COMPLIANCE REPORT PERIOD: APRIL 2015 TO SEPTEMBER 2015

ENVIRONMENTAL CLEARANCE FOR THE DEVELOPMENT OF LANDFILL SITE FOR AIZAWL CITY IN THE STATE OF MIZORAM BY M/S PROJECT DIRECTOR, SIPMIU (NERCCDIP) VIDE MoEF LETTER No.: F.No.10-73/2010-IA.III. dated the 9/01/13 COMMENTS SUBMITTED TO THE MINISTRY OF ENVIRONMENT & FORESTS, GOVERNMENT OF INDIA

SPECIFIC CONDITIONS:

(i) The ''Consent to Establish'' shall be obtained from State Pollution Control Board under Air and Water Act a copy shall be submitted to the Ministry before start of any construction work at site.

STATUS OF COMPLIANCE:

As per Section 21 of air (Prevention & Control of Pollution) Act, 1981, Section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 'Consent to Establish' was granted by Mizoram Pollution Control Board, Aizawl, Mizoram Vide letter No.:H.88088/Poltn/9(154)/2011-MPCB/96-102 dated the 9th August 2012 and renewed at 1 year interval for the development of Compost plant with Engineered Landfill having a capacity of 150 tons/day for Solid Wastes Management of Aizawl City at Tuirial, Mizoram.

No construction started at the moment Invitation to bid was made on 19th September 2015 and extended till 30th October 2015.

(ii) Existing land fill site shall be closed scientifically.

STATUS OF COMPLIANCE:

Existing Landfill site will be closed scientifically as per the Environmental Clearance condition.

The capping of existing dumpsite will be designed, constructed and operated in such a manner that the waste is not allowed to come out and its migration to the ground water through permeation or diffusion can be stopped. This can be achieved through provision of liner on top and sides and proper storm water removal mechanism.

Guidelines for capping, Ministry of Environment and Forest, 1991 specifies that capping must have a liner system and a storm water management system. The liner system must have a liner that is designed and constructed to prevent any migration of wastes out of the dumpsite to the adjacent sub-surface soil or ground water at any time during the closure and post closure period. The liner also must have appropriate chemical properties and sufficient strength to prevent failure.

The guidelines further specify that the following minimum liner system.

a) A surface soil layer of local top soil which supports self-sustaining vegetation and which has thickness not less than 60 cm.

b) A drainage layer of thickness 30 cm or more having a coefficient of permeability in excess of 10^{-2} cm/sec

c) A composite liner comprises a HDPE geo-membrane of thickness 1.5 mm and a compacted clay layer of 60 cm thick or more having coefficient of permeability of - 10- ^{7} cm/sec or less.

c) A regulatory layer (optional) of thickness 30 cm having coefficient of permeability of the local top soil, if the coefficient of permeability of the local top soil is greater than 10^{-4} cm/sec.

d) The horizontal surface of the final cover shall be provided a slope of 3 to 5% for proper surface water drainage.

Guidelines specify that the HDPE geo-membrane must have tensile strength at yield > 18 kN/m, Tensile strength at break > 30 kN/m, tear resistance > 150N and puncture resistance > 250 N.

CAPPING LINER DESIGN FOR CLOSURE SCHEME OF EXISTING DUMPSITE

The capping liner system should be able to prevent migration of rain water into constituents of MSW and should also fulfill the existing rules and guidelines for design of capping system. In line with the Guidelines for capping of SEPs, Ministry of Environment and Forest, 1991 and USEPA Minimum Technological Requirements described earlier, the following liner system is proposed (Refer drawing Nos. O: TIL/3279/SWM/37 & O: TIL/3279/SWM/38). The components listed below are from top surface downwards to the waste.

1. A surface soil layer of local top soil which supports self-sustaining vegetation and which has thickness not less than 60 cm.

2. A drainage layer having a coefficient of permeability in excess of 10^{-2} cm/sec.

3. A single composite liner comprising of:

- A HDPE geo membrane of thickness 1.5mm
- Compacted clay (or compacted amended soil) layer of thickness 600 mm having a coefficient of permeability of 10^{-7} cm/sec.

4. The horizontal surface slope is provided as 3%.

5. A gas collection layer (regulatory layer) of 30 cm having coefficient of permeability of more than 10^{-2} cm/sec. Embedded with perforated HDPE pipes

The composite liners shall consist of a HDPE sheet of 1.5 mm thick (refer table 8.1 mentioned below for specifications).

Table 1 : Specification of HDPE Sheet

Parameter	**Test Method**	**Minimum Values**
THICKNESS, MM	ASTM D 5199	1.5 mm
COLOR	-	Black
5.1.1.1.1 PERMEABILITY	ASTM E 96	2.3×10^{-14} cm/sec.
DENSITY	ASTM D 1505	>0.935 gm/cc
COEFFICIENT OF LINEAR THERMAL EXPANSION	ASTM E 831	$1.5 \times 10^{-5} °C^{-1}$
TENSILE STRENGTH AT YIELD	ASTM D 638, Type IV Dumbbell at 2 inch/min	≥ 22 N/mm
TENSILE STRENGTH AT BREAK	ASTM D 638, Type IV Dumbbell at 2 inch/min	≥ 40 N/mm
ELONGATION AT YIELD	ASTM D 638, Type IV Dumbbell at 2 inch/min	≥ 13 %
ELONGATION AT BREAK	ASTM D 638, Type IV Dumbbell at 2 inch/min	≥ 700 %
CARBON BLACK	ASTM D 4218	2 to 3 %
OZONE RESISTANCE	ASTM D 1149, 168 hrs	No cracks Pass
WATER ABSORPTION	ASTM D 570, 23 °C	**5.1.1.2** ≤ 0.1%
ENVIRONMENTAL STRESS CRACKING	ASTM D 1693	≥ 2000 hrs
VOLATILE LOSSES	ASTM D 1203	≤ 1
TEAR RESISTANCE	ASTM D 1004, A	5.1.1.3 > 150 N
WATER VAPOR TRANSMISSION	***5.1.1.3.1 ASTM E 96***	< .03 gm/m^2 /24 hrs
PUNCTURE RESISTANCE	ASTM D 4833	> 250 N
SEAM PROPERTIES (A) SHEAR STRENGTH (B) PEEL STRENGTH (HOT WEDGE FUSION) (C) PEEL STRENGTH (FILLED EXTRUSION)	ASTM D 4437 mod.	 21 MPa 15.8 MPa 13.6 MPa

STORM WATER DRAINAGE

Storm water drainage is an important aspect of landfill capping design and its management. An overabundance of moisture in and around a landfill can increase leachate generation and overburden the leachate removal system, cause erosion in and around the landfill, as well as hinder the degradation of landfill waste. A capping design must restrict erosion of top dome surfaces and external embankment side slopes during all phases of landfill operation; closure and post- closure.

Considering the above requirement, the storm water drains of 600 mm x 600 mm size on the perimeter of the landfill i.e at the toe of the embankment to be provided. The slope of 3% in the dome of the cap provides adequate slant to the rainwater to get collected in the storm water drains located on the toe of the embankment. The toe drains are connected to the existing drains. Storm water will be disposed off through existing drainage system.

MONITORING AND INSPECTION

The performance of capping is primarily measured by its ability to prevent uncontrolled migration of waste constituents into the soil and ground water. As per guidelines, it is proposed to perform inspection of the following at least 2 to 4 times a year:

Cover system: Should be checked that vegetation growth is occurring satisfactorily and that plants are not showing stunted growth, to detect if any erosion gullies have been formed thereby exposing the barrier layers, to earmark depressions that may have developed with time and to identify ponding of water on the landfill cover. At least one inspection shall be carried out during or immediately after the peak of the monsoon season. Rectification work will be taken up in case of any problem is found in the cover system. Rectification measures will not only re-establish the initial scope of the cover (for proper surface water run-off) but will also ensure that all the components of the dumping site cover system continue to perform are originally envisaged. Aizawl Municipal Council shall periodically carry out maintenance work in the form of soil filling, re-grading the cover and vegetating the dumping site cap. In areas where extensive erosion gully formation is observes filling of cover slopes and re vegetation must be routinely undertaken.

Surface Water Drainage System: Should be checked to identify cracks in drains due to settlements, to delineate clogged drains requiring immediate clean-up and to study the level of deposited soil in the storm water basin and initiate excavation measures. Extensively cracked/settled drains may require replacement after filling soil beneath them to establish slopes for gravity flow.

(iii) The proponent shall ensure that the project fulfills all the provisions of Solid Wastes (Management and Handling) Rules, 2000 including collection and transportation design etc.

STATUS OF COMPLIANCE:

The proposed SWM system is broadly based on the 4R Environmental Protection Rules (Reduce, Recycle, Reuse, and Recover) and is in accordance with the MSW 2000 Rules. The primary aspects of the proposed plan include the following:

- Compliance with Municipal Solid Waste (Management & Handling) Rules, 2000
- Segregation at source
- Provision of segregated infrastructure at all stages of collection and transportation
- Waste to be covered at all stages of handling
- Elimination of manual handling of waste and the provision of proper PPEs to the workers
- 100% collection and transportation of the generated waste
- Maximum recovery of resources by segregating recyclables and biodegradable
- Advocate 4R's i.e. reduce, recycle, reuse, and recover materials through MSW management
- Adopt proven technologies for waste processing
- Promote information, education and communication to ensure system efficiency and sustainability
- Ensure economic sustainability of the proposed system by introducing PPP in MSW management
- Adequate health and safety provisions for workers at all stages of waste handling
- Regular environmental monitoring at waste processing and disposal facilities
- Have robust complaint-handling system in place
- Conduct regular internal and external independent audits on the efficiency of the entire SWM system

(iv) The gas generated from the Landfill facility shall be collected and disposed/utilised as per rules.

STATUS OF COMPLIANCE:

As per rules the soil, air and water in the area shall be continuously monitored for no contamination. Both sampling methods and non-sampling methods are adopted and monitored as per the monitoring plan for timely action to be taken before water contamination and leakage of gases into the soil. The facility is provided with a minimum four monitoring wells for soil water and gas measurements. The details of the monitoring plan are given in **Table 2**, wherein instruments /monitoring areas proposed are listed.

Table 2: Monitoring Plan

Monitoring Method	Type of Monitoring	Equipment Used	Information/data to be recorded
Sampling Monitoring Method (Methods involving collection of samples for laboratory analysis)	Air Monitoring (Collection of Air samples)	Gas Syringes Air Bags	Air quality/analysis of gas
	Ground Water Monitoring (Collection of ground Water)	Monitoring wells (Background wells) – both single depth and multiple depth	Water quality
	(Collection of Ground Water)	Piezometers	Water quality
	(Collection of Leachate samples)	In landfill piezometers	Leachate quality
	Vadose Zone Monitoring	Collection Lysimeters, Soil gas probes & Suction Cup Lysimeters	Analysis of Leachate between, VOC in soil, Gas monitoring, liquid monitoring in Vadose zone
Non-sampling Monitoring Method (Methods involving Physical and Electrical measurements)	Ground water Conductivity	Conductivity cells	Monitor changes in Groundwater Conductivity
	Leachate Monitoring	Inland fill Piezometers	Measure depth of Leachate in landfill
	Temperature	Temperature probes	Measure temperature In land fill
	Vadose zone	Electric probes	Salinity of vadose zone
		Electric Resistance Block	Changes in the water content
		Gamma ray attenuation probes	For monitoring of moisture content
		Neutron Moisture meter	Moisture content in the soil
		Tensiometer	Used to measure negative pressure that exists in soil/landfill
		TDR meter & Thermocouple psycho meters	For recording Thermo Dielectric Properties of water and soil – any change in temperature and moisture will be recorded
		Waves Sensing Devices (seismic type)	To identify leak detection

Apart from the above, regular inspection and monitoring of important components of the landfill shall be done as per the schedule given below:

Final Top Cover	Once in a year and after each substantial rainfall it should be checked for any erosion, landslides, movement of soil, slope, etc.
Vegetation	Four times in a year a check should be made for existence of dead plants/trees. Any plant/tree found dead shall be removed immediately.
Final Grade	Twice a year should be checked for ponding/logging of water. If any abnormalities found, slope should be corrected by putting soil.
Surface drains	Four times a year and after each substantial rain should be checked for any blockages. Leaves, debris or any other accumulation found in the drain shall be removed immediately.
Gas Monitoring	As required in the Management Plan it should be checked for strong presence of odor. The gas monitoring equipments (compressor, pipes, flaring stand, etc) should be checked to ensure their workability as they might become inoperable due to high gas generation.
Groundwater Monitoring	As per the Action Plan. A regular inspection shall be done to check for any failures in the monitoring system.
Leachate Management	As required by the plan.

(v) The Leachate from the facility shall be collected and treated to meet the prescribed standards before disposal.

STATUS OF COMPLIANCE:

The Leachate from the Landfill shall be collected and treated as per the rules and as per the environmental clearance condition to meet the prescribed standards before disposal, the landfill design are arranged as below.

Completed Waste Fill Features

The base of landfill i.e. top of liner has been kept at ground level 286 m and 3 m high (above GL) earthen embankment has been provided to achieve the required storage capacity within the area available. Top width of the embankment has been kept at 3 m. Inner & outer slopes of the embankment have been kept at 1V: 2H for stability of slopes.

The geo-composite liner has been provided on the inner side of the landfill as per the requirement of Central and State Pollution Control board norms. Leachate collection system has been provided at the base of the landfill with 250 mm dia. HDPE header and 110 mm dia. perforated HDPE lateral pipes. Leachate shall be collected in the Leachate collection sump from where it will be pumped to leachate holding tank. Leachate transfer pumps shall be provided of adequate capacity.

MSW shall be dumped in the landfill by refuge collector cum compactor, which shall be further levelled and compacted. Periodic waste audits will ensure that non-conforming waste shall not be dumped at the landfill site. The waste shall be compacted in thin layers using

compactors and covered with a daily cover of soil layer or inert waste. After the landfill is filled it will be covered with top cover system with single liner arrangement and on the top,450 mm thick surface layer (Top Soil) shall be provided with vegetation. The slope of top cover shall be kept as 4% to provide quick drainage of surface runoff.

For ground water monitoring,4 Nos. of wells shall be provided. A suitable ramp to reach the embankment top shall be provided so that refuge collector cum compactor can reach the top of embankment and can directly dump the municipal solid waste in the landfill.

Estimation of landfill capacity

The sketch showing section of landfill is given below for the estimation of landfill capacity (figure 8.1). The capacity of landfill is worked out by considering mainly three parts of landfill which are as follows:

i. Middle part (V_1)
ii. Bottom part in the slope of header pipe (V_2)
iii. Top portion (V_3)

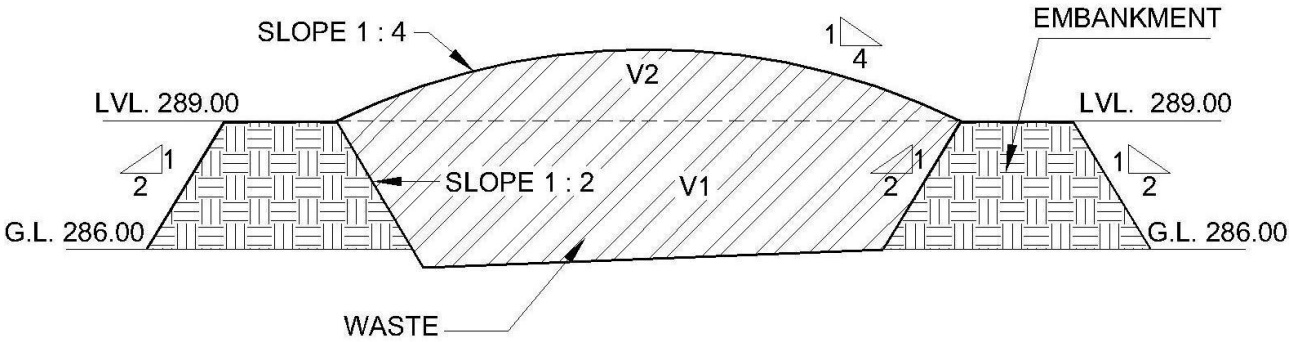


Fig. 1 Three Parts of Landfill

The step wise calculation for the estimation of capacity of landfill and design life (5 years) is given in the below:

a. Waste generated in 2011 = 165.39 x 365 = 60368 MT
b. Landfillable waste generated in 2011 @15% = 60368 x 0.15 = 9055 MT
c. Total landfillable waste generation after 5 years = 17493 MT/year

d. Total landfillable Waste to be generated in 5 Years (T) = 339674*0.15 = 50951.1

e. Total volume of waste in 5 years (on the assumption of 1.10 t/cum) V_w

V_w = 50951.1 /1.10 cum

= **46319.18 cum**

f. Volume of Daily Cover (V_{dc}) V_{dc} = 0.1 x 46320
= **4632 cum**

g. Total Volume required for components of liner system and of cover system (on the assumption of 1.1 m thick liner system (including leachate collection layer)
V_c = 0.11 x 46320
≈ 5095 Cum

h. First Estimate of landfill Volume

= volume of (waste + daily cover + liner and cover system)

= 46320+4632+5095= 62532 = 56047 cum (for 5 years period)

The leachate collection tank shall be provided outside the embankment. These shall be located 0.5 m above the lowest ground level. Waste conveying facilities are provided for mechanically depositing the residue into the MSW landfill after segregation.

No specific intermediate cover is provided other than the daily cover. However if the problem of odor persists intermediate cover may also be considered. In that case, one intermediate cover of soil of thickness 450 mm may be provided at the mid-level

The top cover shall have the highest point at the center and slopes towards the edges radially with around 4 % slope towards the embankment. A network of intercepting drains and peripheral drains are provided for quick draining of the rainwater. The facility shall have green belts, trees and turfing on the embankment/ formation slopes as slope protection and to present pleasing appearance

Selection of Liner System

The objective in the design of liners is to minimize the infiltration of leachate and gases into subsurface soils below the landfill eliminating the potential for ground water contamination. Composite liner designs employing a geo-membrane and clay layer provide more protection and are hydraulically more effective than other types of linings. Liners provide an effective hydraulic barrier beneath the waste to contain the waste and to allow for effective removal of leachate generated during containment.

In the present MSW landfill, single composite liner system shall be provided meet stringent performance criteria that provide a high margin of safety. Each of the liner systems is discussed in more detail in the following sections.

Bottom Liners

The bottom portion of the landfill directly rests on stable compacted specially prepared soil bed. The various layers of liners from bottom to top are:

- 1000 mm thick compacted clay/ amended soil ($k \leq 10^{-7}$ cm/sec.)
- 1.5 mm thick High Density Polyethylene (HDPE) Geo-membrane
- 200mm thick silty sand protective layer
- 300 mm thick granular soil drainage layer (Leachate Collection Layer)

Side Liners

*The side slopes in the soil formation are similarly made on firm compacted specially prepared stable slopes of 2H: 1V.*The various layers of side liners from bottom to top are:

- 600 mm thick compacted clay/ amended soil ($k \leq 10^{-7}$ cm/sec.)
- 1.5 mm thick High Density Polyethylene (HDPE) Geo-membrane
- 100 mm thick protective layer (selected soil)

Top Cover Liners

*The top cover the landfill directly rests on compacted specially shaped waste surface. The bed shall be laid to 3 to 5 % slope (after allowing for pre-grade settlements of the waste) for providing good natural drainage.*The various layers of liners from bottom to top are:

- 450 mm thick granular soil (Gas Collection layer)
- 600 mm thick compacted clay/ amended soil ($k \leq 10^{-7}$ cm/sec.)
- 300 mm thick topsoil /Sweet earth laid to 4% slope

Selection of leachate control facilities

The leachate collection layer is provided in the granular soil (drainage) layer of the bottom liner system. The collection layer shall comprise of a network of perforated HDPE lateral pipes laid at a slope of 2% and 20 m c/c spacing. These laterals collect leachate and transfer it to the HDPE header pipe, which is laid at a slope of 1%. The header pipe ultimately transfers the leachate into the Leachate collection sump. The general arrangement of header and laterals is provided in the layout plan of MSW landfill.

The landfill receives municipal solid waste only. All operations are planned in such a way that generation of liquid waste is minimum and the leachate directly reaches the leachate collection sump for treatment. Apart from the leachate generated as a result of inflow of rainwater into the landfill, the seepage from the moisture content present in the solid waste and the moisture present in the daily soil cover are the few sources of leachate generation. 10 % evaporation has been considered.

Total Area of landfill = 5121 sq. m
Operational Area = 5121/5 = 1024.2 sq. m
Max. Daily rainfall = 98.5 mm (recorded in Aizawl)

Maximum daily rainfall data i.e. 98.5 mm of 2002 year has been considered. This is the highest daily rain fall in the past 10 years.

As per **CPHEEO Manual** Leachate quantity

Estimate of leachate generation to be 25 – 50 % of precipitation
Adopting 35 % leachate generation
i.e. 0.35 x 98.5 = 34.47 mm/day
Leachate volume = volume of precipitation + volume of pore squeeze liquid – volume lost through evaporation – volume of water absorbed by waste

Leachate volume = (1024.2x0.03476) +0– [(0.15x0.03476 x1024.2) + (0.5x 0.03476 x1024.2)]
= 35.60+0-5.34+17.80
= 48.06 m^3/day

Total (Max.) flow = 48.06 m^3/day
The conveyance system has been designed for a lesser flow that will come with time and that also at a very slow rate, therefore lateral pipe of 110 mm and header pipe of 250 mm are provided for leachate collection and removal.

Leachate collection sump sizing
Max. Flow = 50 cum/day
Retention Time = 1 day
Volume required = 50 m^3
Provide a sump of size = 5m x 5 m x 2m

Selection of landfill gas control facilities

The landfill is a secured landfill with single composite liners well in place at bottom, sides and top. The liner system consists of one-layer of geomembrane and one-layer of 2ft. (600mm) thick amended clay as liners whereby the chances of gases escaping from the ground and contaminating the groundwater and soil are avoided . The gases developed due to continued confinement of degradable wastes, if any, are released through the gas extraction facilities provided in the landfill. For this purpose GI Vents are planned at every 200 c/c.

Aesthetic Considerations

Adequate measures are planned to give a facelift by utilizing the abundantly available on site natural soil for raising buffer zones /embankments. Two rows of vegetative plantation shall be developed along the circumference of the outer embankment along with turfing on the slopes. In addition the top cover shall also be developed as a green belt

(vi) The depth of the land fill site shall be decided based on the ground water table at the site.

STATUS OF COMPLIANCE:

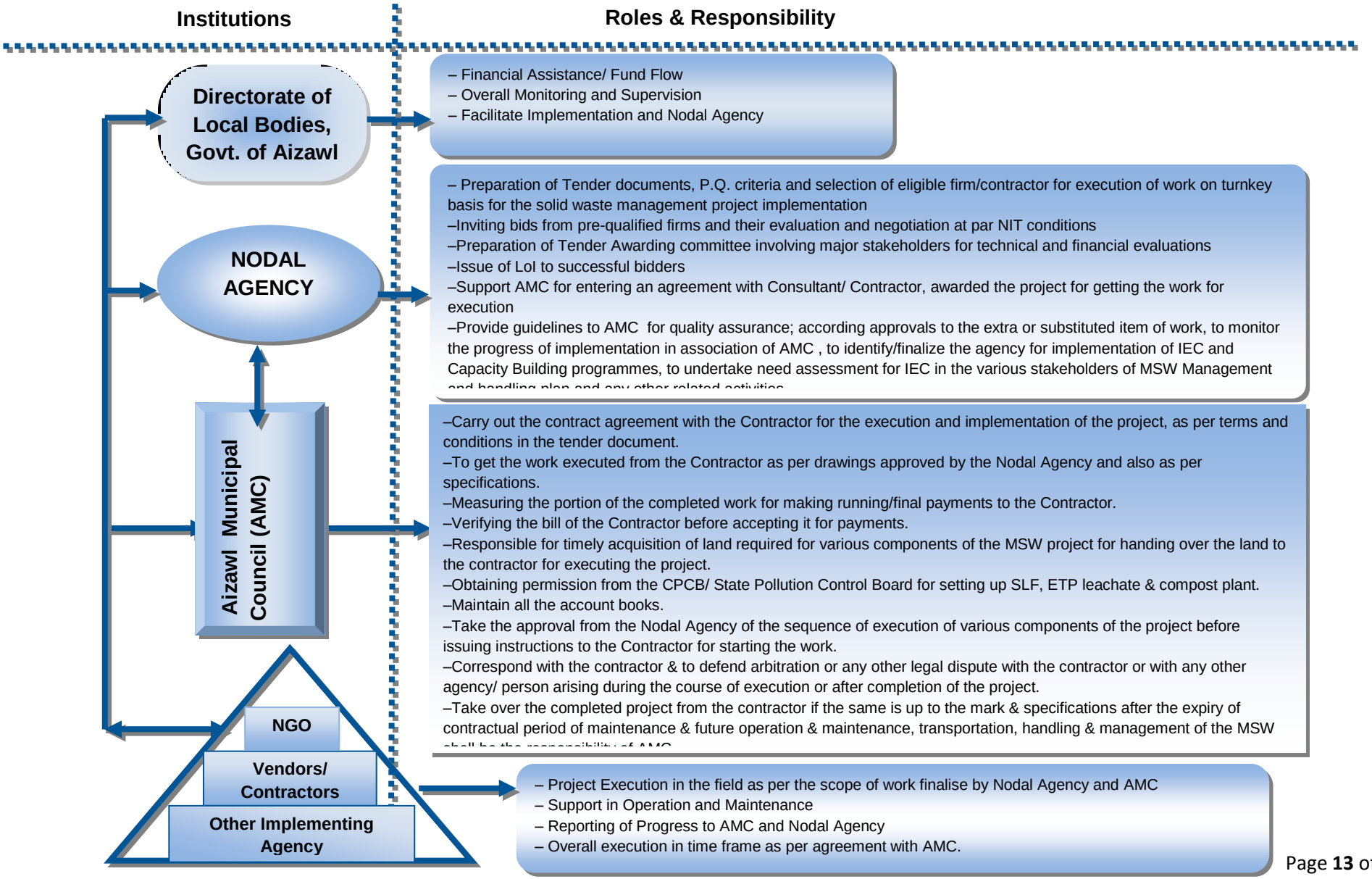
Based on the ground water table the depth of the Landfill are decided along with the topography of the site. The base of landfill i.e. top of liner has been kept at ground level 286 m and 3 m high (above GL) earthen embankment has been provided to achieve the required storage capacity within the area available. Top width of the embankment has been kept at 3 m. Inner & outer slopes of the embankment have been kept at 1V: 2H for stability of slopes. However, The Detailed Project Report is yet to be Sanction by the Ministry of Urban Development, Government of India, no activity are done at present stage.

(vii) An On Site Management Plan shall be prepared and implemented.

STATUS OF COMPLIANCE:

An On Site Management Plan has been shall be prepared and implemented as per the demand and condition of the landfill. At present the proposed management plan are as given in the figure below. However, The Detailed Project Report is yet to be Sanction by the Ministry of Urban Development, Government of India, no activity are done at present stage

Fig 2: Proposed Management Plan.



(viii) Periodical ground water/soil monitoring to check the contamination in and around the site shall be carried out.

STATUS OF COMPLIANCE:

As per rules the periodical ground water/soil monitoring to check the contamination in and around the landfill site will be carried out. Monitoring plan are given in **Table 2**

(ix) Odour control measures shall be carried out.

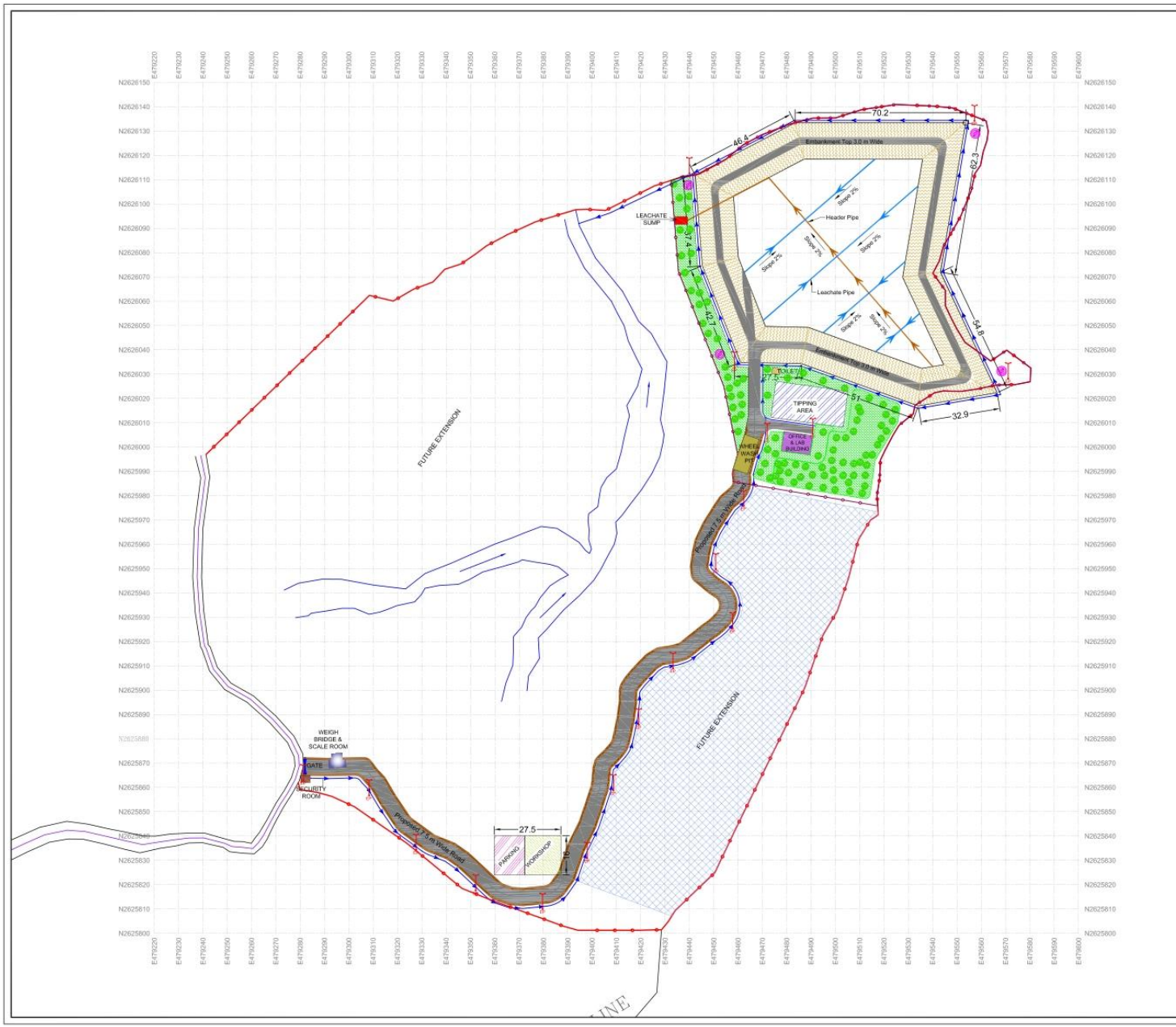
STATUS OF COMPLIANCE:

Odour control measures will be done as per rules and regulation.

(x) Green belt of at least 20 % of total area shall be provided all around the unit.

STATUS OF COMPLIANCE:

Green belt/buffer zone of more than 20% of the total area are provided all around the unit in the Revised Detail Project Report submitted to the Ministry of Urban Development, Government of India for sanction. The detailed drawings are given as below.



NOTES / REMARK : -

1. DRAWING ARE IN METER.
2. ALL GRID IS 10.0 X 10.0 METER.
3. LANDFILL AREA 10562.0 SqM. (2.61 Acres)

LEGEND :-

ROAD
SITE BOUNDARY
SITE BOUNDARY WALL
HEADER PIPE
LEACHATE PIPE
STORM WATER DRAIN
NATURAL DRAIN
GREEN BELT
ELECTRIC POLE
MONITORING WELL

DETAILS :-

ITEM NO.	ITEMS	QUANTITY & AREA
1.	ENTRY / EXIT GATE	= 1 Nos.
2.	SECURITY ROOM	= 14.7 SqM.
3.	WEIGHT BRIDGE ROOM	= 40.0 Tones
4.	TOILET	= 10.0 SqM.
5.	OFFICE + LABORATORY(G+1)	= 96.0 SqM.
6.	WHEEL WASH PIT	= 94.0 SqM.
7.	VEHICLE PARKING	= 200.0 SqM.
8.	WORKSHOP	= 200.0 SqM.
9.	RAMP	= As Required
10.	LEACHATE SUMP	= 50CUM.
11.	GREEN BELT	= 2595.0 SqM.
12.	MONITORING WELL	= 4 Nos.
13.	STREET LIGHT	= 18 Nos.
14.	7.5 m WIDE ROAD	= 390.0 M
15.	3.0 m WIDE ROAD	= 410.0 M
16.	STORM WATER DRAIN AROUND ROAD	= 431.0 M
17.	STORM WATER DRAIN AROUND LANDFILL	= 406.0 M
18.	BOUNDARY WALL	= 560.0 M

TETRA TECH INDIA LIMITED
6TH FLOOR, AGGARWAL METRO HEIGHTS, NETAJI SUBHASH PLACE, PITAMPURA, NEW DELHI - 110 034
TEL.: +91 11 4500 7500/ 8500 FAX: +91 11 4500 7599

PROJECT	DEVELOPMENT OF INTEGRTAED MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM FOR THE AIZAWL TOWN, MIZORAM
CLIENT	SIPMIU AIZAWL,MIZORAM
TITLE	PROPOSED LAYOUT PLAN OF LANDFILL SITE

SCALE	1CM : 10M
DESIGNED	GKS
DRAWN	SR
CHECKED	GKS
APPROVED	SNM
DATE	30.11.2012

DRAWING No.: TIL /3279/SWM/04 | SHEET 1 OF 1 | REV. 01 | A2.

FILE No.: P:\3279\167-3279-1005\CAD\Pulket\04

(xi) The project proponent will set up separate environmental management cell for effective implementation of the stipulated environmental safeguards under the supervision of a senior Executive.

STATUS OF COMPLIANCE:

Environmental issues of the project coordinated by an Environmental Specialist within the SIPMIU/DSMC, who ensures that all subprojects, comply with environmental safeguards. An Environmental Monitoring Specialist (EMS) who is part of the DSMC team implements the Environmental Monitoring Plan from each IEE to ensure that mitigation measures are provided and protect the environment as intended. **Figure 1** shows institutional responsibility for implementation of environmental safeguard monitoring at different level.

EMP shows that most of the mitigation activities are the responsibility of the Construction Contractors (CC) employed to build the infrastructure during the construction stage or the O&M Contractors employed to conduct maintenance or repair work when the system is operating. There are also some actions that need to be taken by SIPMIU in their role as project proponent, and some actions related to the design that would be implemented by the DSMC.

A program of monitoring would be conducted to ensure that all parties take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. This would be conducted by a qualified Environmental Monitoring Specialist (EMS) from the DSMC. The EMS is responsible for all monitoring activities, reporting the results and conclusions to SIPMIU. The EMS will also recommend remedial action if measures are not being provided or are not protecting the environment effectively. The EMS may be assisted by environmental specialist in particular technical fields, and junior or medium-level engineers who can make many of the routine observations on site. Post-construction monitoring will be conducted by the relevant Government Agency (GA) to whom responsibility for the infrastructure will pass once it begins to operate[1]. ANNEXURE – 1 shows the details of SIPMIU and DSMC environmental cell set-up personnel.

EMP shows that most of the mitigation measures are fairly standard methods of minimizing disturbance from building in urban areas (maintaining access, planning work to avoid sensitive times, finding uses for waste material, etc), and experienced contractors should be familiar with most of the requirements. Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects.

ANNEXURE –II gives the details of Grievance redressal mechanism.

[1] In the operational period some infrastructure will be the responsibility of the Municipal Boards/Councils, whilst others will be the responsibility of the appropriate branch of the State government (such as PWD, PHED, etc)

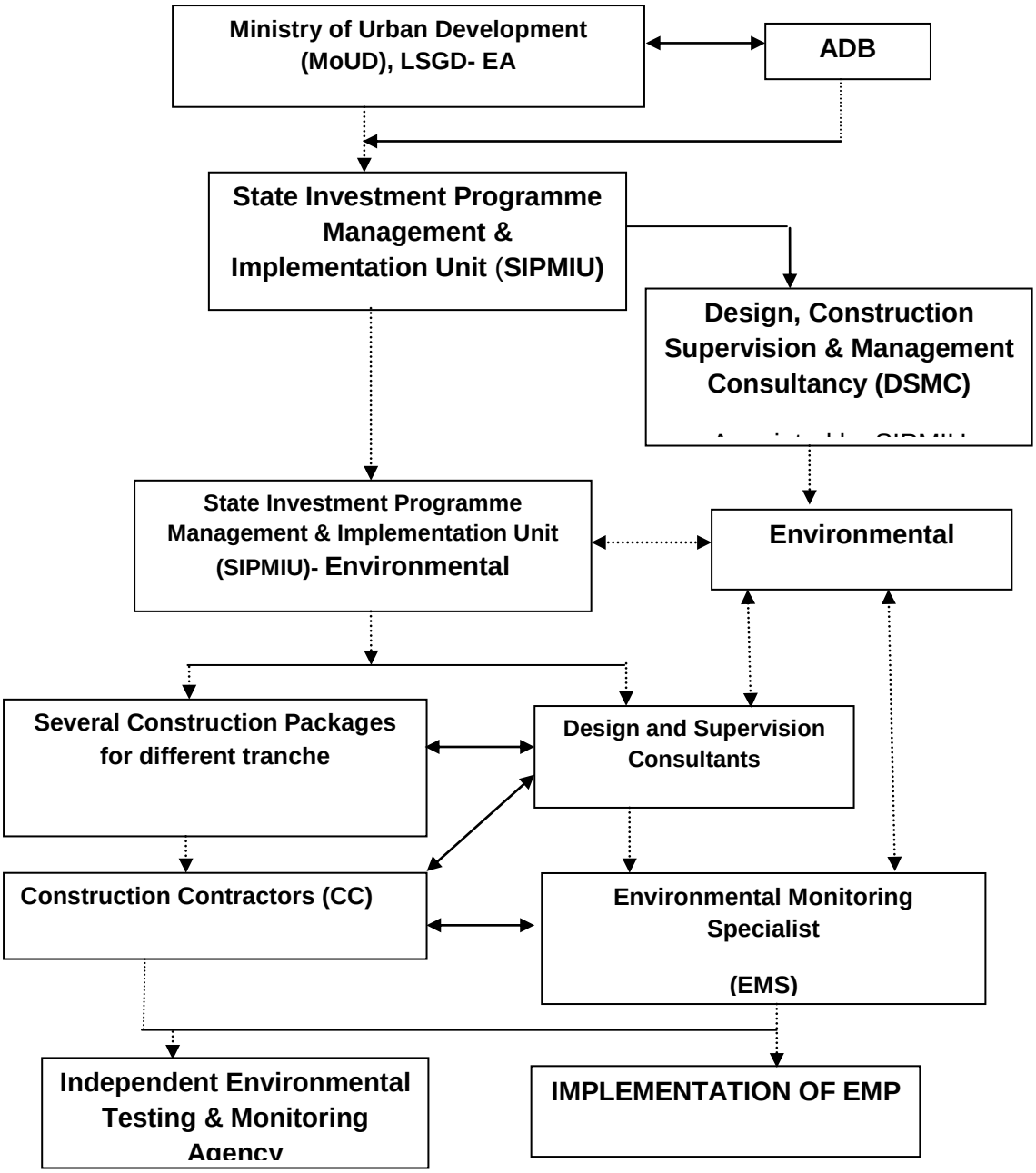


Figure 1: Institutional Responsiblity- Environmental Organization SIPMIU

ANNEXURE – 1: MONITORING TEAM DETAILS

Sl.No	Name	Position
1	Valbuanga	Project Director, SIPMIU
2	Zothanzuali	Dy. Project Director, SIPMIU
3	Dorothy Laldinpuii	Social Development Officer, SIPMIU
4	Ribrata Guha	i/c Team Leader, DSMC
5	Lalhmuaka	Asst. Engineer (Environment &SWM), SIPMIU
6	Rahul Kumar	Environment Specialist, DSMC
7	C.Dorema	Community Awareness Expert, DSMC
8	Ignatius Zomuankima	Resettlement & Rehabilitation Expert, DSMC
9	Gracy Tochhawng	Asst. Engineer (Environment &S&S), DSMC
10	P.C. Ramdinthara	Asst. Engineer, Contractor, S.S Construction
11	Lalramdina	i/c Environment, works, Tantia Construction ltd.
12	X.M.E. Jude	Dy. Project Manager, M/s Eco Protection Engg, ltd.
13	Lalmalsawma	i/c Environment, Gangwal engg. Ltd.

ANNEXURE – 2 : GRIEVANCE REDRESSAL MECHANISM

Grievances of APs will first be brought to the attention of the implementing NGO or Resettlement Officer (RO) of SIPMIU. Grievances not redressed within 30 days by the NGO or RO will be brought to the Grievance Redress Committee (GRC), established in each State. The GRC will comprise the Investment Program Director, RO, and Land Acquisition Officer (LAO), implementing NGO representative, female and male AP representatives (including vulnerable households) and an eminent member of the community. The GRC will meet every month, determine the merit of each grievance, and resolve grievances within a month of receiving the complaint; failing which the grievance will be addressed by the IPEC chaired by the Finance Secretary, with Secretaries of all the concerned departments as members. The IPEC would be fully empowered by the State Government to take decisions in all matters related to the Program. Further grievances will be referred by APs to appropriate courts of law. Records will be kept of all grievances received including : contact details of the complainant, date of receipt of complaint, nature of grievance, agreed corrective actions and the date these were affected and final outcome. All costs involved in resolving grievances will be borne by SIPMIU.

STATE LEVEL		
1.	Minister, UD&PA Department, Mizoram	Chairman
2.	Deputy Commissioner	Convener
3.	Secretary, UD&PA, Govt. of Mizoram	Member
4.	Secretary, Law and Judicial Department	Member
5.	CEO, Aizawl Municipal Council	Member
6.	Project Director, SIPMIU	Member
CITY LEVEL		
1.	Deputy Commissioner , Aizawl	Chairman
2.	Project Director, SIPMIU	Convener
3.	CEO, Aizawl Municipal Council	Member
4.	Councilor of concern ward	Member

5.	Chairman of concerned Local Council	Member
6.	Chief Engineer, PHED	Member
7.	Chief Engineer, PWD	Member
8.	Director, UD &PA	Member
9.	President Central YMA	Member
10.	President, MUP	Member
11.	President, Mizoram Consumer Union	Member
12.	President, MHIP	Member