

## **EXECUTIVE SUMMARY**

### **1. A KHUHAWNNA**

State Investment Programme Management and Implementation Unit (SIPMIU), Aizawl hi Urban Development & Poverty Alleviation (UD&PA) Department, Government of Mizoram hnuaiia division pakhat a ni a, a thil tum ber chu urban development project hrang hrang te kalpui a, a hmanna tur mual hran hran heng water, solid waste management, waste recovery, sewage anga hman theih tura chhawpchuah hi a tum ber chu a ni.

State Investment Programme Management and Implementation Unit (SIPMIU), Aizawl, Government of Mizoram chuan Common Bio Medical Waste Treatment Facility huan ah P/P no 77 of 2005 (5000 m<sup>2</sup> area) chu Solid Waste Resource Management Centre, Airfield Veng, Tuirial, Aizawl ah a siam belh dawn a. A awmna hmun chu Latitude : 23°44'44.13"N, Longitude: 92°47'56.53"E.

Solid Waste Resource management Centre awmna ram hi secretary to the government of Mizoram, UD&PA hnenah land revenue and settlement department in a hawhtir a. A pumpui plot area hi 1,29,548 sq.m. niin 5000 sq.m. hi CBMWTF atana pek a ni. A hmunhma hi Mizoram State Pollution Control Board in CBMWTF siam theihna turin an enfiah tawh a. SIPMIU pawhin Aizawl khaw chhunga solid waste sawngbawl nan landfill treatment hmang turin Environment Clearance 2013 vied file number 10-73/2010-IA.III dated 9<sup>th</sup> January 2013 khan Ministry of Environment & Forest hnen atangin a nei a ni. Land fill bik hi tuna a ram ngaiiah hian area 7900m<sup>2</sup> ah siam mek a ni.

Hemi bakah hian, CBMWTF siam na atana khawtlanga nghawng a neih theih dan tur leh a kaihnawih zir chiang turin promoter chuan hemi hna hi M/s. ENPRO Enviro Tech & Engineers Pvt. Ltd. (ENPRO), Surat hnenah hlanin Common Bio Medical Waste Treatment atan Draft EIA report turin a ti a ni. Hemi project duan hi Category B1 leh project activity 7(da) hnuaiiah tlain EIA notification 2006 ah a lang a ni. ENPRO Enviro Tech leh Engineers Pvt. Ltd. (ENPRO) hi NABET Accredited (NABET/EIA/1922/SA 0125 valid till 12<sup>th</sup> January, 2022) sector hnuaiia awm a ni. ENPRO hian NABL accredited laboratory M/s. Qualissure Laboratory Services nen MOU ziakin baseline monitoring 1<sup>st</sup> December 2020 atangin 28<sup>th</sup> February 2021 thleng an nei ang. ENPRO team hian site tlawhin EIA Report atan ground survey kawng hrang hrangah an kalpui a ni.

## 2. PROJECT ZIARANG

### 2.1 Project kan mamawh chhan

Common Bio-Medical Waste Treatment Facilities (CBMWTFs) hian health care lamah hlawkna tha tak inenkawlna tha leh BMW deh ralna tha leh 'Economies of Scale' (significant decrease in cost of treatment per kilogram) hmangin min pe a. CBMWTF guideline angin, CBWT facility pakhat hian 75km area awthin khum 1000 a awm bawk tur a ni. Tunah rih chuan site thlan sa chhung 75km area ah CBMWTF health care facilities(HCFs) 75 leh khum 2191 nei leh BMW generation 767 kg/d nei an awm lo a ni. Private hospital, nursing home leh clinic ten a mahni a bawlhhlawh lo khawl leh sawngbawl hi thil tha ber a ni lo a ni.

Biomedical waste kan siam chhuah sawngbawl kawngah hian Mizoram hian hmasawna tur kan la ngah hle a ni. A hnuai table ah hian tuna kan dinhmun chiang takin a tarlang:

Mizorama Biomedical Waste Management dinhmun:

Sr No	Description	Units
1	Khum awm zat	3295
2	Bawlhhlawh siam chhuah zat (350gm/bed/day)	1153
3	Bawlhhlawh sawngbawl zat	Nil
4	Khum cover loh awm zat	3295

(Source: SIPMIU)

Bio medical waste treatment facility hi Mizoram ah kan la neih loh avangin bio medical waste ho hi kan la sawngbawl thei lo a. Tunah rih chuan BMW ho hi chu leihnuai phum hi kan tihdan a ni deuh tawp rih a. Aizawl hi chu state capital niin hmun laili leh mi tamna ber a ni a, hemi avang hian BMW mumal taka tihral leh a area bul hnai thlenga khawn khawm dan kan ngaihtuah a ngai. Hemi avang hian tuna facility thar ruahman hian Aizawl district leh a chhehvel chhunga a dik taka lakkhawm, sawngbawl leh tihral dan dik hmangin hna min thawh sak thei dawn a ni.

### 2.2 Location & Study Area

Tuna project ruahman awmna tura tih hi garden P/P of 2005 (on 5000m<sup>2</sup> area) tuna solid waste resource management hmun, Zemabawk veng , Aizawl, Mizoram a ni.

#### SALIENT FEATURES IN STUDY AREA OF PROPOSED PROJECT

Particulars	Details	Approx. Distance from Project Site
Geographical Co-ordinates	Latitude: 23 <sup>0</sup> 44'44.13"N, Longitude:	-

	92°47'56.53"E	
Village/City/Industrial Area	Tuirial Village	2.6km
District	Aizawl	21km
Mihring chenna hnai ber	Tuirial Village	2.6km
Lui hnai ber	Tuirial River	740 meters
Highway hnai ber	NH-306	690 meters
Railway station hnai ber	Bairabi Railway Station	56.3km
Airport hnai ber	Lengpui	21km
Protected Area/Sanctuaries/Ecologically Sensitive Area	None	
CRZ hman theihna tur	No	
Mihring chen tanna hmun	Aizawl	21km

Seismic Zone	Zone V	-
Nearest High Flood Level	0.77 km 145 meters	-
High Tide Line	0.76 km 143 meters	-
Low Tide Line	0.78 km 142 meters	-
Elevation	313 meters	-

**Note:** A chung a hlat zawng inziak khi project site atangin aerial distance hmanga teh vek a ni.

## 2.2 Salient Features of the Proposed Project

Project ruahman capacity :

Sr. no.	Equipment	Number	Capacity
1	Induction Plasma Pyrolysis	1	75 kg/h
2	Autoclave	1	150 L/batch
3	Shredder	1	75 kg/h
4	Effluent Treatment Plant	1	20 KLD
Proposed Capacity of Effluent Treatment Plant		Flow rate: 7 KLD Design Capacity: 20KLD	
Cost of Proposed Project		Rs. 10.38 Crores	
Allocation for CER Activities		Rs. 20,76,000 for next 5 yrs. For required activities such as: i) Basic Health Care Facilities in Villages ii) Community RO Plant iii) Vocational skill development program in different villages iv) Modification and development of concrete roads in villages. v) Sanitation campaign and public toilet provision in Villages	

Estimated Manpower Required	Tuna project ruahman hian mi tam tak hnenah hnathawh tur- construction chhung leh a zawh hnuah nen a pe thei dawn a. Estimate ang chuan temporary basis angin mi 60 a sak lain leh 65 (20 skilled, 30 semi-skilled leh 15 un-skilled) hnenah permanent a thawhna a pe thei dawn a ni,		
	<b>Phase of Project</b>	<b>Type of Labour</b>	<b>No. of Employees</b>
	During Construction	Contractual	45
	During commissioning	Contractual	15
	During operations	Managerial	06
Skilled		14	
Un-skilled		45	
	<b>Total</b>	<b>65</b>	
Area of Land	5000 m <sup>2</sup> – for proposed project		
Area of Green-Belt	1655 m <sup>2</sup> (33.10%)		
Water Requirement – Total	20KLD (9.5 KLD Fresh + 10.5 KLD Recycled)		
<b>Domestic</b>	<b>4 KLD</b>		
<b>Gardening</b>	<b>7.5 KLD</b>		
<b>Industrial</b>	<b>8.5 KLD</b>		
Incinerator/Scrubber	6 KLD		
Floor Washing	1.5 KLD		
Vehicle Washing	1 KLD		
Source of Water-	Recycl	10.5 KLD	
	Fresh	9.5 KLD (from Bore well)	
Waste water Generation	<b>10.6 KLD</b>		
	Industrial	7 KLD	
	Domestic	3.6 KLD	
Mode of Treatment	Industrial	Effluent Treatment Plant ah thawn niin a tih fim hnuah motor sil nan leh incineration scrubber atan a hman theih ang.	
	Domestic	Packaged STP ah thawn niin a bul hnai huan thali tui atan a hman theih ang.	
Power Requirement	Project in 200 KVA power a mamawh ang		
Source of Power Supply	New LT line through state electricity board		
Emergency Power Supply	1 Nos. D.G. Set – 150KVA		
Fuel Requirement	LDO for DG Set		
	20 Litres/Hr		
Sources of Gaseous Emissions	Incinerator – 75 kg/hr D.G. Sets – 1 no. – 150 KVA (stand-by)		
Air pollution Control Measures	High Pressure Drop Venturi scrubber and		

	packed bed scrubber followed by ID Fan and stack height of 30m
Solid/Hazardous Waste generation	<ul style="list-style-type: none"> <li>• Ash from incinerator – 250kg/day</li> <li>• ETP Sludge – 50kg/day</li> <li>• Plastic Waste after Autoclave and shredding – 100kg/day</li> <li>• Glass and metallic body implants After Autoclave – 50kg/day</li> <li>• Metal Sharps after Autoclave and Shredding – As generated</li> <li>• Waste oil – 10kg/day</li> <li>• Used batteries – As generated</li> </ul>
Solid/hazardous Waste Disposal Management	<ul style="list-style-type: none"> <li>• Ash from incinerator – Send to TSDF site for secured landfilling.</li> <li>• ETP Sludge – Sent to TSDF site for secured landfilling</li> <li>• Plastic Waste after Autoclave and shredding – Send to Authorized Recyclers</li> <li>• Glass and metallic body implants after Autoclave – Sent to Authorized Recyclers</li> <li>• Metal Sharps after Autoclave and Shredding – Sent to foundry for metal recovery/ TSDF site</li> <li>• Waste Oil – Send to Authorized Recyclers</li> <li>• Used Batteries – Send to Authorized Recyclers</li> </ul>

## 2.4 Process Hrilhfiahna

### A. Incineration System

Hemi bawlhhlawh hi chu a tlangpuiin incinerator chhung ah hian belt vir hmangin Primary Chamber chhungah charging door kaltlangin a lut tur a ni a. Primary chamber hi refractory leh insulation brick hmanga line thin niin IS 8 & IS-2042 standard a zawm a ni. Boruak a mamawh tawk tur ang hi chu air duct nozzle inang tlang vek hmangin a lo lut a ni. Air flow hi damper hmanga control vek a ni bawk. Primary chamber hi fuel oil burner nena fit thin a ni a, hemi hmang hian amah pawhin eng emaw chen chu a thawk thei a ni. Forced draft fan hi boruak combustion/volatilization atana hman thin a ni. Hemi fan hian flue gas chu venture scrubber a thlen hmain a lo ti dal/ pan ta thin a ni. Boruak combustion hi turbulence nei tlem thei tur ang bera khuahkhirh niin fly ash/mei vap a ti tlem thin a ni. Hemi fly ash/mei vap Primary chamber-a insiam hi dashing door hmanga paih

chhuah thin a ni a, primary chamber chhungah hian boruak temperature 800<sup>0</sup>C atanga 50<sup>0</sup>C vawn hram hram tur a ni.

Primary chamber atanga gas lo chhuak chu secondary chamber laihawl velah a va kal a, hei pawh hi refractory leh insulation brick hmangin a in line a ni. Secondary chamber hi flue gas second hnih lek cham tura design a ni. Secondary chamber ve thung hi chu temperature 1050<sup>0</sup>C atanga 50<sup>0</sup>C vawn tur a ni. Hemi chhunga gas hi a kang fai vek tur niin incinerator pawnah chuan boruak tha chauh a chhuak tur a ni.

Hetiang thil ral leh mai thei ang hi chu flash point a hniamin primary combustion ah an ral duh em em mai a, heta cham bang ho hi secondary chamber ah chuan temperature sang hnuaiah a kang ral ve leh thin a ni, Fixed carbon ho hi bawlhhlawh zinga kang ral mai theilo zinga mi a ni a heihi primary chamber ah chauh fai takin a kang ral thei a ni. Bawlhhlawh chhunga boruak hnawng awm hi primary chamber ah chuan a kang ro vek dawn a, secondary chamber ah kal lehin super-heated water vapour angin a chhuak thin a ni. Mei vap leh bawlhhlawh kang theilo chu primary chamber ah an cham bang thin a, gas nena an thlawh chhuah mai loh nan, boruak che tam lutuk hi kan veng tur a ni. Hemi a bawlhhlawh kang ral/vap te hi 5-10% an ni tlangpui a ni.

Flue gas ho hi air pollution control system ah a kal thla a, high pressure nei hian venturi scrubber ti hniamin particulate matter leh gas thur te hi caustic solution hmanga hip leh packed bed scrubber hmanga paih chhuah theih a ni. Chumi hnuaiah chuan gas ho chu I.D fan hmanga chhuahtir niin 30m height stack ah kaltir leh a ni.†

Incinerator atana technical specifications chu a hnuaiah hian ziah lan a ni

### **TECHNICAL SPECIFICATION OF INCINERATOR**

<b>Incinerator</b>		
1	Brand Type & Model	“ALFA-THERM”/similar controlled air Oil Fired Incinerator Model DSS series
2	Type of Waste	Biomedical Waste
3	Burning Capacity	75kg/hr
4	Auxiliary Fuel	Diesel
5	Type of Burner Operation	Monoblock fully automatic burners
6	Temperature <ul style="list-style-type: none"> <li>➤ Primary Chamber</li> <li>➤ Secondary Chamber</li> </ul>	800+_50 <sup>0</sup> C 1050+_50 <sup>0</sup> C
<b>Primary Chamber</b>		
1	Type	Static Solid Hearth
2	Material of Construction	Mild Steel, 5mm thick
3	Refractory thickness	115mm thick
4	Material	Refractory bricks confirming to IS-8
5	Temperature Resistance	1400 <sup>0</sup> C

6	Insulation thickness	115mm thick
7	Material	Insulation bricks confirming to IS-2042
8	Waste Charging	Automatic through Hydraulic Ram Pusher
9	Ash Removal	Manual
<b>Secondary Chamber</b>		
1	Type	Static Solid Hearth
2	Material of Construction	Mild Steel, 5mm thick
3	Refractory thickness	115mm thick
4	Material	Refractory bricks confirming to IS-8
5	Temperature resistance	1200°C
6	Insulation thickness	115mm
7	Material	Insulation bricks confirming to IS-2042
8	Resistance time for flue gases	2 seconds
<b>Emergency Flue gas Evacuation System</b>		
1	Type of Operation	Automatic pneumatic control damper
2	MOC	Mild Steel
3	Refractory	50mm thick castable
4	Insulation	80mm thick castable
<b>Air Cooled Flue gas cooler with cooling Fan</b>		
1	MOC	Mild Steel
2	Type	Shell and tube type
3	MOC of Tubes	Carbon Steel
4	Design Temperature	900°C
<b>Venturi Scrubber</b>		
1	Type	High Pressure Drop Type
2	Material of Thickness	Stainless Steel 316L, 5mm thick
3	Refractory Thickness	115mm thick
4	Material	Refractory bricks confirming to IS-8
5	Temperature resistance	78-80°C
6	Scrubbing Media	Water with 5% Caustic
<b>Packed Bed Scrubber</b>		
1	MOC	Mild Steel rubber lined
2	Water re-circulation pump with motor	Provided
3	Interconnecting piping	PPR
4	Packing media	Intalox Saddles/Pall rings
5	Interconnecting ducting	Mild Steel Rubber lined
6	Scrubbing Media	Water
<b>I.D. Fan</b>		
1	Type	High Pressure Centrifugal type
2	MOC	Stainless Steel Impeller and Mild Steel Rubber lined casing
3	Drive	Belt Driven
<b>Combustion Fan</b>		

1	Type	Centrifugal
2	Modulation	Manual damper control
3	MOC	Mild Steel/ SS316
4	Drive	Direct Drive
<b>Burners</b>		
1	No. of burners	As per standard design of incinerator
2	Type	Monoblock fully automatic
3	Fuel	Diesel
4	Make	“Alfa-Therm”/Similar
<b>Control Panel</b>		
1	Type	PLC Based
2	PLC Make	Omron/Schneider
3	MOC	CRCA Sheet
4	Finishing & Painting type	Powder coated
5	Audio – visual alarm system	Provided
<b>Height of chimney 30m</b>		
1	MOC	Mild Steel
2	Type	Self Supporting
3	Height	30m from ground level
4	Other Standard Accessories	Aviation lamp, lightening arrestor, stack drain, inspection platform, sampling port
5	Paint	The chimney is painted externally with two coats of heat resistant aluminium paint
6	Ladder	To be provided

(Source: SIPMIU)

## B. Autoclave

Autoclave chu equipment chamber chhunga 15psi pressure hnuai temperature 121<sup>0</sup>C pe thei tura siam a ni a, hemi hian chamber chhunga tibawlhhlawhtu thah vek leh a tih thianghlim hna a thawk thei ang. Natna hrik tam tak hi 80<sup>0</sup>C chunglam ah hian an dam theilo a, hemi hman mai hian natna hrik/tibawlhhlawhtu tam tak ti hlum in mihring tana hlauhawm tur a paih bo thei dawn a ni. Mipuite hriselna ngaih pawimawhna avang leh quality control duh vangin bio hazardous material ho hi chu hman hmain tih thianghlim phawt thin tur a ni. Bio-medical waste chi hran hran plastic baggage, syringe, lapua etc te chu pollution tehkhawng zawmin autoclave ah tih thianghlim ngei ngei tur a ni. Amaherawhchu, bawlhhlawh autoclave hmanga tih thianghlim tawh hi chu a hriat hran bik a, chumi avang chuan bawlhhlawh dang rualin hersawm tura paih mai tur a ni.

### TECHNICAL SPECIFICATIONS OF AUTOCLAVE

Description	Specification
Item	Horizontal high-speed steam sterilizer cylindrical
Capacity	150 ltrs/batch



Chamber Material	Stainless steel SS – 304
MOC of Door	Stainless steel
Door Ring	Stainless steel SS – 304
Jack Material	Stainless steel SS – 304
Outer Cover Material	Stainless steel SS – 304
Back Plate	Stainless steel SS – 304
Digital Alarm System	Provided
Vaccum system with pump	Provided
Temperature Controller	Provided
Heating for steam	Electrical heaters
Material loading trays	2 Nos. Stainless Steel

**(Source: SIPMIU)**

### **C. Shredding**

Shredding hi chu bawlhhlawh hriat hran theih tawh loh khawpa her sawmna emaw chan sawmna a ni. Shredder chuan tuiek theilo blade hriam deuh heng bawlhhlawh hrang hrang – plastic, bottle, hriau leh thil chi hran hran her sawm thei khawpa hriam a nei a. Low speed two shaft system hi bawlhhlawh sak leh hlawm tha herna atan chuan a tha khawp mai.

Natna pai bawlhhlawh chi hrang hrangte chu thliar hrangin-HDPE, PP, rubber, latex, glass leh metal te in a then theih a. Henga thliar hran ho hi shredder ah her sawm vek tur a ni a, hei hian natna pai bawlhhlawh te pawh a ti fai ang a, medical/food-grade atana hmanrua recycle pawh a veng dawn a ni. Shredder hi chu bawlhhlawh nawi te te (10-25mm) plastic, thlai chhia, paper te mumal taka pollution tehkhawng ina a siam te size mumal taka her sawm tu a ni. Hemi system ah hi chuan blade 5 hmangin 3 hi chu che thei a ni a, 2 hi che theilo a ni ve thung. Shredder hian bawlhhlawh sawngbawl ngai a let tam takin a tih tlem phah thei a ni.

### **TECHNICAL SPECIFICATION OF SHREDDER**

Description	Specification
Model	MT-75
Type	Medium Series Twin shaft shredder
Cutting Chamber	442 X 545 mm
Hopper Size	692 X 795 mm
Shaft	2 Nos Hexagonal Shaft
Electric Load	20HP, 15 Kw
Operation	3 phase/ 415 watt/ Operates on 60% of rated power
Motor Make	ABB/Siemens/Bharat Bijlee
Gear box Type	Planetary Type
No. of Gear box	1 No.
Gearbox Make	Brevini (Italy)/ RR (Italy)
Drive	Electrical
Material of Construction	High Wear Resistant Impoted Alloy

	Shaft: EN-9 Hopper-Mild Steel Paint-Epoxy
Safety Feature & Others	Auto Reserve System VFD {Variable Frequency Drive (ABB Schneider/Siemens make} Overloaded relays, Limit Switch interlocking Emergency Stop Button Manual Reversal Switch
Machine size & weight	Length: 3000 mm Width: 1700mm Height: 2300 mm Weight: Approx 2.5 Tons

(Source: SIPMIU)

### 3. Environment sawifiahna

Baseline environmental status hi study area bikah neih a ni a, heath hian tehkhawng hrang hrang hmanga teh a ni a, **1<sup>st</sup> December 2020 atanga 28<sup>th</sup> February 2021** thleng lak a ni, hmun hrang hrang ah la in project site turah pawh hian lak a ni. Surface leh ground water, soil, air leh noise sample te lak khawm niin NABL accredited Qualissure Laboratory Services ah enfiah a ni. ENPRO Enviro Tech leh Engineers Pvt. Ltd hian MOU ziakin Qualissure Laboratory Services hi baseline environmental monitoring ti turin an rel. Boruak che vel thenkhat hi ENPRO team chuan NABL approved leh MoEF recognized laboratory ah te an zirchiang a ni. Sample te hi lakhawmin an vawng tha a, standard procedure/method angin an zirchiang thin a ni.

Sr.	Environmental Attributes	Baseline Status
1.	<b>Ambient Air Quality</b>	Station 6 ah – project site tur leh mihring chenna hnaih lamah
	Observation	-
	PM <sub>10</sub>	16.0 – 68.0 µg/m <sup>3</sup> 5.0 – 24.0 µg/ m <sup>3</sup>
	PM <sub>2.5</sub>	4.8 – 8.9 µg/ m <sup>3</sup>
	SO <sub>2</sub>	12.0 – 20.8 µg/ m <sup>3</sup>
	NO <sub>x</sub>	0.32 – 0.442 µg/ m <sup>3</sup>
	CO	10 – 16.8 µg/ m <sup>3</sup>
	NH <sub>3</sub>	Not Detected (ND)
	HC	Not Detected (ND)
	VOC	Not Detected (ND)
	PAH	Not Detected (ND)
	Inference	Result te hi NAAQ permissible limit china hmuh vek a ni.
2.	<b>Meteorological Status</b>	Meteorological data 1 <sup>st</sup> December 2020 atanga 28 <sup>th</sup> February 2021 chu lakhawmin NABL approved laboratory ah Qualissure Laboratory Services a paltlang.

	Observation	<p>Winter season  Pre-dominant wind – South to North  Calm condition – 26.1 %  Average wind speed – 3.6 m/s  Maximum wind speed – 8.8 m/s  Temperature range – 6.8 to 31.3°C  Relative Humidity range – 17 to 84 %</p>
	Inference	<ul style="list-style-type: none"> <li>Mihring chenna hnai ber chu Tuirial khua niin proposed project site atangin 2.6 km a hlaa awm a ni</li> </ul>
3.	<b>Water Quality</b>	<p>Surface water sample chu hmun hnih atanga lak a ni –</p> <ol style="list-style-type: none"> <li>Tuirial lui</li> <li>Chite lui</li> </ol> <p>Ground water sample hi chu hmun 4 ah lak a ni ve thung –</p> <ol style="list-style-type: none"> <li>Thingsulthliah khua (Tubewell)</li> <li>Sesawng khua (Tubewell)</li> <li>Tuirial (Handpump)</li> <li>Aizawl (Handpump)</li> </ol>
	Observation	<p><b>Surface Water:</b> Surface water sample SW1 hi Tuirial lui atanga lak niin SW2 hi chu Chite lui atanga lak a ni. A sample hi CPCB-1979 leh Bureau of Indian Standards, 1982 limits (Surface water), BOD a sang a, natna hrik awm thei tihfai hnu pawhin in theih tur chuan treatment lak a ngai tho a ni.</p> <p><b>Ground Water:</b> GW1 &amp; GW2 hi tubewell sample niin GW3 &amp; GW4 hi handpump sample te an ni. GW3 tih lohah hi chuan coliform a awm a. E.Coli GW2 leh GW4 ah a awm bawk. Chuvangin mihring in tlaka siam tur chuan chhuan so, chlorination, disinfection emaw UV treatment a ngai hmasa ang.</p>
	Inference	<p>Surface water hi in tlaka siam tur chuan treatment a mamawh a, chumi hnuah disinfection a ngai a ni. Ground water ho hi chuan chhuan so mai bakah in tlaka siam tur chuan chlorination, disinfection emaw UV treatment a mamawh hmasa a ni.</p>
4.	<b>Noise Quality</b>	<p>Noise quality hi hmun 6 ah lak niin project site tur ami pawh a tel a ni.</p>
	Observation	<p>A tlangpui thuin noise level hi 52.7 – 55.1 dB[A] chhun ah leh 41.2 – 47.4 dB [A] zan ah te record a ni.</p>
	Inference	<p>Result zawng zawng hi CPCB permissible limit chhunga tla vek an ni</p>

5.	<b>Soil Quality</b>	Soil quality hi hmun 6 ah lak niin project site tur ami pawh a tel a ni.																																			
	Observation – Physical	Lei hi a tlangpuiin sandy clay loam a ni. pH hi 25 <sup>0</sup> C ah 5.52 leh 7.38 inkar ah a tla Electrical conductivity chu 16.55 – 28.87 mS/cm inkar a ni Exchangeable Sodium content chu 94.22 – 188.0 mg/kg soil. Exchangeable Potassium content chu 180.6 – 264 mg/kg soil a ni bawk.																																			
	Chemical																																				
	Inference – Physical & Chemical	Soil Sample pH ho hi chu moderately acidic atanga neutral a ni tlangpui Soil texture hi a tlangpuiin sandy clay loam a ni a, Calcium ah a hniam																																			
6.	<b>Land Use/ Land Cover</b>	Satellite IRS P-6 LISS III thlalak hi National Remote Sensing Centre (NRSC) Hyderabad atangin a neih theih a. Land Use/ Land Cover mapping hi 10km radius neiin proposed project site centre ah lang ngei se a tha.																																			
	Observation	- <table border="1"> <thead> <tr> <th>Sr. No.</th> <th>LULC Class</th> <th>Area (Ha)</th> <th>Area (%)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Water Bodies</td> <td>2868.31</td> <td>9%</td> </tr> <tr> <td>2</td> <td>Agricultural Forest</td> <td>12980.44</td> <td>41%</td> </tr> <tr> <td>3</td> <td>Dense Mixed Jungle</td> <td>5673.13</td> <td>18%</td> </tr> <tr> <td>4</td> <td>Built Up</td> <td>3234.13</td> <td>10%</td> </tr> <tr> <td>5</td> <td>Dense Scrub</td> <td>1558.00</td> <td>5%</td> </tr> <tr> <td>6</td> <td>Bamboo Forest</td> <td>1100.00</td> <td>3%</td> </tr> <tr> <td>7</td> <td>Road</td> <td>2766.75</td> <td>9%</td> </tr> <tr> <td>8</td> <td>Open Scrub</td> <td>1612.00</td> <td>5%</td> </tr> </tbody> </table>	Sr. No.	LULC Class	Area (Ha)	Area (%)	1	Water Bodies	2868.31	9%	2	Agricultural Forest	12980.44	41%	3	Dense Mixed Jungle	5673.13	18%	4	Built Up	3234.13	10%	5	Dense Scrub	1558.00	5%	6	Bamboo Forest	1100.00	3%	7	Road	2766.75	9%	8	Open Scrub	1612.00
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Environmental Attributes	Baseline Status		
	Total	31792.75	100%
<b>Zirchianna aṭanga Thuthlukna (Inference)</b>	Zirchianna aṭanga a lan dan in Project chhehvêla hmun te hi Thlai chinna/huan (Agricultural Forest) - 41%, Thing chi hrang hrang awmna (Dense Mixed Jungle) – 18%, Hnim buk in a bawh chin (Dense Scrub) – 5%, lei dep a hnim to (Open Scrub) – 5%, Mau hmun (Bamboo Forest) – 3% leh hmun hring te'n a tuam a. Mihring chenna (human settlement) hmun hian 10% a awb bawh a. Dai hnaiah huan te hi a inṭan a ni. Za zela pakua (9%) chu tui awmna hmun a ni a; Tuirial Lui (Sonai river) Chhim aṭanga Hmar zawnga luang te, Muthi Lui te, Sele Lui te, Suibai Lui te, Sakel Lui te a a luang a ni. Heng bakah hian 9% chu inkalpawhna in a huam.		
<b>Ecology and Biodiversity</b>	Hetilai hmun leh a chhehvêlthe hi Science thiamna hmangin uluk taka zirchian a ni tawh ṭhin a, chutiang zirchian tawhna (Secondary data) leh zirbelhna ṭangkawpin Primary data buatsaih a ni. Nungcha leh Thing, rêm mai thei tur Rare or Endangered or Endemic or Threatened – REET) ang chi te chu uluk taka zirchian a ni.		
<b>Hmuhchhuah (Observation)</b>	Government in Project a neihna/bunna hmun tur hi thlai awmlohna leh hmun chhengchhe lai, huan atana hman duhlohna hmun a ni a. Hnim tlêm erawh a chhehvêlah ṭo ve in thing leh nungcha rêm mai thei (REET) ang chi a awm lem lo a ni. Project neihna hmun a thing leh hnim awm tlângpui te chu – <i>Trema orientalis (Belphaur)</i> , <i>Acrocarpus fraxinifolius (Nganbawm)</i> , <i>Musa sylvestris</i> , <i>Toona ciliate (tei)</i> , <i>Clerodendrum glandulosum</i> , <i>Solanum americanum</i> , <i>Ageratum conizoyides</i> , <i>Vermonia cineria</i> -te an ni. Tuirial RRF pawh zirchianna hian a huam tel a ni.		
<b>Zirchianna aṭanga Thuthlukna (Inference)</b>	Zirchianna aṭanga hmuhchhuah (result) siamna atân hian a tam lam leh a a zin lan inlaichinna (ration between abundance and frequency, A/F) hman a ni a (whitford, 1949). Hetilai hmuna thil nung te chu chhiarkawp hmanga chawhchhuah niin (Random Distribution) A/F chu 0.036 a ni. Shannon indices value of buffer zone = 2.78 a ni a, hei hian a entir chu helai hmun hi thil nung te chu inhnerem takin an cheng ho a ni (moderate diversity). Polulation size leh Dominance of the species = 6.4% a ni a, hei hian a		

	<p>entir chu Thing chi khat chauh te chu a tam lutuk emaw a tlêm lutuk bik lo a ni. Evenness hi 94% vêl a ni a, hei hian a entir chu nungcha chêngte chu hmun tin deuthaw an an inzârpharh a ni.</p>
<p><b>Leilung chanchin (Geology)</b></p>	<p>Leilung zirchianna aţangin helai hmun leh a chhehvêlah hian Lung –Kêl-ha (Shale), lung chang deuh (siltstone) leh lung sen lei rawng lam (sandstone) leh lung no thenkhat hmuh tur a awm a. Geological Survey of India in a târlan danin Mizoram leilung te hi a upa lova, tlâng te pawh Hmar aţanga Chhim hawi zawngin a awm a, mual pawng thlih thlih, awihpang leh tlâng sang deuh te a awm a ni. Mizoram Thlang lam (Western region) hi tlângkàng in a vawrhchhuah, lung a insiam zo ţep tawh te (Neogene Sedimentary Rocks) an ni a. Hengte hi zirna atanga tehfung pakhat Surma Group leh Tipam Formation te ni tlângpuiin lung chang deuh (siltstone) leh lung sen-lei rawng lam (sandstone) te, lung chirh rawng ang tak (mudstone) te leh chinai lung (Limestone) tlêm hmuh tur a awm a. Mizoram chhaklam (Eastern region) te hi Barail Group te an ni thung.</p>
<p><b>Tui leh Tuihna Chanchin (Hydrology)</b></p>	<p>Aizawl district huamchung zawng hi Surma Formation of Miocene Age kan tih hnuaiah a awm a. Lung te chu Ruah leh Ni leh thil dangin a a siam danglam (weathering) lai mêk te niin, an tawpna tur (final stage) an la thleng lo deuh a (semi-consolidated formation). Tlangpang hniam lai deuh te hi leihnuai tui put harsatna lai a nih avangin ruahtui luankhawmna hmun a ni thin a. Chutiang hmunah te chuan lung chang tak tak te, Surma Group a mi ni si insiamdanglam te hmuh tur a awm thin a ni. Project neihna hmun tur leh a chhehvelah hian lei hnuaia tui hmuh tur a awm lova. Chumi a nih avang chuan hmun ruam laiah tui hmuh tur a awm beisei a ni a, lei hnuaia 3m – 5m velah tui a awm beisei a ni bawk.</p>
<p><b>Zirchianna aţanga Thuthlukna (Inference)</b></p>	<p>District pumpui hi tlâng ram in a bawh vel a ni a, awihlân tak tak niin slope degree 20% aia tam te pawh hmuh tur a awm a ni. Chumi piah lamah chuan tuihna chungchang zirchianna hmuh tur a awm lem lova. Ground Water Estimation Committee, 1997 (GEC-97) in a sawi danin hetiang tlangram hmun te hi tuihna awm na hmun zirchianna atan hman a ni ngai lem lo. Chumi anih avang chuan R.D. Block in a zirchianna chu hman a ni. Lei hnuaia tui awm zat pawh Chiang taka hriat theih a ni lova, chuangin kum tin a lei hnuaia tui pût zât chhut nan Rainfall Infiltration Factor Method hman a ni.</p> <p>Kum tina lei hnuaia aţanga tui awm zât tura beisei chu 3.86 mcm a ni a, chutih lain kum tina hmuh theih</p>

	beisei chu 0.14 mcm a ni thung. Lei hnuaia tui tlin khawmna hi tehna aţang chuan 3.94% a ni a. =hâl laiin lei hnuaia tui put a awm lo tluka ngaih a ni. Hemi piah lamah hian mipuiin an hman tura beisei chu 0.27 mcm a ni a, lo huan thlai atan 3.21 mcm a ni thung. Kan sawi tâk thenkhat aţanga kan hmuhchhuah theih chu, Aizawl district a lei hnuaia tui inkhawl dân hi a him tawk (SAFE) a ngaih a ni.
<b>Mipui-Vantlang dinhmun (Socio Economic Status)</b>	Primary data hi a chhehvêl khaw hrang hrang 10km bial chhunga mi lâk a ni.
<b>Hmuhchhuah (Observation)</b>	Khaw 16 leh khawpui deuh pakhat he zirna huang chhungah hian a awm a. Sipmiu lamin a din tur CBMWTF hi Aizawl Solid Waste Management Centre, Tuirial Airfield, Mizoram-ah a awm dawn a. A sakna hmun hi thingtlâng Tlângnuam taluka hmun (47% villages/ 1 uninhabited village) a ni a; Thingsulthliah, taluka, Aizawl District aţangin 53% (including 1 town) a tel a ni. Chumi anih avang chuan zau taka zirna, km sawm bial te hi Aizawl District pahnih aţangin neih a ni.
<b>Zirchianna aţanga Thuthlukna (Inference)</b>	10 kms a zau hmun zirchiante hi za-a-za (100%) te chu Aizawl District chhunga talukas te an ni a. Zirbingna chung bikah hian Mizoram pum mipui aţanga 28.6% an chêng a, Aizawl District mipui cheng zinga 78.5% an tel a ni. Kum 10 dana mihring pun chakan aţanga teh in pahnihna a ni a, Tlângnuam talukas hnuaiah a awm a ni. Hei hian a entir chu mipui tenkhawsakna tur dap in Aizawl district an pan khawm nasa a ni.

#### 4. Ram a nghawng theih dan leh a nghawng tihthem dân

Project ruahman anih hian a chhehvêl a nghawng theih dan tur uluk taka zir a ni a.

Khawl in a siam chhuah thli chhia te chu hman nawn leh theih tura ruahman a ih avangin tui thianghlim a mawmawh tlêm dawn a. Chuvangin tui renchem kawngah pawh ngaihtuahawm a ni lo tura ngaih a ni.

Thli chhia te chu a chhehvêl tui tlinna emaw luiah emaw luan ral tir mai mai a ni dawn lova, chuvangin tui a ti bawlhhlawh dawn lova, leihnuia tui pawh a tibawlhhlawh dawn lo a ni.

Thli chhia ruala thil nawi bâl chhia lo dang tur eawm lo thlifim turin pressure na tak pawh do thei tur Venturi Scrubber vuah a ni dawn a. Acid leh chemical hlauhawm lo ti dal turin caustic solution ruahman a, Acidic gas insiam thei thlenga lo tireh turin ruahmanna siam a ni. AERMODcloudTM Version 18 Rev. 86 hmangin Pollutant emission (TSPM,

HCL, NO<sub>x</sub>) zirchianna neih a ni a. Hemi hmang hian a project awmna hmun tur (ground concentration) a hriat theih a, Ground conc. Hi zirchianna aṭangin a NEGATIVE a ni.

Project hi kalpui anih hunah a chhehvel nungcha leh ramngaw te, leilung leh a siamna hmun tur lei hnuai lam thlengin nghawng a nei dawn a. CBMW din anih chuan a ṭhuthmun ram chuan ngai a awḥ thei tawḥ dawn lova. A hmun laihna hnu lei te chu a chhehvêl thing phun nân emaw thil dang ṭangkai ah hman a ni dawn thung. Project awmna hmun in awḥ za zêl a 33 (33%) chu hmun hring a siam tum a ni a. Impact identification matrix tehkhawng hmanga the ah he project hian ram ngaw leh nungcha leh a chhehvel ah nghawng tha lo lutuk a nei dawn lo a ni (insignificant negative impact).

#### *5. Ramngaw, leilung leh thilnung dang a nghawng theih dan zirchian*

He project atan hian boruak thianghlim neih te, tui thianghlim vawn ṭhat te, leilung chakna tihbo loh te, ri bengchheng lutuk siam lo tur te leh CBWM khawl uluk taka zirchian reng te a ni dawn a. Central Pollution Control Board (CPCB) in dân leh dun a zam ang te uluk taka vawng turin hma lak a ni ang.



*ENVIRONMENTAL MONITORING PARAMETERS & FREQUENCY*

<b>Sl. No</b>	<b>Item/Attribute</b>	<b>Parameter (Tehkhawng)</b>	<b>Frequency &amp; Responsible Party (Zirchian hun bi)</b>
1	Boruak thianglim tehna	Particulate Matter [PM <sub>2.5</sub> ] & [PM <sub>10</sub> ], Sulphur Dioxide [SO <sub>2</sub> ], HCL, Notrogen Dioxide [NO <sub>x</sub> ] leh Carbon Monoxide [CO], VOC	Laboratory (external) hmangin Thla 3 dan zelah; project awmna hmun leh a chhhehvêl khua 10km bial chhungah (hmun 6 ah)
2	A siam laia boruak chhia atanga tehna	PM, HCl, NO <sub>x</sub>	Laboratory (external) hmangin Thla 3 dan zelah
		HF, Total Organic Carbon	Laboratory (external) hmangin Thla 3 dan zelah
		Dioxin & Furan	Laboratory (external) hmangin kum 1 dan zelah
3	A siamna khuchuak atangin	CO, O2 (or added in future by CPCB)	Online Monitoring (CEMS) connected to CPCB/ SPCB Server
4	Hnathawhna hmuna endik	PM <sub>2.5</sub> , PM <sub>10</sub> , SO <sub>2</sub> , NO <sub>x</sub> , Noise, Temperature, Humidity	Laboratory (external) hmangin Thla 3 dan zelah emaw a hmunah EHS Exe. / Sr. Chemist
5	Lei hnuaia tui endik	As per IS 10500	Kum 2 danah (Fûr tel lovin)
6	Tuichhia endik	pH, EC, Turbidity (Tui nut lam), TDS, Calcium, Magnesium, Total Hardness, Total Alkalinity, DO, COD, BOD Chlorides. Sulphate, Phosphate, Ammonia, Nitrate, oil & grease, Bioassay test (Heavy Metals if required)	Laboratory (external) hmangin thla tin tumkhat
		pH, COD, TDS, BOD, Flow	Laboratory (internal) hmangin nitin tumkhat (CPCB Guidelines)

		A luan luhna leh chhuahna a tui luan dân	Online monitoring on continuous basis provided with recorder
7	Ri bengchheng tehna	Equivalent Noise Level - dB (A) {darkar khat tal a zawn in}	Laboratory (external) hmangin Thla 3 dan zelah vawikhat
8	Leilung tehna	pH, EC, Moisture Organic Matter, N, P, K, SO <sub>4</sub> <sup>-2</sup> , Cl <sup>-</sup> , Ca <sup>2+</sup> , Mg <sup>2+</sup> & Na <sup>+</sup>	Kum khat ah vawikhat
9	Thlichhia hlauhawm tehna	General parameters	Laboratory (external) hmangin kumkhat ah vawikhat
10	Greenbelt (hmun hring in a bawh chin)	Thingphun zât, Thing awm zat, Thing thi tawh lam awm zat	Kumtluanin zing tawh taka endik a ni ang: In House by EHS Executive & other EMC members
11	Hnathawkte hriselna endik	As per statutory provision & requirement	Kumtluanin Medical Officer leh Doctor ten (approved as per OHS plan)
12	STP	pH, COD, TDS, BOD, Flow, DO, TSS	Daily by Internal Lab

A chung a tarlante bakah hian hmanrua uluk taka vawn leh him taka hnathawhna hmun thawh theih tura ruahman te a tel a. Ruahmanna kimchang hi log-book ah a chuang vek a ni.

## 6. Tul dang zirbelhna

### 6.1 Thli chhia a awm a finfiah, Chhiatna thleng thei laka fihlim dan tur

Thil siamna in thli chhia a siam in harsatna a thlen theih te chu uluk taka zirchian a ni ang a, he SIPMIU hmun thlan ah hian thlichhia avangin harsatna a thleng thei a, a hnuaia tarlan te a tang hian chtiang thli chhia chu a insiam thei a ni:

- Hospital a/anga thli chhia
- Laboratories atangin
- Health care sub-centre

A chung a tarlan atanga thli chhia lo chhuak te hi a hlauhawm deuh zawk (red bag) meidcal waste kan tih ang chi leh vantlang thli pangngai (general housekeeping wasted) kan tih ang chi a lo chhuak thin a. Emission factor kan tih tak in a teh chu heng pahnihte hi thlichhia anga a pahniha a luan chhuah in a ni.

Hospital, laboratories leh Health Care Sub-Centre-te, disinfectants dang te, anti-neoplastic agent te, heavy metals (e.g. Mercury), adt. hi leilung tan a hlauhawm a. Amaherawh cu uluk taka thliar leh senghawi anih erawh chuan chhiatna nasa zawk thleng lovin him takin a awmna hmun tur (treatment/ storage/ disposal) ah kan thlen thei a ni.

Risk Assessment kan tih hi thlichhia dahkhawmna leh a sawngbawlina atanga boruak emaw chemical hlauhawm insiam thei zirchianna a ni a. A dahkhawmna lo put palh pawh ni se engtia hmalak tur nge tih thlenga ruahmanna siamna a ni.

## *Qualitative Risk Assessment hi kalpui mek a ni bawk:*

### 1. Project site a thil ÷ul dang kalpui te

- Project site aṅanga Biochemical waste te Bio-Medical Waste Treatment Facility (SIPMIU) site thlenga phurh
- Thlichhia te buk a enfel
- Incineration (mei na taka kan tir)
- Autoclave (mei na tak leh pressure sang taka chemical reaction awm tura hâl)
- Shredding (chansawm emaw tih kehsawm)
- ETP (Effluent Treatment Plant- hmanga tui te tihthianglim)

Waste Storage Area (thlichhia dahkhawmna hmun) leh Incineration Area (bawlhhlawh hâlna hmun) te hi ngaihpaawimawh an ni.

Chhiatna leh harsatna thleng thei laka theih ang tawka project site ah hian ruahmanna siam a kalpui a ni ang a. Kangmei chhuah palh pawha hman turin Fire Extinguisher te, smoke alarm te, hmun hrang hrangah dah a ni ang.

CBWM hnuai hnthawk te chu ETP Chemicals te him taka an chelek a an sawngbawl theihnân zirtirna uluk taka pêk an ni ang a, a ÷ul angin invenna thuam (PPEs) te pawh pek an ni bawk ang. Kum khata vawikhat emaw a aia tam medical checkup an nei ngei bawk ang.

Chhiatrupna thleng thei laka sahimna turin Disaster Management Plan felfai tak ruahman a ni ang a. Mawhphurtute chu uluk taka an chanvo te hrilhhriat an ni bawk ang.

## *7. Project Kalpui Hlawkna*

Project ruahman anga kalpui theih anih chuan felfai takin, thli chhia leh hlauhawm thei te chu sawngbawl a ni ang a, bawlhhlawh dang anga khawi emaw laia paih leh phum bo mai a nih dawn loh avagin a him viau bawk ang.

Mipui Vantlang tân he project hian hmasawmna a thlen ngei rin a ni a, Hetilai hmun leh a chhehvela hmasawmna ruhrel dintu pawimawh tak a ni bawk ang. Project kaltlangpui anih hnuah mipui te hnen atangin a hlawk zia hmuh beisei a ni.

He project hian hnaruaak tam tak a siam ang a, a sak hunlai leh khawl hman theiha a awm hunah pawh hnthawk tur hi a awm zel ang a, chumai bakah bawlhhlawh leh thli chhia vel sawngbawl turin hnthawkte engemawzat mamawh a ni bawk ang. Chuvangin a chhehvela cheng te tân hna thawh tur tam tak a insiam dawn a ni.

Project kalpui a nih hunah chuan hnthawk tur tam tak a awm ang a, a sak hunlai hian mi 60 bawr mamawh a ni ang a, tin, a sak zawh hnu ah mi 65 (20 skilled, 30 semi-skilled and 15 un-skilled) te mamawh a ni ang.

## *8. Environmental Management Plan*

Central Pollution Control Board in a endikna tehkhawng a ruahman angin khawl hman a nih dan chungchangah te, khu a siamchhuah te uluk taka enfel a ni ang a. Khawl pakhat chhiat thut a thlakna tur te, khawl chhia siamna tur bungrua te, sahimna tura mamawh leh ÷ul dangte pawh inruahman lawk vek a ni ang. Khawl (Plant) te uluk taka enkawl anih theih nân khauh taka kalpui a ni ang a, Plant a thawktute leh thlichhia sawngbawltute training uluk taka pêk an ni ang.

Operator te chuan bio medical waste facility chungchanga SOP ukuk takin an vawng anga. Dàn anga thlichhia sawngbawl lo tute chu hotute hrilhhriat zêl an ni ang. Bawlhhlawh leh thli chhia halral, tihkehsawm leh sawngbawl chungchang uluk taka record vawn a ni ang.

Helai hmuna cheng chhungkua, bawlhhlawh petu te chuan hnathawk te chu a hmunah kal in hnthawh dan an thlithlai thei ang a, hnathawktute chuan non-chlorinated plastic bag pe chhuak in bio-medical waste te a ÷ul hunah, sawrkar chawlh pawh tiam in, an la khawm ang.

Engemaw avangin bawlhhlawh te chu hun rei tak dahkhawl a ngaih chuan hnathawktuten uluk taka boruak tana hlauhawm a nih loh nân an sawngbawl ang a, chutiang tur chuan zirtirna pêk an ni bawk ang.

### *8.1 Environmental Management Cell*

Project pumpui inrelbawlna chu Managing Director in a enkawl ang a. Technical leh Scientific staff te chu General Manager hnuiah lâk an ni ang.

- Qualified leh experience nei ÷ha tak te, ramngaw leh nungcha te, hriselna nghawng theih te, leh sahimna chi hrang hrang ngaihtuah a hma la turin lâk an ni ang.
- EMP ÷ha taka vawn anih theih nân HR Manager, Plant-in-charge leh Environment Manager te chuan General Manager bulah report an thehluat ÷hin ang.
- Environmental Manager (Environment, Hriselna leh Sahimna ngaihtuah tu ni bawk) chuan khawl chet vel dan zawng zawng a enkawl anga. General manager bulah direct in report a pe ang.
- Lab-in-charge chu Environmental Manager bulah a in report anga, EMP hlawhtling taka neih anih theih nan.
- Plant operator te chu plant-i/c bulah an in report anga, shift-i/c bulah pawh in report in khawl fel leh fel loh te an thlithlai reng bawk ang.