covered by large varieties of vegetation and small grasses, within Aizawl, there are no major tracts of designated reserved forests within the subproject boundaries.</p> <p>The forest type of Aizawl is represented by Tropical semi-evergreen forest. A phyto diversity survey was carried out at some of the project locations in Greater Aizawl Planning Area (GAPA) using the Shannon-Wiener Diversity Index, and evenness with the Evenness index. The indices were employed to get a comprehensive, easily comparable, and quantitative estimate of the diversity and degree of evenness (i.e., uniformity) of the plant community. The indices show that there are no priority sites within GAPA. Dampa Sanctuary (Protected Area) is situated near the Bangladesh Boundary and is very far from the GAPA.</p>
	Economic Development	<p>The Aizawl development planning area covers an area of 128.98 sq km of which 21.58% of the total area is developed whereas 78.42% of the total area is not suitable for developing due to excessive slopes and instability due to landslides. 1.98% of the total area is under cantonment / defense area.</p> <p>Efforts shall be made by AMC to comply with the requirement of the CPHEEO Manual and MSWMH Rule 2000. The Manual recommends that a zone of 500 m around the landfill boundary should be declared a "No-Development Buffer</p>

		Zone".
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ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PLAN

Environmental impact due to the construction and operation stages of the project shall be predicted quantitatively using appropriate models such as ISCST3 for air dispersion calculations, DHAWANI for noise impacts. Impacts shall also be evaluated qualitatively using engineering judgment and best management practices. Adequate environmental management measures will be incorporated during the entire planning, construction and operation stages of the project to minimize the adverse environmental impacts and assure sustainable development of the area. The impacts during the construction phase will be temporary in nature. This summary details the pollution sources and mitigation measures proposed for the project.

AIR ENVIRONMENT

During the construction phase, operation of construction equipments and vehicles will be the main sources of pollution. A dust control plan will be implemented and regular maintenance of vehicles and equipment will be carried out.

During the operation phase, the main sources of pollution shall be fugitive dust and odor emissions from waste handling and composting and emissions due to vehicular movement. Adequate mitigation measures shall be implemented. Emissions from waste handling areas shall be controlled by provision of covered areas, proper ventilation and by maintaining negative pressure. Herbicides will be sprayed to discourage further decomposition of MSW. The segregation site and composting plant shall be provided with adequate dust control systems such as cyclones, bag filters to control the dust emissions. A gas recirculation system shall be provided to reduce CO formation. Dioxins and Furans shall be controlled by extensive segregation to ensure complete removal of plastic and other chlorinated compounds, controlling PM emissions.

NOISE ENVIRONMENT

During the construction phase, adequate mitigative measures such as controlled time of construction, job rotation etc. will be implemented. During the operation phase, the sources of noise emissions shall be equipments such as shredders, generator etc and vehicular movement. Noise enclosures shall be provided wherever possible and workers shall be provided with ear plugs.

WATER ENVIRONMENT

During the construction phase, a septic tank shall be provided to treat the domestic wastewater generated due to labor settlements. As the site is approx 20 km away Aizawl city and Municipal water supply is not available here so tubewell water will be used for drinking water and other service requirement. During operation tubewell water will be used for all day to day necessary requirements.

LAND ENVIRONMENT

During operation phase of the project, the rejects (inserts) from waste segregation system will be dumped in landfill and the organic waste will be used for composting. The recyclable waste

after segregation will be sold to approve vender. For the improvement of land environment good number of plant will be planted along the boundary wall.

ECOLOGICAL ENVIRONMENT

There is no ecologically sensitive area within a 10 km radial distance of the project site. No Wildlife sanctuary, national park or similar eco-sensitive area is present within vicinity of project site. A peripheral greenbelt will be provided.

SOCIO ECONOMIC ENVIRONMENT

Within arduous of 4 km of the project site there is no habitation .The proposed project will lead to employment generation and will have a positive impact on the socio economic environment. Preference to local population shall be given and adequate mitigation measures will be ensured to reduce odor emissions and disease vectors from proposed site.

ENVIRONMENTAL MANAGEMENT SYSTEM

For the effective implementation of the EMP, an Environmental Management System (EMS) will be established at the proposed project. The EMS will include the following:

- a. An Environmental Management cell
- b. Environmental Monitoring Program
- c. Personnel Training
- d. Regular Environmental Audits and Corrective Action
- e. Documentation – Standard operating procedures Environmental Management Plans and other records.

RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

For the effective & safe implementation Municipal Waste Management project, it is important to identify associated safety hazards and carry out a basic risk assessment; an effective risk assessment & disaster management plan has been proposed which will be detailed in EIA report. Risk assessment & disaster management plan includes:

- a. Critical aspects including safety culture, training and awareness, relationships and training of contractor staff and many others.
- b. Safety measures, possibility of accidents either due to human errors and/ or due to equipment/ system failure.
- c. Disaster management and response plan to minimize the adverse impacts due to an unfortunate incident and disaster Management aspects.

CONCLUSION

All possible environment aspects have been adequately assessed and necessary control measures have been formulated to meet statutory requirements. Thus implementing this project will not have any appreciable negative impacts.

Moreover, the landfill area requirement will reduce significantly as the about 30% of solid waste will be converted into compost, approx 10-15% will be recyclable waste and as only inerts (50-60%) would be sent for disposal at landfill site. This would save upon the future requirements of area for land filling.

*****End*****