

SIX MONTHLY COMPLIANCE  
REPORT ON SOLID WASTE  
MANAGEMENT CENTRE,  
TUIRIAL, AIZAWL MIZORAM  
AIZAWL MUNICIPAL  
CORPORATION

Prepared by ECO-MANAGEMENT SERVICES (ECOMS)

## TABLE OF CONTENTS

<b>Sl.no</b>	<b>Contents</b>	<b>Page number.</b>
<b>1</b>	<b>Chapter 1: Introduction</b>	<b>1-2</b>
<b>2</b>	<b>Chapter 2: Compliance to General and specific conditions</b>	<b>3-7</b>
<b>3</b>	<b>Chapter 3: Detailed Environmental Monitoring Report</b>	<b>8-12</b>
<b>4</b>	<b>Document 1: Consent to establish</b>	<b>13-14</b>
<b>5</b>	<b>Document 2: Test results</b>	<b>15-56</b>
<b>6</b>	<b>Green belt</b>	<b>57</b>
<b>7</b>	<b>Photo plates</b>	<b>58-60</b>

## **Chapter 1.**

### **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 linear the system. The collection layer shall comprise of a network of perforated high density polyethylene (HDPE) lateral pipes laid 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.

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##### **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	General Conditions	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 will be 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, a fresh 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 required
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 enforced 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: <b>H88088/Poltn/9(154)2015-MPCB/151 dated 7<sup>th</sup> Sept. 2018.</b>	Document attached (Document 1) and will be renewed at the time of expiration.
2	Existing landfill site shall be closed scientifically.	The existing landfill is under operation.	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 was done by PPP mode at point to point conducted by each local council in every locality. The wastes were collected by dry and wet segregation. The vehicle (158) ply around different 58 localities every day except on Sunday. The vehicles were properly covered and some vehicles were specially designed for garbage truck. Segregation is not done properly at the source which need to be improve in the future. Waste management at source have been practiced immediately using the Locality “Ramhlun South” as the Pilot program. Door to door collection of segregated wastes has been practiced for this area. Non segregated wastes are rejected and returned to the owners by the collectors. They have employed unskilled labour from the revenue of sanitation fee and contribution by every house hold. This labour swept the street	As instructed during the monitoring, immediate action is taken on the deplorable conditions at the entry site. Gate is constructed to prevent unauthorized entry of the dumping site. Segregation and Bailing of recyclable waste has been done as far as possible. Some of the recyclable waste were export for recycling. Picture attached.

		and pick up the garbage from sanitation point to dumping truck. If this is found satisfactory it will be practices in other localities.	
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.	Gas generated from Landfill shall be collected per rules as soon as segregation process is finished for the upper Landfill area (Stock point).
5	The Leachates from the facility shall be collected and treated to meet the prescribed standards before disposal.	Leachate's collection point was made and were collected. But treatment was not given which will be check and practice. Leachate collection and treatment proposal is under processed which will be implemented as soon as possible to prevent and check pollution of leachate from the pre-storage area.  Estimates and plan are already approved, construction will be proceed soon.	Testing results of leachates is attached as "Effluent water testing results". Leachates quality exceeds the standard given by MSWM rules 2000. Action have been taken immediately and it will be implemented.  <b>BOD and COD levels of leachate exceeds the standard, however, there is slight decrease in the value of BOD and COD in May 2023 compare to March 2023 which may be due to dilution of leachate by rain water.</b>

6	The depth of the Landfill site shall be decided based on the ground water table at the site.	No Ground water Potential.	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.	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.	Ground water/Soil monitoring has been done in and around the site.	Report attached for Water, Air, Noise and Soil monitoring.  <b>Water quality of Tuirial river exceeds the limit in TDS, TSS and EC which could be possibly due to improper dumping of sediments in the upstream of the river outside the vicinity of SWM centre. Photographs are attached.</b>
9	Odour control measures shall be carried out.	Covering the landfill weekly with soil to reduce odours from newly deposited wastes will be carried out once the main Landfill is in full operation.	Landfill still not yet in full operation.
10	Green Belt of at least 20% of total area shall be provide all around the unit.	Green Belt is maintained surrounding the unit. The estimation of the No. of Trees and Vegetation is under process.	List of trees inside green belt and map showing green belt area is attached.
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.	Members are already nominated for constitution of environment cell, official approval is waited.	Under Process. Separate Environmental Management Cell will be setup as soon as possible.

Enclo:

1. Consent to Establish.
2. List of trees in green belt area.
3. Map showing green belt area.
4. Effluent water testing results.
5. Water, Air, Noise and Soil monitoring Data.

## 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 March and May, 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**

<b>S. No</b>	<b>Location Code</b>	<b>Location Name/ Description</b>	<b>Environmental Setting</b>
1.	A1	<b>Tuirial SWM project site</b>	Landfill site
2	A2	<b>Tuirial SWM 1 km north from project site</b>	Residential
3	A3	<b>Tuirial SWM 1 km South from project site</b>	Residential
4	A4	<b>Tuirial SWM 1 km North east from project site</b>	Residential
5	A5	<b>Tuirial SWM 1.2km South east from project site</b>	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 (SO<sub>2</sub>)
- Oxides of Nitrogen (NO<sub>2</sub>)
- Carbon Monoxide (CO)

The duration of sampling of PM<sub>2.5</sub>, PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>x</sub> 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<sub>2.5</sub> i.e. <2.5 microns), and Respirable Dust Sample was used for sampling Respirable fraction (<10 microns), gaseous pollutants like SO<sub>2</sub>, and NO<sub>x</sub>. 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 September, 2016, 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 1 km 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 was taken from two site 1. Tuirial  
2. Beraw Lui

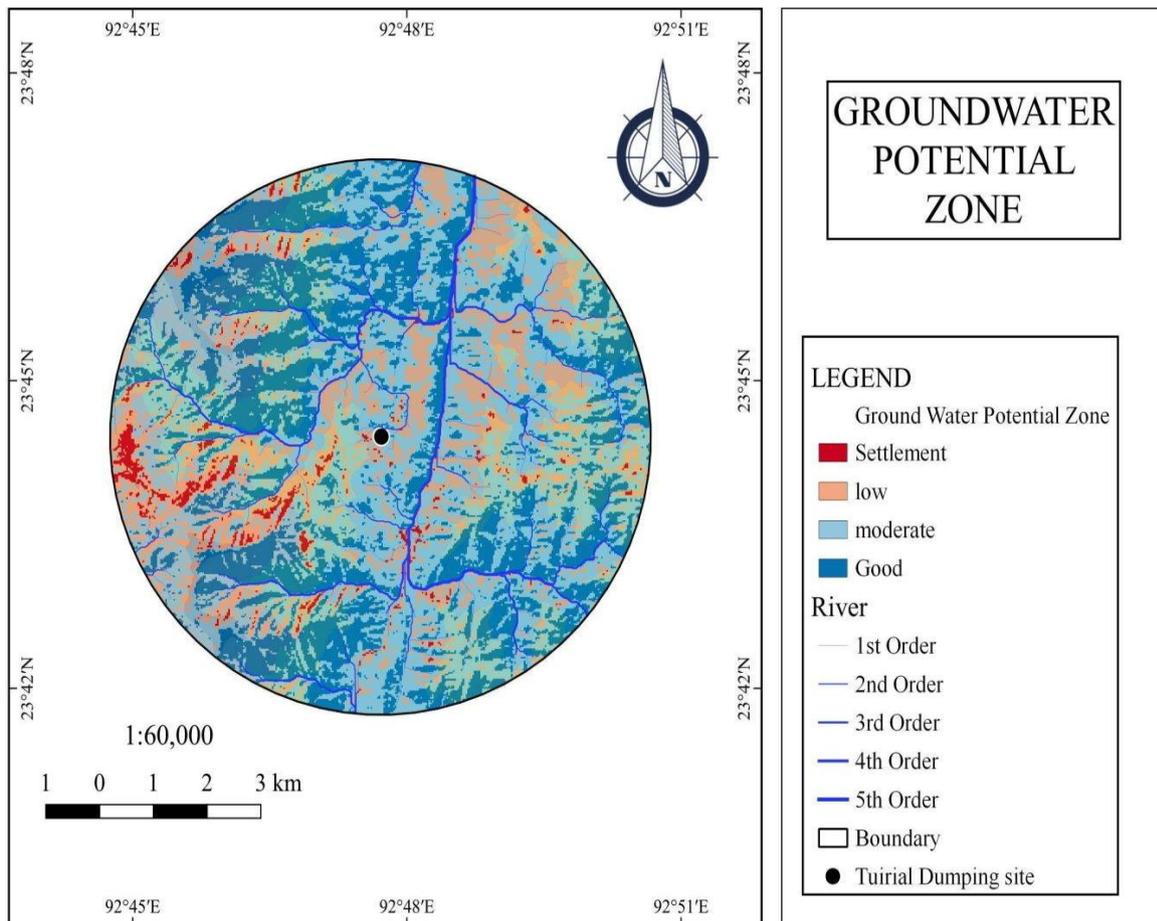
##### Surface Water and Waste Water:

Surface Water samples were collected from five location and waste water from two Location sites. 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	Location Name/ Description
1.	WW 1	Location 1(Tuirial SWM) Leachate
2.	WW 2	Location 6(Tuirial SWM) Leachate
3	SW 3	Location 1 (Tuirial River)
4	SW 4	Location 2 (Luite)
5	SW 4	Location 3(Tuikhur at Tuirial village) Groundwater
6	SW 5	Location 4(Muthi River)
7	SW 6	Location 5(Beraw lui) 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**

<b>S. No.</b>	<b>Location Code</b>	<b>Location Name/ Description</b>
1.	L1	<b>Tuirial SWM L1 (Top Left)</b>
2.	L2	<b>Tuirial SWM L2 (Center)</b>
3.	L3	<b>Tuirial SWM L3 (Top Right)</b>
4.	L4	<b>Tuirial SWM L4 (Bottom right)</b>
5.	L5	<b>Tuirial SWM L5 (Bottom left)</b>

### 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 September, 2016.

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 Spectrophotometer and Inductive Coupled Plasma Analyzer.

**Document 1:**  
**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 7<sup>th</sup> 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 10<sup>th</sup> 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

Memo No. H.88088/Poltn/9(154)/2015-MPCB/151

Dated Aizawl, the 7<sup>th</sup> September, 2018

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, Khatla, Aizawl, Mizoram-796001  
Ph.No.2336173/2336590 Fax 2336591 Email:mspcb@mizoram.gov.in Website: http://www.mizoram.gov.in

Office of the Program Director  
SIPMIU (NERCCDIP)

Aizawl : Mizoram

Receipt No. 178

Date 20/11/18

Section

**Document 2:**  
**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: 15th March 2023**

**TEST REPORT**

Parameters	Units	Standard	W1
Colour			Yellowish
Odour			Decayed
Temperature	°C		24
pH		5.5-9	7.56
Turbidity	NTU	NA	96
Electrical Conductivity	µS	NA	873
Total Dissolve Solids	Mg/L	2100	1200
Total Suspended Solids	Mg/L	200	60
Alkalinity	Mg/L	NA	320
Hardness	Mg/L	NA	470
Calcium	Mg/L	NA	38
Magnesium	Mg/L	NA	432
Free Carbondioxide	Mg/L	NA	24
Sulphate	ppm	NA	39.6
Phosphate	ppm	NA	3.3
Nitrate-N	ppm	NA	36
Ammonia-N	ppm	50	50.28
Chloride	Mg/L	600	560
Dissolve Oxygen	Mg/L	NA	4.5
Biological Oxygen Demand	Mg/L	100	267
Chemical Oxygen Demand	Mg/L	250	701

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: 15<sup>th</sup> March 2023

### TEST REPORT

Parameters	Units	Standard	L1
Colour			Dark green
Odour			Decayed
Temperature	°C		26
pH		5.5-9	7.72
Turbidity	NTU	NA	1072
Electrical Conductivity	µS	NA	2246
Total Dissolve Solids	Mg/L	2100	1600
Total Suspended Solids	Mg/L	200	70
Alkalinity	Mg/L	NA	1230
Hardness	Mg/L	NA	130
Calcium	Mg/L	NA	21.4
Magnesium	Mg/L	NA	108.6
Free Carbondioxide	Mg/L	NA	36
Sulphate	ppm	NA	21.9
Phosphate	ppm	NA	2.049
Nitrate-N	ppm	NA	39.2
Ammonia-N	ppm	50	69.45
Chloride	Mg/L	600	595
Dissolve Oxygen	Mg/L	NA	0.7
Biological Oxygen Demand	Mg/L	100	296
Chemical Oxygen Demand	Mg/L	250	1104



Laboratory Technician

ECOMS

Zemabawk North  
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES  
(ECOMS MIZORAM)

Pan:AAIFE6941L

**WATER:**

**Sampling Location: Location 1 (Tuirial River)**

**Coordinates: 23°43'04"N**

**92°47'58"E**

**Sample Description: Surface water Quality**

**Quantity of sample: 2 Litres**

**Type of Sampling: Once**

**Date of sampling: 15<sup>th</sup> March 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)**

**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: 15<sup>th</sup> March 2023**

### 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



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**Sampling Location: Location 3(Tuikhur at Tuirial village)**

**Coordinates: 23°43'07"N**

**92°47'56"E**

**Sample Description: Surface water Quality**

**Quantity of sample: 2 Litres**

**Type of Sampling: Once**

**Date of sampling: 15<sup>th</sup> March 2023**

**Nature of Sample: Water Quality**

### 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

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: 15<sup>th</sup> March 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

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**Sampling Location: Location 5(Perrenial stream near the project site)**

**Coordinates: 23°44'32"N**

**92°47'56"E**

**Sample Description: Surface water Quality**

**Quantity of sample: 2 Litres**

**Type of Sampling: Once**

**Date of sampling: 15<sup>th</sup> March 2023**

**Nature of Sample: Water Quality**

**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

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**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: 15<sup>th</sup> March 2023**

**TEST REPORT**

Sl. No	Parameters	Unit	Location 1
1	Colour		Brown
2	pH		6.21
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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

ECO



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: 15<sup>th</sup> March 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 2
1	Colour		Brownish Yellow
2	pH		6.24
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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 (Excheangabl	mg/kg	225.33
18	Manganese (Excheangabl	mg/kg	124.06
19	Ammonium	mg/g	5.8



Laboratory Technician

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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: 15<sup>th</sup> March 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 3
1	Colour		Brownish Yellow
2	pH		5.87
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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 (Excheangabl)	mg/kg	315.22
18	Manganese (Excheangabl)	mg/kg	172.38
19	Ammonium	mg/g	6.3



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Zemabawk North  
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021

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## 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: 15<sup>th</sup> March 2023

## TEST REPORT

Sl. No	Parameters	Unit	Location 4
1	Colour		Yellowish Brown
2	pH		6.11
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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 (Excheangabl)	mg/kg	202.32
18	Manganese (Excheangabl)	mg/kg	104.05
19	Ammonium	mg/g	5.2



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**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: 15<sup>th</sup> March 2023**

**TEST REPORT**

Sl. No	Parameters	Unit	Location 5
1	Colour		Brownish Yellow
2	pH		5.92
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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 (Excheangabl)	mg/kg	276.26
18	Manganese (Excheangabl)	mg/kg	133.21
19	Ammonium	mg/g	5.6

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### 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: 15<sup>th</sup> March 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



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Zemabawk North  
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



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**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: 15<sup>th</sup> March 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



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Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021

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### 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: 15<sup>th</sup> March 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



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Zemabawk North  
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



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#### LOCATION4

**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: 15<sup>th</sup> March 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



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**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:** 15<sup>th</sup> March 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	SO2	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NOX	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

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**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: 15<sup>th</sup> March 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	BDL	Within prescribed limit
4	NO <sub>X</sub>	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



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**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: 15<sup>th</sup> March 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO <sub>X</sub>	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

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**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: 15<sup>th</sup> March 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NOX	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



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**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: 15<sup>th</sup> March 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO <sub>X</sub>	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



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**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: 20<sup>th</sup> 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: 20<sup>th</sup> 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



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Zemabawk North  
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



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**WATER:**

**Sampling Location: Location 1 (Tuirial River)**

**Coordinates: 23°43'04"N**

**92°47'58"E**

**Sample Description: Surface water Quality**

**Quantity of sample: 2 Litres**

**Type of Sampling: Once**

**Date of sampling: 20<sup>th</sup> May 2023**

**Nature of Sample: Water Quality**

**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

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**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: 20<sup>th</sup> 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

**Sampling Location: Location 3(Tuikhur at Tuirial village)**

**Coordinates: 23°43'07"N**

**92°47'56"E**

**Sample Description: Surface water Quality**

**Quantity of sample: 2 Litres**

**Type of Sampling: Once**

**Date of sampling: 20<sup>th</sup> May 2023**

**Nature of Sample: Water Quality**

### 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: 20<sup>th</sup> 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



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**Sampling Location: Location 5(Perrenial stream near the project site)**

**Coordinates: 23°44'32"N  
92°47'56"E**

**Sample Description: Surface water Quality**

**Quantity of sample: 2 Litres**

**Type of Sampling: Once**

**Date of sampling: 20<sup>th</sup> May 2023**

**Nature of Sample: Water Quality**

### 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



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### 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: 20<sup>th</sup> May 2023

### TEST REPORT

Sl. No	Parameters	Unit	Location 1
1	Colour		Brown
2	pH		5.93
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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



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**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: 20<sup>th</sup> May 2023**

**TEST REPORT**

Sl. No	Parameters	Unit	Location 2
1	Colour		Brownish Yellow
2	pH		6.24
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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



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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: 20<sup>th</sup> May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 3
1	Colour		
2	pH		5.964
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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



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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: 20<sup>th</sup> May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 4
1	Colour		Yellowish Brown
2	pH		6.11
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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



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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: 20<sup>th</sup> May 2023

TEST REPORT

Sl. No	Parameters	Unit	Location 7
1	Colour		Brown
2	pH		5.99
3	Bulk Density	g/cm <sup>3</sup>	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 <sub>2</sub> m <sup>-2</sup> h <sup>-1</sup>	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



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**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:** 20<sup>th</sup> 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



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Zemabawk North  
Aizawl-796017

Reg No: RF-MZ 451 of 2020-2021



ECO-MANAGEMENT SERVICES  
(ECOMS MIZORAM)

Pan:AAIFE6941L

**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: 20<sup>th</sup> 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



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### 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: 20<sup>th</sup> 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



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**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: 20<sup>th</sup> 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



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**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:** 20<sup>th</sup> 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	SO2	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NOX	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

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**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: 20<sup>th</sup> 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	BDL	Within prescribed limit
4	NO <sub>X</sub>	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



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**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: 15<sup>th</sup> March 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO <sub>X</sub>	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

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**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: 15<sup>th</sup> March 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 <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NOX	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



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**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: 20<sup>th</sup> May 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	16	Within prescribed limit
3	SO <sub>2</sub>	IS 5182 PART 23: 2006	$\mu\text{g}/\text{m}^3$	80	<1	Within prescribed limit
4	NO <sub>X</sub>	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



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## 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	Thel-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

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 ECOMS

**PHOTO PLATES**



Tuirial river at the month of March, 2023



Tuirial river at the month of May, 2023



Leachate treatment Tank



**AIR AND NOISE QUALITY MONITORING**



**Map showing green belt area of TUIRIAL SWM**