"SOLID WASTE MANAGEMENT SYSTEM FOR LUNGLEI TOWN"

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

(EXECUTIVE SUMMARY)
ENGLISH

Submitted by

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VOYANTS
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ECOMS

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EXECUTIVE SUMMARY OF EIA

1.1 INTRODUCTION

The report aims to record the anticipated environmental outcomes resulting from the proposed project. An environmental impact assessment was performed to pin point crucial environmental concerns that should be addressed in the initial phases of project development, with the goal of minimizing any potential adverse environmental effects throughout various stages of the project life cycle. This process involves establishing the current environmental baseline conditions, recognizing significant environmental impacts, and proposing necessary mitigation measures to minimize environmental damage

The scope of the Environment Impact Assessment (EIA) study covers to identify, predict and evaluate potential environmental and socio-economic impacts which may result from the proposed Municipal Solid Waste Management project and to develop suitable Environment. Management Plan (EMP) to mitigate the impacts by formulating suitable remedial measures.

1.2 DESCRIPTION OF PROJECT

The project is classified as category "B" under the MoEF notification dated 14th September 2006 and involves Municipal Solid Waste Management Facility having capacity of 15 MTPD. Municipal Solid Waste Management Facility in Lunglei Town, an analysis of the extensive survey data indicates that a total quantity of 25.65 TPD waste is generated in Lunglei Town (2011) out of which 30.10% (7.72 TPD) is biodegradable, 49.09% (12.59 TPD) is recyclable and 20.81% (5.34 TPD) is inert ash & debris. The calculations also suggest that per capita per day waste generation is around 0.450 kg/ capita/ day. At present, waste collected from Lunglei Town is dumped at disposal site at Tlabung Road, 8.5 km away from Lunglei town core area, without segregation or pre-processing. The site is in used from last 8 years, since crude dumping is being done at this site, it possess severe negative impacts on environment.

1.3 DESCRIPTION OF THE ENVIRONMENT

To assess the impact of Solid Waste Management Centre on different components of environment of Lunglei Town, the study was carried out to generate baseline data w.r.t. air, water, noise, land use pattern, hydrology, flora & fauna, socio- economic aspects during the winter season. The environmental status of the different monitored parameters is discussed

briefly in the following paragraphs.

1.3.1 Physical Environment

Meteorology (Climate)

The climate condition of project areas is divided in 4 seasons viz. winter season (December to February), summer season (March to May), monsoon season (June to September) and retreating monsoon season (October to November). The temperature in the region is quite moderate and does not experience any extreme variations both in summer as well as in winter. Winter sets in from around the end of October and lasts till the end of February. The climate of Lunglei city is characterized by its coolness, relative high humidity nearly all the year round and abundant rainfall. In brief, it enjoys pleasant climate which is neither very hot nor very cold throughout the year. The average annual rainfall is around 2350.9mm. About 20 percent of the annual rainfall occurs during the pre-monsoon months and is mostly in the form of thunder-showers and about 60 to 70 percent of the annual rainfall occurs during the period from May to August.

Topography and Drainage

The general topography of Lunglei District varies widely. While the eastern and northern parts of the district are characterized by a rather hilly terrain with high and prominent relief, the western and south western parts of the district, on the other hand is portrayed by comparatively low and less prominent ridges. There are, as a whole is characterized mainly by several ridge lines and intervening valleys.

Drainage

Lunglei being situated on a hilly terrain with more than 20 % slopes, most of the rainwater flows down as surface run off. The natural drainage system of the location includes: (i) eastern drainage system; and (ii) western drainage system. Two rivers surround the city along its sides, namely Mat on the eastern side, Tlawng on the northern site and Rangte on the western side. The storm water and the wastewater from Lunglei town mostly get drained out into Tlawng River system.

Air Environment

Ambient air quality monitoring was carried out in six location. The locations were selected in downwind, cross wind and up wind of the proposed project. The air pollutants namely Particulate matter (PM10 & PM2.5), Sulphur dioxide (SO2), the oxides of nitrogen (NOX), were sampled on 8/24 hourly and results were averaged to 24 hours to meet the requirements of the MoEF and compared with the standards stipulated by CPCB. The minimum and maximum levels of

Particulate Matter < 2.5 microns are recorded in the range of 2.1 to 4.3 µg/m3, whereas the particulate matter < 10 microns are in the range of 15 to 40 µg/m3. The sulphur dioxide concentrations within the study area are in the range of 3.2 to 6 µg/m3 and the oxides of nitrogen observed are in the range of 1.5 to 4 µg/m3. The observed pollutant levels were compared with CPCB Standards for Particulate Matter (100µg/m3) and sulphur dioxide and nitrogen dioxide (80µg/m3) and found to be well within the limits indicating the baseline environmental status in terms of air pollution is better with all the pollutants are within the concentration levels.

Noise Environment

Base noise levels are monitored in 6 different locations within study zone, using a continuous noise measurement device. The day levels of noise have been monitored during 6 AM to 10 PM and the night levels during 10 PM to 6 AM. The noise levels were monitored as per the Ambient Noise Standards of residential standards. In rural areas wind blowing and movements of birds would contribute to noise levels especially during the nights. The day equivalents during the study period are range between 44.6 to 46.9 dB (A), whereas the night equivalents were in the range of 36.8 to 39.5 dB (A). From the results it can be seen that the day equivalents and the Night equivalents were within the Ambient Noise standards of residential.

Water Environment

Surface and Ground water samples were collected from different sources within the study area and analyzed for all important physico-chemical and biological parameters to establish the quality of water prevailing in the project surroundings The groundwater samples was drawn from the hand pumps and open wells used by villagers for their daily use. The surface water samples were drawn from lakes, ponds and rivers. The pH of ground water observed to be 5.92 and in surface water it is from 6.06 to 6.32, the TDS level of ground water is 23.36 mg/l, whereas in surface water the levels are 9.3 to 12.3 mg/l. The chloride concentrations in ground water is 34.96 mg/l, whereas the surface water has a chloride values of 29.12 to 39.99 mg/l. The hardness observed in ground water is 138 mg/l and in surface water the hardness found to be between 20 to 40.2 mg/l. Overall, all the ground water sample and surface water collected from the study area were found to be fit for human consumption; within the permissible limits and all surface water samples are meeting the class 'A' norms as per IS: 2296-1982 inland surface water Standards.

Soil

The soil formation Lunglei falls in the North Eastern Hills (Purvachal) agroclimatic zone with warm and humid climate. About 43% of the total land area is occupied by laterite soil, the remaining land area is equally covered with alluvial soil and forest soil with a rich humus cover (ICAR, 2018). Physio-graphically, the district consists of parallel to sub parallel hill ranges trending in the North to South direction. These hills are steep with narrow gorges and are often separated by rivers and streams. Most of these streams are tributaries to the Kaladan River. Geologically, Lunglei is rich in shale, siltstone, and sandstone of Surma formed during the Miocene age.

Land Use

Land use land cover rate is differing from time to time as well as cultural practices. In the study area we found five different types of land use and land cover. Due to the population ever increase which degrade and exhaust for human wants and satisfaction and livelihood. The built-up land comprises 9.87% which includes town area and road, Agriculture 20.13%. Open forest make up majority of the study area and account for 55.25% of the land use while 14.75% of the area are cover by dense forest. The figure 5.10 shows that the land use pattern, the vegetation cover areas were found in the southern part of the dump site, while built-up land were found in the eastern site surrounded by cropped land around the build-up area.

Biological Environment/Bio Assessment:

In Lunglei District (4572.00 sq.km) forest area covers 88.6 % of the total area (FSI, 2019). The communities have the right to utilize the land and cultivate in the vicinity forests as per the approval accorded by the Village Council. As per the ISFR classification of 2019 (FSI, 2019), 283105 ha. of the forests in Lunglei falls under open forests (70.39%), 119013 ha. (29.59%) under moderately dense forests and 99 ha. (0.02%) under very dense forests.

The Study area include 10 km radius from the proposed SWMC. This includes open Forest cover, fallow land, agriculture land and build up area.

FLORA

The Study Area covers 10 sq. kms. but the Proposed Landfill Site covers only 7.2 hectares. The Study Area is an abandoned jhum land and so the forest is an open forest

with no definite forest type. Most of the land in the study area falls under private ownership and had been used mostly abandoned. Due to jhumming, the vegetation of the study area is poor and there is no or little chance of occurring rare and endangered species. The water source is also poor with three small streams or nallahs with scanty of water during dry season.

Rare and Endangered Species

With reference to the biodiversity survey, no endemic, rare and endangered species has been located in the Study Area.

FAUNA

Fauna includes all animals that can be found in the study area. In this study IUCN Red List criteria is used to describe the condition of the fauna found in the area. Most of the data are secondary in nature due to the lack of time for adequate fauna study.

1.3.2. Socio-economic Environment

Mizoram is a vibrant, exotic state where tradition and royal glory meet in a riot of colors. The land is endowed, rich culture and heritage, beauty and natural resources. The festivals of Mizoram mirror the people, their culture, their artistic genius and skill in music and dance which is a vital element in the life of every tribe

The state of Mizoram has an area of 21081 sq.kms. As per details from Census 2011, Mizoram has population of 10.97 Lakhs, an increase from figure of 8.89 Lakh in 2001 census. Total population of Mizoram as per latest census data is 1,097,206 of which male and female are 555,339 and 541,867 respectively. The State has population density of 42per sq. km. (as against the national average of 312). The decadal growth rate of the state is 29.18% (against 21.54% for the country) and the population of the state continues to grow at a much faster rate than the national rate. Major demographic indicators are shown

General Statistic of the district

AREA	SQ.KM.	4,536 km2
LONGITUDE	DEGREE	22.8831° N
LATITUDE	DEGREE	92.6984° E
ALTITUDE	METRES	1222

1.4. Anticipated Environmental Impacts and its Mitigation Measures

The potential impacts on the environment from the proposed project are identified based on the nature of the various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site.The proposed project may cause impact on the environment in two phases.

- Impact during development phase
- Impact during operation phase

a) Impacts during development phase:

Development phase works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The impact is generally confined to the project area and is expected to be negligible outside the plant boundaries.

b) Impacts during Operation Phase

During the operation phase of the proposed project there would be impacts on the air environment, water environment, land environment and socio-economic aspects.

Impact on Air Quality

The potential source of air quality impact arising from the construction of the proposed project is fugitive dust generation. Exhaust emissions from vehicles and equipment deployedduring the construction phase is also likely to result in marginal increase in the levels of PM, SO_2, NO_x, CO and unburnt hydrocarbons. The main sources of air pollution during operationphase are from landfill operations, vehicular movement, incinerator, and DG set.

The proposed mitigation measure:

- Regular water sprinkling.
- Temporary tin sheets of sufficient height (3m) will be erected around the site of dustgeneration.
- Tree plantations around the project boundary with 10 – 15m

- Plantation of 2 to 3 years old saplings, regular watering will be done.
- Incinerator will be provided with a stack height meeting Guidelines (minimum 30m),Spray dryer, Multi cyclone, Bag house, Wet scrubber.
- During operation part of the landfill, to minimize the odor and gases generation, daily it will be covered with soil/ash and during rainy period with temporary cover (HDPE/plasticsheets).

Impact on Water Quality

During construction, impacts from the workers include wastewater generated from canteen areas, and sewage from temporary sanitary facilities. The used engine oil and lubricants, and their storage as waste materials as the potential to create impacts if spillage occurs. The site formation may produce large quantities of run-off water, washing of various equipment, vehicles and containers, leachate collected from landfill leachate generated at treatment, incineration, recycling plants etc.

The proposed mitigation measure:

- Runoff water and equipment washed water from the site will be collected to working pit to arrest the suspended solids and if any over flow is, it will be diverted to nearby greenbelt/plantation area.
- The settled water will be reused for construction purposes, and for sprinkling on roads to control the dust emission, etc.
- The domestic sewage generated will be treated in portable STP or sent to septic tank/soak pit.
- The excess leachate/wastewater will be sent to incinerator, the dry sludge from incineration will be handled as a solid waste and will be disposed in the landfill.
- Rainwater from surface areas will be harvested by construction of check dams all along the storm water drainage network at a definite pitch.

Impact of Noise Level

The major activities, which produce periodic noise, during construction phase, are foundation works, fabrication of structures, plant erection, operation of construction equipment, movement of vehicles etc. During operation phase the major source of noise in proposed project will be from unloading of Solid waste, Incinerator, DG set, etc.

The proposed mitigation measure:

- All noise generating equipment will be used during day time for brief period of itsrequirement.

- Proper enclosures will be used for reduction in noise levels, where ever possible the noise generating equipment will be kept away from the human habituation.
- All vehicles entering into the project will be informed to maintain speed limits, and notblow horns unless it is required.
- Noise level specifications for various equipment as per Occupational Safety and HealthAssociation (OSHA) standards.
- Employees will be provided with PPE like ear plugs, helmets, safety shoes, etc.
- Development of greenbelt all along the boundary and along the roads within the project.
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Impact on Land Environment

Land environment in the area has potential for contamination arising out of municipal solidwaste stored on to the landfill area.

The proposed mitigation measure:

The leachate generated from the landfill area is collected in the leachate holding tank and the leachate is used back on to the landfill for dust suppression, mixing in stabilization process, etc. If any excess leachate is left over, it will be treated in spray dryer.

Impact on Ecology

There is no ecological and otherwise sensitive areas viz. wildlife sanctuary, national parks, archaeological important areas within 10km radius of the project site. There are no known rare, endangered or ecologically significant animal and plant species.

The proposed mitigation measure:

Due to the development of green belt at the project vicinity the impact on the ecology will be minimal.

Impact on Socio Economics

The proposed facility is likely to provide direct and indirect employment and likely to increase the socio-economic status of the nearby villages in the study area. Due to proposed project the facilities for public transport, water supply telecommunications, education, public wealth etc., are likely to improve.

ENVIRONMENT MANAGEMENT PLAN

The Environmental Management Plan (EMP) is required to ensure a sustainable

development of the plant area and the surrounding areas of the plant. The EMP will be integrated in all the major activities of the project, with clearly defined policies, to ensure that the ecological balance of the area is maintained and the adverse effects are minimized. EMP requires multidisciplinary approach with mitigation, management, monitoring and institutional measures to be taken during implementation and operation, to eliminate adverse environmental impacts or reduce them to acceptable levels. In order to ensure sustainable development in the study area; it needs to be an all-encompassing plan for which the plant authorities, government, regulating agencies, and the population of the study area need to extend their cooperation and contribution.

The mitigation measures are planned for construction and operation phases and the overallmanagement plan helps to improve the supportive capacity of the receiving bodies. The EMPaims to control pollution at the source level to the possible extent with the available and affordable technology followed by the standard treatments before getting discharged. The recommended mitigation measures will synchronize the economic development of the study area with the environmental protection of the region.

ENVIRONMENT MONITORING PROGRAM

Environmental monitoring program describes the processes and activities that need to take place to characterize and monitor the quality of the environment. Environmental monitoring is used in the preparation of environmental impact assessments, as well as in many circumstances in which human activities carry a risk of harmful effects on the natural environment. Different activities involved in the proposed project and their impact on various environmental attributes have been taken into account while designing a detailed environmental monitoring program. A separate budgetary provision has been made for implementation of Environmental Monitoring Plan. The environmental monitoring cost is estimated based upon the environmental monitoring program being considered. A budgetary provision of Rs 5.875 Lakhs has been kept for environmental monitoring during construction stages. For operation stage Rs 22.815 Lakh are being kept for 3 years. The total environmental monitoring cost is being considered as Rs 28.69 Lakh. A comprehensive monitoring mechanism has been devised for monitoring of impacts due to proposed project.

All monitoring strategies and program have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in environmental parameters. In all cases the results of monitoring will be reviewed, analyzed statistically and submitted to concerned authorities. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts. The monitoring program will have three phases

- Construction phase

- Monitoring phase
- Post monitoring phase

PROJECT BENEFITS

The contribution of the proposed project on local social infrastructure is expected to be significant. This Project will provide a significant amount of direct and indirect employment opportunities to the local people. From the proposed project the major benefits, include improving the degraded environment by establishing an Integrated Municipal Solid Waste Management Facility

- It will be the showcase for other states for management of Solid waste with additionalbenefit of green and clean Environment.
- It minimizes the pollution load on environment from Municipal Solid waste
- Compliance with prescribed regulatory norms which in turn avert the risk of closure onaccount of violation of rules
- It reduces the number of Municipal Solid waste dump sites in the area and also eliminates the pollution potential
- The management of wastes is relatively easier & economically viable at common facility.
- Cost of environmental monitoring is less at common facility
- Prevention of natural resource contamination thereby improving overall environmentalstatus of the region
- Demand for housing and other facilities will increase

CONCLUSION

The EIA study has made an overall assessment of the potential environmental impacts likely to arise from the proposed Integrated Municipal Solid Waste Treatment and Disposal Facility. Baseline data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to proposed developmental activity.

The potential impacts on the environment from the proposed project are identified based on the nature of the various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site. Mitigation measures are proposed to minimize the adverse impacts if any due to the project in the form of Environment Management Plan. The costing for each of the plant has been done based on land cost with respective civil, building and plant and machinery. The total project cost is Rs. 6 crore.

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EXECUTIVE SUMMARY OF EIA

1.1 INTRODUCTION

He report hian project siamin environment-a nghawng a neih theih dan mumal taka chhinchhiah hi a tum a ni a . Development project hna khawih a nih in, environment a nghawng dan tak hre chat thei turin environmental impact assessment hi project thawh ṭantir lamah neih a ni ṭhin a , chu chuan project thawh a nih chhung zawnga environment khawih chhe lo thei ang ber tura kalpui hi a tum a ni. Environmental baseline (tehfung) hman mêk siam te, environment a ṭha zawnga nghawng lian tak a neih dan tur te, leh environment khawih chhe lo thei ang ber tura hmalâk leh ruahmanna siam te hi a huam a ni.

Environment Impact Assessment (EIA) zirchianna chuan Municipal Solid Waste Management project-in environment leh vantlang nunphung, ei leh bar thlenga a nghawng theih dan tur lo hrilh lâwk leh zir chian te, leh environment chhe mêk siam ṭhatna tur leh a chhiat belh zel lohna nâna lo inrin lâwk leh ruahmanna - Environment Management Plan (EMP) siam te hi a huam a ni.

1.2 DESCRIPTION OF PROJECT

He project hi MoEF-in notification September ni 14, 2006-a a chhuahah category "B" hnuaia awm in, Municipal Solid Waste Management Facility - 15 MTPD nei chin a huam a ni. Lunglei khawpuia Municipal Solid Waste Management Facility zir chianna (survey) neihin a tar lan dan chuan, 25.65 TPD hi Lunglei khawpuiin kum 2011-a bawlhhlawh an siam chhuah a ni a, 30.10% (7.72 TPD) hi ṭawih thei chi a ni a, 49.09% (12.59 TPD) hi hman nawn leh theih (recyclable) a ni a, 20.81% (5.34 TPD) hi mei vâp leh lei/thil nawi a ni thung. Ni tina mi pakhatin bawlhhlawh a paih/siam chhuah zât hi 0.450 kg/ capita/ day anga chhût a ni. Tunah hian, Lunglei khawpui aṭanga bawlhhlawh lâk khawm hi a paihna hmun Tlabung kawnga awm, Lunglei khawpui laili aṭanga 8.5 km-a hla a ni a, bawlhhlawh hi thliar hran emaw sawngbawl hmasak emaw a ni lo. Kum 8 chhung chu he bawlhhlawh paihna hmun hi hman a lo ni tawh a, bawlhhlawh hi eng mah thliar hran leh sawngbawl lova paih tawh a nih avang hian nasa takin environment-ah nghawng ṭha lo tak a nei mêk a ni.

1.3 DESCRIPTION OF THE ENVIRONMENT

Solid Waste Management Centre-in Lunglei khawpui leh a chhehvel environment a nghawng dan zir chian a ni a, generate baseline data neih nan hêng - boruak, tui, bengchheng (noise), ram leilung hman dan (land use pattern), tui hna (hydrology), nungcha (flora & fauna), leh vantlang nunphung leh ei leh bar zawnna kawng te hi thlasik laiin zir chian a ni a. Environment

dinhmun hêng teh khawng hrang hrang aṭanga a lan dan chu a hnuaiah hian tawi fel taka tar lan a ni:

1.3.1 Physical Environment (Mita hmuh theih)

Sik leh sa (Climate)

He project kalpui a nihna hmunah hian sik leh sa chu hmun lia ṭhen a ni a, chûngte chu - thlasik (December to February), nipui (March to May), fûr (June to September) and favâng (October to November) te an ni. Boruak hi a nuam tâwk hle a, nipui leh thlasikah pawh a lum lutuk lo va, a vawt lutuk lo bawk. October thla aṭangin thlasik hi a inṭan a, February thla tâwp thlengin a daih a ni. Lunglei khawpui boruak hi dai nuam hle a, kum tluanin boruak hnâwng (humidity) a sangin, ruahtui tla pawh a ṭhahnem hle. A tawi thei ang berin sawi ila, sik leh sa nuam tak neiin kumtluanin a vawt lutuk lo va, a lum lutuk bawk hek lo. Kum khat chhungin 2350.9mm ruahtui a tla a. Kum khata ruahtui tla 20% hi fur inṭan hmain (pre-monsoon months) khawpui leh ṭêk nen a bei ṭhin a, 60 aṭanga 70 percent hi May aṭanga August thla chhungin a tla bawk.

Topography and Drainage (Ram leilung awm dan leh luikawr awm dan)

Lunglei District ram leilung awm dan hi a inang lo hle a. A district khaw chhak lam leh hmar lam chu tlang sang leh chhengchhia (hilly terrain with high and prominent relief) a ni a, khawthlang leh chhim lam erawh chu tlang bâwk hniam leh inkham zui (low and less prominent ridges) a ni thung. Chutichuan, a tlangpuiin tlang inkham zui kârah phai ruam a inzep tiin a sawi theih ang.

Drainage (Luikawr awm dan)

Lunglei hi tlang sanga awm a ni a, 20 % aia tam hi awih tlân (slopes) a ni, ruahtui tam zawk hi lei chung lânga luang ral (surface run off) a ni a. Luikawr awm chu hetiang hian ṭhen a ni : (i) khawchhak lam (eastern drainage system); (ii) khawthlang lam (western drainage system). Lui pathum- a chhak lamah Mat, a hmâr lamah Tlawng leh khawthlanh lamah Rangte luiin he khawpui hi a hual a. Lunglei khawpuia ruahtui tla leh tui chhia hi Tlawng leh a fintu (Tlawng River system) lui kawrah an luang lût deuh vek a ni.

Air Environment

Ambient air quality monitoring hi hmun 6-ah endik a ni. A endikna tur hmun hi project-a ruahman angin downwind, cross wind leh up wind-a thlan a ni. Boruak tibawlhhlawhtu (air pollutants) te chu - Particulate matter (PM10 & PM2.5), Sulphur dioxide (SO2), oxides of nitrogen (NOX), Darkar 8 chhungin sample lâk a ni a, a result hi MoEF leh CPCB-in a tehfung an siam mil turin darkar 24 average-a lâk a ni. Particulate Matter < 2.5 microns a tlêm aṭanga a tam lam hi 2.1 to 4.3 µg/m3 a ni a, particulate matter <10 microns erawh 15 to 40 µg/m3 inkar a ni thung. Sample lakna hmuna Sulphur dioxide tam lam chu 3.2 to 6 µg/m3 a ni a, oxides of nitrogen chu 1.5 to 4 µg/m3 a ni. Hêng boruak tibawlhhlawhtu (pollutants) sample lâk khawm te hi CPCB Standards {Particulate Matter (100µg/m3)

leh sulphur dioxide and nitrogen dioxide (80µg/m3)} nena khaikhinin, tun dinhmunah chuan a la zia viau rih niin a lang.

Noise Environment

Base noise levels hi hmun 6-ah chatlak awm lovin noise measurement device hmanga endik a ni a. Chhun lamah 6 AM atanga 10 PM leh zan lamah 10 PM to 6 AM noise level hi teh a ni a. Noise level hi Ambient Noise Standards of residential standards milpuia teh a ni a. Thingtlangah chuan thli thaw leh sava hian a bik takin zan lamah thawm an siam tam a Zir chian a nih chhungin noise level hi 44.6 to 46.9 dB (A) chhun lamah a ni a , zan lamah erawh 36.8 to 39.5 dB (A) a ni thung. Result atanga a lan dan chuan day equivalents leh night equivalents te hian Ambient Noise standards of residential standard hi an kal pel lo a ni .

Water Environment

Surface leh Ground water sample hi zir chian turin project kalpuina hmun hrang hrang atanga lâk khawm a ni a, a tui awm dan leh nihphung (physico-chemical and biological parameters) hmangin he project leh a chhehvela tui quality hi endik leh hriat theih a ni. Lei hnuai tui sample hi hand pump leh tuichhunchhuah thingtlang miten ni tina an hman atangin lâk chhuah a ni a. Lei chunglânga tui sample chu dil, tuikhuah leh lui atanga lâk a ni. Lei hnuaia tui pH hi 5.92 vel a ni a, surface water pawh 6.06 atanga 6.32 a ni, ground water TDS level hi 23.36 mg/l a ni a, surface water-ah chuan 9.3 to 12.3 mg/l a ni thung. Ground water-a chloride tam lam hi 34.96 mg/l a ni a, surface water hian chloride 29.12 - 39.99 mg/l a nei thung. Ground water hardness hi 138 mg/l niin surface water hardness chu 20 to 40.2 mg/l inkâr a ni thung. A vaia khaikhawmin, ground water leh surface water zir chian tura lâk te hi mihringte in atan a tlâk a; a him tawk chin hnuaia awmin hêng surface water sample lâk khawmte hian IS: 2296-1982 inland surface water Standards hnuaiah class 'A' norms an pha vek a ni.

Soil

Lunglei hi leilung awm dan thliar hrannaah chuan North Eastern Hills (Purvanchal) hnuaia dah a ni a, thlai chin nan a tha a, a lumin boruak a hnawng bawk. A ram leilung 43% hi laterite soil a ni a, a bâk zawng hi alluvial soil leh forest soil niin humus a tam hle (ICAR, 2018). A ram leilung pianhmang chu, Lunglei district hi Chhim leh Hmar hawi zâwngin tlâng a inkhawh thlûr sung a. Hêng tlângte hi a awihin a karah lui emaw kawrtêin emaw a tlangpuiin a daidang thin. Hêng luikawr tam zâwk hi Chhimtuipui (Kaladan River)-ah a inchhung lût. Leilung chhungril zir chiannaah chuan, Lunglei hi shale, siltstone, leh Miocene age atanga lo insiam tawh sandstone of Surma-ah te hian a hausa a ni.

Land Use

Ram leilung hman dan leh land cover hi hun leh hnam nunphung a zirin a danglam thei viau a. He zir chiannaah hian land use leh land cover hi chi 5 laia ṭhen theih a ni. Mihring inthlahpung zel avangin damkhawchhuah nan ram chu a lo dâin chenral mêk a ni a. Built-up land chu 9.87% niin town area leh kawngpui a huam a, Agriculture 20.13%. Open forest hi zir chiannaah chuan tam berin 55.25% hman tawh a ni a, 14.75% chu ram chang a ni thung. Figure 5.10 hian ram leilung hman dan te, bawlhhlawh paihna hmun chhim lama hnim hring leh thinkungin a awh chin te a lantir a, chutih laiin built-up land chu bawlhhlawh paihna hmun chhak lamah hmuh a thung a, thlai chinna hmunin a hual a ni.

Biological Environment/Bio Assessment:

Lunglei District ram zau zâwng pumpui (4572.00 sq.km) aṭangin 88.6 % chu ramgawin a awh a (FSI, 2019). A chhûnga cheng mipuite chuan an khaw ram chu an duh danin Village Council thuneihna hnuaiah an hamng thei a. ISFR classification of 2019 (FSI, 2019)-in a tar lan danin, Lunglei huam chhunga ramngaw 283105 ha.-a zau hi open forests (70.39%) a ni a, 119013 ha. (29.59%) hi moderately dense forests a ni a, 99 ha. (0.02%) hi thing bitna hmun a ni(very dense forest).

He zir chianna hian SWMC propose aṭanga km 10 bial chhûng a huam a. He zirc chiannaah hian open Forest cover, fallow land, agriculture land leh build up area te a tel a ni.

FLORA

10 sq. kms. huam chhungah zir chianna hi kalpui a ni a;amaherawhchu, Proposed Landfill Site hian 7.2 hectares chauh a awh a ni. He zirchianna hmun hi chul a nih avangin open forest a ni a, eng forest type-ah mah dah theih a ni lo. Hmun tam zawk hi mimal ram a ni a, hman tawh loh leh rauhsan tawh deuh vek a ni. Lo neihna hmun a nih avangin vegetation cover hi a tlem hle a, rare and endangered species pakhat tê mah hmuh theih leh hmuhna tur chance a awm lo. Tuihna a ṭha lo hle a, kawrtê pathum emaw nallahs an tih mai hi a awm a, chu pawh chu ṭhal laiin a kangchat deuhthaw a ni.

Rare and Endangered Species

Biodiversity survey aṭanga a lan dan chuan, endemic, rare and endangered species te hi Study Area chhûngah hmuh tur an awm lo.

FAUNA

Fauna chuan study area chhunga ramsa awm zawng zawm a huam a. He zir chiannaah

hian IUCN Red List criteria chu he lai hmuna ramsate dinhmun hriat chian nana tehfung atana hman a ni. Hun a chêp avangin duh ang thâlin ramsate dinhmun hi zir chianna hman a awm lo va, data kan neih tam zawk hi secondary data (mi dang lâk sa) a ni.

1.3.2. Socio-economic Environment

Mizoram chu ram hring mawi leh nuam, zo nun ze mawi pangpâr ang maia mawi taka a vulna hmun, hnam nunphung hausa tak leh lal neia khawsa thin an ni. Kût hrang hrang hian Mizote nunphung a tar lang a, an themthiamzia leh zai leh lâma an chîm chin sânzia hmuh theihin a awm.

Mizoram chu 21081 sq.kms-a zau a ni a. 2011 Census atanga a lan dan chuan, mi nuai 10.97 Mizoramah hian an khawsa a, 2001 census-ah chuan mi nuai 8.89 an khawsa a ni. Chhiarpui hnuhnung bera Mizorama chêng zawng zawng chu mi 1,097,206 an ni a, chûng zingah chuan mipa - 555,339 awmin mi 541,867 chu hmeichhia an ni. State population density(km khat bial chhunga mihring bit zawng) hi 52per sq. km. (India ram pum – 382per sq.km) a ni a. Mizoram decadal growth rate(chhiarpui neih inkara than dan) hi 29.18% (against 21.54% for the country) a ni a, national rate aiin Mizoramah hian mihring nasa takin an pung a ni. Major demographic indicators chu a hnuaiah hian tar lan a ni.

General Statistic of the district

AREA	SQ.KM.	4,536 km2
LONGITUDE	DEGREE	22.8831° N
LATITUDE	DEGREE	92.6984° E
ALTITUDE	METRES	1222

1.4. Environment chhiat belh zel loh nana hmalâkna leh lo inven lâwk dan tur.

Project proposal-in environment a nghawng theih dan hi project hna kal lai leh a hnua a hnathawh dan ringawt atanga chhût lovin, project site-a tûn dinhmuna environmental quality pawh en tel tur a ni. Proposed project chuan environment a nghawng dan hi hun hnih(two phases)-in a then theih.

- Impact during development phase (Hmasawnna tura project kalpui a nih mêk laiin)
- Impact during operation phase (Project-in hna a thawh tak tak hnu)

a) Impacts during development phase:

Development phase chuan site clearance (ram ṭhiah), site formation (lei laih), building works (in sak/lung rem), infrastructure siam leh leh rem khawm te hi a huam a. Hei hian hna thawhna hmun chhûng (project area) chauh a nghawng tura ngaih a ni a, project area pawn lam erawh chu a nghawng lutuk lo va, tlemin a ngaihthah theih deuh niin a lang.

b) Impacts during Operation Phase

Operation phase chuan air environment (boruak) te, water environment(tui) te, land environment(lei) leh socio-economic aspects (vantlang nunphung) te a nghawng a ni.

Impact on Air Quality

Project hna thawhna hmun aṭanga vaivut khu leh thil nawi lêng vêl hian air quality-ah nghawng a nei a. Hnathawh lai (construction phase)-a lirthei leh khawl hman aṭanga meikhu chhuak hian PM, SO_2, NO_x, CO leh unburnt hydrocarbons level boruakah a tisang thei. Operation phase-a boruak tibawlhhlawhtute chu- landfill operations (bawlhhlawh chhun khawm), vehicular movement(lirthei chêt velna), incinerator(bawlhhlawh hal ralna), leh DG set(generator) te an ni.

A tihziaawmna tura kawng awmte chu:

- Regular water sprinkling. (Tuia phuh huh)
- Bawlhhlawh khû leh vaivut a darh loh nan Rangva emaw tin sheets 3m vela sanga hnathawhna hmun hung.
- Hnathawhna hmun ramri pawn 10 – 15m vela thing phun kual.
- Thing ṭiak kum 2 aṭanga kum 3-a upa phun a , tui pêk ṭhat.
- Incinerator khu chhuahna dâwt chu inkaihhruaina angin a hniam berah 30 m tal a ni tur a ni,Spray dryer, Multi cyclone, Bag house, Wet scrubber, te pawh a awm ngei tur a ni.
- Lei chhun khah (landfill) hna thawh a nih laiin, boruak leh a rim chhuak tur tihziaawm nan ni tin lei emaw mei vâp (soil/ash)-a chhilh tur a ni a, fûr lai chuan temporary cover (HDPE/plasticsheets) hmangin a khuh theih ang.

Impact on Water Quality

Hnathawhna hmun tur siam a nih mêk lai hian, hanthawktute pawhin ei rawngbawlna aṭanga tui chhia an paih te, inthiarna hmun an siam lailawk aṭanga tui chhe paih te hian tui an tibawlhhlawh thei a. Engine oil leh lubricant te, leh tui chhia an khâwl te pawh a bûak palh chuan water quality a nghawng thei. Hnathawhna tur hmun laih leh ṭhiah darh (site formation) hian surface run-off tam tak a siam thei a, hmanraw silfai te, lirthei leh container silfai te, landfill treatment, incineration, recycling plants leh dangte aṭanga leachate lo pût chhuak pawh a huam tel a ni.

A tihziaawmna tura kawng awmte chu:

- Runoff water leh hmanraw silna tui chhia chu khur laih (working pit)-ah thil nawi leh sakhat lo man tang tura luan luhtir tur a ni a, a lo khat liam palh a nih chuan a bul hnaia thing phunna hmunah (greenbelt/plantation area) hruai pên tur a ni.
- Tui khawl sa chu construction purpose te, leh kawng khu tur phuh huh nan leh a dangtea hman nawn leh tur a ni.
- Mihringin tui chhia kan siam chhuah chu portable STP emaw sent to septic tank/soak pit-ah emaw luhtir tur a ni.
- Leachate/wastewater a tam lutuk chuan incinerator-a kaltir tur a ni a, hal tawh hnua bal khawro chambang chu solid waste anga ngaiin landfill-ah paih tur a ni.
- Ruahtui tla luang ral tur dan nan check dam siamin tui luankawr mumal tak siamin a khawlna tura khur laihah a luang lût ang.

Impact of Noise Level

Construction phase-ah chuan hun bi neiin thawm bengcheng hnathawh hrang hrang avangin a awm thei a chungte chu foundation works(ban khur laih, lei laih etc), fabrication of structures(thir chher, tan, welding, chhut), plant erection(ban phun) , construction equipment hrang hrang hman, lirthei chêtvelna leh a dangte. Operation phase-a thawm bengchheng siam thin chu bawlhhlawh paih (unloading of Solid waste), Incinerator, DG set, leh a dangte an ni.

A tihziaawmna tura kawng awmte chu:

- Thawm bengchheng siam thei hmanruate chu chhun lamah chauh a tul dan anga hman.
- Thawm bengchheng tiziaawm turin inhungna bang mumal tak neih, a theih hram chuan thawm bengchheng siam thei hmanrua chu mihring khawsak tamna hmuna hman loh.
- Lirthei project khawihna hmuna tlan reng reng chu speed limit siam te, a tul hunah chauh horn hman te.
- Hmanraw hrang hrangin thawm bengcheng an siam dan (Noise level specification) Occupational Safety and HealthAssociation (OSHA)-in standard an siam chin chauh hman.
- Hnathawktute chu PPE entir nan beng hnawh (ear plugs), helmets, safety shoes, leh a dangte hmanga thuam.
- Project huam chhung leh kawngpui chheh vela thing phun.

Impact on Land Environment

Municipal solid waste landfill area-a chhek khawl atang hian lei tibawlhhlawh/ pawlh bawlhhlawhtu a insiam thei a.

A tihziaawmna tura kawng awmte chu:

Landfill area aṭanga leachate(bawlhhlawh tui chhia) lo insiam chu leachate khawlna khur (tank)-ah dah khawl leh leachate chu boruak khu tiziaawm turin landfill-ah bawk leih leh ṭhin a ni, a tinghet turin (mixing in stabilization process) pawlh a ni bawk ṭhin, etc. Leachate chu a tam lutuk chuan spray dryer hmanga sawngbawl a ni leh ṭhin.

Impact on Ecology

Ecological leh sensitive areas viz. wildlife sanctuary, national parks, archeological important areas ang hi project site aṭanga 10km huam chhungah hmuh tur a awm lo. Rare, endangered emaw ecologically significant animal and plant emaw pawh species hmuh tur a awm lo.

A tihziaawmna tura kawng awmte chu:

Project khawihna hmun hnaivaiah hian thing phun a nih avangin ecology chu a nghawng lutuk lo vang.

Impact on Socio Economics

He project hian a chheh vela cheng mihringte nunphung leh ei bar zawnna kawngah direct leh indirect takin a bul hnai khuaa mite hna a pe thei a. Project kalpui a nih avang hian public transport te, tui supply te, telecommunications, zirna , vantlang hriselna leh a dangte chenin hmasawnna a thlen thei a ni.

ENVIRONMENT MANAGEMENT PLAN

Environmental Management Plan (EMP) hi project site leh a chhehvela awmte tana sustainable development a awm theih nan a pawimawh a. EMP hi project hna thawh a nih chhung zawngin kalpui tur a ni a, a thil tum a chiang hle tur a ni a, a chhehvela ecological balance a awm theihna tur leh a nghawng ṭha lo a neih lohna turin a pawimawh a. EMP chu multidisciplinary approach niin mitigation, management, monitoring leh institutional measures te hi project siam lai leh a zawh hnua a hna kalpui tak tak a nihin a pawimawh a, a chhe zawnga environment a nghawng loh nan leh tihziaawm/pawm zam theih level-a tihhniam hi a tum a ni. Study area chhunga sustainable development a awm theih nan; thuneitu hrang hrang hêng plant authorities, sawrkar, regulating agencies, leh a bul hnaia mipui awmte hi ṭanrual a, thawhhona ṭha neih a ṭul a ni.

Mitigation measures hi construction leh operation phase hrang hranga ruahman a ni a, overall management plan hian receiving body-te supportive capacity tihchangtlunna kawngah a pui a ni. EMP hian a tum ber chu source level-a pollution chu a theih ang anga control a tum a, chu chu technology awm sa leh man tlawm zawk hmanga control a, paih(discharge) a nih hmain standard treatment-a sawngbawl chhunzawm a ni ṭhin. Mitigation measures atana rawtnate hian zirchianna hmuna sum leh pai lama hmasawnna leh he biala environment humhalhna chu a rualin a kal kawptir dawn a ni.

ENVIRONMENT MONITORING PROGRAM

Environmental monitoring program chuan environment quality thliar hran nan leh vil zui nan thil tih tur leh hmalak dan tur a tar lang a. Environmental monitoring hi environmental impact assessments inbuatsaih nana hman ṭhin a ni a, hei bâkah hian mihringte thil tih hrang hrangin natural environment a chhe zawnga a nghawng dan hriat chian nan a ṭangkai hle. Environmental monitoring program kalpui a nih dawn hian project proposal-in kawng hrang hranga environment a nghawng theih dan uluk taka ngaihtuah lâwk a ni ṭhin a. Environmental Monitoring Plan kalpuina tur hian budget pawh a hrana dah a ni ṭhin. A monitor nana sum fai hman ngai tur zât pawh a hna thawh dan tur mila siam a ni bawk. Budget-ah Rs 5.875 Lakhs chu construction stage-a environmental monitoring atan dah lailawk a ni a. Operation stage atan Rs 22.815 Lakhs chu kum 3 chhûng atan dah a ni bawk. Environmental monitoring atan hian a vaiin Rs 28.69 Lakhs sen ngai tura chhût a ni. Proposed project avang hian a vil zuina tur pawh changtlung leh huam zau zawka kalpui tura ruahmanna siam a ni.

A vil zui dan leh a vilzuina tur kawng hrang te hian a chhan leh a vang ṭha tawk tak an nei vek a, tuna environment dinhmun leh a tehkhawng (environmental parameters) a zirin a vil zui dan tur pawh hi ruahmanna siam ṭhin a ni . Case hrang hranga monitoring result hi en nawn leh vek tur a ni a, awmze neia endikin (statistically) thuneitute hnenah thehluh tur a ni. Monitoring programme kalpui a nih hma hian a tehkhawng tur (baseline data) fel taka lo neih hmasak phawt tur a ni a, chumi nena khaikhin chuan monitoring chu kalpui chauh tur a ni. A vil zui dan tur chu hun thum (3 phase)-a ṭhen hran a ni

- Construction phase
- Monitoring phase
- Post monitoring phase

PROJECT BENEFITS (Project-in hlawkna a siam dan)

He project proposal hian kawng tam takin a bul vela chêng mihringte hnenah hmasawnna a thlen thei a. A bul vela chêngte tân hna hmuhna tur tam tak direct leh indirect takin a siamsak thei ang. He project aṭanga a hlawkna ber tur chu Integrated Municipal Solid Waste Management Facility hmangin environment chhe zel tur chu nasa takin a tiziaawm thei dawn a ni.

- Bawlhlawh sawngbawl dan chungchangah state dangte tân pawha entawn tlak a ni ang a, environment a lo thianghlim bawk ang (green and clean Environment).
- Municipal Solid waste avanga environmental pollution awm ṭhin hi a tlahniam ang.
- Dan leh hrai mumal tak zawmin chu chuan dan bawhchhiatna tur lak a vêng thei ang.
- Bawlhhlawh paihna hmun (Municipal Solid waste dump sites) tam tak neih a ngai tawh lo va, hei hian pollution thleng tur lakah tam tak a veng thei ang.
- Hmun khata bawlhhlawh sawngbawl hi a awlsamin sum sen a tlem zawk ang.

- Hmun khata environmental monitoring kalpui hi sum sen a tlem zawk ang.
- Natural resource tihbawlhhlawh a nih loh nan a veng thei a, a bul hnaia environment pawhin hma sawn phah zawk ang.
- In leh thil dang mamawhna a lo sang ang.

CONCLUSION

EIA zir chianna chuan Integrated Municipal Solid Waste Treatment and Disposal Facility-in kawng hrang hranga environment a nghawng theih dan tur te. Hmasawnna hnathawh (developmental activity) kalpui a nih dawn avangin hei hian environment a nghawng dan hriat chianna turin a tehkhawng (environmental baseline) tur siam fel leh lâk khawm te a huam a ni.

Project proposal-in environment a nghawng theih dan hi project hna kal lai leh a hnua a hnathawh dan ringawt atanga chhût lovin, project site-a tûn dinhmuna environmental quality pawh en tel tur a ni. He project avanga environment chhiat belh zel tur tihziaawm nan hmalak dan tur hrang hrang chu Environment Management Plan hmang hian tar lan a ni a. He plant kalpui tura sum sen ngai zat hi a ram man a zira chhût niin civil, building leh thlai leh khawl thlenga chhût tel a ni. He project atana a vaia sum sen ngai chu Rs. 6 crore a ni.