



**SIX MONTHLY
COMPLIANCE REPORT ON
SOLID WASTE
MANAGEMENT CENTRE,
TUIRIAL, AIZAWL
MIZORAM.**



**Prepared By ECOMS
&
AIZAWL MUNICIPAL CORPORATION**

2023

TABLE OF CONTENTS

Sl.no	Contents	Page number.
1	Chapter 1: Introduction	1-2
2	Chapter 2: Compliance to General and specific conditions	3-7
3	Chapter 3: Detailed Environmental Monitoring Report	8-12
4	Annexure	13-59

Introduction and Project Description

Introduction

This project has been granted environmental clearance letter no. MoEF Letter No.: F.No.10-73/2010-IA.III. dated the 9/01/13. by the Ministry of Environment and Forest.

Project Description

Salient Features:

The project is of Municipal Solid Waste Management facility. The proposed plant is a 165.39 MTPD municipal solid waste processing plant in which composting (63 MTPD) is to process the Municipal solid waste of Aizawl City by SIPMIU at Tuirial which is approx. 20 km away from Aizawl City.

The component includes Collection, Segregation, Composting and land filling. The technology used for its process is “accelerated aerobic composting under controlled condition”.

Waste Water and Rainwater:

The leachate collection layer is provided in the granular soil (drainage layer or the bottom liner) of the system. The collection layer shall comprise of a network of perforated high density polyethylene (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 low 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.

.

Parking:

The site has adequate parking facilities.

Project Status

Project site is in post-constructional/ operational phase.

Purpose of the Report

This six-monthly report is being submitted as per the condition stipulated in the Environmental Clearance letter. Further, the study will envisage the environmental impacts that have generated in the local environment due to the project.

The environmental assessment is being carried out to verify: -

- That the project does not have any adverse environmental impacts in the project area and its surrounding.
- Compliance with the conditions stipulated in the Environmental Clearance Letter.
- That the Project Management is implementing the environmental mitigation measures as suggested in the approved Form-1, Form-1A, Environmental Management Plan (EMP) and building plans.
- The project proponent is implementing the environmental safeguards in true spirit.
- Any non-conformity in the project with respect to the environmental implication of the project.

Chapter 2.

Part- A General Conditions:

Sl.No	GeneralConditions	Compliance
1	Full support shall be extended to the officers of this ministry/Regional Office at Shillong by the project proponent during inspection of the project for monitoring purposes by furnishing full details and action plan including action taken reports in respect of mitigation measures and other environmental protection activities	Complied
2	A six-Monthly monitoring report shall need to be submitted by the project proponents to the Regional Office of this Ministry at Shillong regarding the implementation of the stipulated conditions.	It has been submitted regularly.
3	Ministry of Environment & Forests or any other competent authority may stipulate any additional conditions or modify the existing ones, if necessary, in the interest of environment and the same shall be complied with.	No modifications were made.
4	The Ministry reserves the right to revoke this clearance if any of the conditions stipulated are not complied with the satisfaction of the Ministry.	Noted
5	In the event of a change in project profile or change in the implementation agency, afresh reference shall be made to the Ministry of Environment and Forests.	Noted
6	The project proponents shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of start of land development work.	Complied
7	A copy of the clearance letter shall be marked to concern Panchayat/local NGO, if any, from whom any suggestion/representation have been made received while processing the proposal.	It can be issued as per requirements.
8	State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industries Centre and Collector's Office/ Tehsildar's office for 30 days.	State Pollution Control Board were informed.
9	These stipulations would be forced among others under the provisions of Water (Prevention and Control of Pollution) Act 1974, the Air.	Noted

PART-B Specific Conditions:

Sl. no	SPECIFIC CONDITIONS	ACTION TAKEN	REMARKS
1	The “Consent to Establish” shall be obtained from the Board under Air and Water Act a copy shall be submitted to the Ministry before start of any construction work at the site.	“Consent to Establish” was granted by Mizoram Pollution Control Board, Aizawl, Mizoram vide letter No: H88088/Poltn/9(154)2015-MPCB/151 dated 7th Sept. 2018.	Document attached in previous compliance report and will be renewed at the time of expiration. Document- Annexure I.
2	Existing landfill site shall be closed scientifically.	The existing landfill is proposed for reconstruction.	The existing landfill will be closed scientifically as per the Environmental Clearance condition as soon as possible.
3	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.	Waste collection is done by PPP mode at point to point under supervision of concerned local council in every locality. The wastes are collected separately as dry and wet waste. The vehicles (158) collected from different 85 localities every day except on Sunday. The vehicles were properly covered and some vehicles are specially designed for garbage truck. Waste segregation at source have been practiced. Each local council has employed 5 unskilled labour in each localities for door to door collection.	Apart from some localities the said rules is being followed in every possible manner.
4	The gas generated from Landfill facility shall be collected and disposed/utilized per rules.	Gas generation plan was already made by SIPMIU. Due to technical issues, it was not implemented which will be implement as soon as the landfill meet requirements. AMC has prepared a new DPR for Landfill where in LFG will be harness effectively. (Annexure VI)	Landfill is proposed for re-construction and maintenance. Hence there is no Landfill gas generated.
5	The Leachates from the facility shall be collected and	Maintenance and monitoring of leachate treatment tank was done in	Testing results of leachate is

	treated to meet the prescribed standards before disposal.	which the treatment facility and filter material were re-installed. Also, a new leachate collection and treatment system with a capacity of 68809lts (with the same size as the existing treatment tank), for treating leachate from pre-storage area is under construction and nearly completed.	attached as “Effluent water testing results”. The leachate quality were under the prescribe limit. Document- Annexure II. Water Section Code WW2 Page No.36
6	The depth of the Landfill site shall be decided based on the ground water table at the site.	Low Ground water Potential. SIPMIU has dug a Borewell near the landfill site where samples were taken for analysis. In the new proposed Landfill, the floor and wall of the Landfill will be RCC, which will prevent any seepage/percolation of leachate to underground to prevent contamination of underground water.	Map indicating Ground Water Potential attached in report submitted on December 2022.
7	An on-site Emergency Management shall be prepared and implemented.	On-site Emergency Management Plan was prepared and implemented effectively. Aizawl smart city will provide 1 fire tender in case of emergency.	Document already submitted in earlier report.
8	Periodic ground water/soil monitoring to check the contamination in and around the site shall be carried out.	Soil monitoring have been done from 5 locations from the project site. Ground water monitoring has been done by taking a water sample from a borewell that is located 2.5 metres from the landfill site.	Report attached for Water, Air, Noise and Soil monitoring. Document- Annexure II. Groundwater sample from borewell has been taken and analysed. Document- Page No.41.
9	Odour control measures shall be carried out.	Covering the landfill weekly with soil to reduce odour from newly deposited wastes will be carried out once the main Landfill is in full operation. -MSW Rules 2016.	Landfill is under re-construction.
10	Green Belt of at least 20% of total area shall be provide all around the unit.	Green Belt (38% of the total area) is maintained surrounding the unit. More trees will be planted during the next planting season.	List of trees inside green belt and map showing green

			belt area was submitted on July 2023 compliance report. Document- Annexure III.
11	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.	Separate environmental cell was set up.	List of members is attached in this report. Document- Annexure IV.

Chapter 3

Details of Environmental Monitoring

AMBIENT AIR QUALITY MONITORING

Ambient Air Quality Monitoring Stations

Ambient air quality monitoring has been carried out at Five locations in the month of May and August, 2023 . This will enable to have an analytical understanding about air quality and the changes in the air environment in the study area with respect to the condition prevailing. The location of the ambient air quality monitoring station is given in Table.

Details of Ambient Air Quality Monitoring Stations

S. No .	Location Code	Location Name/Description	Environmental Setting
1.	A1	Tuirial SWM project site	Landfillsite
2	A2	Tuirial SWM 1km north from Project site	Residential
3	A3	Tuirial SWM 1km South from project site	Residential
4	A4	Tuirial SWM 1km Northeast From project site	Residential
5	A5	Tuirial SWM 1.2km Southeast from project site	Residential

Ambient Air Quality Monitoring Methodology

Monitoring was conducted in respect of the following parameters:

- Particulate Matter 2.5 (PM 2.5)
- Particulate Matter 10 (PM 10)
- Sulphur Dioxide (SO₂)
- Oxides of Nitrogen (NO₂)
- Carbon Monoxide (CO)

The duration of sampling of PM_{2.5}, PM₁₀, SO₂ and NO_x was 8 hourly continuous sampling per day and CO was sampled for 1 hours continuous, thrice in 24 hour duration monitoring. The

monitoring was conducted for one day at the location. This is to allow a comparison with the National Ambient Air Quality Standards.

The air samples were analyzed as per standard methods specified by Central Pollution Control Board (CPCB) and IS: 5182. The techniques used for ambient air quality monitoring and minimum detectable levels are given in the Table.

Fine Particulate Sampler (Greentech High Volume Air Sampler) instruments have been used for monitoring Particulate Matter 2.5 (PM_{2.5} i.e. <2.5 microns), and Respirable Dust Sampler was used for sampling Respirable fraction (<10 microns), gaseous pollutants like SO₂, and NO_x. Bladder and Aspirator bags were used for collection Carbon monoxide samples. Gas Chromatography techniques have been used for the estimation of CO.

Table: Techniques used for Ambient Air Quality Monitoring

S. No.	Parameter	Technique	Technical Protocol
1	Particulate Matter 2.5	Fine Particulate Sampler (Greentech High Volume Air Sampler), Gravimetric Method	IS-5182 (Part-IV)
2	Particulate Matter 10	Respirable Dust Sampler (Greentech High Volume Air Sampler), with cyclone separator, Gravimetric Method	IS-5182 (Part-23)
3	Sulphur dioxide	Modified West and Gaeke	IS-5182 (Part-II)
4	Nitrogen dioxide	Jacob & Hochheiser	IS-5182 (Part-VI)
5	Carbon Monoxide	Gas Chromatography	IS-5182 (Part-X)

AMBIENT NOISE MONITORING

Ambient Noise Monitoring Locations

The main objective of noise monitoring in the study area is to assess the present ambient noise levels in project site due to various construction allied activities and increased vehicular movement. A preliminary reconnaissance survey has been undertaken to identify the major noise generating sources in the area. Ambient noise monitoring was conducted at 1 locations in the month of May and August 2023, as given in below.

Details of Ambient Noise Monitoring Stations

S. No.	Location Code	Location Name/Description	Present Landuse
1.	L-1	Tuirial SWM project site	Landfill Site
2	L-2	Tuirial SWM 1km South from project site	Residential
3	L-3	Tuirial SWM 1 km North from project site	Residential
4	L-4	Tuirial SWM 1 km Northeast from project site	Residential

Methodology of Noise Monitoring

Noise levels were measured using integrated sound level meter Noise meter HP-822A. The integrating sound level meter is an integrating/ logging type with Octave filter attachment with frequency range of 31.5 to 16000 Hz. This instrument is capable of measuring the Sound Pressure Level (SPL), Leq and octave band frequency analysis.

Noise level monitoring was carried out continuously for 2 hours. The noise levels were monitored on working days only. During each hour Leq were directly computed by the instrument based on the sound pressure levels.

GROUNDWATER AND SURFACE WATER QUALITY MONITORING

Groundwater Quality Monitoring Locations

Groundwater table were below 2 meters depth. Groundwater were taken from two site 1. Tuirial 2. Borewell adjacent to landfill site.

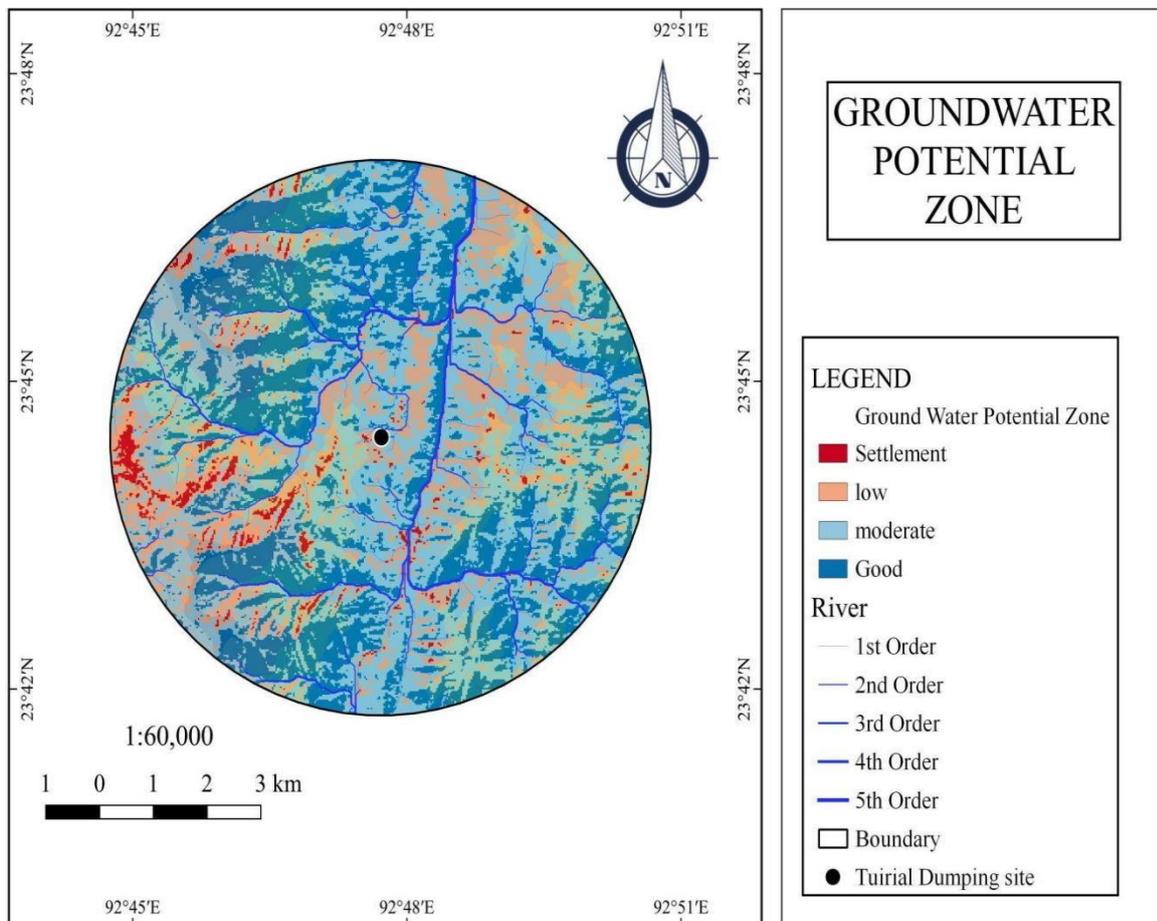
Surface Water and Waste Water:

Surface Water samples were collected from five location and waste water from two Location sites. Sample collection and analysis were done with the standard given by IS 3025-3 (1987): Methods of Sampling and Test (Physical and Chemical) for Water and Wastewater. The sample were analyzed for various parameters to compare with the standards for drinking water as per IS: 10500 for Surface water sources. The details of water sampling locations are given in Table.

Details of Water Quality Monitoring Station

S. No.	Location Code	LocationName/Description
1.	WW1	Location1 (Tuirial SWM) Leachate
2.	WW2	Location6 (Tuirial SWM) Leachate
3	SW1	Location1 (Tuirial River)
4	SW2	Location2 (Luite, perennial stream)
5	GW1	Location3 (Handpump well at Tuirial village) Groundwater
6	SW3	Location4 (Muthi River)
7	GW2	Location5 (Borewell) Groundwater

Fig: Ground Water Potential Zone.



SOIL MONITORING

Soil Monitoring Locations

The objective of the soil monitoring is to identify the impacts of ongoing project activities on soil quality and also predict impacts, which have arisen due to execution of various constructions allied activities. Accordingly, a study of assessment of the soil quality has been carried out.

To assess impacts of ongoing project activities on the soil in the area, the physico-chemical characteristics of soils were examined by obtaining soil samples from selected points and analysis of the same. One sample of soil was collected from the project site for studying soil characteristics, the location of which is listed in Table.

Details of Soil Quality Monitoring Location

S. No.	Location Code	Location Name/Description
1.	L1	Tuirial SWML1 (Top Left)
2.	L2	Tuirial SWML2 (Center)
3.	L3	Tuirial SWML3 (Top Right)
4.	L4	Tuirial SWML4 (Bottom-right)
5.	L5	Tuirial SWML5 (Bottom left)

Methodology of Soil Monitoring

The sampling has been done in line with IS: 2720 & Methods of Soil Analysis, Part-1, 2nd edition, 1986 of American Society for Agronomy and Soil Science Society of America. The homogenized samples were analyzed for physical and chemical characteristics (physical, chemical and heavy metal concentrations). The soil samples were collected in the month of May and August, 2023.

The samples have been analyzed as per the established scientific methods for physico- chemical parameters. The heavy metals have been analyzed by using Atomic Absorption Spectro-photometer and Inductive Coupled Plasma Analyzer.

ANNEXURE I

Consent to Establish

OFFICE OF THE MIZORAM STATE POLLUTION CONTROL BOARD
AIZAWL : MIZORAM

NO OBJECTION CERTIFICATE (CONSENT TO ESTABLISH)
(RENEWED)

No. H.88088/Poltn/9(154)/2015-MPCB/151 : Dated Aizawl, the 7th September, 2018
Validity: 10.8.2018 - 9.8.2019

NO OBJECTION CERTIFICATE (CONSENT TO ESTABLISH) granted to the Project Director, State Investment Program Management & Implementation Unit (SIPMIU), Government of Mizoram for setting up of COMPOST PLANT WITH ENGINEERED LANDFILL having a capacity of 150 tons/day for Solid Wastes Management of Aizawl City at Tuirial, Mizoram under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 and Section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 is hereby *renewed for another one (1) year with effect from 10th August, 2018* with reference to the application No. W-11020/7/2017-PD/SIPMIU (NERCCDIP)/56 Dt. 17.08.2018.

All the conditions stipulated in the original certificate shall remain same and shall be strictly complied with.

**GREEN
CATEGORY**

Sd/- C. LALDUHAWMA
Member Secretary

Mizoram Pollution Control Board
Dated Aizawl, the 7th September, 2018

Memo No. H.88088/Poltn/9(154)/2015-MPCB/151 :
Copy to: Project Director, State Investment Program Management & Implementation Unit (SIPMIU), Government of Mizoram with reference to the application No. W-11020/7/2017-PD/SIPMIU (NERCCDIP)/56 Dt. 17.08.2018


(C. LALDUHAWMA)
Member Secretary
Mizoram Pollution Control Board

Mizoram State Pollution Control Board, New Secretariat Complex, Thiruvananthapuram, Khasi, Aizawl, Mizoram-796001
Ph.No. 2336173/2336598 Fax 2336591 Email: mpcb@nic.gov.in Website: http://www.mpcb.mizoram.gov.in

Office of the Program Director
SIPMIU (NERCCDIP)
Aizawl : Mizoram

Receipt No. 198
Date 08/11/18
Section _____

ANNEXURE II
TEST RESULTS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021

ECOMS



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Location 1(Tuirial SWM)

Coordinates: 23° 44'45"N 92° 47'50"E

Sample Description: Leachate

Type of Sampling: Once

Nature of Sample: Waste water quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	W1
Colour			Yellowish
Odour			Decayed
Temperature	°C		32
pH		5.5-9	7.26
Turbidity	NTU	NA	57
Electrical Conductivity	µS	NA	795
Total Dissolve Solids	Mg/L	2100	2000
Total Suspended Solids	Mg/L	200	50
Alkalinity	Mg/L	NA	265
Hardness	Mg/L	NA	440
Calcium	Mg/L	NA	38
Magnesium	Mg/L	NA	402
Free Carbondioxide	Mg/L	NA	23
Sulphate	ppm	NA	37.6
Phosphate	ppm	NA	4.9
Nitrate-N	ppm	NA	36
Ammonia-N	ppm	50	45.65
Chloride	Mg/L	600	520
Dissolve Oxygen	Mg/L	NA	8
Biological Oxygen Demand	Mg/L	100	186
Chemical Oxygen Demand	Mg/L	250	563

Laboratory Technician





Sampling Location: Location 6(Tuirial SWM)

Coordinates: 23° 44'39"N 92° 47'51"E

Sample Description: Leachate

Type of Sampling: Once

Nature of Sample: Waste water quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	L1
Colour			Brownish
Odour			Decayed
Temperature	°C		34
pH		5.5-9	7.28
Turbidity	NTU	NA	908
Electrical Conductivity	µS	NA	1876
Total Dissolve Solids	Mg/L	2100	2400
Total Suspended Solids	Mg/L	200	68
Alkalinity	Mg/L	NA	1100
Hardness	Mg/L	NA	125
Calcium	Mg/L	NA	23.6
Magnesium	Mg/L	NA	101.4
Free Carbondioxide	Mg/L	NA	34
Sulphate	ppm	NA	11.93
Phosphate	ppm	NA	5.453
Nitrate-N	ppm	NA	39.4
Ammonia-N	ppm	50	59
Chloride	Mg/L	600	530
Dissolve Oxygen	Mg/L	NA	1.3
Biological Oxygen Demand	Mg/L	100	223
Chemical Oxygen Demand	Mg/L	250	820



Laboratory Technician

EMSECOMS

WATER:

Sampling Location: Location 1 (Tuirial River)

Coordinates: 23° 43'04"N 92° 47'58"E

Sample Description: Surface water Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	Test Method	TR
Colour	Hazen	5 to 15	IS 10501	Clear
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	26
pH		6.5-8.5	ICMR / BIS	5.96
Turbidity	NTU	1	IS 10500	290
Electrical Conductivity	µS	300	ICMR	1099
Total Dissolve Solids	Mg/L	100	WHO	>1000
Total Suspended Solids	Mg/L	75	ICMR / BIS	20,000
Alkalinity	Mg/L	600	CPCB	60
Hardness	Mg/L	300	CPCB	276
Calcium	Mg/L	75	BIS	48
Magnesium	Mg/L	30	BIS	228
Free Carbondioxide	Mg/L			10
Sulphate	ppm	200	CPCB	27.94
Phosphate	ppm	5	ICMR	5
Nitrate-N	ppm	150	ICMR	30
Ammonia-N	ppm	50	CPCB	0.72
Chloride	Mg/L	45	ICMR / BIS	39.56
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	8
Biological Oxygen Demand	Mg/L	<2	CPCB	2.9
Chemical Oxygen Demand	Mg/L	10	WHO	11.02



Laboratory Technician

ECOMS

Sampling Location: Location 2 (Luite)

Coordinates: 23° 45'30"N 92° 48'01"E

Sample Description: Surface water Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	Test Method	Sample H
Colour	Hazen	5 to 15	IS 10501	Cloudy
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	23.5
pH		6.5-8.5	ICMR / BIS	5.66
Turbidity	NTU	1	IS 10500	29
Electrical Conductivity	µS	300	ICMR	122
Total Dissolve Solids	Mg/L	100	WHO	32
Total Suspended Solids	Mg/L	75	ICMR / BIS	58
Alkalinity	Mg/L	600	CPCB	30
Hardness	Mg/L	300	CPCB	120
Calcium	Mg/L	75	BIS	74
Magnesium	Mg/L	30	BIS	46
Free Carbondioxide	Mg/L			6
Sulphate	ppm	200	CPCB	8.39
Phosphate	ppm	5	ICMR	1.3
Nitrate-N	ppm	150	ICMR	0.017
Ammonia-N	ppm	50	CPCB	0.304
Chloride	Mg/L	45	ICMR / BIS	28.97
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	8.8
Biological Oxygen Demand	Mg/L	<2	CPCB	1.6
Chemical Oxygen Demand	Mg/L	10	WHO	6.28



Laboratory Technician

ECOMS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Location 3(Tuikhur at Tuirial village)

Coordinates: 23° 43'07"N 92° 47'56"E

Sample Description: Surface water Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	Test Method	TK
Colour	Hazen	5 to 15	IS 10501	Clear
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	22
pH		6.5-8.5	ICMR / BIS	5.99
Turbidity	NTU	1	IS 10500	24
Electrical Conductivity	µS	300	ICMR	246
Total Dissolve Solids	Mg/L	100	WHO	54
Total Suspended Solids	Mg/L	75	ICMR / BIS	43
Alkalinity	Mg/L	600	CPCB	30
Hardness	Mg/L	300	CPCB	83
Calcium	Mg/L	75	BIS	28
Magnesium	Mg/L	30	BIS	55
Free Carbondioxide	Mg/L			8
Sulphate	ppm	200	CPCB	189.6
Phosphate	ppm	5	ICMR	0.4
Nitrate-N	ppm	150	ICMR	8
Ammonia-N	ppm	50	CPCB	0.023
Chloride	Mg/L	45	ICMR / BIS	30.38
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	14.2
Biological Oxygen Demand	Mg/L	<2	CPCB	1.8
Chemical Oxygen Demand	Mg/L	10	WHO	6.69



Laboratory Technician

ECOMS

Sampling Location: Location 4(Muthi River)

Coordinates: 23° 45'38"N 92° 48'28"E

Sample Description: Surface water Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	Test Method	M1
Colour	Hazen	5 to 15	IS 10501	Cloudy
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	24
pH		6.5-8.5	ICMR / BIS	6.03
Turbidity	NTU	1	IS 10500	116
Electrical Conductivity	µS	300	ICMR	311
Total Dissolve Solids	Mg/L	100	WHO	43
Total Suspended Solids	Mg/L	75	ICMR / BIS	46
Alkalinity	Mg/L	600	CPCB	80
Hardness	Mg/L	300	CPCB	154
Calcium	Mg/L	75	BIS	35
Magnesium	Mg/L	30	BIS	119
Free Carbondioxide	Mg/L			7.4
Sulphate	ppm	200	CPCB	26.2
Phosphate	ppm	5	ICMR	0.01
Nitrate-N	ppm	150	ICMR	2
Ammonia-N	ppm	50	CPCB	0.053
Chloride	Mg/L	45	ICMR / BIS	28.79
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	8.4
Biological Oxygen Demand	Mg/L	<2	CPCB	1.2
Chemical Oxygen Demand	Mg/L	10	WHO	3.78



Laboratory Technician

ECOMS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021

ECOMS



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Location 5(Perennial stream near the project site)

Coordinates: 23° 44'32"N 92° 47'56"E

Sample Description: Surface water Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Quantity of sample: 2 Litres

Date of sampling: 20th May 2023

TEST REPORT

Parameters	Units	Standard	Test Method	Sample F
Colour	Hazen	5 to 15	IS 10501	Cloudy
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	19
pH		6.5-8.5	ICMR / BIS	6.08
Turbidity	NTU	1	IS 10500	21
Electrical Conductivity	µS	300	ICMR	443
Total Dissolve Solids	Mg/L	100	WHO	36
Total Suspended Solids	Mg/L	75	ICMR / BIS	24
Alkalinity	Mg/L	600	CPCB	30
Hardness	Mg/L	300	CPCB	169
Calcium	Mg/L	75	BIS	51
Magnesium	Mg/L	30	BIS	118
Free Carbondioxide	Mg/L			4
Sulphate	ppm	200	CPCB	21.92
Phosphate	ppm	5	ICMR	0.019
Nitrate-N	ppm	150	ICMR	0.027
Ammonia-N	ppm	50	CPCB	0.036
Chloride	Mg/L	45	ICMR / BIS	39.99
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	6.4
Biological Oxygen Demand	Mg/L	<2	CPCB	0.7
Chemical Oxygen Demand	Mg/L	10	WHO	4.32



Laboratory Technician

ECOMS

SOIL QUALITY:

Sampling Location: Tuirial SWM L1 (Top Left)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 20th May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 1
1	Colour		Brown
2	pH		5.93
3	Bulk Density	g/cm ³	1.32
4	Moisture Content	%	23.4
5	Water Holding Capacity		1.48
6	Sand	%	54.5
7	Silt	%	21.4
8	Clay	%	24.1
9	Texture	Class	Sandy Clay Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	183
11	Soil organic Carbon	%	4.87
12	Total Nitrogen	mg/kg	27.12
13	Available Phosphorus	mg/kg	23.21
14	Exchangeable Potassium	mg/kg	241.49
15	Sodium (Excheangable)	mg/kg	18.29
16	Calcium (Excheangable)	mg/kg	108.53
17	Magnesium (Excheangable)	mg/kg	247.69
18	Manganese (Excheangable)	mg/kg	146.1
19	Ammonium	mg/g	5.1



Laboratory Technician

ECOMS



Sampling Location: Tuirial SWM L2 (Center)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 20th May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 2
1	Colour		Brownish Yellow
2	pH		6.24
3	Bulk Density	g/cm ³	1.56
4	Moisture Content	%	22.7
5	Water Holding Capacity		1.13
6	Sand	%	80.8
7	Silt	%	10
8	Clay	%	10
9	Texture	Class	Loamy Sand
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	109
11	Soil organic Carbon	%	3.58
12	Total Nitrogen	mg/kg	21.89
13	Available Phosphorus	mg/kg	19.38
14	Exchangeable Potassium	mg/kg	201.43
15	Sodium (Excheangable)	mg/kg	22.54
16	Calcium (Excheangable)	mg/kg	217.94
17	Magnesium (Excheangable)	mg/kg	225.33
18	Manganese (Excheangable)	mg/kg	122.6
19	Ammonium	mg/g	5.1



Laboratory Technician

ECOMS



Sampling Location: Tuirial SWM L3 (Top Right)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 20th May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 3
1	Colour		
2	pH		5.964
3	Bulk Density	g/cm ³	1.448
4	Moisture Content	%	22.4
5	Water Holding Capacity		1.432
6	Sand	%	63.14
7	Silt	%	16.7
8	Clay	%	20.56
9	Texture	Class	Sandy Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	155.4
11	Soil organic Carbon	%	4.978
12	Total Nitrogen	mg/kg	23.504
13	Available Phosphorus	mg/kg	21.872
14	Exchangeable Potassium	mg/kg	229.65
15	Sodium (Excheangable)	mg/kg	22.236
16	Calcium (Excheangable)	mg/kg	246.894
17	Magnesium (Excheangable)	mg/kg	251.474
18	Manganese (Excheangable)	mg/kg	135.594
19	Ammonium	mg/g	4.88



Laboratory Technician

ECOMS

Sampling Location: Tuirial SWM L4 (Bottom right)

Sample Description: Soil Quality

Quantity of sample: 300g

Type of Sampling: Once

Date of sampling: 20th May 2023

Nature of Sample: Soil Quality

TEST REPORT

Sl. No	Parameters	Unit	Location 4
1	Colour		Yellowish Brown
2	pH		6.11
3	Bulk Density	g/cm ³	1.45
4	Moisture Content	%	25
5	Water Holding Capacity		1.63
6	Sand	%	45.5
7	Silt	%	26
8	Clay	%	28.5
9	Texture	Class	Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	149
11	Soil organic Carbon	%	4.98
12	Total Nitrogen	mg/kg	21.76
13	Available Phosphorus	mg/kg	24.17
14	Exchangeable Potassium	mg/kg	233.46
15	Sodium (Excheangable)	mg/kg	25.85
16	Calcium (Excheangable)	mg/kg	143.19
17	Magnesium (Excheangable)	mg/kg	202.32
18	Manganese (Excheangable)	mg/kg	102.1
19	Ammonium	mg/g	4.9



Laboratory Technician

ECOMS

Sampling Location: Tuirial SWM L5 (Bottom left)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 20th May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 7
1	Colour		Brown
2	pH		5.99
3	Bulk Density	g/cm ³	1.42
4	Moisture Content	%	21.6
5	Water Holding Capacity		1.55
6	Sand	%	51.1
7	Silt	%	21.1
8	Clay	%	29.8
9	Texture	Class	Sandy Clay Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	162
11	Soil organic Carbon	%	3.95
12	Total Nitrogen	mg/kg	21.56
13	Available Phosphorus	mg/kg	22.65
14	Exchangeable Potassium	mg/kg	236.32
15	Sodium (Excheangable)	mg/kg	18.66
16	Calcium (Excheangable)	mg/kg	160.02
17	Magnesium (Excheangable)	mg/kg	215.88
18	Manganese (Excheangable)	mg/kg	124.57
19	Ammonium	mg/g	4.6



Laboratory Technician
ECOMS

NOISE QUALITY:

LOCATION 1.

Sampling Location: Tuirial SWM project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	11am – 1pm	Noise meter HP-822A	IS:10988- 1984 Indian standard	65	36	75	With prescribe limit



Laboratory Technician

ECOMS



LOCATION 2.

Sampling Location: Tuirial SWM 1 km South from project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	12am – 2pm	Noise meter HP-822A	IS:10988- 1984 Indian standard	53	39	59	With prescribe limit



Laboratory Technician

ECOMS



LOCATION 3.

Sampling Location: Tuirial SWM 1 km North from project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	9am – 11am	Noise meter HP-822A	IS:10988- 1984 Indian standard	53	35	60	With prescribe limit



Laboratory Technician
ECOMS



LOCATION 4.

Sampling Location: Tuirial SWM 1 km Northeast from project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	12pm – 2pm	Noise meter HP-822A	IS:10988- 1984 Indian standard	60	39	72	With prescribe limit



Laboratory Technician
ECOMS



AIR QUALITY:

LOCATION 1:

Sampling Location: Tuirial SWM project site

Sample Description: Ambient air quality

Type of Sampling: Continuous

Nature of Sample: Air Quality

Duration of sampling: 8 hours

Date of sampling: 20th May 2023

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration ($\mu\text{g}/\text{m}^3$))	Location 1	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	33	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	12	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	8	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	3	Within prescribed limit

Laboratory Technician



LOCATION 2:

Sampling Location: Tuirial SWM 1 km north from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration ($\mu\text{g}/\text{m}^3$))	Location 2	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	36	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	13	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	BDL	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	7	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	3	Within prescribed limit



Laboratory Technician
ECOMS



LOCATION 3:

Sampling Location: Tuirial SWM 1 km South from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration ($\mu\text{g}/\text{m}^3$))	Location 3	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	30	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	17	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	10	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	4	Within prescribed limit

Laboratory Technician
ECOMS





LOCATION 4:

Sampling Location: Tuirial SWM 1 km North east from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration ($\mu\text{g}/\text{m}^3$))	Location 4	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	38	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	16	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	6	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	3	Within prescribed limit



Laboratory Technician
ECOMS

LOCATION 5:

Sampling Location: Tuirial SWM 1.2km South east from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 20th May 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration (µg/m3)	Location 5	Comments
1	PM10	IS 5182 PART 23: 2006	µg/m3	100	35	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	µg/m3	60	16	Within prescribed limit
3	SO2	IS 5182 PART 23: 2006	µg/m3	80	<1	Within prescribed limit
4	NOX	IS 5182 PART 23: 2006	µg/m3	80	7	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	µg/m3	4	3	Within prescribed limit



Laboratory Technician
ECOMS

Sampling Location: Location 1(Tuirial SWM)

Location code: WW 1

Coordinates: 23° 44'45"N 92° 47'50"E

Sample Description: Leachate

Quantity of sample: 2 Litres

Type of Sampling: Once

Date of sampling: 13th August 2023

Nature of Sample: Waste water

TEST REPORT

S. No	Parameter	Standards (SWM rules, 2000 Land disposal)	Results
1	Suspended solids, mg/l, max	200	160
2	Dissolved solids (inorganic) mg/l, max.	2100	1200
3	pH value	5.5 to 9.0	7.26
4	Ammonical nitrogen (as N), mg/l, max.	-	42.6
5	Total Kjeldahl nitrogen (as N), mg/l, max.	-	93.8
6	Biochemical oxygen demand	100	88
7	Chemical oxygen demand, mg/l, max.	-	221
8	Arsenic (as As), mg/l, max	0.2	0.13
9	Mercury (as Hg), mg/l, max	-	0.02
10	Lead (as Pb), mg/l, max	-	0.5
11	Cadmium (as Cd), mg/l, max	-	0
12	Total Chromium (as Cr), mg/l, max.	-	0.18
13	Copper (as Cu), mg/l, max.	-	>1
14	Zinc (as Zn), mg/l, max.	-	0.36
15	Nickel (as Ni), mg/l, max	-	0.18
16	Cyanide (as CN), mg/l, max.	0.2	BDL
17	Chloride (as Cl), mg/l, max.	600	394
18	Fluoride (as F), mg/l, max	-	0.32
19	Phenolic compounds (as C ₆ H ₅ OH) mg/l, max.	-	0.51



Laboratory Technician



Sampling Location: Location 6(Tuirial SWM) Location code: WW2

Coordinates: 23° 44'39"N 92° 47'51"E

Sample Description: Leachate

Quantity of sample: 2 Litres

Type of Sampling: Once

Date of sampling: 13th August 2023

Nature of Sample: Waste water

TEST REPORT

S. No	Parameter	Standards (SWM rules, 2000 Land disposal)	Results
1	Suspended solids, mg/l, max	200	165
2	Dissolved solids (inorganic) mg/l, max.	2100	1279
3	pH value	5.5 to 9.0	7.19
4	Ammonical nitrogen (as N), mg/l, max.	-	49.8
5	Total Kjeldahl nitrogen (as N), mg/l, max.	-	96.4
6	Biochemical oxygen demand	100	92
7	Chemical oxygen demand, mg/l, max.	-	236
8	Arsenic (as As), mg/l, max	0.2	0.11
9	Mercury (as Hg), mg/l, max	-	0.02
10	Lead (as Pb), mg/l, max	-	0.5
11	Cadmium (as Cd), mg/l, max	-	0
12	Total Chromium (as Cr), mg/l, max.	-	0.16
13	Copper (as Cu), mg/l, max.	-	>1
14	Zinc (as Zn), mg/l, max.	-	0.38
15	Nickel (as Ni), mg/l, max	-	0.19
16	Cyanide (as CN), mg/l, max.	0.2	BDL
17	Chloride (as Cl), mg/l, max.	600	402
18	Fluoride (as F), mg/l, max	-	0.36
19	Phenolic compounds (as C ₆ H ₅ OH) mg/l, max.	-	0.71

Laboratory Technician

ECOMS

WATER:

Sampling Location: Location 1 (Tuirial River)1 Location Code: SW1

Coordinates: 23° 43'04" 92° 47'58"E

Sample Description: Surface water Quality

Quantity of sample: 2 Litres

Type of Sampling: Once

Date of sampling:13th August 2023

Nature of Sample: Water Quality

TEST REPORT

Parameters	Units	Standard	Recommended	TR
Colour	Hazen	5 to 15	IS 10501	Clear
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	22
pH		6.5-8.5	ICMR / BIS	6.5
Turbidity	NTU	1	IS 10500	30
Electrical Conductivity	µS	300	ICMR	129
Total Dissolve Solids	Mg/L	100	WHO	14
Total Suspended Solids	Mg/L	75	ICMR / BIS	20
Alkalinity	Mg/L	600	CPCB	60
Hardness	Mg/L	300	CPCB	66
Calcium	Mg/L	75	BIS	15
Magnesium	Mg/L	30	BIS	51
Free Carbondioxide	Mg/L			10
Sulphate	ppm	200	CPCB	27.84
Phosphate	ppm	5	ICMR	BDL
Nitrate-N	ppm	150	ICMR	BDL
Ammonia-N	ppm	50	CPCB	BDL
Chloride	Mg/L	45	ICMR / BIS	30
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	17.2
Biological Oxygen Demand	Mg/L	<2	CPCB	0.6
Chemical Oxygen Demand	Mg/L	10	WHO	8.68



Laboratory Technician

ECOMS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Location 2 (Luite near landfill site) Location code: SW2

Coordinates: 23° 45'30"N 92° 48'01"E

Sample Description: Surface water Quality

Quantity of sample: 2 Litres

Type of Sampling: Once

Date of sampling: 13th August 2023

Nature of Sample: Water Quality

TEST REPORT

Parameters	Units	Standard	Recommended	Sample H
Colour	Hazen	5 to 15	IS 10501	Cloudy
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	23.5
pH		6.5-8.5	ICMR / BIS	6.36
Turbidity	NTU	1	IS 10500	29
Electrical Conductivity	µS	300	ICMR	22
Total Dissolve Solids	Mg/L	100	WHO	0.032
Total Suspended Solids	Mg/L	75	ICMR / BIS	0.03
Alkalinity	Mg/L	600	CPCB	30
Hardness	Mg/L	300	CPCB	20
Calcium	Mg/L	75	BIS	7.2
Magnesium	Mg/L	30	BIS	57.6
Free Carbondioxide	Mg/L			2
Sulphate	ppm	200	CPCB	8.39
Phosphate	ppm	5	ICMR	0.024
Nitrate-N	ppm	150	ICMR	0.017
Ammonia-N	ppm	50	CPCB	0.304
Chloride	Mg/L	45	ICMR / BIS	28.97
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	8.8
Biological Oxygen Demand	Mg/L	<2	CPCB	1.2
Chemical Oxygen Demand	Mg/L	10	WHO	0.28



Laboratory Technician

ECOMS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Location 3(Tuikhur at Tuirial village) Location code: GW1

Coordinates: 23° 43'07"N 92° 47'56"E

Sample Description: Groundwater Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Quantity of sample: 2 Litres

Date of sampling: 13th August 2023

TEST REPORT

Parameters	Units	Standard	Recommended	TK
Colour	Hazen	5 to 15	IS 10501	Clear
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	20
pH		6.5-8.5	ICMR / BIS	5.98
Turbidity	NTU	1	IS 10500	17
Electrical Conductivity	µS	300	ICMR	129
Total Dissolve Solids	Mg/L	100	WHO	10
Total Suspended Solids	Mg/L	75	ICMR / BIS	38
Alkalinity	Mg/L	600	CPCB	20
Hardness	Mg/L	300	CPCB	82
Calcium	Mg/L	75	BIS	26
Magnesium	Mg/L	30	BIS	56
Free Carbondioxide	Mg/L			12
Sulphate	ppm	200	CPCB	189.16
Phosphate	ppm	5	ICMR	BDL
Nitrate-N	ppm	150	ICMR	BDL
Ammonia-N	ppm	50	CPCB	BDL
Chloride	Mg/L	45	ICMR / BIS	30
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	15.4
Biological Oxygen Demand	Mg/L	<2	CPCB	0.7
Chemical Oxygen Demand	Mg/L	10	WHO	7.72



Laboratory Technician

Sampling Location: Location 4(Muthi River)

Coordinates: 23° 45'38"N 92° 48'28"E

Sample Description: Surface water Quality

Type of Sampling: Once

Nature of Sample: Water Quality

Location code: SW3

Quantity of sample: 2 Litres

Date of sampling: 13th August 2023

TEST REPORT

Parameters	Units	Standard	Recommended	M1
Colour	Hazen	5 to 15	IS 10501	Cloudy
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	20
pH		6.5-8.5	ICMR / BIS	6.75
Turbidity	NTU	1	IS 10500	108
Electrical Conductivity	µS	300	ICMR	207
Total Dissolve Solids	Mg/L	100	WHO	40
Total Suspended Solids	Mg/L	75	ICMR / BIS	46
Alkalinity	Mg/L	600	CPCB	110
Hardness	Mg/L	300	CPCB	94
Calcium	Mg/L	75	BIS	38
Magnesium	Mg/L	30	BIS	56
Free Carbondioxide	Mg/L			10
Sulphate	ppm	200	CPCB	26.32
Phosphate	ppm	5	ICMR	BDL
Nitrate-N	ppm	150	ICMR	2
Ammonia-N	ppm	50	CPCB	0.063
Chloride	Mg/L	45	ICMR / BIS	20
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	10.4
Biological Oxygen Demand	Mg/L	<2	CPCB	1.1
Chemical Oxygen Demand	Mg/L	10	WHO	5.52



Laboratory Technician

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021

ECOMS



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Location 5 (Borewell)
Coordinates: 23° 44'32"N 92° 47'56"E
Sample Description: Groundwater Quality
Type of Sampling: Once
Nature of Sample: Water Quality

Location code: GW2
Quantity of sample: 2 Litres
Date of sampling: 13th August 2023

TEST REPORT

Parameters	Units	Standard	Recommended	Sample F
Colour	Hazen	5 to 15	IS 10501	Cloudy
Odour		Agreeable	IS 10502	Odourless
Temperature	°C	<40	ISI	23
pH		6.5-8.5	ICMR / BIS	6.28
Turbidity	NTU	1	IS 10500	116
Electrical Conductivity	µS	300	ICMR	43
Total Dissolve Solids	Mg/L	100	WHO	0.036
Total Suspended Solids	Mg/L	75	ICMR / BIS	51
Alkalinity	Mg/L	600	CPCB	40
Hardness	Mg/L	300	CPCB	40.2
Calcium	Mg/L	75	BIS	14
Magnesium	Mg/L	30	BIS	24
Free Carbondioxide	Mg/L			14
Sulphate	ppm	200	CPCB	24.82
Phosphate	ppm	5	ICMR	0.01
Nitrate-N	ppm	150	ICMR	0.027
Ammonia-N	ppm	50	CPCB	0.912
Chloride	Mg/L	45	ICMR / BIS	39.99
Dissolve Oxygen	Mg/L	4.0-6.0	WHO	10.6
Biological Oxygen Demand	Mg/L	<2	CPCB	0.7
Chemical Oxygen Demand	Mg/L	10	WHO	3.32



Laboratory Technician

SOIL QUALITY:

Sampling Location: Tuirial SWM L1 (Top Left)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 13th August 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 1
1	Colour		Brown
2	pH		6.21
3	Bulk Density	g/cm ³	1.43
4	Moisture Content	%	23.9
5	Water Holding Capacity		1.2
6	Sand	%	64.8
7	Silt	%	12
8	Clay	%	24.2
9	Texture	Class	Sandy Clay Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	148
11	Soil organic Carbon	%	6.65
12	Total Nitrogen	mg/kg	23.41
13	Available Phosphorus	mg/kg	14.11
14	Exchangeable Potassium	mg/kg	124
15	Sodium (Excheangable)	mg/kg	31.8
16	Calcium (Excheangable)	mg/kg	282.89
17	Magnesium (Excheangabl	mg/kg	366.89
18	Manganese (Excheangabl	mg/kg	194.01
19	Ammonium	mg/g	6.8



Laboratory Technician

ECOMS

EMS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

Sampling Location: Tuirial SWM L2 (Center)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 13th August 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 2
1	Colour		Brownish Yellow
2	pH		6.24
3	Bulk Density	g/cm ³	1.59
4	Moisture Content	%	22.7
5	Water Holding Capacity		1.08
6	Sand	%	80.8
7	Silt	%	10
8	Clay	%	10
9	Texture	Class	Loamy Sand
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	124
11	Soil organic Carbon	%	4.59
12	Total Nitrogen	mg/kg	24.63
13	Available Phosphorus	mg/kg	19.98
14	Exchangeable Potassium	mg/kg	498
15	Sodium (Excheangable)	mg/kg	98.7
16	Calcium (Excheangable)	mg/kg	221.04
17	Magnesium (Excheangable)	mg/kg	225.33
18	Manganese (Excheangable)	mg/kg	124.06
19	Ammonium	mg/g	5.8



Laboratory Technician

ECOMS



Sampling Location: Tuirial SWM L3 (Top Right)

Sample Description: Soil Quality

Type of Sampling: Once

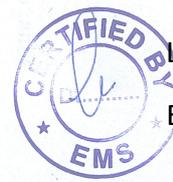
Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 13th August 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 3
1	Colour		Brownish Yellow
2	pH		5.87
3	Bulk Density	g/cm ³	1.61
4	Moisture Content	%	22.2
5	Water Holding Capacity		1.24
6	Sand	%	77.8
7	Silt	%	10
8	Clay	%	12.2
9	Texture	Class	Sandy Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	119
11	Soil organic Carbon	%	6.23
12	Total Nitrogen	mg/kg	25.47
13	Available Phosphorus	mg/kg	21.38
14	Exchangeable Potassium	mg/kg	166
15	Sodium (Excheangable)	mg/kg	14
16	Calcium (Excheangable)	mg/kg	455.3
17	Magnesium (Excheangable)	mg/kg	315.22
18	Manganese (Excheangable)	mg/kg	172.38
19	Ammonium	mg/g	6.3



Laboratory Technician
ECOMS

Sampling Location: Tuirial SWM L4 (Bottom right)

Sample Description: Soil Quality

Type of Sampling: Once

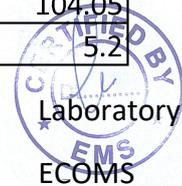
Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 13th August 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 4
1	Colour		Yellowish Brown
2	pH		6.11
3	Bulk Density	g/cm ³	1.74
4	Moisture Content	%	25
5	Water Holding Capacity		1.46
6	Sand	%	45.5
7	Silt	%	26
8	Clay	%	28.5
9	Texture	Class	Loam
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	121
11	Soil organic Carbon	%	5.78
12	Total Nitrogen	mg/kg	23.69
13	Available Phosphorus	mg/kg	26.11
14	Exchangeable Potassium	mg/kg	251
15	Sodium (Excheangable)	mg/kg	14.6
16	Calcium (Excheangable)	mg/kg	144.89
17	Magnesium (Excheangable)	mg/kg	202.32
18	Manganese (Excheangable)	mg/kg	104.05
19	Ammonium	mg/g	5.2



Laboratory Technician

ECOMS

Sampling Location: Tuirial SWM L5 (Bottom left)

Sample Description: Soil Quality

Type of Sampling: Once

Nature of Sample: Soil Quality

Quantity of sample: 300g

Date of sampling: 13th August 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 5
1	Colour		Brownish Yellow
2	pH		5.92
3	Bulk Density	g/cm ³	2.01
4	Moisture Content	%	19.8
5	Water Holding Capacity		1.09
6	Sand	%	86.8
7	Silt	%	5
8	Clay	%	8.2
9	Texture	Class	Loamy Sand
10	Respiration	mg CO ₂ m ⁻² h ⁻¹	120
11	Soil organic Carbon	%	6.63
12	Total Nitrogen	mg/kg	25.56
13	Available Phosphorus	mg/kg	20.08
14	Exchangeable Potassium	mg/kg	242
15	Sodium (Excheangable)	mg/kg	22.6
16	Calcium (Excheangable)	mg/kg	369.73
17	Magnesium (Excheangable)	mg/kg	276.26
18	Manganese (Excheangable)	mg/kg	133.21
19	Ammonium	mg/g	5.6



Laboratory Technician

ECOMS

NOISE QUALITY:

LOCATION 1.

Sampling Location: Tuirial SWM project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	11am – 1pm	Noise meter HP-822A	IS:10988- 1984 Indian standard	67	38	78	With prescribe limit



Laboratory Technician

ECOMS



LOCATION 2.

Sampling Location: Tuirial SWM 1 km South from project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	12am – 2pm	Noise meter HP-822A	IS:10988- 1984 Indian standard	55	40	67	With prescribe limit



Laboratory Technician

ECOMS

LOCATION 3.

Sampling Location: Tuirial SWM 1 km North from project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	9am – 11am	Noise meter HP-822A	IS:10988- 1984 Indian standard	55	38	63	With prescribe limit



Laboratory Technician
ECOMS

Zemabawk North
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES(ECOMS
MIZORAM)

Pan:AAIFE6941L

LOCATION 4

Sampling Location: Tuirial SWM 1 km Northeast from project site

Sample Description: Noise quality

Duration of sampling: 2 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Numbers of parameters: 1

Sl. No	Parameters	Time	Equipment	Methods	Readings			Comments
					Leq	Lmin	Lmax	
1	Noise level	12pm – 2pm	Noise meter HP-822A	IS:10988- 1984 Indian standard	65	45	75	With prescribe limit



Laboratory Technician

ECOMS



AIR QUALITY:

LOCATION 1:

Sampling Location: Tuirial SWM project site

Sample Description: Ambient air quality

Type of Sampling: Continuous

Nature of Sample: Air Quality

Duration of sampling: 8 hours

Date of sampling: 13th August 2023

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration) ($\mu\text{g}/\text{m}^3$)	Location 1	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	36	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	18	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	8	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	4	Within prescribed limit

Laboratory Technician





LOCATION 2:

Sampling Location: Tuirial SWM 1 km north from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration) ($\mu\text{g}/\text{m}^3$)	Location 2	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	42	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	19	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	BDL	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	8	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	4	Within prescribed limit



Laboratory Technician
ECOMS

LOCATION 3:

Sampling Location: Tuirial SWM 1 km South from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration) ($\mu\text{g}/\text{m}^3$)	Location 3	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	35	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	17	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	7	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	3	Within prescribed limit



Laboratory Technician
ECOMS



LOCATION 4:

Sampling Location: Tuirial SWM 1 km North east from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration ($\mu\text{g}/\text{m}^3$))	Location 4	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	37	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	18	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	8	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	4	Within prescribed limit



Laboratory Technician
ECOMS



LOCATION 5:

Sampling Location: Tuirial SWM 1.2km South east from project site

Sample Description: Ambient air quality

Duration of sampling: 8 hours

Type of Sampling: Continuous

Date of sampling: 13th August 2023

Nature of Sample: Air Quality

Sl. No	Parameters	Methods of Analysis	Unit	CPCB Limit (Concentration ($\mu\text{g}/\text{m}^3$))	Location 5	Comments
1	PM10	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	100	35	Within prescribed limit
2	PM2.5	CPCB, 2011 NAAQS monitoring analysis guidelines, Vol-1	$\mu\text{g}/\text{m}^3$	60	17	Within prescribed limit
3	SO ₂	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO _X	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	5	Within prescribed limit
5	CO	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	4	3	Within prescribed limit



Laboratory Technician
ECOMS

ANNEXURE III

GREEN BELT

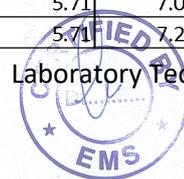
Green belt reserved is well maintain to reduce the adverse effect of the SWM on the environment.

Quadrats Random sampling methods was employed to evaluate the diversity of different tree species in the green belt area. 39 tree species were record, most of the trees grows naturally in the area while few are planted.

Tree Species and Diversity

Sl.No	Local Name	Scientific Name	Number of Individual (Q)	Number of Quadrats (Y)	Occurrence (X)	Relative Dominance	Relative Frequency	IVI	Rank
1	April	<i>Erythrina caffra</i>	3	10	3	2.12	4.29	7.25	12
2	Ar-dah	<i>Archidendron bigeminum</i>	5	10	4	1.18	5.71	8.31	9
3	Ar-ngeng	<i>Maesa indica</i>	1	10	1	0.38	1.43	2.09	32
4	Chhawn-tual	<i>Aporosa octandra</i>	4	10	1	1.53	1.43	4.09	25
5	Herh-se	<i>Messua ferrea</i>	6	10	2	0.12	2.86	4.67	23
6	Hmawng	<i>Ficus maclellandii</i>	1	10	1	0.11	1.43	1.82	35
7	Hnah-khar	<i>Macaranga indica</i>	7	10	1	0.21	1.43	3.62	28
8	Hnahkhar-pa	<i>Macaranga denticulata</i>	8	10	6	0.21	8.57	11.05	3
9	Hnah-kiah	<i>Callicarp arborea Roxb.</i>	6	10	2	0.22	2.86	4.78	20
10	Kang-tek	<i>Albizia procera</i>	7	10	3	0.51	4.29	6.78	16
11	Khar-duap	<i>Macaranga peltata</i>	8	10	6	0.26	8.57	11.10	2
12	Khar pa	<i>Mallotus macrostachyus</i>	1	10	1	0.03	1.43	1.74	37
13	Khiang	<i>Schima wallichii</i>	8	10	4	0.37	5.71	8.35	8
14	Khuang-thli	<i>Bischofia javanica</i>	1	10	1	0.03	1.43	1.74	36
15	Lam-khuang	<i>Artocarpus heterophyllus</i>	5	10	6	0.15	8.57	10.14	6
16	Len-hmui	<i>Syzygium cumini</i>	6	10	2	0.21	2.86	4.76	21
17	Nau-thak	<i>Litsea manopetala</i>	5	10	4	0.22	5.71	7.35	10
18	Neempata	<i>Azadirachta indica</i>	5	10	4	0.12	5.71	7.25	13
19	Ngiau	<i>Michelia champaca</i>	7	10	6	0.37	8.57	10.92	4
20	Pathlawi-rim-nam	N/A	6	10	2	0.16	2.86	4.72	22
21	Sazu-thei-pui	<i>Ficus hirta</i>	2	10	2	0.03	2.86	3.45	31
22	Se-hawr	<i>Castanopsis indica</i>	7	10	6	0.20	8.57	10.75	5
23	Si-hneh	<i>Eurya cerasifolia</i>	7	10	7	0.10	10.00	12.08	1
24	Sun-hlu	<i>Phyllanthus emblica</i>	3	10	2	0.08	2.86	3.79	27
25	Teak	<i>Tectona grandis</i>	6	10	3	0.22	4.29	6.20	17
26	Thei-hai	<i>Mangifera indica</i>	6	10	2	0.23	2.86	4.79	19
27	Thei-pui	<i>Ficus semicordata</i>	2	10	2	0.10	2.86	3.52	29
28	Thei-tat	<i>Artocarpus lakoocha</i>	1	10	1	0.11	1.43	1.82	34
29	Thei-ret	<i>Ficus elastica</i>	1	10	1	0.03	1.43	1.74	38
30	Thing-dawl	<i>Tetrameiss nudiflora</i>	4	10	2	0.41	2.86	4.40	24
31	Thing-khawi-lu	<i>Vitex peduncularis</i>	2	10	6	0.09	8.57	9.23	7
32	Thing-pawn-chhia	<i>Glochidion heyneanum</i>	2	10	1	0.05	1.43	2.04	33
33	Thing-sia	<i>Castanopsis tribuloides</i>	8	10	3	0.31	4.29	6.86	15
34	Thlan-vawng	<i>Gmelina arborea</i>	3	10	2	0.13	2.86	3.84	26
35	Thuam-riat	<i>Alstonia scholaris</i>	2	10	2	0.07	2.86	3.49	30
36	Vang	<i>Albizia chinensis</i>	5	10	3	0.32	4.29	6.02	18
37	Vawm-bal	<i>Drimycarpus racemosus</i>	1	10	1	0.02	1.43	1.73	39
38	Zai-rum	<i>Anogeissus acuminata</i>	4	10	4	0.22	5.71	7.07	14
39	Zawng-tah	<i>Parkia timoriana</i>	5	10	4	0.16	5.71	7.28	11

Laboratory Technician



ECOMS

ANNEXURE IV

Environmental Management Cell



AIZAWL MUNICIPAL CORPORATION
Thuampui, Aizawl - 796017 : Mizoram

Ph: 0389-2352090 Email: umcmizoram@gmail.com Website: www.umcmizoram.com



Dated Aizawl, the 13th June, 2023

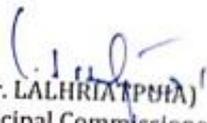
NOTIFICATION

Pursuant to operationalization of Solid Waste Management Centre (SWMC) at Tuirial and as per Ministry of Environment, Forest and Climate Change with regard to Environmental Clearance for the development of landfill site of SWMC at Tuirial Vide No. RONE/E/IA/INF/27/2005-07, dated 14th October, 2022, **Environmental Cell** is hereby constituted with the following composition with immediate effect and until further order.

1. Pu Lalremruata Kullai, Joint Municipal Commissioner, AMC - Chairman
2. Pu R Lalmuanpuia, Executive Engineer, AMC - Secretary
3. Prof. Lahnunluanga, Deptt of Environmental Science, MZU - Member
4. Pu C.Lalmuanawma, Town Planner, AMC - Member
5. Pi Helen Rodingliani, Executive Engineer, PHE - Member
6. Pi Vanlalnunpuii Hmar, Divisional Forest Officer, EF & CC Deptt. - Member
7. Pi PC Lalmuanpuii, Environmental Engineer, MPCB - Member
8. Pi Veronica Vanlalhriatpuii Colney, Assistant Architect, AMC - Member

Terms & Conditions:

1. The Environmental Cell shall prepare effective and efficient proposals relating/pertaining to the maintenance and operation of SWMC at Tuirial.
2. The Environmental Cell shall study and prepare report in all matters relating to the status of SWMC Reports, etc i.e. Six Monthly Report to be submitted to Integrated Regional Office (IRO) at Shillong.
3. The tenure of Environmental Cell will be valid during utilization of SWMC at Tuirial.
4. The meeting of the Cell will be convened at least once a month or as may be required and decided by AMC.
5. Representatives of Departments, other than representatives of AMC, shall be given Rs. 1500/- per head as meeting allowance per meeting.


(Er. LALHRIATPUII)
Municipal Commissioner
Aizawl Municipal Corporation
Dated Aizawl the 13th June, 2023

Memo No. D.24015/314/2021-AMC

Copy to:

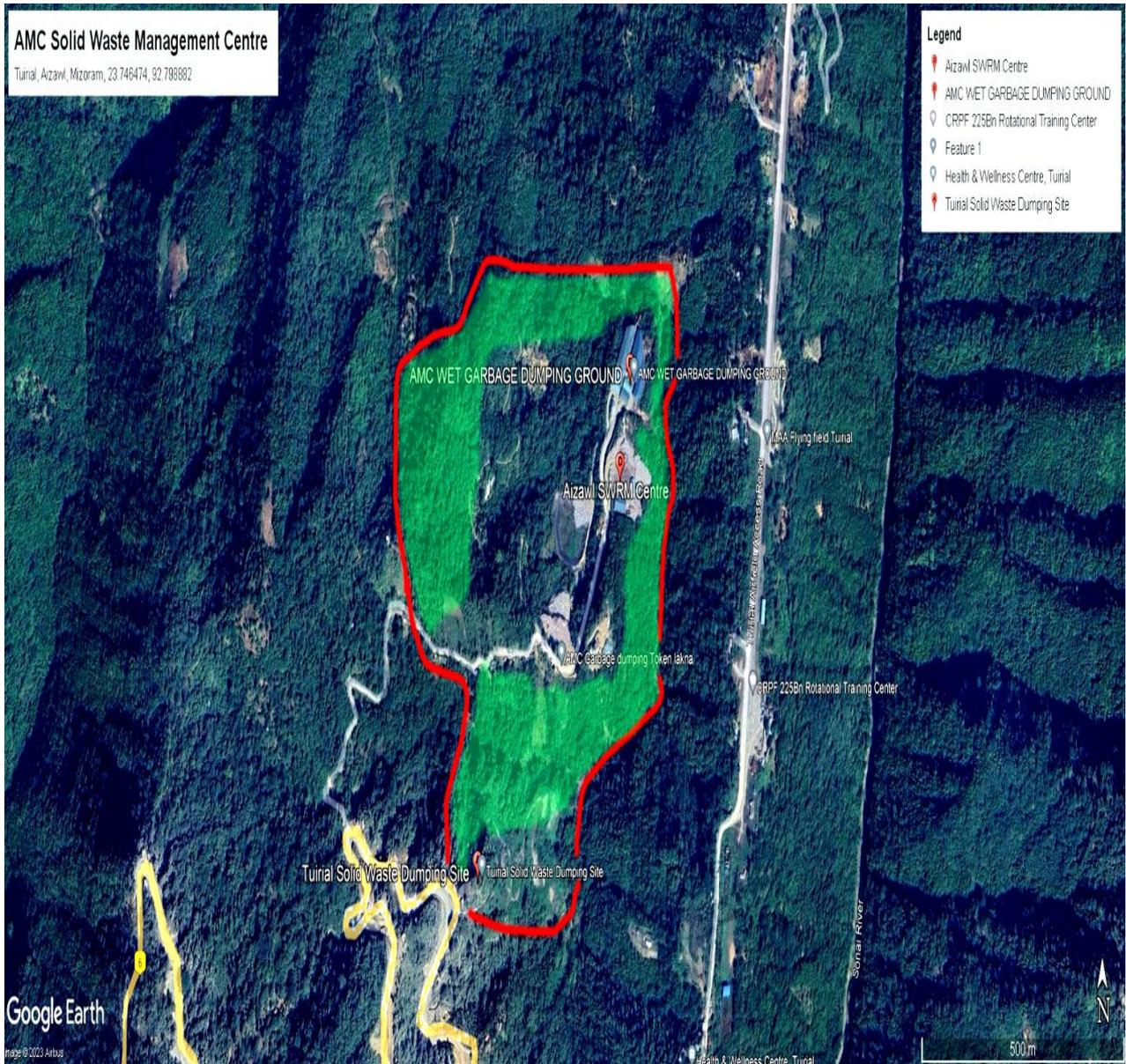
1. PA to Mayor, AMC, for information.
2. PA to Executive Councillors i/c SWMC, AMC, for information.
3. The Principal Secretary, EF & CC Deptt., for information.
4. The Engineer-in-Chief, PHED, for information.
5. The Registrar, MZU, for information.
6. The Member Secretary, MPCB, for information.
7. All Members concerned, for information.
8. All Officers under AMC, for information.
9. Guard file.


Municipal Commissioner
Aizawl Municipal Corporation

TO AVOID COVID-19 INFECTION WEAR MASK, OBSERVE PHYSICAL DISTANCING OF 6 FEET, MAINTAIN HAND HYGIENE.

ANNEXURE V

PHOTO PLATES



Map showing green belt area of TUIRIAL SWM





**DETAILED PROJECT REPORT
ON**

**IMPROVEMENT OF
SANITARY LANDFILL**

**AT
AMC SOLID WASTE MANAGEMENT CENTRE,
TUIRIAL**

Project Cost : Rs 4,92,56,900
*(Rupees Four Crores Ninety Two Lakhs Fifty Six Thousand
Nine Hundred) only*

CONTENTS

<i>Sl no</i>	<i>Chapters/Topics</i>	<i>Page No</i>
1	Background of the project	1
2	Necessity	2
3	Goals and Objectives	3
4	Project Benefits	4
5	Project Cost	4
6	Annexure	5-7
7	Detailed Estimates	8-11
8	Drawings	

The Solid Waste Management Centre, located at Tuirial was previously managed by SIPMIU and handed over to the AMC on 20th January, 2022. The centre caters to a total of 214 TPD including 44 TPD capacity Landfill, 74 TPD capacity Material Recovery Facility, 50TPD Mechanical Composting Plant and 46TPD Vermi composting Plant. Ever since it has been under the management of the AMC, innumerable efforts have been taken to improve the condition of the centre and such efforts entail a huge involvement of funds. The existing infrastructures require repairs and proper planning of the activities within the centre needs major concern. All the collected wastes within the jurisdiction of AMC are transported to this centre from all corners and traffic movement above all else is also an immense task to manage. Moreover, wastes collected in the landfill sites often get smouldered due to generation of methane gas within the piles. As a result, it is utmost required that apart from infrastructure, safety aspects that may endanger the environment needs to be given prime priority in the functioning of the centre.

BACKGROUND OF THE PROJECT



Municipal Commissioner, AMC assisted by Environmental Cell of AMC has conducted a site inspection on 24.7.2023 and observed a number of aspects requiring immediate improvement. Consequently, the following suggestions have been proposed:

- 1) There are two small perennial water bodies to the east and west of the landfill site. A proper channel or intake needs to be constructed so as to divert it from flowing inside the sanitary landfill.
- 2) The said water bodies have infiltrated the geo membrane (lining) of the landfill constructed by SIPMIU. This infiltration has resulted in seepage causing mud flow, further deteriorating the geo membrane (lining) of the landfill. As a result, replacement of the geo-membrane needs immediate attention.
- 3) Before installation of cushion and leachate collecting system, it is vital to construct proper concrete foundation for the landfill as well as for the embankments/sides. Concrete will prevent subsidence of the soil underneath thereby preventing leachate from entering and polluting the ground water. This process needs to be given utmost priority since the water bodies to the East and West side of the landfill has already infiltrated the landfill.

NECESSITY

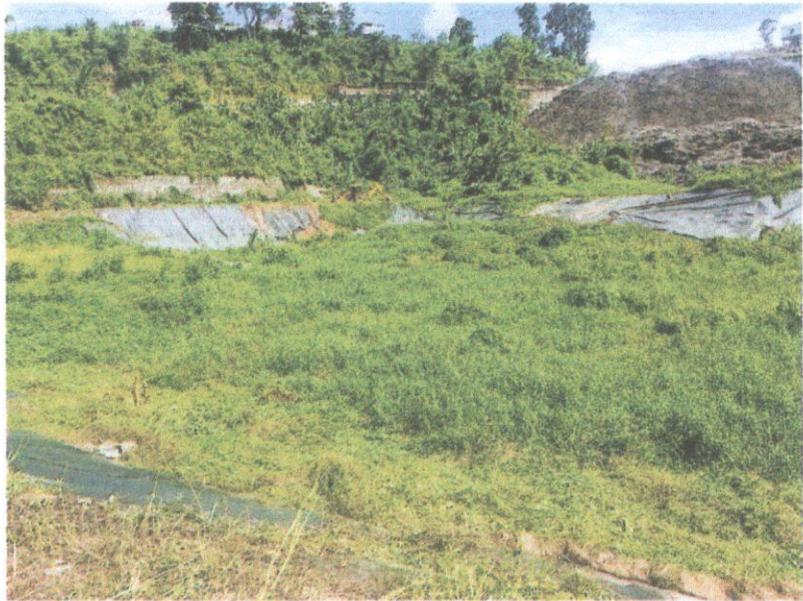


- Reconstruction of Sanitary landfill and reinstallation of high density polyethylene (HDPE) geo- membrane and leachate collection pipe.
- Construction of proper drainage system.
- Systematic treatment of leachate.
- Installation of perforated HDPE pipe for collection of landfill gas

**GOALS
AND
OBJECTIVES**

LOCATION

The sanitary landfill within the AMC Solid Waste Management Centre is located at 23° 74'55"N 92° 79'92"E, at Tuirial.



There is no need for acquisition as the Solid Waste Management Centre is already a Municipal property.

**LAND
AVAILABILITY**

- The proposed project will facilitate methodological collection of landfill gas into storage tanks which will further be processed for domestic use like generation of electricity, fuel for incinerator etc
- Planned and systematic treatment of leachate will contribute towards minimising the air pollution that can be caused by the leakage of landfill gases.
- Proper treatment of leachate will ensure that the pollutants do not infiltrate the ground water of the nearby areas
- Successful implementation of the proposed project will immensely contribute towards achieving clean and green environment.

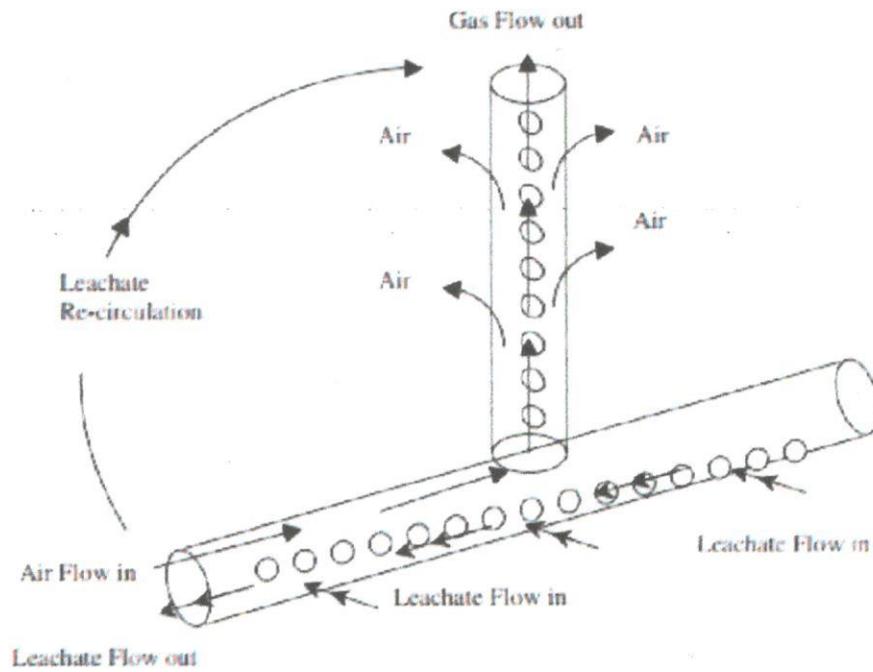
**BENEFITS/
OUTCOME
OF
THE
PROJECT**

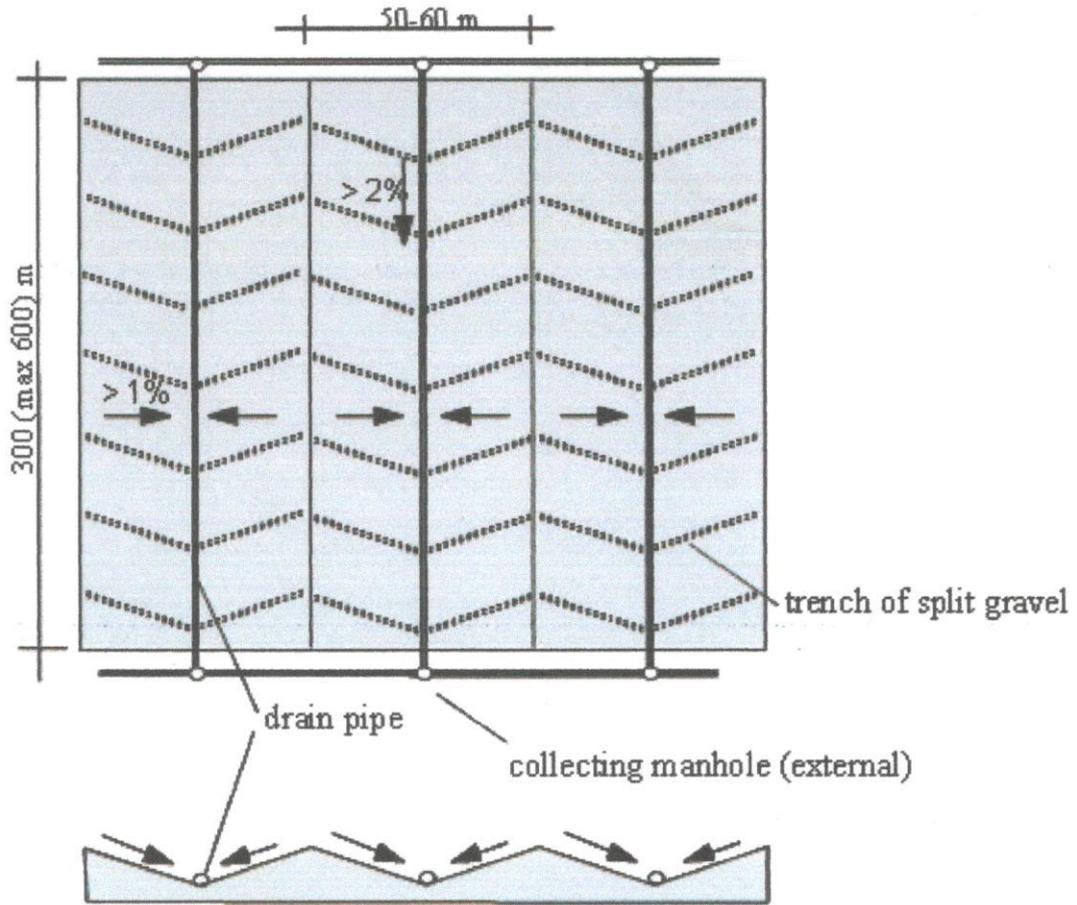
**COST
OF
PROJECT**

It is estimated that a total cost of approximately **Rs 4,92,56,900/-** (*Rupees Four Crores Ninety Two Lakhs Fifty Six Thousand Nine Hundred only*) is required for the completion of this project. (Detailed Estimate enclosed)

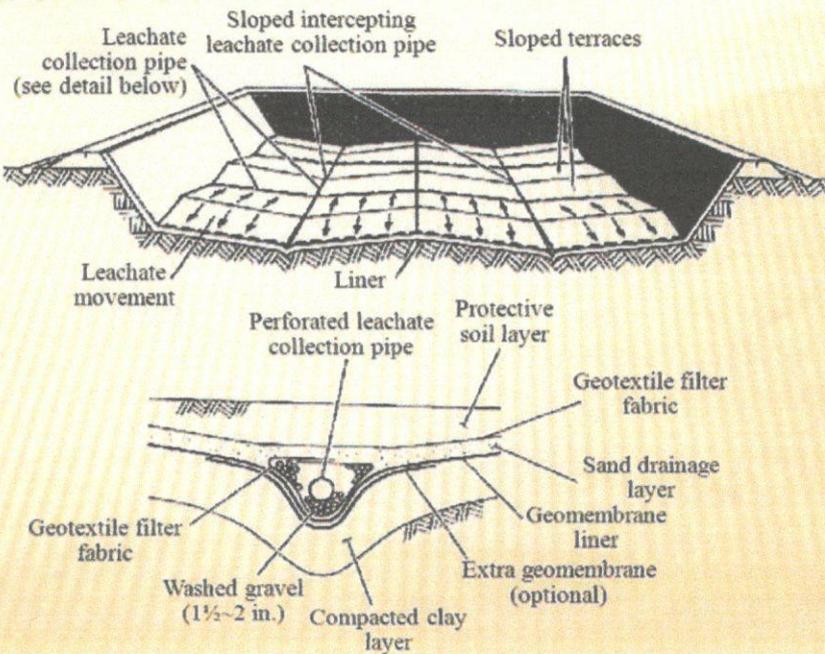
Annexure

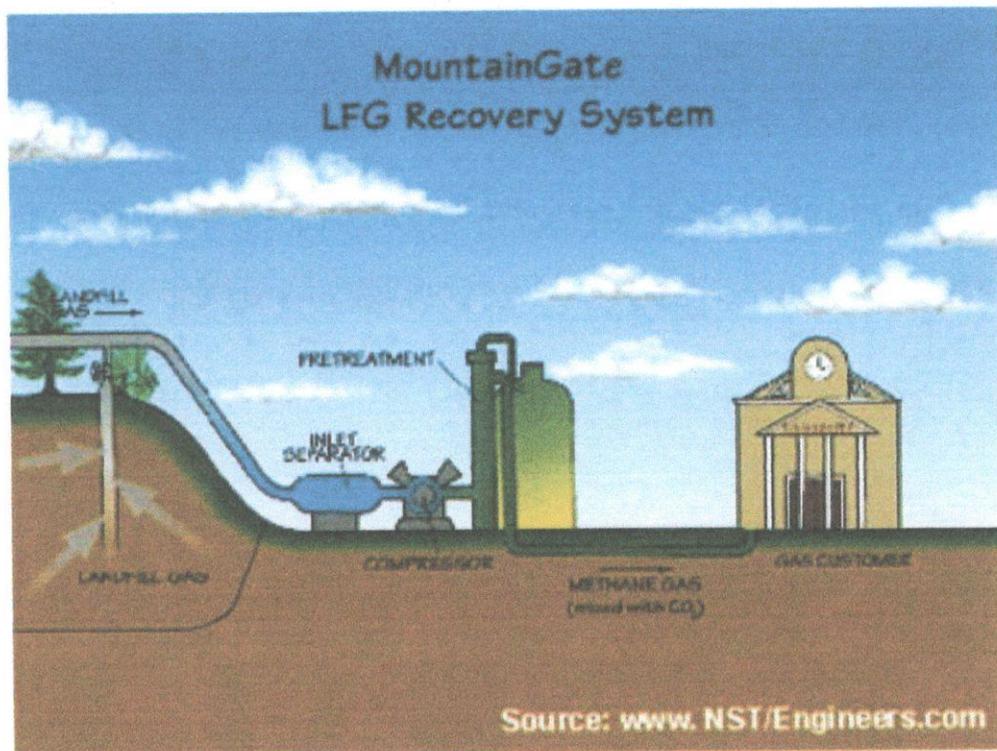
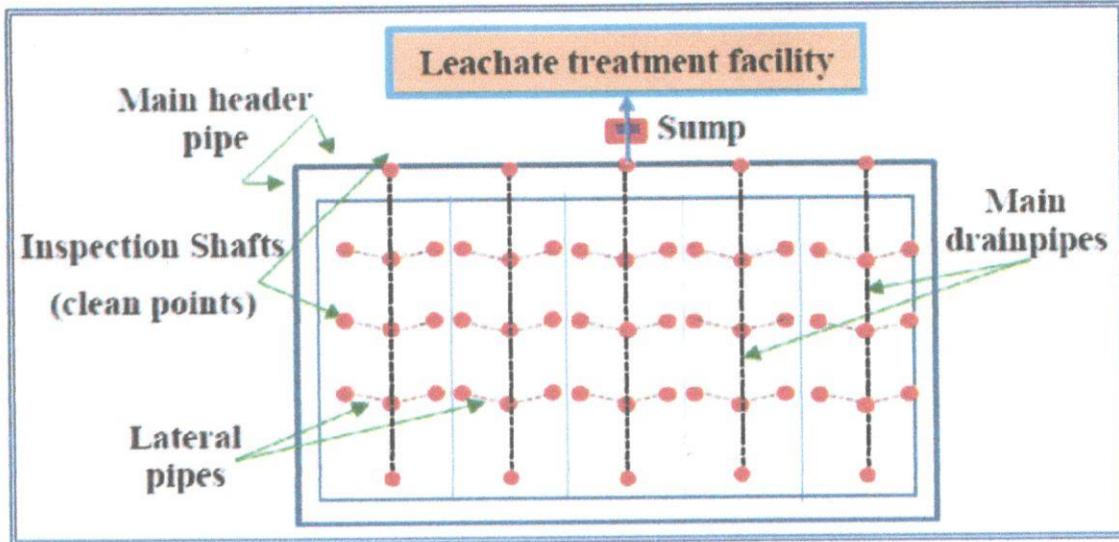
EXAMPLES OF SYSTEMS/ METHODS OF LEACHATE COLLECTION





Leachate Collection System with Graded Terraces





**Detailed Estimate for re-construction of Sanitary Landfill, Solid Waste Management Center
at Tuirial, Aizawl, Mizoram.**

As per mizoram PWD SOR 2019, (Volume - I)

SI No	SOR No.	Particulars of Items and details of works	Nos.	Length (m)	Breadth (m)	Height or Depth(m)	Quantity	Unit	Rate (Rs)	Amount (in Rs)
1	2.01	Surface dressing of ground including removing vegetation and inequalities not exceeding 15cm deep and disposal of rubbish, lead upto 50m and lift upto 1.5m.								
		(a) All kins of Soil								
			1	66.00	60.00	-	3960.00	sqm		
						Total	3960.00	sqm	14.00	55440.00
2	2.07	Earthwoak in excavation in foundation trenches or drains etc. (not exceeding 1.5m in width or 10sqm on plan) including dressing of sides and ramming of bottoms, lift upto 1.5m including getting out excavated soil and disposal of surplus excavated soil as								
		(a) Ordinary and hard soil								
		Landfill	1	66.00	60.00	1.00	3960.00	Cum		
		Intake	2	6.00	6.00	2.00	144.00			
		To Treatment Plant	1	15.00	7.00	10.00	1050.00			
		Drain	2	95.00	1.00	1.00	190.00			
			2	85.00	1.00	1.00	170.00			
		R/wall	4	8.50	0.75	1.20	30.60			
						Total	5544.60	Cum	419.90	2328177.54
3	4.01	Providing and laying in position cement concrete of specified grade excluding costs of centering and shuttering - All work up to Plinth level:								
		(a) 1:1.5:3 (1 cement : 1.5 course sand : 3 stone aggregate 20mm nominal size)								
			2	6.00	6.00	0.10	7.20			
			1	15.00	7.00	0.10	10.50			
			2	95.00	1.00	0.10	19.00			
			4	8.50	0.75	0.10	2.55			
			2	95.00	1.00	0.10	19.00			
			2	85.00	1.00	0.10	17.00			
			2	79.00	2.00	0.15	47.40			
			2	78.50	2.00	0.15	47.10			
						Total	169.75	Cum	9108.20	1546116.95
4	2.04	Extra for additional lead as in through cutting or when excavated earth/rock etc. can not be disposed of directly to valley below, by manual mean(when lead is more than								
		(a) Ordinary and hard soil								
		Landfill	1	66.00	60.00	1.00	3960.00	Cum		
						Total	3960.00	Cum	111.40	441144.00

5	2.2	Providing and filling stone aggregate of size below 90mm in plinth, etc. in layers not exceeding 10cms in depth, consolidating each layer by ramming and watering and dressing complete.							
			1	66.00	60.00	0.20	792.00	Cum	
						Total	792.00	Cum	2741.00
									2170872.00
6	7.01	Regular coursed rubble masonry with hard stone in foundation upto one storey above and below ground level including curing etc. complete.							
		a) in cement mortar 1 : 3 (1 cement : 3 fine sand)							
		Intake	4	6.00	0.75	2.00	36.00	Cum	
			2	6.00	6.00	0.20	14.40	Cum	
		Drain	2	95.00	0.80	0.80	121.60	Cum	
			2	85.00	0.80	0.80	108.80	Cum	
		R/wall	4	8.50	1.00	3.80	129.20	Cum	
			2	7.50	1.00	3.50	52.50	Cum	
			2	8.80	1.20	3.80	80.26	Cum	
						Total	542.76	Cum	7406.00
									4019650.94
7	2.16	Filling available excavated earth(excluding rock) in trenches, Plinth, sides of foundations, etc. in layers not exceeding 20cm in depth, consolidating each deposited layers by ramming and watering, lead upto 50m and lift upto 1.5m.							
			1	15.00	7.00	3.70	388.50	Cum	
			2	7.50	1.00	3.50	52.50	Cum	
						Total	441.00	Cum	129.50
									57109.50
8	2.2	Providing and laying in position machine batched and machine mixed design mix M-20 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge. "(Note:- Cement content considered in this item is @ 330 kg/cum."Excess/ less cement used as per design mix is payable/recoverable							
		(a) All work upto plinth level							
		Horizontal slab	1	66.00	60.00	0.30	1188.00	Cum	
		Inclined slab	2	68.00	2.70	0.15	55.08	Cum	
		Inclined slab	2	63.50	2.70	0.15	51.44	Cum	
						Total	1294.52	Cum	10678.70
									13823737.33
9	5.18	Steel reinforcement for RCC work including straightening, cutting, bending, placing in position and binding all complete.							
		(d) Thermo-Mechanically Treated bars of grade FE-500 or more							
			Nos	Length (m)	W/kg		Weight	Unit	
		10mm dia @ 150c/c							
		Horizontal slab	880	66.00	0.617	-	35835.36	kg	

		Horizontal slab	800	60.00	0.617	-	29616.00	kg		
		Inclined slab(Long)	36	68.00	0.617	-	1510.416	kg		
			907	2.70	0.617	-	1510.416	kg		
		Inclined slab(short)	36	63.50	0.617	-	1410.462	kg		
			847	2.70	0.615	-	1405.89			
							Total	71288.54	kg	101.60
										7242916.07
10	5.10	Centering and shuttering including strutting, propping, etc. and removal of form for all heights -								
		(a) Foundations, footings, bases of columns etc. for mass concrete								
		Inclined slab	2	68.00	2.70	-	367.20			
			2	63.50	2.70	-	342.90			
							Total	710.10	Sqm	618.40
										439125.84
11	2.21	Providing and filling approved river sand in trenches, Plinth, etc. in layers not exceeding 20cms in depth, consolidating each layer by ramming and watering and dressing complete.								
		Filter material								
		River sand	1	66.00	60.00	0.20	792.00			
							Total	792.00	Sqm	2381.10
										1885831.20
12	7.17	Back filling behind abutment, wing wall and return wall complete as per drawings and Technical Specification.								
		Filter material								
		(a) Gravelly material	1	66.00	60.00	0.30	1188.00			
							Total	1188.00	Sqm	1086.00
										1290168.00
13	As Per SIPM IU (NER CCDI P)	Supply of 110mm OD PE80 PN4 perforated HDPE pipes for collection of Leachates and collection of landfill gas.								
		Horizontal	4	66.00	-	-	264.00	rm		
		Vertical	4	6.00	-	-	24.00	rm		
							Total	288.00	rm	780.00
										224640.00
14	As Per SIPM IU (NER CCDI P)	Supply of socket for the connection of perforated pipes in to gas vent pipes.								
			30	-	-	-	30.00	each		
							Total	30.00	each	250.00
										7500.00

15	As Per SIPM IU (NER CCDI P)	Providing & Laying 1.5mm thick HDPE Geo membrane layer (10% extra for covering side and joining sheet)							
			2	72.5	16.00	-	2320.00	sqm	
			2	74.5	16.00	-	2384.00	sqm	
						Total	4704.00	sqm	300.00
									1411200.00

Total 36943629.37
C.I.(27.33%) 10096693.91
GST(6%) 2216617.76
G.Total 49256941.03

Say 49256900.00

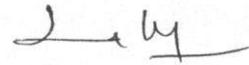
Rupees Four Crores Ninety two Lakhs Fifty six Thousand Nine Hundred only

Prepared by



(LALLAWMKIMA)
Junior Engineer
Aizawl Municipal Corporation

Checked by



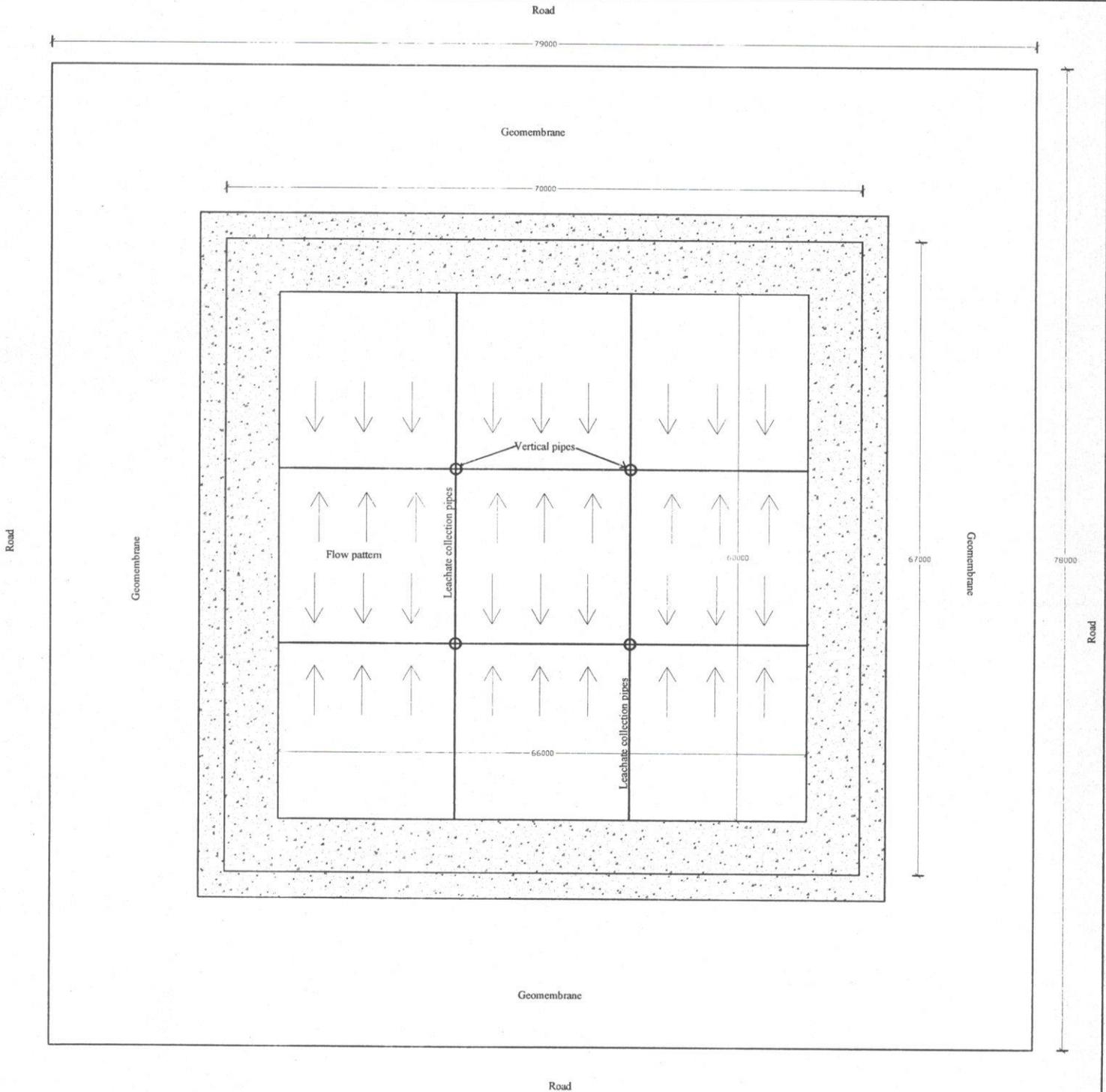
(Er. LALMUANPUA)
Executive Engineer
Aizawl Municipal Corporation

Approved by



(Er. LALHRIATPUA)
Municipal Commissioner
Aizawl Municipal Corporation

PLAN OF PROPOSED RECONSTRUCTION OF SANITARY LANDFILL AT AMC SWMC, TUIRIAL



SECTION SHOWING PROPOSED RECONSTRUCTION OF SANITARY LANDFILL AT AMC SWMC, TUIRIAL

Note :-	
1	Scale : NTS
2	All dimensions are in millimeters unless stated otherwise
3	Nos. of reinforcing steel shall not be counted from the drawings

