Draft Initial Environmental Examination

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India: North-Eastern Region Capital Cities Development Investment Program (Tranche 3) — Aizawl Septage Management (Bio digester) Subproject

Prepared by State Investment Program Management and Implementation Unit (SIPMIU), Urban Development Department

For the Government of Mizoram
North-eastern Region Capital Cities Development Investment Program (NERCCDIP)

Asian Development Bank

ABBREVIATIONS

ADB	—	Asian Development Bank
AMC	—	Aizawl Municipal Council
CBO	—	community building organization
CLC	—	City Level Committees
CPHEEO	—	Central Public Health and Environmental Engineering Organization
CTE	—	Consent to Establish
CTO	—	Consent to Operate
DRDO	—	Defense Research and Development Organisation
DSMC	—	Design Supervision Management Consultant
EAC	—	Expert Appraisal Committee
EIA	—	Environmental Impact Assessment
EMP	—	Environmental Management Plan
GAPA	—	Greater Aizawl Planning Area
GRC	—	Grievance Redress Committee
H&S	—	health and safety
IEE	—	initial environmental examination
IPCC	—	Investment Program Coordination Cell
lpcd	—	liters per capita per day
MFF	—	Multitranche Financing Facility
MOEF	—	Ministry of Environment and Forests
MSW	—	municipal solid waste
NAAQS	—	National Ambient Air Quality Standards
NEA	—	national-level Executing Agency
NER	—	North Eastern Region
NERCCDIP	—	North Eastern Region Capital Cities Development Investment Program
NGO	—	nongovernmental organization
NSC	—	National level Steering Committee
O&M	—	operation and maintenance
PMIU	—	Project Management and Implementation Unit
SEA	—	State-level Executing Agency
SEIAA	—	State Environment Impact Assessment Authority
SIPMIU	—	State-level Investment Program Management and Implementation Units
SPS	—	Safeguard Policy Statement
TOR	—	terms of reference
UD and PAD	—	Urban Development and Poverty Alleviation Department
ULB	—	urban local body
LCC	—	Local Council Chairman

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EXECUTIVE SUMMARY

1. The North Eastern Region Capital Cities Development Investment Program (NERCCDIP) envisages achieving sustainable urban development in the Project Cities of Agartala, Aizawl, Kohima, Gangtok and Shillong through investments in urban infrastructure sectors. NERCCDIP is being implemented over a six year period beginning in 2010, and is being funded by a loan via the Multitranche Financing Facility (MFF) of the Asian Development Bank (ADB). Tranche 1 was approved in July 2009 and the second tranche (Tranche 2) was approved in December 2011. The executing agency (EA) is the Government of Tripura (GoT) Urban Development Department (UDD) and the implementing agency is the State-level Investment Program Management and Implementation Units (SIPMIU).

2. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's SPS (2009). This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

3. This draft Initial Environmental Examination (IEE) has been prepared for Aizawl Septage Management Subproject for funding under NERCCDIP Tranche 3 following the EARF and meeting the requirements of ADB SPS, 2009. The components of the subproject include: (i) improvement of the Sanitation system; (ii) construction of bio-digesters; (iii) septage treatment facility, and (iv) development of capacity building. This is a pilot study[1] for areas that cannot be connected to the sewerage system and considered as a small scale preliminary study to be conducted by SIPMIU in order to evaluate feasibility prior to replication and implementation of a full scale off–site sanitation system. This draft IEE is based on preliminary design and will be updated during detailed design phase. However, this IEE already covers assessment of the subproject's most environmentally sensitive component, including direct, indirect, induced, and cumulative impacts. An Environmental Management Plan (EMP) is part of this IEE which includes (i) mitigation measures for significant environmental impacts during implementation, (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; and (iii) public consultation and information disclosure; and grievance redress mechanism.

4. Potential negative impacts were identified in relation to design, construction, and operation of the infrastructure. A number of impacts and their significance have been reduced by amending the designs and considering the environmental criteria for subproject selection specified in the EARF thus no impacts were identified as being due to the project design or location. During the construction phase, impacts mainly arise from the need to excavate large areas, dispose/utilize moderate quantities of cut soil, increase in dust level due to earth movement, traffic along the routes for transporting materials, disturbance to people as the facilities will be constructed in residential areas, and workers health and safety. These are common impacts of construction in built-up areas, and there are well developed methods for their mitigation. During operation, the biodigester and septage treatment facility should be serviced at regular intervals, dependent upon the size and type and desludged at regular

[1] The Asian Development Bank prepared concept notes for introducing "Best Practices for Septage Management" for Technical Assistance Loan. Ministry of Urban Development and Asian Development Bank agreed to pilot best practices for septage management through TA Loan Number 7947-IND in Aizawl City and Lunglei town (Mizoram) and Himachal Pradesh (HP). The impact of this TA Loan is to improve access of urban population to proper sanitation facilities in unsewered zones such as hill towns and peri-urban areas in India. For activities in Aizawl, visit http://sipmiu.org/aizawl/septage-management/

intervals, dependent on the model type and loading. Potential impacts during operation include generation of sludge and bio-solids, and effluent, if only partially treated, can cause contamination of soil, groundwater, and surface water. NERCCDIP includes development of a single window system (SWS)[2] for efficient septage management in Aizawl. SWS includes development of the Aizawl City Septage Management Plan which includes O&M manuals for the biodigester and septage treatment facility and provision of trainings to ensure operators have the proper knowledge to manage the system. Therefore anticipated environmental impacts are mainly related to the construction period which can be minimized by the mitigating measures and environmentally-sound engineering and construction practices. O&M impacts can be avoided by ensuring operators are qualified and experienced, complying with national and state regulations, and implementing mitigation measures per O&M manual.

5. The stakeholders were involved in developing the IEE through face-to-face discussions and public meetings organized by SIPMIU. Views expressed were incorporated into the IEE and the subproject planning and development. Relevant information will be disclosed to stakeholders in language and form understandable to them and to a wider audience via ADB website. The consultation process will be continued and expanded during subproject implementation to ensure that stakeholders are fully engaged in the project, have the opportunity to participate in its development and implementation, and made aware of the project grievance redress mechanism.

6. The EMP includes mitigation measures intended to protect the environment, workers and community and will form part of the civil works contract. Its implementation will be assured by an environmental monitoring program. SIPMIU, with the assistance of design, supervision and monitoring consultants (DSMC) will monitor and measure the progress of EMP implementation thru observations on- and off-site, document checks, and interviews with workers and beneficiaries. Indicative EMP implementation cost includes budget to cover updating the IEE, preparing and submitting semi-annual reports, consultations and disclosure, application for environmental clearance/s, NOCs, CFEs, and CFOs and monitoring of EMP implementation. The cost of mitigation measures and surveys during construction stage will be incorporated into the contractor's costs. SIPMIU will communicate with ADB regarding environmental safeguard issues. EMP implementation reporting to ADB will be done on a semi-annual basis.

7. Therefore the subproject is unlikely to cause significant adverse impacts as the potential environmental impacts associated with design, construction, and operation can be mitigated to standard levels without difficulty. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS, 2009.

[2] Septage management is a multi-functional, multi stakeholder activity at different level, starting from building to septic tank, desludging transport and safe disposal. Apart from the regulations, providing enabling environment, monitoring of the septage operators, levy taxes and tariff, proper data base, its documentation and networking with the stakeholders are required. All these operational mechanisms are inter-linked and an integrated approach is needed to manage the different services of septage management, under the umbrella of new mechanism known as "Single Window System (SWS)". The SWS will ensure a user friendly, transparent and accountable service delivery model on base line, networking of key stakeholders and capacity building. Detailed analysis of the septic tank owners and baseline study for enlisting/update the data base is to be undertaken. Awareness and Capacity building with handholding support will be extended to service providers and households during the registration of the septic tank

I. INTRODUCTION

1. The North Eastern Region Capital Cities Development Investment Program (NERCCDIP) envisages achieving sustainable urban development in the Project Cities of Agartala, Aizawl, Kohima, Gangtok and Shillong through investments in urban infrastructure sectors. NERCCDIP is being implemented over a six year period beginning in 2010, and is being funded by a loan via the Multitranche Financing Facility (MFF) of the Asian Development Bank (ADB). Tranche 1 was approved in July 2009 and the second tranche (Tranche 2) was approved in December 2011. The executing agency (EA) is the Government of Tripura (GoT) Urban Development Department (UDD) and the implementing agency is the State-level Investment Program Management and Implementation Units (SIPMIU).

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3. This draft Initial Environmental Examination (IEE) has been prepared for Aizwal Septage Management Subproject for funding under NERCCDIP Tranche 3 following the EARF and meeting the requirements of ADB SPS, 2009. The components of the subproject include: (i) improvement of the sanitation system; (ii) construction of bio-digesters; (iii) septage treatment facility (STP), and (iv) development of capacity building. This is a pilot study[3] for areas that cannot be connected to the sewerage system and considered as a small scale preliminary study to be conducted by SIPMIU in order to evaluate feasibility prior to replication and implementation of a full scale off–site sanitation system. This draft IEE is based on preliminary design and will be updated during detailed design phase. However, this IEE already covers assessment of the subproject's most environmentally sensitive component, including direct, indirect, induced, and cumulative impacts. An environmental management plan (EMP) is part of this IEE which includes (i) mitigation measures for significant environmental impacts during implementation, (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; and (iii) public consultation and information disclosure; and grievance redress mechanism.

II. POLICY AND LEGAL FRAMEWORK

A. ADB Policy

4. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for Environmental Assessment are described in ADB SPS 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

[3] The Asian Development Bank prepared concept notes for introducing "Best Practices for Septage Management" for Technical Assistance Loan. Ministry of Urban Development and Asian Development Bank agreed to pilot best practices for septage management through TA Loan Number 7947-IND in Aizawl City and Lunglei town (Mizoram) and Himachal Pradesh (HP). The impact of this TA Loan is to improve access of urban population to proper sanitation facilities in unsewered zones such as hill towns and peri-urban areas in India. For activities in Aizawl, visit http://sipmiu.org/aizawl/septage-management/

5. **Screening and Categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects screened for their expected environmental impacts are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

(ii) **Category B**. Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.

(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all Projects will result in insignificant impacts.

6. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment will be followed with few inclusions of requirement learned during execution time. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

7. **Public Disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

(i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;

(ii) Final or updated EIA and/or IEE upon receipt; and

(iii) Environmental Monitoring Reports submitted by SIPMIU during project implementation upon receipt.

B. National Law

8. **EIA Notification (2006).** The Government of India EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for environmental assessment in India. This states that environmental clearance is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

9. Category A projects requires environmental clearance from the National Ministry of Environment and Forests (MOEF). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the MOEF prepares a comprehensive terms of reference (TOR) for the EIA study, which are finalized within 60 days. Upon completion of the study and review of the report by the EAC, MOEF considers the recommendation of the EAC and provides the environmental clearance if appropriate.

10. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares the TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the environmental clearance based on the EAC recommendation. EIA Notification of 2006 also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

11. The only type of infrastructure provided by the NERCCDIP that is specified in the EIA Notification of 2006 is solid waste management. Thus environmental clearance is not required for Aizwal Septage Management Subproject..

12. **Water (Prevention and Control of Pollution) Act (1974).** Any component of NERCCDIP having potential to generate sewage or trade effluent will come under the purview of the Water (Prevention and Control of Pollution) Act, 1974. Such projects have to obtain Consent to Establish (CTE) under Section 25 of the Act from the State Pollution Control Board before starting implementation and Consent to Operate (CTO) before commissioning. The annual renewal of the CTO is based on the performance of the facility and its compliance with the discharge standards. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies. Biodigesters are not covered by the Water (Prevention and Control of Pollution) Act thus CTE and CTO are not required

13. **Air (Prevention and Control of Pollution) Act (1981).** Any component of NERCCDIP having potential to emit air pollutants has to obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 from State Pollution Control Board before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution. If stone crushers, generators and other air pollution sources are to be established as part of the subproject, they will fall under the purview of the Air Act.

14. **Forest Legislation.** Forest legislation in India dates back to the enactment of the Indian Forest Act, 1927. This Act empowers the State Government to declare “any forest land or waste-land, which is the property of Government or over which the Government has proprietary rights or to the whole or any part of the forest-product of which the Government is entitled”, a reserved forest or protected forest. The State Government may assign to any village-community the rights of Government over a reserved forest - those are called village-forests. The Act also allows Government control over forest and lands not being the property of Government.

15. Acts like clearing or break up of any land for cultivation or for any other purpose, damage to vegetation/trees and quarrying or removing any forest produce from reserved forest is prohibited. All these are also applicable to village-forests. For protected forests, with the provision of the Act, the State Government makes rules to regulate activities like: cutting of trees and removal of forest produce; clearing or breaking up of land for cultivation or any other purpose; and for protection and management of any portion of protected forest.

16. GoI Forest (Conservation) Act, 1980 (amended in 1988) restricts the deforestation of forests for use of non-forest purposes. According to the Act, State Government requires prior approval of GoI for the use of forest land for non-forest purposes (means the breaking up or clearing of any forest land) or for assigning least to any private person or agency not controlled

by government. The Forest (Conservation) Rules, 2003 issued under this Act, provide specific procedures to be followed for conversion of forest land for non-forest purposes.

17. Conversion of forest lands that are part of National Parks/Sanctuaries and Tiger Reserve areas (notified under Indian Wildlife (Protection) Act, 1972) is not permitted. In exceptional case, the State Government requires consent of the Indian Board of Wildlife for obtaining approval of the State Legislature for de-notification of the area as a sanctuary.

18. Cutting of trees in non-forest land, irrespective of land ownership, also requires permission from the Mizoram Forest and Environment Department (MFED). Afforestation to the extent of two trees per each tree felled is mandatory.

III. DESCRIPTION OF THE PROJECT

A. Type, Category and Need

19. **Type.** This is a pilot septage subproject intended to improve the current situation in Aizawl in terms of improving the septage and sanitation system.

20. **Category.** Environmental examination indicates the proposed subproject falls within ADB's environmental Category B projects. The subproject components will only have small-scale, localized impacts on the environment, and can be mitigated. Under ADB procedures, such projects require an IEE to identify and mitigate the impacts, and to determine whether further study or a more detailed EIA may be required.

21. **Need.** The septic tank is the only facility for treatment of human waste in Mizoram even at the capital city of Aizawl. Septage management plan based on septic tank technology has its limitation. The effluent quality of septic tank is BOD 100-150 mg/l at best, even if it is regularly desludged. Since septic tanks treats only black water, the untreated grey water continues to be discharged in the aquatic environment. If the effluent of septic tank is discharged to the underground through soak-pits, it will continue to pollute the groundwater and will remain to be one of suspected causes of landslide under the geological condition of Aizawl City where the rock structure appears in the very near the land surface. The effluent of septic tank cannot be fully soaked due to thin layer of sub soil and percolates down-hill and discharges directly into the open drains due to absence of sewerage networks. Many septic tanks are built under the houses and do not have an access hole for desludging. Further due to high cost operation of septic tank cleaning, maximum households cannot afford routine cleaning.

22. Though Government of Mizoram is implementing the very first sewerage project in Aizawl City which covers only 20% of the entire city population, it would take many years to cover the entire city area by the sewerage system. In the meantime, uncovered residents of Aizawl City need to rely on the on-site sanitation system. Even in the area covered by the sewerage system, there will remain the populations who can't be connected to the sewer networks due to the topographic reason. Therefore it is really necessary to take up on-site sanitation facilities in Aizawl on a pilot basis to find out which is feasible and best for the residents of the city. The proposal for demonstration of technology options/solutions for full digestion on-site through scientific treatment quality is therefore proposed for demonstration. Table 1 provides a comparison of septic tanks and biodigesters.

Table 1: Septic Tank versus Bio-digester - A Comparison

Characteristic	Septic tank	DRDE Bio Digester
Nature	Mostly aerobic	Anaerobic
Human waste decomposition Minimal waste	Decomposition resulting in high residual waste accumulation in the tank and necessity to Evacuate frequently.	More than 90% solid waste is decomposed into gases and water thus very small amount of solid remains in the tank thus not requiring any regular maintenance and evacuation.
Pathogen reduction	As the process is aerobic most of the diseases bearing pathogens remain active causing water borne disease.	As the process is anaerobic, over 99% disease bearing pathogens are inactivated thus preventing any spread of Water borne disease.
Gas emitted	Foul smelling H_2S is emitted making the surrounding area polluted and unpleasant.	Emits natural methane and CO2 without any foul smell
Water pollution	As there is minimal waste decomposition, the effluent is polluting the ground or surface water.	As over 90% waste is decomposed and converted to gas and liquid, the remaining effluent is minimally polluting and can be easily discharged.
Bi-products	Septic tank does not yield any useful bi-product.	Bio digester yield useful by products in the form of useful biogas which could use for heating lighting and electricity generation.

23. The objective of the pilot study is to establish feasibility and costs of large scale adoption of bio-digester technology. Approximately 5% of the Aizawl population (285 households) is proposed to be covered. The pilot will also establish the feasibility of different sizes of community clusters to be connected to a bio-digester unit as also the feasibility of converting individual septic tanks to bio-digesters, with the objective of improving the quality of effluent discharged in the drain as also possibilities of recycling the treated effluent for non-potable purposes. The amount of maintenance required and robustness of the system will also be tested in the pilot.

B. Location and Implementation Schedule

24. The subproject will cover the Greater Aizawl Planning Area (GAPA)[4] which covers a total land area of 128.9 square kilometers (km^2). GAPA includes Aizawl city and 82 local councils. Maximum subproject components will be located on government-owned land. A Resettlement Plan (RP) has been prepared for the subproject to address potential involuntary resettlement impacts. Table 2 provides the locations for the pilot study.

Table 2: Locations of Proposed Bio-toilet Installation

	Name of Local Council	10 HH	20 HH	30 HH	50 HH
1	Hunthar	10	2	1	2
2	Hlimen	9	1	0	0
3	Edenthar	0	2	0	1

	Name of Local Council	10 HH	20 HH	30 HH	50 HH
4	Vaivakawn	5	1	0	0
5	Kanan	14	3	1	0
6	Zonuam	18	1	0	0
7	Luangmual	25	11	1	2
8	Chawlhhmun	14	9	0	2
9	Chawnpui	10	2	3	0
10	Laipuitlang	10	2	0	0
11	Durtlang Leitan	2	0	0	0
12	Kulikawn	4	0	0	0
13	Govt. Complex	2	0	0	1
14	Tanhril	2	0	0	6
15	Sakawrtuichhun	1	2	0	0
16	Bawngkawn	2	0	0	0
17	Chaltlang	5	0	0	0
18	Durtlang	7	1	2	6
19	Durtlang North	6	2	3	2
20	Thuampui	15	3	0	3
21	Model Veng	1	0	0	0
22	Dawrpui	1	0	0	0
23	Dinthar	1	0	0	0
24	Venghlui	0	1	0	0
25	Ramhlun Vengthar	1	0	0	0
26	Saron Veng	8	0	0	0
27	College Veng	0	0	0	1
28	Muanna Veng	0	0	1	4
29	Zemabawk	0	3	2	4
30	Chanmari West	1	0	0	0
31	Tuikual North	1	0	0	0
32	Dawrpui Vengthar	2	0	0	1
33	Thakthing Tlang	1	0	0	0
34	Mualpui	1	0	0	0
35	Mission Veng	1	0	0	0
36	Maubawk	0	1	2	0
37	Zemabawk North	0	3	0	0
38	Zuangtui	0	0	1	0
39	Falkland	0	0	3	0
	Total	180	50	20	35
	Grand Total	285			

25. Detailed design began in the third quarter of 2014. Construction will begin in last quarter of 2015 and will take around 12 months. All civil works will be completed by 2016. Table 3 provides the indicative schedule as per preliminary design. The implementation schedule will be finalized during detailed design and to be included in the final IEE.

Table 3: Indicative Implementation Schedule

Sr.No	Activity	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
1	DPR Approval & Kick off the programme												
2	Training and capacity building												
3	Identification, Documentation of Beneficiaries & Awareness programme												
4	EOI for empanelment of TOT												
5	Evaluation of demo toilets constructed during the training.												
6	Establishment of Innoculam production centre												
7	Implementation of technology												
8	End term Evaluation and final report												

C. Description of the Subproject

Improving Septage Management. Five cesspool cleaners will be provided under of the NERCCDIP Tranche 3 to improve Aizawl Municipal Council (AMC) septage management capacity. The cesspool cleaners will be used to vacuum clean septage from septic tanks at a pre-determined interval e.g. every 2 years, so that operational efficiency of septic tanks is maintained. The septage is proposed to be disposed and treated in the STP plant being set up as part of the sewerage subproject described below.

26. **Pilot Study of Bio-digester Technology Solutions.** Bio-digester technology is a decomposition mechanized toilet system by means of which human waste is decomposed to bits in the digester tank using a specific high-graded bacteria further converting them into methane and water. Uncovered residents (285 households) of Aizawl City will be provided with bio-digester technology solutions developed by Government of India Defense Research and Development Organization (DRDO).[5] The subproject envisages providing on-site sanitation solution by placing around 32,000 community-based bio-digesters. Different sizes of household clusters will be tested to check their efficacy and feasibility of connection to a common system. In a few individual houses the existing septic tanks will be converted into bio-digesters, to provide a benchmark for efficacy of this system for individuals versus community based systems. Based on the experience of the above mentioned systems of sanitation, further expansion strategy and preferred system will be decided.

[5] The technology, which uses unique microbial consortium to treat waste, was originally developed by the Defence Research Development Establishment (DRDE), Gwalior, to meet the sanitation requirements of soldiers serving in the high altitudes of Ladakh and Siachen. The system is built to operate from minus 20 degrees to plus 50 degrees, produces colorless, odorle-ss and inflammable gas containing 50 – 70% methane, and is highly customizable as per the requirements and local conditions. The best feature is that it totally does away with manual scavenging and is low on maintenance and installation cost.

27. The bio-digester developed by DRDO is maintenance-free system and does not require any sewage system. The bio-digester technology proposed for pilot includes: sludge separation, fixed film and floating film-based accelerated anaerobic decomposition assisted by anaerobic microbial inoculum, settlement and clarification, chlorination, phytorid bed treatment/green house with filtration, aeration, activated carbon filter. **Specifications.** Black water from toilet as well as grey water from bath is proposed to be treated. A digester with sludge retainer and minimum 9 chambers is proposed. The volume of inoculum required is dependent on the capacity of the digester. For a 6,750 L capacity digester, 2,000 L inoculum will be charged at the time of commissioning. For a 15,000 L capacity digester, 4,000 L inoculum will be charged. For a 20,000 L capacity digester, 6,000 L inoculum will be charged. For a 24,000 L capacity digester there will be 12 chambers. Grey water is proposed to be introduced in 10th chamber. At the time of commissioning 8000 liter inoculum will be charged. A reed bed system is proposed to be installed alongside the digester for further treatment of effluent. After reed bed, effluent is proposed to be passed through a chlorination system as well as Activated carbon filter for pathogen, color and odor removal. This water can be recycled and used in the toilet flush.

28. **Important Features of Bio-toilet.** Low space requirement, choice of material for fabrication / construction, affordable, organic pollution reduction by 99%, pathogen inactivation by 99%, viability in all geo-climatic conditions in the country, effluent is free from odour and safe for environmental discharge, maintenance free, no need to clean the tank, permits toilet cleaning agents, and easy to transport and install.

29. **Functioning Mechanism.** All the waste from the toilets flows into a holding tank, and then into the bio-digester. All of these processes happen underground. bio-digester has 3 or more anaerobic chambers that treat human wastes effectively, and don't require any cleaning or emptying the tank because of its unique systematic structural arrangements. To start with the very first chamber, where in, the human wastes arrive from the toilet's outlet, consequently the solids drop to the bottom of the tank because of the systematic structure of the bio-digester tank and the high graded pre-residing bacteria (i.e. anaerobic bacteria, which can survive in the absence of oxygen) rushes for their job (i.e. eating away organic waste).

30. When this chamber is filled, the water overflows to the second chamber where more of the same happens, except at this time most of the biological/solid/sludge matter has been left in the first chamber. When the water overflows into the third chamber, it is almost 90% clean and hence the final stage of digestion takes place.

31. The treatment, the task of cleansing water is continuously carried forward from the start to the end point, till the water exits the bio-digester. When the treated water finally comes out from the bio-digester, it is 98% clean and free from entire pathogens.

32. From the last chamber, the water flows into a bed of reeds (optional), which do the final purification of the water. The reed bed is an open pond filled with course stones to a level higher than the overflow. So the reeds grow directly in the water but – to all appearances – are growing in course gravel. Any pollutants remaining in the water nourish the growing reeds so that, once they have utilized all available nutrients, the water is clean enough be used on the garden, thus re-entering the groundwater system.

Figure 1: Typical Diagram of Bio- Toilet

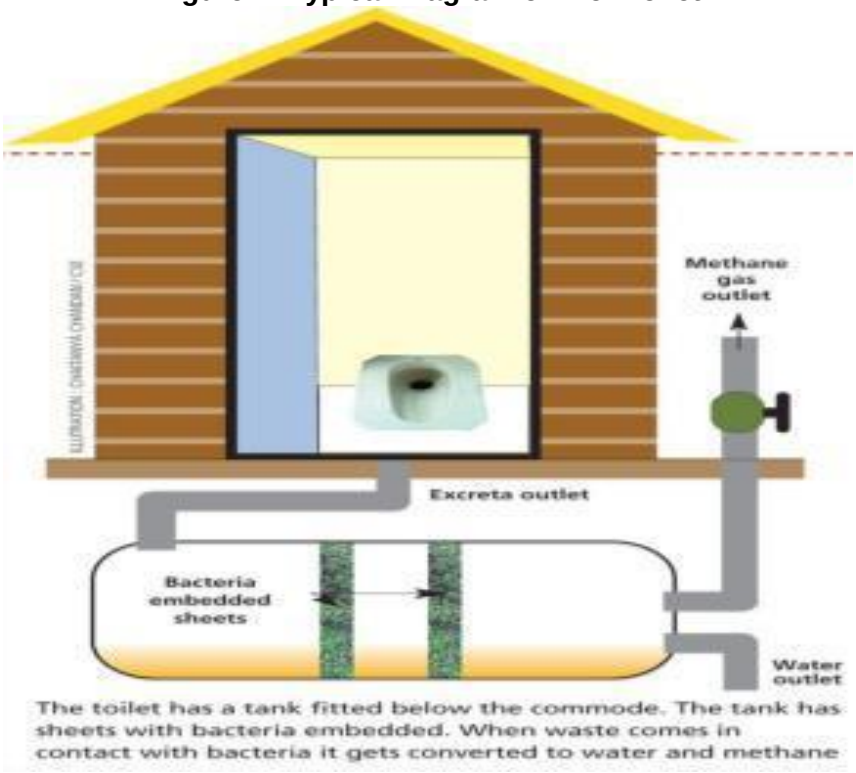


Figure 2: Functioning Diagram of Bio Digester

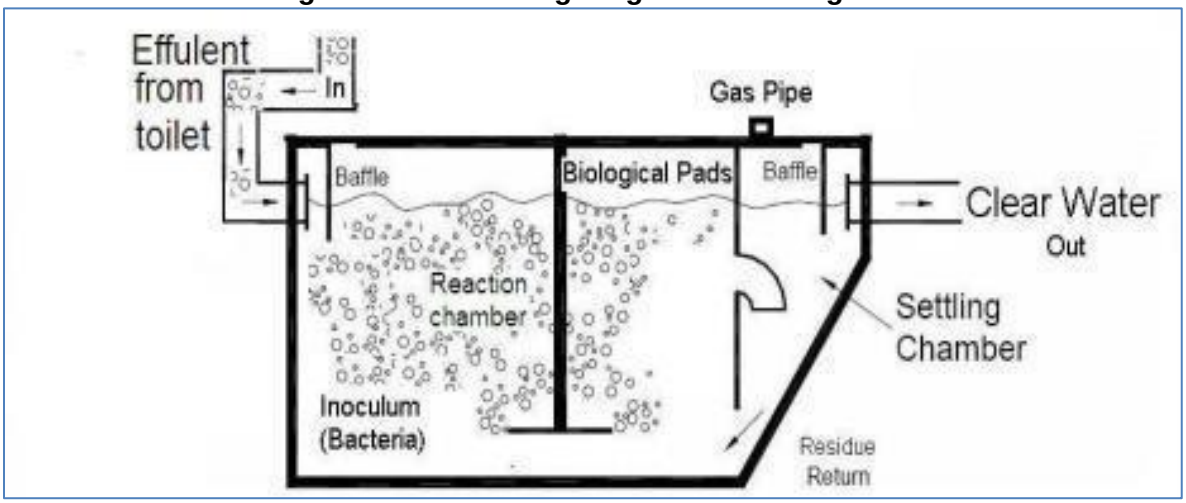


Figure 3: Location Map for Bio – Digester Pilot Project:

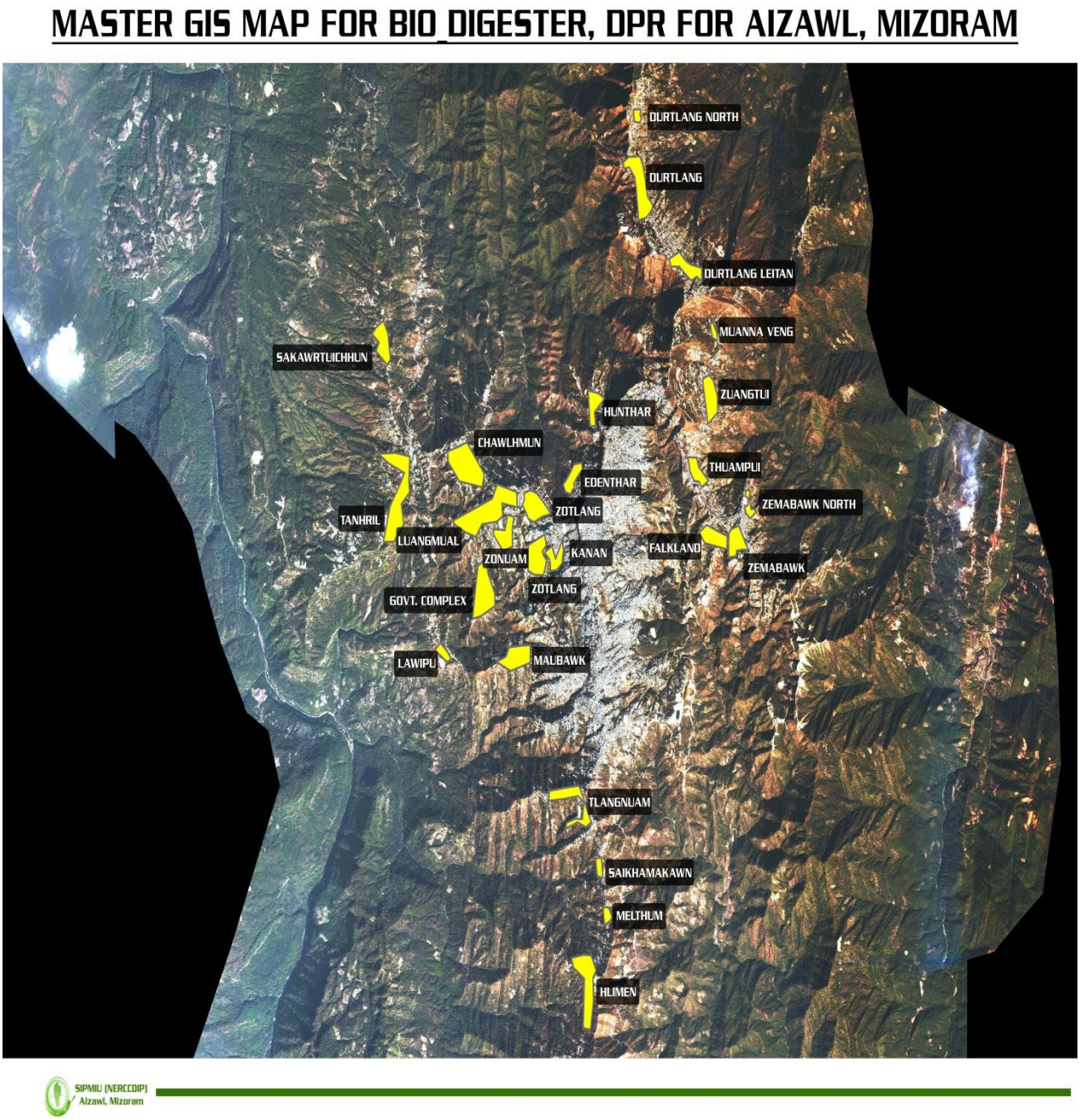


Table 4: Suggested Bio-Digester Size and Coverage for Demonstration

	Item	Treatment	Clusters of HH	Specifications	Space required LxWxH in CM	Households covered	Population
1	Sub community toilets	with gray water treatment and recycling	10	Black water from toilet as well as grey water from bath is proposed to be treated. A 6750 liter digester with sludge retainer and minimum 9 chambers is proposed. At the time of commissioning 2000 liters inoculum will be charged.	375x238x175	400	2000
	Sub community toilets		20	Black water from toilet as well as grey water from bath is proposed to be treated. A 15000 liter digester with sludge retainer and minimum nine chambers is proposed. At the time of commissioning 4000 liters inoculum will be charged.	475x325x175	1200	6000
	Sub community toilets		30	Black water from toilet as well as grey water from bath is proposed to be treated. A 20000 liters digester with sludge retainer and minimum nine chambers is proposed. At the time of commissioning 6000 liter inoculum will be charged.	475X325x225	600	3000
	Sub community toilets		50	Black water from toilet as well as grey water from bath is proposed to be treated. A 24000 liter digester with sludge retainer and minimum twelve chambers is proposed. Grey water is proposed to be introduced in 10th chamber. At the time of commissioning 8000 liters inoculum will be charged.	475x395x225	1000	5000
2	Recycling system for transfer of treated water for flushing to lower houses)	Reed bed/ Pump/ ACF/ piping	50	A reed bed system is proposed to be installed alongside the digester for further treatment of effluent. After reed bed, effluent is proposed to be passed through a chlorination system as well as Activated carbon filter for pathogen, color and odor removal. This water can be recycled in the toilet flush.	850x370x100	1000	5000
						3200	16000

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location and Administrative Boundaries

33. Aizawl, the capital of Mizoram lies between 92°30-92°60 E - longitude and 21°58-24°85 N latitude. The city of Aizawl is located on one prominent north-south extending ridgeline, situated between 700 m to nearly 1288 m from the Mean Sea Level. Aizawl is linked with rest of India through the National Highway 54 (NH 54). The nearest air linkage is at Lengpui, 32 km from the city.

34. **Topography**. Mizoram is a land of rolling hills, rivers and lakes with mainly clayey loam soil mixed with broke angular shale of varying size. The Mizo Hills, which dominate the state's topography, rise to more than 6,560 ft near the Myanmar border. There are as many as 21 major hills, ranges or peaks of different heights run through the length and breadth of the state with the highest peak 'Phawngpui (Blue Mountain) towering 2,065 meters above the sea level. The terrain has, perhaps, the most variegated topography among all hilly areas in this part of the country. The hills are extremely rugged and leaving some plains scattered occasionally here and there. The region, in general, exhibits first - order topography of folded Miocene Strata. The compact and relatively - older rocks constitute these ridges and the younger strata make up the valleys. Elements of second - order topography are seen towards east of longitude 93°30’ East.

35. **Drainage**. 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 city includes: (i) eastern drainage system; and (ii) western drainage system. Two rivers surround the city along its sides, namely Tuirial River on the eastern side and Tlawng River on the western side. The storm water and the wastewater from the Aizawl city ultimately get drained out into these two river systems. The eastern portion of the city is drained mainly by Chite-lui (covers more than two third of the eastern portion) and Tuirial rivers. The river Tlawng, flowing from South to North, carries water from the western part of the city.

36. **Natural Hazards**. The Capital City Aizawl falls under Seismic Zone -V. It is referred to as the Very High Damage Risk Zone. The Indian states Kashmir, Punjab, the western and central Himalayas, the North-East Indian region and the Rann of Kutch fall in this zone. Generally, the areas having trap or basaltic rock are prone to earthquakes. The present valleys and ravines are the result of the underlying faults and structural patterns, giving origin to different types of drainage patterns. Faulting has resulted in creation of steep curves, highly dissected ranges with deep ravines, spurs, etc., vulnerable to comprehensive erosion. The rocks are fractured and hence susceptible to failure during monsoon resulting in landslides.

37. Subsidence is another problem encountered in Aizawl. Land subsidence and soil fissuring are generally considered as phenomena connected to groundwater extraction or consolidation of strata in sedimentary basins, the subsidence case of Aizawl appears to be a result of fluvial action. This is particularly because all the subsidence cases occur during and just after the rainfall. The percolated water which comes out as return flow also carries the finer fraction of soil, which adversely affects the shear strength parameter. Removal of finer fraction can also lead to formation of piping in the subsurface and result in sudden subsidence. Presence of dissolved material in the subsurface can also lead to subsidence if the area remains under action of water for a relatively long period.

38. **Geology**. Mizoram constitutes the sedimentary basin complex of Assam Shelf and Assam-Arakan. The Assam-Arakan sedimentary basin is a shelf-slope-basinal system. The shelf part of the basin spreads over the Brahmaputra valley. The basinal part (geosynclinal) is occupied by the Naga Schuppen belt and the Cachar, Tripura, Mizoram and Manipur fold belts. The Assam-Arakan fold belt extends southward to the Cachar-Mizo fold zone. West of this zone, lies the frontal belt of Tripura with mostly closed folds which gradually become tighter towards east in Mizoram. The common rocks found are sandstone, limestone, shale, silt stone and slates. The rock system is weak and unstable, prone to frequent seismic influence. The geo-morphological formations consist of steep hill slopes and deep valleys oriented on the topographic surface in a linear fashion.

39. **Soils**. The soil formation of Aizawl, in general, is of loose sedimentary type, with high porosity and permeability. This results in the city being highly susceptible to erosion and rain induced landslides, leading to severe damages to property and lives every year. Soils vary from sandy loam and clayey loam to clay, generally mature but leached owing to steep gradient and heavy rainfall. The soils are porous with poor water holding capacity, deficient in potash, phosphorous, nitrogen and even humus due to the traditional practice of shifting cultivation called 'jhuming'. The pH shows acidic to neutral reaction due to excessive leaching (Environment & Forest Department Report 2003). Shifting cultivation principally practiced in Mizoram affects soil productivity through increase of soil acidity, lowering of surface moisture and intensifying erosion losses of soil and nutrients through runoff.

40. **Climate**. The climate of Mizoram is neither very hot nor very cold, but moderate throughout the year. The whole state falls under the direct influence of south-west monsoon and receives an adequate amount of rainfall. The fluctuation in temperature is not much and the highest temperature is observed during May to July and starts decreasing with the onset of monsoon. This fall of temperature continues with the span of monsoon and becomes more evident with the retreating monsoon. The temperature becomes minimum in December and January. In summer the temperature ranges between 18° C to 32° C. During winter season, the minimum and maximum temperature ranges between 8°C to 32°C. During the last two decades, a substantial increase in average temperature has been observed, which may be due to global warming. Relative humidity in the dry season is 60% to 70% and in the monsoon period is about 90%. During southwest monsoon, February to April is comparatively dry when humidity is between 60% to 70%.

41. **Air Quality**. There are no major air-polluting industries in Aizawl and traffic/vehicular emission is the only significant source of pollutant, so air quality is likely to be well within the National Ambient Air Quality Standards (NAAQS).

42. **Noise Level.** The observed noise levels in the project area of Aizawl were measured over 24 hrs using a handheld noise meter. The results indicate that noise levels are higher than the threshold limits.

43. **Surface Water**. The analysis of water quality of rivers within Greater Aizawl, namely the Tlawng Chite Lui and Lawibual rivers indicate that the water quality parameters are within the prescribed standard values. Low values of turbidity, total dissolved solids, non-existence of oil & grease and high value of dissolved oxygen clearly indicate that the water quality of the rivers is fairly good. However, coliform is present in higher concentrations.

44. Groundwater Due to the hilly terrain with slopes more than 20%, most of the rainwater flows out as surface run off. Hence, the scope of groundwater storage is limited and is

depending upon the secondary porosity and structural control in the higher elevated aquifers. The groundwater stored in these aquifers emanates in the form of springs that act as a source of water supply for the people especially in the rural areas. The ground water exploration done by the Central Ground Water Board (CGWB) indicates that there is considerable potential for exploration of ground water within a depth range of 200 m with a potential yield ranging from 120 liters to 330 liters per minute for draw down of 13 m to 20 m. While the quality of groundwater, is found to be potable from the hydro-chemical point of view, the hydro-geological conditions in Aizawl are not favorable for ground water recharge and storage.6

B. Ecological Resources

45. Though there are sizeable areas covered by large varieties of vegetation and small grasses, within Aizawl, there are no major tracts of designated reserved forests within the Greater Aizawl planning area boundaries.

46. The forest type of Aizawl is represented by tropical semi-evergreen forest. A phyto diversity survey was carried out at some of the project locations in the Greater Aizawl Planning Area (GAPA) using the Shannon-Wiener Diversity Index, and evenness with the Evenness index. The indices were employed to get a comprehensive, easily comparable, and quantitative estimate of the diversity and degree of evenness (i.e., uniformity) of the plant community. The indices show that there are no priority sites within GAPA. Dampa Sanctuary (Protected Area) is situated near the Bangladesh boundary and is very far from the GAPA.

47. **Ecological Resources – WTP Site.** Natural vegetation exists adjacent to the project site but no major trees have been observed within and around the site. There are no critical habitats adjacent to or within the vicinity of the proposed site.

C. Economic Development

48. **Land Use.** The Aizawl development planning area covers an area of 128.98 sq km of which 21.58% of the total area is developed whereas 78.42% of the total area is not suitable for developing due to excessive slopes and instability due to landslides. 1.98% of the total area is under cantonment/defense area.

49. **Local Economy – Commerce, Industry and Agriculture**. In recent years, Aizawl has seen growth in its industrial sector and is becoming one of the most important industrial center of Mizoram. Out of the total registered industrial units of the entire state of Mizoram as many as 1,134 or 51.43% are concentrated in Aizawl city. Industrial growth and development in Aizawl is mainly in seen in small scale sectors.

50. Since 1972, mining and quarrying for building materials has been started within Aizawl city. As per the information from geology and mining wing on July 2001, there are more than 29 quarries without any legal support. The method of extraction is mainly through drilling, blasting, etc., which is leading to slope instability. The unused materials are disposed off alongside the quarries and slopes causing environmental problems.

51. **Infrastructure**. Water supply in Aizawl is in a state of crisis. Most people are dependent upon the piped water supply system, which presently provides water for only an hour or so a

[6] Report on Dynamic ground water resources of Mizoram, March 2004. Central Ground Water Board, NE Region, Guwahati.

week. People have installed rainwater catchment and storage systems and sometimes are able to get water from springs or the ground. However, average consumption during the rainy season is not more than 80 lpcd and it is much less, perhaps as little as 50 lpcd or 60 lpcd, during the dry season. The River Tlawng is the major source of water for Aizawl. Water supply from this source involves a high static lift of 1,017 meters, from the riverbed level at 146 meters to the main storage reservoir at 1,163 meters, making it one of the most expensive water supply systems in India. However, after the completion of tranche – 2 works, the supply system will improve to some extent.

52. **Roads and Transportation**. The road network is characterized by the presence of NH 54 running from east to west connecting Sairang/Silchar in the West and Lunglei in the East. One major district road is running from north to south and other roads branching out from this main road. Due to topographical constraints, almost all roads are narrow and the intersections and junctions in the city are 'V' shaped. At most of the intersections, there is absence/poor-turning area. The road sections that have poor geometric alignment and steep gradient include (i) Armed Veng to Bawngkawn, (ii) Republic Kawipui to Treasury Square, (iii) Salem Veng to Damveng, (iv) Secretariat complex to Tuikhuatlang, (v) D. Hnunliana to Industry Mualpeng, (vi) Mission Vengthlang to Synod Book-room, and (vii) Bethlehem to Bungkawn in the city of Aizawl.

53. **Drainage.** Though Aizawl has numerous drains criss-crossing the city, the drainage situation has come to a deplorable state with choked, over flowing drains, acting as disposal point for solid waste and sewage. The poor drainage conditions coupled with loose sedimentary soils and unregulated construction activities for developmental purposes have lead to a substantial incidence of landslides.

54. **Health Facilities.** The city has 16 hospitals out of which, 2 hospitals are run by the Presbyterian and Seventh Day Adventist Church and nine is a private hospital. Also, there are about 23 dispensaries and sub-health centers scattered all over the city.

55. **Slum Upgradation.** There are no notified slums in the city. However, several areas especially on the fringes of the city, at lower elevations where wastes are concentrated, have extremely poor living conditions. These areas have poor accessibility and therefore, are also critically short of basic infrastructure. The State Government is in the process of identifying such areas in the city and notifying them as economically backward area. RAY (Rajiv Gandhi Awaz Yojna) is being taken up by State Government under UD&PA Department (Urban Development & Poverty Alleivation) for Upgradation to the identified economically backward areas.

56. **Education Facilities.** Being the state capital, it has all levels of education facilities such as one university campus along with 11 colleges and considerable number of higher secondary schools, high schools, middle schools and primary schools. The city also has one veterinary college, one polytechnic institute, one industrial training institute and two-law colleges.

D. Social and Cultural Resources

57. **Demography**. The GAPA has a total population of 293,416 as per 2011. Earlier census recorded as per 2001 was 237,787 a total rise of 53.17%. Around 52% of the urban population of the state lives in the city. With respect to literacy rate, Aizawl has attained a literacy rate of 100%, which is more than the national average (64.8%) and state average (88.49%). Within the city, only 15.9% of the population have education up to graduation and beyond. Workers engaged in various activities reflect the predominance of tertiary sector, with 48.7% of the population in salaried services.

58. Ninety eight percent of the population in Aizawl belongs to the scheduled tribes (STs). The main indigenous groups are the Lushais, Chakmas, Ralte, Paite, Baite, Pawi Dhilen, Lakher, Hmar, and Piang. Lushai group of tribals accounts for more than 98% of the city tribals. Though they speak their tribal dialect among themselves, they also speak English in general, while interacting with others. Most tribes are Christian (84%). Though categorized as tribes, they are into modern means of production and consumption.

59. **History, Culture, and Tourism**. Aizawl is the capital of the state Mizoram, it is a hilly place and is a beautiful site as you look around buildings erected on the steep hill slope is also another wonder for tourists. The beautiful churches usually painted in white colours in every localities is yet another wonder. Chapchar Kut the festival celebrated during the month of March is the most joyful festival of the Mizos, where young and energetic –men and women dressed in their colorful attires all poised to perform the colourful Cheraw dance and other cultural dances and is one of the biggest tourist attractions. There is no heritage building nor is there any property related to cultural activities in the surroundings of the proposed sanitary landfill site.

60. **Indigenous People**. In Aizawl and the entire state of Mizoram, the tribes constitute the mainstream society. Aizawl has predominantly tribal population (95% of the total population) with Mizo being the dominant tribe followed by small group of immigrants from the neighboring states like Assam, Manipur, Tripura and even from Myanmar. All the tribal communities are into modern means of livelihood. They have the same traditions, customs and usage the most predominant indigenous group is Mizo accounting for 98% of the total indigenous people, speaking one common language called Mizo Tawng (usually known as Lusei) and follow Christianity. However, people living within the Aizawl city having urban outlook and do not exhibit any primitive or distinct characteristics of that are considered to be indigenous people.

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

61. This section of the IEE reviews possible subproject-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the subproject's area of influence. As defined previously, the primary impact areas are (i) the locations for laying of pipes, and toilet sites; (ii) main routes/intersections which will be traversed by construction vehicles; and (ii) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Aizawl area outside of the delineated primary impact area; and (ii) entire Mizoram State in terms of over-all environmental improvement.

62. The ADB Rapid Environmental Assessment Checklists for septage in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp were used to screen the subproject for environmental impacts and to determine the scope of the IEE investigation. The completed Checklist is found in Appendix 2. All the proposed subproject components, except for the replacement of pumps and installation of house meters, will interact physically with the environment.

63. In the case of this subproject (i) most of the individual elements are relatively small and involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant; and (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements, will not cause direct impact on biodiversity values. The subproject will be in properties owned and/or acquired by the local government and access to the subproject

locations is through public ROW and existing roads hence, land acquisition and encroachment on private property will not occur.

A. Pre-construction – Location and Design

64. **Location**. These Impacts are associated with planning particularly on the site selection. They include impacts due to encroaching on sensitive areas and impacts on the people who might lose their homes or livelihoods due to the development of the proposed site.

65. **Utilities**. Telephone lines, electric poles and wires, water lines within the proposed subproject locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, DSMC will (i) identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

66. **Social and Cultural Resources.** There is a risk that any work involving ground disturbance can uncover and damage archaeological and historical remains. For this subproject, excavation will occur in open area or existing infrastructure, so it could be that there is a medium risk of such impacts. Nevertheless, DSMC/SIPMIU will:

(i) consider alternatives if the site is found to be of high risk;
(ii) include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available; and
(iii) develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.

67. Site selection of construction work camps, stockpile areas, storage areas, and disposal areas. Priority is to locate these near the subproject locations. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking Bio Septage systems. Residential areas will not be considered for setting up camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings.

68. Site selection of sources of materials. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority would be sites already permitted by Mining Department. If other sites are necessary, these will be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas even if some distance from construction activities. It will be the construction contractor’s responsibility to verify the suitability of all material sources and to obtain the approval of ULB.

B. Construction

1. Screening of No Significant Impacts

69. The construction work is expected not to cause major negative impacts, mainly because:

- most of the activities will be on the built-up areas of Aizawl city and/or existing RoWs thus could be constructed without causing impacts to biodiversity;
- most of the sites are located on government-owned land which is not occupied or used for any other purpose;
- overall construction program will be relatively short and is expected to be completed in 12 months with activities to conducted by small teams and specified location so most impacts will be localized and short in duration; and
- Most of the predicted impacts associated with the construction process are produced because the process is invasive, such as involving excavation. However, the routine nature of the impacts means that most can be easily mitigated and the impacts are clearly a result of the construction process rather than the design or location, as impacts will not occur if excavation or other ground disturbance is not involved.

70. As a result, there are several aspects of the environment which are not expected to be affected by the construction process and these can be screened out of the assessment at this stage as required by ADB procedure. These are shown in Table 5. These environmental factors are screened out presently but will be assessed again before starting the construction activities.

Table 5: Field in which Construction is expected not to have Significant Impacts

Field	Rationale
Topography, Soils, and Geology	Activities are not large enough to affect these features.
Climate	Activities are not large enough to affect this feature.
Air Quality	Short-term production of dust is the only effect on atmosphere
Groundwater	Activities will not be large enough to affect these features
Ecological Resources - Protected Areas	Construction-related transport activities (hauling of materials and disposal of wastes) will not affect the forested area nearby.
Flora and Fauna	No rare or endangered species in the landfill site.
Economic Development	Activities are not large enough to permanently affect this feature.
Land Use	No change in land use.
Socio-economic	Subproject site is located entirely on government-owned land so there is no need to acquire land from private owners except for STP land and some temporary impacts which is included in the updated RP
Commerce, Industry, and Agriculture	Activities are not large enough to affect these features
Population	Activities are not large enough to affect this feature.
Health and education facilities	Activities are not large enough to affect this feature.
Religious sites	No religious sites within the two subproject sites.
Historical, Archaeological, Paleontological, or Architectural sites	No scheduled or unscheduled historical, archaeological, paleontological, or architectural sites

71. **Construction Method.** Although the site is not fairly large, the Bio - Digester construction will be straightforward involving mainly simple excavation. The ditch will be dug by backhoe diggers and manually, and soil will be stored for further use. Clay will then be applied to the floor and sloping sides of each ditch and after watering will be covered with low density poly-ethylene (LDPE) sheeting and concreting in some parts. A thin layer of cement mortar is

then added, and concrete tiles are embedded into the surface by hand, with more cement grouting applied to seal joints between tiles.

72. **Anticipated Impacts and Mitigation Measures**. Although construction of the subproject components involves quite simple techniques of civil work, the invasive nature of excavation and the subproject locations in the built-up areas of Aizawl city. Where there are a variety of human activities, will result to impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration. Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be (i) constructed by small teams working at a time; (ii) any excavation done near sensitive area like school, religious places and house will be protected as per standard norms7.

73. **Sources of Materials.** Significant amount of gravel, sand, and cement will be required for this subproject. The construction contractor will be required to:

(i) Use quarry sites and sources permitted by government;
(ii) Verify suitability of all material sources and obtain approval of State Investment Program Management and Implementation Unit (SIPMIU); and
(iii) Submit to DSMC on a monthly basis documentation of sources of materials.

74. **Air Quality.** It is most certain that work will be conducted during the dry season, so there is potential for creating dust from the excavation of dry soil, backfilling, transportation to disposal, and from the import and storage of sand/gravel for bedding. Emissions from construction vehicles, equipment, and machinery used for excavation and construction will also induce impacts on the air quality in the construction sites. Anticipated impacts include dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons) but temporary and during construction activities only. To mitigate the impacts, construction contractors will be required to:

(i) Consult with SIPMIU/DSMC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
(ii) Excavate the SRs foundations at the same time as the access roads (if needed) are built so that dug material is used immediately, avoiding the need to stockpile on site;
(iii) Damp down exposed soil and any stockpiled on site by spraying with water when necessary during dry weather;
(iv) Bring materials (aggregates) as and when required;
(v) Use tarpaulins to cover sand and other loose material when transported by vehicles;
(vi) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly; and
(vii) Clean wheels and undercarriage of vehicles prior to leaving construction site.

75. **Surface Water Quality**. Due to hilly topography and high intensity rainfall, there is likely large scale erosion from construction areas. This may lead to silting and blockage of drains and water bodies. These potential impacts are temporary and short-term duration only and to ensure these are mitigated, construction contractor will be required to:

[7] Occupational health & Safety of employees working only in factories and mines have been specifically covered in GOI laws. However, the Constitution of India has provisions to ensure that the health and well-being of all employees are protected and the State has the duty to ensure protection. For this subproject, the mitigation measures were based on the World Bank Environmental, Health, and Safety (EHS) Guidelines.

(i) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(ii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with SIPMIU/DSMC on designated disposal areas;
(iii) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(iv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(v) Dispose any wastes generated by construction activities in designated sites; and
(vi) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

76. **Noise Levels**. The rock cutting and trenching activities will certainly generate noise and vibrations. The sensitive receptors are the general population in these areas. Noise will be for a short term (about 2-3 days at each location) thus impact is negative, short-term, and reversible by mitigation measures. The construction contractor will be required to:

(i) Plan activities in consultation with SIPMIU/DSMC so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;
(ii) Provide prior information to the local public about the work schedule;
(iii) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
(iv) Ensure that there are no old and sensitive buildings that may come under risk due to the use of pneumatic drills; if there is risk, cut the rocks manually by chiselling;
(v) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and
(vi) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

77. **Landscape and Aesthetics**. The construction work is likely to generate significant quantities of waste soil and debris. This activity will generate wood, metal and concrete debris. Indiscriminate disposal of the soil and waste may affect the local environment at the disposal location. These impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Prepare and implement Waste Management Plan;
(ii) Avoid stockpiling of excess excavated soils;
(iii) Avoid disposal of any debris and waste soils in the forest areas and in or near water bodies/rivers;
(iv) Coordinate with UD&PAD for beneficial uses of excess excavated soils or immediately dispose to designated areas;
(v) Recover wood, metal, used oil, and lubricants and reuse or remove from the sites;
(vi) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(vii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(viii) Request SIPMIU/DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

78. **Accessibility.** Transport infrastructure will be affected as in the narrower streets there is not enough space for excavated soil to be piled off the road. The road itself may also be excavated in places where there is no available land to locate pipes alongside. Traffic will therefore be disrupted, and in some very narrow streets the whole road may need to be closed for short periods. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(i.) Plan pipeline work in consultation with the traffic police;
(ii.) Conduct work during light traffic;
(iii.) Plan work such that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed in a minimum possible time;
(iv.) Provide for immediate consolidation of backfilling material to desired compaction to avoid future settlement risk - this will allow immediate road restoration and therefore will minimize disturbance to the traffic movement;
(v.) Do not close the road completely, ensure that work is conducted onto edge of the road; allow traffic to move on one line;
(vi.) In unavoidable circumstances of road closure, provide alternative routes, and ensure that public is informed about such traffic diversions;
(vii.) In case of closure of main roads, provide information to the public through media – daily newspapers and local cable television (TV) services, about the need and schedule of road closure, and alternative routes;
(viii.) At all work sites public information/caution boards shall be provided – information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/locality; traffic diversion details, if any; entry restriction information; competent official's name and contact for public complaints.

79. **Socio-Economic – Income**. Excavation will obstruct access to residences/commercial building. Disruption of access to commercial establishments may affect livelihood. Since many of the roads are narrow, construction activities may also obstruct traffic. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to:

(i) Leave space for access between mounds of excavated soil;
(ii) Provide wooden planks/footbridges for pedestrians and metal sheets for vehicles to allow access across trenches to premises where required;
(iii) Consult affected businesspeople to inform them in advance when work will occur;
(iv) Address livelihood issues; implement the Resettlement Plan (RP) to address these issues;
(v) Provide prior public information about the work schedule in particular locality and the traffic diversions/changes in any – information shall disseminated through local papers and cable television services;
(vi) Provide sign/caution/warning boards at work site indicating work schedule and traffic information; prevent public entry into work sites through barricading and security; and
(vii) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.

80. **Socio-Economic – Employment.** Manpower will be required during the 12 months construction stage. This can result to generation of contractual employment and increase in local revenue. Thus potential impact is positive and long-term. The construction contractor will be required to:

(i.) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2-km immediate area if manpower is available; and
(ii.) Secure construction materials from local market.

81. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor will be required to:

(i) Develop and implement site-specific Health and safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training8 for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iii) Provide medical insurance coverage for workers;
(iv) Secure all installations from unauthorized intrusion and accident risks;
(v) Provide supplies of potable drinking water;
(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(vii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
(viii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
(ix) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(x) Ensure moving equipment is outfitted with audible back-up alarms;
(xi) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
(xii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.

82. **Community Health and Safety.** Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. In most of the cases location of project sites at isolated area, hence health and safety risk to community is

[8] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

minimum. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Plan routes to avoid times of peak-pedestrian activities.
(ii) Liaise with SIPMIU/DSMC in identifying risk areas on route cards/maps.
(iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
(iv) Provide road signs and flag persons to warn of dangerous conditions, in case of location near the road.

83. **Quarry Sites and Borrow Pits.** Extraction of clay, soils, stones, aggregates, and loose materials other than stones can cause disruption of natural land contours and vegetation resulting in accelerated erosion, landslides, disturbance in natural drainage patterns, sedimentation/siltation of surface waters, and water pollution. Extraction of rocks and materials from river beds can result in endangerment of bridges and continuous degradation of the river regime. Potential impacts are negative and can be long-term and irreversible thus the construction contractor will be required to:

(i) Verify suitability of all material sources and obtain approval of DSMC;
(ii) Prioritize government-approved quarries and borrow pits;
(iii) Obtain approval of DSMC if new quarries and borrow sites are necessary;
(iv) Obtain approval of DSMC if extracting rocks, gravel, and sand from small rivers or streams is necessary. The extraction points shall be spread out along the length of the river to minimize disruption in river flow and to prevent instability to embankments. Local residents and water users shall be consulted to ensure that irrigation intakes, bunds, and local fishing are not adversely impacted; and
(v) Request DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

84. **Work Camps.** Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

(i) Consult with SIPMIU/DSMC before locating project offices, sheds, and construction plants;
(ii) Minimize removal of vegetation and disallow cutting of trees;
(iii) Provide water and sanitation facilities for employees;
(iv) Prohibit employees from poaching wildlife and cutting of trees for firewood;
(v) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(vi) Recover used oil and lubricants and reuse or remove from the site;
(vii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
(viii) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
(ix) Request SIPMIU/DSMC to report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work.

85. **Social and Cultural Resources – Chance Finds.** For this subproject, excavation will occur at specific isolated location, so it could be that there is a low risk of such impacts. Nevertheless, the construction contractor will be required to:

(i) Strictly follow the protocol for chance finds in any excavation work;

(ii) Request SIPMIU/DSMC or any authorized person with archaeological/historical field training to observe excavation if deemed necessary by local authorities;
(iii) Stop work immediately to allow further investigation if any finds are suspected; and
(iv) Inform SIPMIU/DSMC if a find is suspected, and take any action they require ensuring its removal or protection in situ.

C. Operation and Maintenance

1. Screening out Areas of No Significant Impact

86. Because a bio-digester system should operate without the need for major repair and maintenance, there are several environmental sectors which should be unaffected once the system begins to function. The STP is located outside the town in an uninhabited and unused area while the toilet blocks will be placed in fixed and relatively small areas within the city. Thus there are several fields that are not expected to have significant impacts during the operation and maintenance stage of the subproject (Table 6).

Table 6: Fields in which Operation and Maintenance is Not Expected to have Significant Impacts

Field	Rationale
Location and administrative boundaries	No impact expected
Topography, soil, and geology	O&M activities are not large enough to affect these features.
Climate	O&M activities are not large enough to affect these features.
Air Quality	O&M activities are not large enough to affect these features.
Groundwater	O&M activities are not large enough to affect these features.
Ecological Resources	O&M activities are not large enough to affect these features.
Land Use	O&M activities are not large enough to affect these features.
Local Economy – Industries, Trade, and Commerce	O&M activities are not large enough to affect these features.
Population	O&M activities are not large enough to affect these features.
History, Culture and Tourism	O&M activities are not large enough to affect these features.

D. Mode of Operation

96. **Management.** Mizoram UD&PAD will be responsible for management and implementation of the pilot project. This will be supported by a public education campaign. UD&PAD will employ local contractors to conduct repairs, and contractors should be required to operate the same kinds of Health and safety procedures as used in the construction phase to protect workers and the public.

97. **Clear Water from Bio – Digester:** The comparison of quality water discharged in drain with different option as per DRDO report, the chemical and biological character of discharge water is much lower for bio – digester than conventional septage tank. The quality of discharge water can be further improved by use of reed bed. A comparison detail is given below in table 7 and table 8 with national clear water discharge in swear (IS 3306, 1974)

Table 7: Indicative Effluent Quality

	Septic Tank	Bio digester/Bio tank	Bio tank + Reed bed treatment
pH	6.7-7.5	7.0-7.2	7.0-7.5
Turbidity (NTU)	500-800	70-90	2-5
Total Suspended Solids (mg/L)	150-300	90-120	50-80
TDS (mg/L)	500-850	350-450	100-300
VS (mg/100ml)	50-60	20-30	5-12
COD (mg/L)	1200-2000	250-300	15-25
BOD 5(mg/L)	350-500	70-120	2-4
Coliforms (MPN/ml)	>3000	300-350	0-12

Table 8: National standard for clear water in public sewers

Parameter	Into public sewers Indian Standards: 3306 (1974)	Bio digester/Bio tank
pH	5.5 - 9.0	7.0-7.2
BOD (for five days at 200C)	350	2-4
COD	-	15-25
Suspended solids	600	100-300
Total dissolved solids (inorganic)	2100	50-80
Temperature (0C)	45	30
Oil and grease	20	NA
Phenolic compounds	5	NA
Cyanides	2	NA
Sulphides	-	NA
Fluorides	15	NA
Total residual chlorine	-	NA
Pesticides	-	NA
Arsenic	0.2	NA
Cadmium	1	NA
Chromium (hexavalent)	2	NA
Copper	3	NA
Lead	1	NA
Mercury	0.01	NA
Nickel	3	NA
Selenium	0.05	NA
Zinc	15	NA
Chlorides	1000	NA
Boron	2	NA
Sulphates	1000	NA
Sodium (9%)	60	NA
Ammoniacal nitrogen	50	NA
Radioactive materials		NA
Alpha emitters (milli-curie/ml)	10-7	NA
Beta emitters (micro-curie/ml)	10-6	NA
Coliforms (MPN/ml)	<1000	300 -350

87. **Operation and Maintenance.** The Operation and maintenance of the Bio-Digesters Project will resting with urban local body i.e. Aizawl municipal council. However it will work in the loop of proposed single window system where all related support will be available in single roof. The Operation and maintenance of the Bio digesters and bio toilets are as detailed below:

(i.) Bio toilets and bio digesters do not need any maintenance. However there is some regular housekeeping required ensuring that the bio digesters and bio toilets perform efficiently for the desired duration of service.

(ii.) Unlike septic tanks, bio digesters do not require frequent evacuation and desilting.

(iii.) Similarly unlike STPs, digesters do not need expensive equipment, electricity and regular maintenance.

(iv.) However since bio digesters are sewage treatment systems based on biological processes, these bacteria required conductive environment to perform in most efficient manner. In order to achieve these conditions, there are some simple do's and don'ts instruction as under:

88. **Maintenance of the Bio-Toilets.** Toilet, connection pipes, digester tank, inoculum, outlet pipes etc. are the main components of the bio toilet. For effective functioning of the bio toilet, proper maintenance of these components is necessary.

(i.) Do's (for users):-

- After each use, at least two mugs (one litre) water must be poured into the commode. This is necessary for flow of the excreta and proper functioning of inoculum.
- Flush out the excreta with water after use of the toilet.

(ii.) Don'ts (for users):-

- Do not use soap or detergent in the toilet as this is detrimental for the inoculum.
- Do not put external articles like bottles, cloths, napkins, plastic bags, pouches etc. into the toilet bowl.

89. Maintenance Instructions.

(i.) Do's:

- Toilet and commode bowl must be cleaned regularly (daily).
- For normal cleaning of toilet and commode use one cap full of sanifresh/Harpic in one bucket full (15 litres) of water.
- Use baking powder and vinegar for deep cleaning of toilet and commode.
- Use water for removing blockage in the commode.
- Keep the gas valve closed if bio gas is not being used.

(ii.) Don'ts:

- Never use acid for cleaning the toilet and commode bowl.
- Never use anti-bacterial agents or detergent for cleaning or disinfecting the toilet and commode.

90. **General**. The work will follow the same procedures during the construction stage. UD&PAD needs to require its operation and maintenance (O&M) contractor to:

(i) Prepare and submit Operational Manuals for the Bio - Septage;

(ii) Maintenance of Bio Septage should be done as per supplier repairing guideline,

(iii) Ensure compliance of treated water from Bio Septage to the GOI Wastewater Quality standards at all times;

(iv) Maintain a record of quantity and end-users of dried sludge; and

(v) Conduct all Bio Septage network maintenance works during non-monsoon period.

91. If trenches are will be dug to locate and repair leaks or remove and replace lengths of pipe or illegal connections, the work will follow the same procedures during the construction stage. UD&PAD needs to require its O&M contractor to:

(i) Refill and re-compact trenches soil and backfilled sand will be removed to expose the leaking junction or pipe;
(ii) Conduct work during non-monsoon period; and
(iii) Cover or wet excavated material to prevent dusts.

92. **Ecological Resources**. There are no significant ecological resources in or around the project area of the town, so any repairs or maintenance work can be conducted without ecological impacts. As there is no significant flora and fauna in or around project site, there should also not be any ecological impacts from the increase in abstraction.

93. **Economic Development**. Although network repairs could result in shops losing some business if the work means that access is difficult for customers, any losses will be small and short-lived and will probably be at the level of normal business fluctuations. It should therefore not be necessary to compensate for such losses. Nevertheless UD&PAD needs to require its O&M contractor to:

(i) Inform all residents, businesses and sensitive receptors about the nature and duration of any work well in advance so that they can make preparations if necessary;
(ii) Consult city authorities regarding any such work so that it can be planned to avoid traffic disruption as far as possible, and road diversions can be organised if necessary.

94. The provision of an improved and expanded Bio Septage system is not expected to have direct economic benefits for business or industry, as connections will only be provided to domestic users. However businesses will almost certainly benefit from the expected improvement in the health and well-being of their workforce as this should result in fewer days lost through illness, and overall increased productivity.

95. The use of local contractors will provide economic benefits to the companies and the workers they employ. There is however little prospect of directing these benefits to persons affected by any maintenance or repair works as contractors will utilise their existing workforce. To provide at least some economic benefits to affected communities, unskilled persons employed to maintain and operate the STP should be residents of the neighbouring area.

96. **Social and Cultural Resources**. There is no risk of excavation in the city discovering material of historical or archaeological importance, there will be no need to take precautions to protect such material when areas are excavated to repair.

97. Repair works could cause some temporary disruption of activities at locations of social and cultural importance such as schools, hospitals, temples, tourist sites etc., so the same precautions as employed during the construction period should be adopted. UD&PAD needs to require its O&M contractor to:

(i) Consult the city authorities to identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
(ii) Complete work in these areas quickly;
(iii) Consult municipal authorities, custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and

address key issues, and avoid working at sensitive times, such as religious and cultural festivals.

98. The citizens of the Aizawl will be the major beneficiaries of the improved septage management, as they will be provided with a constant supply of better quality water, piped into their homes. In addition to improved environmental conditions, the subproject will improve the over-all health condition of the town as diseases of poor sanitation (such as diarrhoea and dysentery) will be reduced.

E. Cumulative Impact Assessment

99. The cumulative impact assessment (CIA) examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing and reasonably foreseeable future projects or activities. The subproject's potential cumulative effects were considered with respect to Valued Components (VCs) in the categories of environmental, socio-economic, and heritage resources in four areas:

(i) Of any potential residual project effects that may occur incrementally over time;
(ii) Consideration of other known relevant projects or activities within the specified study area boundaries, even if not directly related to the subproject;
(iii) Potential overlapping impacts that may occur due to other developments, even if not directly related to the proposed project; and
(iv) Future developments that is reasonably foreseeable and sufficiently certain to proceed.

100. In addition, the CIA considered the scope or influence of the subproject. Two boundaries, spatial and temporal[9], were used.

101. The subproject IEE has identified the VCs as air quality, water (surface and groundwater) quality, noise, geophysical (hydrogeological), traffic management, social-economic and socio-community, and human health. There are no foreseeable projects that will overlap with the subproject. The spatial and temporal boundary of the subproject is the whole GAPA.

102. Air quality effects will occur during construction. Consequently, although emissions of common air contaminants (CAC) and fugitive dust may be elevated in proximity to active work sites, this impact will be short-term and localized to the immediate vicinity of the alignment. Greenhouse Gas (GHG) emissions may increase as a result of project activities (i.e., vehicle and equipment operation, concrete production, disposal of excavated material, landfilling of residual wastes). Given the subproject's relatively minor contribution to CAC and GHG emissions during construction, the overall significance rating of both these potential residual effects is considered to be negligible during construction.

103. During construction noise levels in the immediate proximity of most work sites are expected to increase. The duration of this exposure will be relatively brief. This exposure represents a temporary, localized, adverse residual effect of low to moderate significance for

[9] Spatial boundary refers to the area immediately surrounding the subproject location; while the temporal area considers the potential cumulative effects associated with subproject construction, and operation and maintenance, and those associated with other past, existing and reasonably foreseeable projects in the vicinity of the subproject.

affected receptors. While building damage due to ground vibrations is unlikely, there may annoyance to spatially located receptors during construction.

104. Land use/traffic management concerns will occur spatially during construction. During construction, site-specific mitigation measures will be implemented to address temporary disruptions to land use and access in the vicinity of the alignment such as road and sidewalk closures, traffic delays and detours, parking modifications, and increased volumes of construction–related traffic. There should be improved traffic movement along the alignment once construction is completed. Since the subproject will be built in undeveloped land earmarked for wastewater treatment purposes, it will not conflict with existing or planned land use. However, following improvement in infrastructures and services, added residential developments, commercial and business facilities and increased densities are expected to develop and enhance the subproject area. This can be considered a long-term cumulative benefit of the subproject.

105. Conversion of the private land, although barren and unproductive, to a BIO SEPTAGE is a relatively small change in the visible landscape and is not likely to be readily apparent at anything at local scale. It is theoretically possible that other private land owners may wish to sell adjacent unproductive lands in the future for similar purposes but there is no program to promote this nor are there any known plans for such operations. This cumulative impact is therefore not considered as significant. It is also unlikely that the establishment of the Bio – Septage unit will encourage significant development of similar wastewater treatment facilities by third parties.

106. Adverse impacts such as localized disruption of vehicle traffic and pedestrian movements in areas along the alignment, and elevated CAC and fugitive dust emissions in proximity to work sites, elevated noise and vibration levels and visual impacts will occur during construction. These short-term effects will be mitigated by providing alternate travel routes or alternating traffic movements and, where possible, access to businesses, schools and residences. However, upon completion of construction the socio-community will benefit from improved Bio Septage and wastewater management system. This is considered a long-term cumulative benefit.

107. Development at the site and in the vicinity of the subproject may result in similar impacts relative to water quality and soils, but each impact is independent of one another and is mitigated on a site-specific basis. Further, while water quality impacts have the ability to compound when taking into account regional water basins into consideration, the subproject will be required to adhere to the mandatory state and local laws, ordinances, regulations, and water quality standards. Regional geologic impacts do not generally compound, and are limited to the site at which they occur.

108. The subproject, when considered with other projects in the same watershed, may result in cumulative impacts to surface and groundwater quality from increased surface impermeability and resultant runoff. Construction projects could result in increased erosion from exposed soil areas, which could contribute sediments into local drainage courses and other waterways. However, it is reasonably assumed that new construction associated with future projects will be required to meet national, state, and local construction and operation standards at least as rigorous as those required at present. Therefore, the potential for cumulative impacts to water quality and soils is deemed to be less than significant.

109. No adverse residual effects to human health will occur as a result of subproject construction or operation. While exposure to elevated noise levels and fugitive dust and CAC emissions will occur in proximity to subproject work sites during construction, due to their short-term, localized nature, these effects are expected to be minor and insignificant with no measurable effects on human health. The subproject operations will benefit the general public by contributing to the long-term improvement of septage management and community liveability in Aizawl.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Public Consultations

110. An over-all stakeholder consultation was taken up in Aizawl to present information on NERCCDIP and its components. Participants included elected representatives at state and local levels, officials and staff of concerned government departments, public sector providers of urban services, civil society, community, and environmental groups and NGOs. The poor members of the community were included and women were represented during the consultations. The participants expressed their support to NERCCDIP.

111. SIPMIU's social, gender and environmental team also consulted Centre for Science and Environment, Science Teachers Association of Mizoram and Clean Mizoram Society, community building organizations in Aizawl such as Young Men's Christian Association, Mizo Hmeichhia Inzawmkhawm Pawl, a women's organization in Aizawl and People's Association, MUP to gather information on their willingness to participate in the subproject's awareness raising activities. All consulted organizations provided their support to the subproject.

112. Consultation with project stakeholders is an integral part of the project and a continuous process dovetailed into the project as required and feasible throughout the project duration. A range of consultation tools such as workshops, focus group discussions (FGDs), formal and semi structured interviews, presentations, information brochures, informal discussions, mapping, have been used extensively as part of consultations activities.

Date	Location	No. of Participants	Type of Participants	Topics Discussed	Issues Raised
4April 2014	Aijal Club, Khatla	109, M-79, F-30	Honble Minister for UD&PA, MoUD, Principal Secretary UD&PA, AMC executive members, Local Council members, Local residents, NGOs,PMMC, SIPMIU, DSMC, MPCB (Mizoram Pollution Control Board), Social Welfare Department, PHE, Agriculture Deptt, Journalist, Local Residents etc.	Details of project, project benefits/ success achieved in other states. ADB safeguards policy. Requirement of community participation for successful implementation of the project.	SIPMIUs participation in project implementation. Role of Local Councils/ authority. User charge. Clean method and hygienic system.
20th Dec 2014	Local Council house of each area. (29 locations)	M-174(average 6 people)ateach location.	Local Council members and NGO representatives.	Need for implementation of the project. Provision for poor and vulnerable people. Potential positive and negative impacts of proposed project during construction. Community response towards the project	SIPMIUs participation in project implementation Role of Local Council in project Implementation
21 & 22 Dec 2014	At all project locations	M-232, F 174 T-406	Landowner, Neighboring house owners who will get connected to the facility, Local Council members	ADB safeguards policy.Area of land required. Requirement of written consent from landowners. Construction procedure and pipe alignment.	Benefits from the project (no more hassle for emptying septic tank, clear re-usable water discharge etc.) Role of Local Council in project implementation. No pressure for land contribution; owners volunteered to give their land for community welfare motive; neighbouring households keen to connect to the facility.

B. Future Consultation and Disclosure

113. UD&PAD extended and expanded the consultation and disclosure process significantly during implementation of NERCCDIP. They have appointed an experienced NGO to handle this key aspect of the program. The NGO will continuously (i) conduct a wide range of activities in relation to all subprojects in the city; and (ii) ensure the needs and concerns of stakeholders are registered and are addressed in subproject design.

114. For this subproject, the NGO\ Local council members will develop, in close coordination with SIPMIU and DSMC, a public consultation and disclosure program which is likely to include the following:

(i.) **Consultation during detailed design:**

- Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and CBOs) to hear their views and concerns, so that these can be addressed in subproject design where necessary; and
- Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.

(ii.) **Consultation during construction:**

- Public meetings with affected communities (if any) to discuss and plan work programs and allow issues to be raised and addressed once construction has started; and
- Smaller-scale meetings to discuss and plan construction work with individual communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation;

(iii.) **Project disclosure:**

- Public information campaigns (via newspaper, TV and radio) to explain the project to the wider town population and prepare them for disruption they may experience once the construction program is underway;
- Public disclosure meetings at key project stages to inform the public of progress and future plans, and to provide copies of summary documents in local language; and
- Formal disclosure of completed project reports by making copies available at convenient locations in the study towns, informing the public of their availability, and providing a mechanism through which comments can be made.

115. Based on ADB requirements, the following will be posted on ADB website: (i) this IEE, upon receipt; (ii) a new or updated IEE, if prepared, reflecting significant changes in the Project during design or implementation; (iii) Corrective action plan prepared during Project implementation to address unanticipated environmental impacts and to rectify non-compliance to EMP provisions; and (iv) environmental monitoring reports, upon receipt.

VII. GRIEVANCE REDRESS MECHANISM

116. A project-specific grievance redress mechanism (GRM) been established during Tranches 1 and 2 implementation to receive, evaluate, and facilitate the resolution of affected peoples' concerns, complaints, and grievances related to social and environmental issues of the project. The GRM will continue to function and cover Tranche 2. It will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

117. A common GRM has been in place for social, environmental, or any other grievances related to the project. Every grievance shall be registered and careful documentation of process with regard to each grievance undertaken, as explained below. The SIPMIU environmental and social safeguards officers have the overall responsibility for timely grievance redress on environmental and social safeguards issues.

118. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The SIPMIU environment and social safeguard officers will be assisted by design and supervision management consultant (DSMC) safeguards specialists with information/collateral/awareness material etc. and in conducting project awareness campaigns. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per project Resettlement Framework, and SIPMIU will ensure that their grievances are addressed.

119. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes that have already been installed by SIPMIUs or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a complaints register in SIPMIU offices. Appendix 3 includes the sample grievance registration form. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. SIPMIU safeguard officers will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party.

120. **Grievance redress process**. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and DSMC on-site personnel will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned SIPMIU safeguard officers and contractors, will be posted at all construction sites at visible locations. The SIPMIU safeguard officers will be responsible to see through the process of redressal of each grievance.

(i) **1st Level Grievance.** The phone number of the SIPMIU office should be made available at the construction site signboards. The contractors and SIPMIU safeguard officers can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.

(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the city-level grievance redress committee (GRC) with support from SIPMIU safeguard officers and DSMC environment and

resettlement specialists. City-level Grievance Redress Committee (GRC)[10] will attempt to resolve them within 15 days.

(iii) **3rd Level Grievance.**The SIPMIU safeguard officers will refer any unresolved or major issues to the State-level GRC, who with consultation with SIPMIU and city-level GRC will resolve them within 15 days.

121. Despite the project GRM, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

122. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's developing member countries. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

123. Recordkeeping. Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by SIPMIU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the SIPMIU office, and on the web, as well as reported in the semi-annual environmental monitoring reports to be submitted to ADB.

124. **Periodic review and documentation of lessons learned.** The SIPMIU safeguard officers will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the SIPMIU's ability to prevent and address grievances.

125. **Costs**. All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the concerned SIPMIU; while costs related to escalated grievances will be met by the EAs. Cost estimates for grievance redress are included in resettlement cost estimates. The grievance redress process is shown in Figure 4.

[10] The GRC established in Tranches 1 and 2 will continue to function and include resolving issues/complaints, if any, in Tranche 3.

Figure 4: NERCCDIP Grievance Redress Mechanism

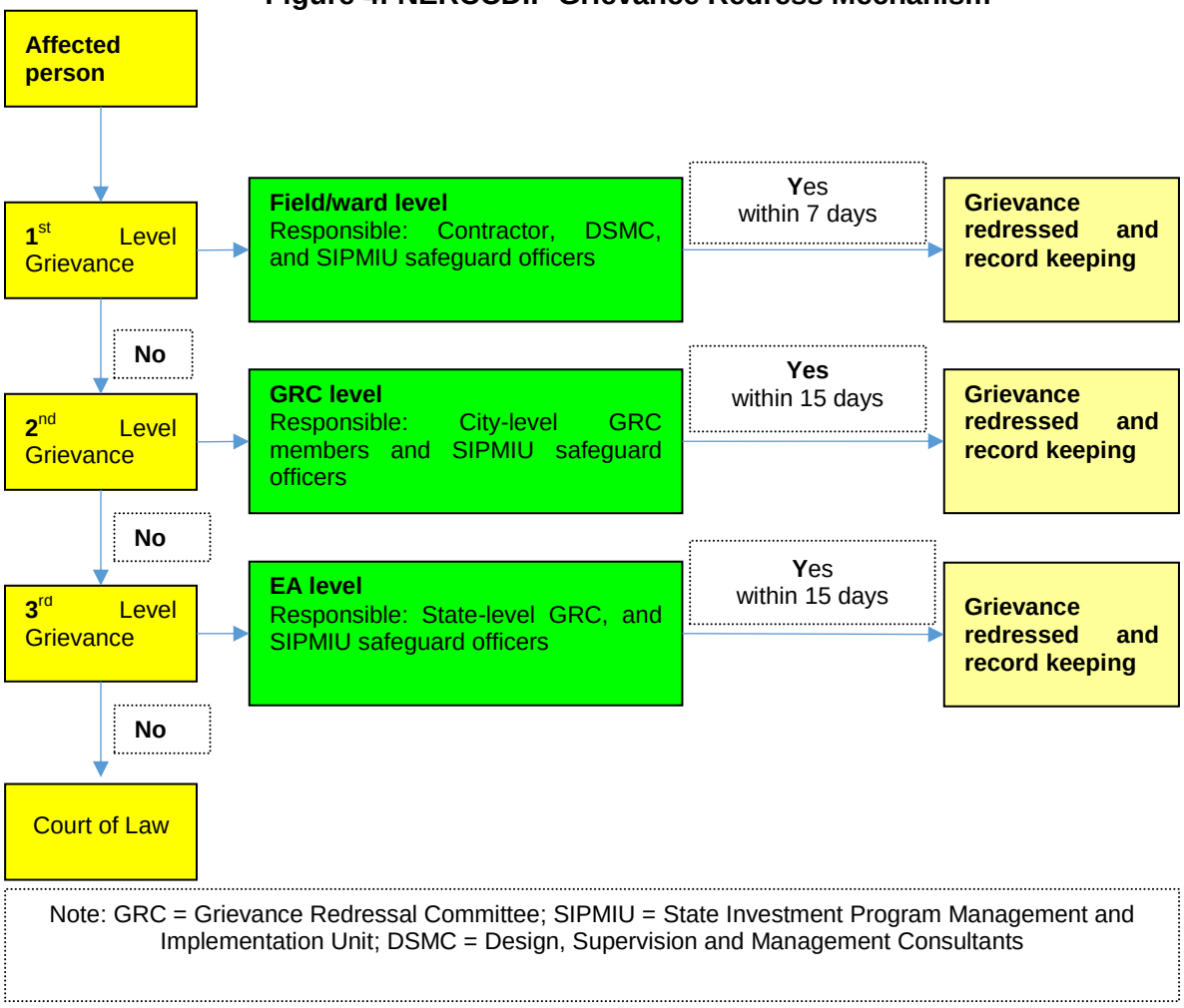


Table No 9: GRC Member for NERCCDIP Aizawl

STATE LEVEL		
1.	Minister, UD&PA Department, Mizoram	Chairman
2.	Deputy Commissioner	Convener
3.	Secretary, UD&PA, Govt. of Mizoram	Member
4.	Secretary, Law and Judicial Department	Member
5.	CEO, Aizawl Municipal Council	Member
6.	Project Director, SIPMIU	Member
CITY LEVEL		
1.	Deputy Commissioner , Aizawl	Chairman
2.	Project Director, SIPMIU	Convener
3.	CEO, Aizawl Municipal Council	Member
4.	Councillor of concern ward	Member
5.	Chairman of concerned Local Council	Member
6.	Chief Engineer, PHED	Member
7.	Chief Engineer, PWD	Member
8.	Director, UD &PA	Member
9.	President Central YMA (NGO)	Member
10.	President, MUP (NGO)	Member
11.	President, Mizoram Consumer Union	Member
12.	President, MHIP (NGO)	Member

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

126. MOUD is the national-level executing agency (EA) and the Urban Development Department of Tripura and the Urban Development and Poverty Alleviation Department of Mizoram are the state-level EAs. Each NERCCDIP state has established State-level Investment Program Management and Implementation Units (SIPMIU).

127. The environmental safeguards officer in the SIPMIU will:

(i) confirm existing IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
(ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
(iii) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by the contractors;
(iv) establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the EMP;
(v) facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (e.g., No Objection Certificates, Consent for Establishment, Forest Clearance, Consent for Operations, etc.), as relevant; All necessary environmental clearances should be obtained prior to contract awards to avoid delay in physical progress of relevant subprojects;
(vi) supervise and provide guidance to the contractors to properly carry out the environmental monitoring and assessments as per approved IEEs/EMPs;
(vii) review, monitor and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
(viii) consolidate monthly environmental monitoring reports from contractors and submit semi-annual monitoring reports to ADB;
(ix) ensure timely disclosure of final IEEs/EMPs in locations and form and language accessible to the public and local communities; and
(x) address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner; and
(xi) organize an induction course for the contractors covering, including among others, EMP implementation, health and safety, grievance redressal, and community protection.

128. SIPMIU will be assisted by the DSMC, who will design the infrastructure, manage tendering of contracts, and supervise the construction process. The environment sspecialist in the DSMC will, but not limited to:

(i) review environmental guidelines and requirement of GoI, state governments and ADB SPS, 2009, and EARF;
(ii) guide the implementation of future subprojects;
(iii) provide technical support to SIPMIU including review of EARF guidelines for specific type of subprojects and assist in subproject screening, categorization and preparation of required environmental assessment report;

(iv) assist and guide SIPMIU environment officer in environmental management functions including preparing IEEs, updating subproject IEEs as required during subproject implementation, monitoring EMP implementation, preparing semi-annual environmental monitoring reports;
(v) assist SIPMIU environment officer in preparing guidelines and procedure as required in the subproject EMPs;
(vi) provide support and guidance to SIPMIU environment officer in undertaking environmental monitoring;
(vii) facilitate grievance redress at field level;
(viii) assist contractors in implementing corrective actions for non-compliances;
(ix) provide training on environmental safeguards to SIPMIU staff and contractors; and
(x) perform any other task assigned by DSMC team leader, deputy team leader and SIPMIU project director.

129. **Civil works contracts and contractors.** IEEs and EMPs are to be included in bidding and contract documents and verified by the SIPMIUs. The contractor will be required to designate an environmental supervisor/focal person to (i) coordinate with DSMC on updating the IEE/EMP or developing a site-specific EMP based on detailed designs, and (ii) ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

B. Institutional Capacity Development Program for EMP Implementation

130. The DSMC environmental specialist is responsible for trainings on environmental awareness and management in accordance with both ADB and government requirements. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of NERCCDIP. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. The contractors will be required to attend environmental awareness and orientation prior to deployment to work sites. The proposed training project along with the frequency of sessions is presented in Table 10.

Table 10: Proposed Institutional Capacity Building Program

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	**Module 1 – Orientation** • ADB Safeguards Policy Statement • GoI Environmental Laws and Regulations **Module 2 – Environmental Assessment Process** • ADB environmental process, identification of impacts	1 day	Officials and SIPMIU involved in the project implementation

Description	Contents	Schedule	Participants
	and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements • Review of environmental assessment report to comply with ADB requirements • Incorporation of EMP into the project design and contracts		
Construction stage			
Orientation program/ workshop for contractors and supervisory staff	• Roles and responsibilities of officials/contractors/ consultants towards protection of environment • Environmental issues during construction • Implementation of EMP • Monitoring of EMP implementation • Reporting requirements	1 day	SIPMIU Contractors
Experiences and best practices sharing	• Experiences on EMP implementation – issues and challenges • Best practices followed	1 day on a regular period to be determined by EAs, SIPMIUs, consultants and contractors	SIPMIUs

C. Environmental Mitigation Plan

131. Table 8 to 10 shows the potential adverse environmental impacts, proposed mitigation measures, responsible parties, and estimated cost of implementation. This EMP will be included in the bid documents and will be further reviewed and updated during implementation.

D. Environmental Monitoring Program

132. Table 11 to 13 shows the proposed environmental monitoring program for this subproject. It includes all relevant environmental parameters, location, responsibility of mitigation and monitoring, method of monitoring and frequency of monitoring. Monitoring activities during the detailed engineering design stage will from part of the baseline conditions of the subproject location and will be used as the reference for acceptance of restoration works by the construction contractors.

Table 11: Environmental Impacts and Mitigation Measures (Pre - Construction Stage)

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
1	Land acquisition and resettlement impacts required due to the project components and sensitive land uses	Permanent	• Not significant as the subproject will not involve land acquisition, only land donation for sites of biodigesters. Land donation certificates have been obtained together with land documents and countersigned by the Land Revenue Officer.	• Establishment of a system for archiving records of all land titles donated or acquired and all records of title transfer as a result of land acquisition.	SIPMU / Social Expert DMSC	SIPMU
2.	Alignment of septage lines from water pipes	Permanent	Moderate	• Provide minimum 0.5 m distance of septage lines from water pipes as per CPHEEO guidelines	SIPMU / Septage Expert DMSC	SIPMU
2	Relocation of utility lines	Permanent	Moderate	• All utilities and services impacted due to the proposed components will be shifted/relocated, with prior approval of the concerned agencies.	SIPMU / Septage Expert DMSC	SIPMU
3	Seismic considerations in design of structures	Permanent	Moderate	• The designs of the project components, will conform to National Building Code. • Seismic data will be included in the technical specifications (Section III of bid	SIPMU / Structural Engineer DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				documents) of biodigesters.		
	Assets/facilities lost, including common property resources and religious	Permanent	Moderate	• Designs to be worked out to minimize impacts on these assets. Compensation and assistance will be provided in accordance with the provisions of the RP. •	SIPMU / Structural and Social Expert Engineer DMSC	SIPMU
4	Damage to trees and clearance of vegetation at the project locations	Permanent	Moderate	• Only trees that will require removal within the proposed construction areas of the sites will be cut. After the finalization of the designs and layout of the project components, the trees within proposed construction areas will be marked. For trees not proposed to be cut, taking all precautions to protect them from any damage from construction activities, including placement of tree guards will be taken up.	SIPMU / Environmental Expert DMSC	SIPMU
5	Pollution control and IEC activities of the source, including sanitation facilities and waste collection.	Permanent	Moderate	• In consultation with the SIPMU, design of sanitation facilities and solid waste collection facilities shall be carried out within lands belonging to the AMC. The Person implementing the RP	SIPMU / Environmental Expert and Social Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				shall be assigned responsibilities to carry out awareness campaigns.		
6	Locations for disposal of spoil	Permanent	Moderate	• A utilization plan for the disposal of earth resulting from the excavation will be prepared by the contractor as part of the spoil management plan.	SIPMU / Environmental Expert DMSC	SIPMU
7	Identification of sources of materials	Temporary	Moderate	• The contractor, at the detailed design stage, shall (i) identify all potential material sources; (ii) verify suitability of all material sources and obtain approval of DMSC.	Contractor / Environmental Expert DMSC	SIPMU
8	Sludge management and disposal	Temporary	Moderate	• Design of Bio Septage to include zero sludge formation.	Contractor / Design Engineer DMSC	SIPMU
9	Environmental clearance	Temporary	Moderate	• Not required as EIA guideline MOEF GoI. The project comes under category C	SIPMU / Environmental Expert DMSC	SIPMU
10.	Minimum distance of sewer lines from water supply pipelines		Moderate	• Ensure technical specifications for the subproject components include minimal distance	Contractor / Design Engineer DMSC	SIPMIU

Table 12: Environmental Impacts and Mitigation Measures (Construction Stage)

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
1	Pit operations	Permanent	Moderate	• The contractor will: (i)	Contractor / Environmental	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				store stripped materials as not to disrupt natural drainage and protect them to prevent erosion and migration of soil particles into surface waters; (ii) provide temporary ditches and/or settling basins to collect run-off water and to prevent erosion and contamination of surface water; (iii) plant exposed areas with suitable vegetation at the earliest opportunity and prevent ponding of water through temporary drains discharging to natural drainage channels; (iv) restore sites after construction activities by stabilizing contours and slopes, spreading stripped materials to promote percolation and re-growth of vegetation, and draining any standing water.	Expert DMSC	

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
2	Relocation of utility lines	Permanent	Moderate	• The contractor will be required to: (i) plan for immediate attendance by the service providers to any damages to utilities during construction; (ii) replace (or compensate for) public and private physical structures damaged due to construction or vibration; and (iii) provide prior public information about the likely disruption of services. • In consultation and with support from SIPMU, the contractor will provide alternate arrangements for Bio Septage in the event of disruption beyond reasonable time, for instance, through tankers.	SIPMU / Septage Expert DMSC	SIPMU
3	Stockpiling of construction materials, excavated earth/spoil from trenches	Temporary	Moderate	• Due consideration will be given for material storage and construction sites such that it doesn't cause any hindrance to daily	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				life movement. The contractor will (i) consult with implementing agency on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) avoid stockpiling of earth fill, especially during the rainy season, unless covered by tarpaulins or plastic sheets; (iii) prioritize reuse of excess spoils and materials in the construction works; (iv) protect surface water bodies from any source of contamination, such as oily wastes, debris, and spoils that will degrade its quality; (v) submission of site-specific lay-out plan/s showing storage and disposal areas.		
4	Soil erosion	Permanent	Moderate	• The measures to address soil erosion at the proposed facilities	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				will consist of measures as per design, or as directed by the DMSC to control soil erosion, sedimentation, and water pollution. All temporary sedimentation, pollution control works, and maintenance thereof will be deemed incidental to the earthwork or other items of work.		
5	Dewatering of trenches Temporary	Temporary	Moderate	• For dewatering of groundwater encountered during construction of trenches, the contractor shall work out arrangements for dewatering	Contractor / Environmental Expert DMSC	SIPMU
6	Loss of access to residents, businesses, and institutions during construction	Temporary	Moderate	• The construction works do not interfere with the convenience of the public or access to, use, and occupation of public or private roads, or any other access to properties, whether public or private.	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				Temporary access to properties adjacent to the construction site will be provided through the construction of ramps		
7	Locations for disposal of spoil	Permanent	Moderate	• A utilization plan for the disposal of earth resulting from the excavation will be prepared by the contractor as part of the spoil management plan.	Contractor / Environmental Expert DMSC	SIPMU
8	Generation of Dust	Temporary	Moderate	• The contractor will take every precaution to reduce the levels of dust at construction sites, and not exceeding the pre-project ambient air quality standards.	Contractor / Environmental Expert DMSC	SIPMU
9	Sludge management and disposal	Temporary	Moderate	• Design of Bio Septage to include zero sludge formation.	Contractor / Design Engineer DMSC	SIPMU
10	Material handling at site	Temporary	Moderate	• All workers employed for mixing cement, concrete, etc. will be provided with protective footwear and goggles. Workers engaged in welding works will be provided	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				with welder's protective eye shields. The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions. • SIPMIU will ensure strict compliance on OH&S provisions in the EMP.		
11	Disposal of construction waste/debris/cut material	Temporary	Moderate	• For project components involving demolition of structures, the contractor will prepare and implement a waste management plan. Safe disposal of the extraneous material will be ensured in the pre-identified disposal locations. To enable minimization of waste disposal and do this in an environmentally safe manner.	Contractor / Environmental Expert DMSC	SIPMU
12	Safety measures during construction	Temporary	Moderate	• The contractor will comply with all regulations regarding safe scaffolding, ladders, working	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				platforms, gangway, stairwells, excavations, trenches, and safe means of entry and egress.		
13	Risk caused by force majeure	Temporary	Minor	• All reasonable precaution will be taken to prevent danger to the workers and the public from fire, flood, drowning, etc. Specifically, the contractor will (i) provide medical and accident insurance for workers; (ii) provide first aid in the construction camp site; and (iii) provide access to hospitals/clinics within the project site that can be accessed in case of emergency by arranging necessary transport for safe carriage of the injured	Contractor / Environmental Expert DMSC	SIPMU
14	First aid	Temporary	Moderate	• At every workplace, a readily available first aid unit, including an	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				adequate supply of sterilized dressing material and appliances, will be provided as per the factory rules. Suitable transport will be provided to facilitate transfer of injured or ill persons to the nearest hospital. At every workplace and construction camp, equipment and nursing staff will be provided		
15	Archaeological property chance find	Permanent	Moderate	• In the event of an archaeological chance find at the construction site, the contractor will prevent workmen or any other persons from removing and damaging any chance find artifacts and will, immediately upon discovery thereof, inform the DMSC of such discovery and carry out the DMSC's instructions for dealing with the same, awaiting which all work will	Contractor / Environmental and Social Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				be stopped for 100 m in all directions from the site of discovery. • The DMSC will seek direction from the Department of Archaeology before instructing the contractor to resume work on the site.		
16	Clearing of construction Site and restoration	Temporary	Moderate	• Contractor will prepare site restoration plans for approval by the DMSC. The plan will be implemented by the contractor prior to demobilization. • On completion of the works, all temporary structures will be cleared away, all rubbish burned, excreta or other disposal pits or trenches filled in and effectively sealed off, and the site left clean and tidy, at the contractor's expense. The site will be restored to pre-project	Contractor / Environmental Expert DMSC	SIPMU

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
				conditions through removal of all extraneous material on site		

Table 13: Environmental Impacts and Mitigation Measures Operation and Maintenance Stage)

	Environmental Issue	Duration / Extent	Magnitude	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
1	Environmental conditions	Permanent	Moderate	• Aizawl Municipal Council will undertake seasonal monitoring of air, water, noise, and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring, as well as the locations to be monitored will be as per the monitoring plan prepared	Sanitation In charge of Aizawl Municipal Council	Aizawl Municipal Council
2	Source protection - water quality	Permanent	Moderate	• Continuous surface and drinking water quality monitoring will be carried out, in addition to semi-annual field visits by UD&PAD jointly with the AMC and SPCB representative to assess any potential polluting	UD&PAD / Sanitation in charge AMC	Aizawl Municipal Council / UD&PAD Department

				activities/ threats. The findings shall be documented, taken up, and presented to the concern authorities for decision		
3	Management of Septage sludge and waste at the Site	Permanent	Moderate	• A waste collection system will be in operation to handle sludge and waste, in a leak-proof container that will be stored and disposed off at the landfill site, to ensure effective management of sludge and waste at the Septage site.	Aizawl Municipal Council	Aizawl Municipal Council
4	Effective maintenance of the Septage	Permanent	Moderate	• AMC will ensure regular maintenance of the Bio Septage. Utilization of. Disposal of Septage sludge will be at the sanitary landfill site in Aizawl. Reuse of sludge will be explored after testing to meet government safety standards.	Aizawl Municipal Council	Aizawl Municipal Council

Table 14: Pre-construction Environmental Monitoring Program

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Environmental Clearances	Not applicable	DSMC	follow up with SPCB on clearances	Checking of records	Clearances issued	As required	SIPMIU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Baseline Environmental Condition – Ambient Air Quality	Subproject location	DSMC	Establish baseline values of (i) respirable particulate matter (RPM) and (ii) suspended particulate matter (SPM)	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Ambient Air Quality Standards	Once prior to start of construction	SIPMIU
Baseline Environmental Condition - Water Quality	Subproject location	DSMC	Establish baseline values of suspended solids (TSS), pH biological oxygen demand (BOD), faecal coliform	Air sample collection and analyses by in-house laboratory or accredited 3rd party laboratory	GOI Water Quality Standards	Once prior to start of construction	SIPMIU
Utilities	As per site requirement	DSMC	(i) List of affected utilities if any and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions	Checking of records	(i) List of affected utilities and operators prepared; (ii) Requirement for a contingency plan for service interruptions included in bid documents	Once	SIPMIU
Social and Cultural Heritage	As per site requirement	SIPMIU and DSMC	Chance Finds Protocol	Checking of records	Chance Finds Protocol provided to construction contractors prior to commencement of activities	Once	SIPMIU
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	As per site requirement	SIPMIU and DSMC to determine locations prior to award of construction contracts.	List of selected location for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Checking of records	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas provided to	Once	SIPMIU

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
					construction contractors prior to commencement of works.		
Sources of Materials	As per site requirement	SIPMIU and DSMC to prepare list of approved quarry sites and sources of materials	(i)List of approved quarry sites and sources of materials; (ii) Bid document to include requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	Checking of records	(i) List of approved quarry sites and sources of materials provided to construction contractors (ii) Bid document included requirement for verification of suitability of sources and permit for additional quarry sites if necessary.	Once	SIPMIU

DSMC = Design Supervision Management Consultant, O&M = operation and maintenance, SIPMIU = State-level Investment Program Management and Implementation Units

Table 15: Construction Environmental Monitoring Program

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Sources of Materials	Quarries and sources of materials	Construction Contractor	Construction Contractor documentation	(i) Checking of records; (ii) visual inspection of sites	(i) Sites are permitted; (ii) Report submitted by construction contractor monthly (until such time there is excavation work)	Monthly submission for construction contractor As needed for DSMC	DSMC
Air Quality	Construction sites and areas designated for stockpiling of materials	Construction Contractor	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices; (iv) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (v) vehicular emissions such as sulphur dioxide (SO2), nitrous oxides (NOx), carbon monoxide (CO), and hydrocarbons (HC)	(i) Checking of records; (ii) visual inspection of sites	(i) Stockpiles on designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) air pollution control devices working properly; (iv) GOI Ambient Quality Standards for ambient air quality; (v) GOI Vehicular Emission Standards for SO2, NOx, CO and HC.	Monthly for checking records	DSMC in coordination with Pollution Control Board
Surface Water Quality	(i) Construction sites; (ii) areas for stockpiles,	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and	visual inspection	(i) Designated areas only; (ii) silt traps installed and	Monthly	DSMC in coordination with Pollution Control Board

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	storage of fuels and lubricants and waste materials;		waste materials; (ii) number of silt traps installed along drainages leading to water bodies; (iii) records of surface water quality inspection; (iv) effectiveness of water management measures; (v) for inland water: suspended solids, oil and grease, biological oxygen demand (BOD), and coliforms.		functioning; (iii) no noticeable increase in suspended solids and silt from construction activities (iv) GOI Standards for Water Discharges to Inland Waters and Land for Irrigation		
Noise Levels	(i) Construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels	(i) Checking of records; (ii) visual inspection	(i) Complaints from sensitive receptors satisfactorily addressed; (ii) silencers in noise-producing equipment functioning as design; and (iii) sound barriers installed where necessary	Monthly	DSMC in coordination with Pollution Control Board
Existing Utilities and Infrastructure	Construction sites	Construction Contractor	(i) Existing Utilities Contingency Plan	(i) Checking of records; (ii) visual inspection	Implementation according to Utilities Contingency Plan	As needed	DSMC
Landscape and Aesthetics	(i) Construction sites; (ii) areas for stockpiles, storage of fuels	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive	(i) Checking of records; (ii) visual inspection	(i)No accumulation of solid wastes on-site; (ii) implementation of Waste	Monthly	DSMC

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	and lubricants and waste materials; (iii) work camps		receptors; (iii) SIPMIU/DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.		Management Plan; (iii) complaints from sensitive receptors satisfactorily addressed.		
Accessibility	(i) Construction sites; (ii) traffic haul road	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors; (iii) number of signages placed at subproject location.	Visual inspection	(i) Implementation of Traffic Management Plan, if required; (ii) complaints from sensitive receptors satisfactorily addressed; (iii) signages visible and located in designated areas	Monthly	DSMC
Socio-Economic - Income	Construction sites	Construction Contractor	(i) Complaints from sensitive receptors; (ii) number of walkways, signages, and metal sheets placed at subproject location.	Visual inspection	(i) Complaints from sensitive receptors satisfactorily addressed; (ii) walkways, ramps, and metal sheets provided (iii) signages visible and located in designated areas	Quarterly	DSMC
Socio-Economic - employment	construction sites	Construction Contractor	(i) Employment records; (ii) records of sources of materials	Checking of records	Number of employees from Agartala equal or greater than 50% of total workforce	Quarterly	DSMC

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Occupational Health and safety	construction sites	Construction Contractor	(i) Site-specific Health and safety (H&S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (x) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and	(i) Checking of records; (ii) visual inspection	(i) Implementation of H&S plan; (ii) number of work-related accidents; (iii) % usage of personal protective equipment; (iv) number of first-aid stations, frequency of potable water delivery, provision of clean eating area, and number of sign boards are according to approved plan; (v) % of moving equipment outfitted with audible back-up alarms	Quarterly	DSMC

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			areas for storage and disposal.				
Community Health and safety	Construction sites	Construction Contractor	(i) Traffic Management Plan; (ii) complaints from sensitive receptors	Visual inspection	(i) Implementation of Traffic Management Plan; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSMC
Work Camps	Work camps	Construction Contractor	(i) Complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) SIPMIU/DSMC report in writing that the camp has been vacated and restored to pre-project conditions	Visual inspection	(i) Designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSMC
Chance Finds	Construction sites	Construction Contractor	Records of chance finds	Checking of records	Implementation of Chance Finds Protocol	As needed	DSMC

BOD = biological oxygen demand, DSMC = Design Supervision Management Consultant, H&S = health and safety, RPM = respirable particulate matter, SIPMIU = State-level Investment Program Management and Implementation Units SPM = suspended particulate matter.

Table 16: Operation and Maintenance Environmental Monitoring Program

Field	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Drinking Water Quality	Drinking Water Facilities	AMC and O&M Contractors	Comparison with IS and IMC standard	Sample collection and laboratory analyses	Indicators \ Standard set by BIS	Quarterly or as prescribed by BIS	AMC Mizoram
Surface water Quality	Nearest Surface water Body	AMC and O&M Contractors	Comparison with Surface Water Quality Standard of CPCB, MOEF	Sample collection and laboratory analyses	Indicators \ Standard set by CPCB	Quarterly or as prescribed by SPCB Mizoram	AMC Mizoram
RPM	Maintenance site	AMC and O&M Contractors	Comparison with RPM limits in NAAQM	Sample collection and laboratory analyses	Standard set by CPCB	Quarterly or as prescribed by CPCB	AMC Mizoram
Noise Level	Maintenance site	AMC and O&M Contractors	Comparison with Noise level limits in NANQM	Sample collection and laboratory analyses	Standard set by CPCB	Quarterly or as prescribed by CPCB	AMC Mizoram
Occupational Health and safety	subproject location	AMC and O&M Contractors	Complaints from sensitive receptors	(i) Records of training; (ii) H&S Plan approved by AMC	Complaints from sensitive receptors satisfactorily addressed	As needed	AMC Mizoram
General Maintenance	subproject location	AMC and O&M Contractors	Complaints from sensitive receptors	Checking of records	Complaints from sensitive receptors satisfactorily addressed	As needed	AMC Mizoram
Community Health and safety	subproject location	AMC and O&M Contractors	Complaints from sensitive receptors	Checking of records	complaints from sensitive receptors satisfactorily addressed	As needed	AMC Mizoram

CPCB = Central Pollution Control Board, O&M = operation and maintenance, AMC = Public Health and Engineering Department, UD&PAD = Urban Development and Poverty Alleviation Department. NAAQM = National Ambient Air Quality Monitoring NANQM = National Ambient Noise Quality Monitoring, BIS= Bureau of Indian standard, IMC = Indian Medical Council, RPM= Respirable Particulate Matter, MOEF = Ministry of Environment and Forest (including Climate Change), SPCB = State Pollution Control Board.

E. Environmental Management Plan Costs

133. Most of the mitigation measures require the construction contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the construction contractors or DSMC are included in the budgets for the civil works and do not need to be estimated separately. Mitigation that is the responsibility of SIPMIU will be provided as part of their management of the project, so this also does not need to be duplicated here.

134. The remaining actions in the EMP are the various environmental monitoring activities. These have not been budgeted elsewhere, and their costs are shown in Table 17. The figures show that the total cost of environmental management and monitoring for the subproject as a whole.

Table 17: Environmental Management and Monitoring Costs (INR)

Item	Total Cost (INR Lakhs)	Source of Funds
Environment Management Cost	0.50	
Mitigation Measures (pre-construction)	to be determined	SIPMIU Cost
Mitigation Measures (construction)	to be determined	Construction Contractors Cost
Mitigation Measures (O&M)	to be determined	UD&PAD Cost
Monitoring Measures (Pre-construction)	to be determined	DSMC Cost
Monitoring Measures (Construction)	-	Construction Contractor Cost
Monitoring Measures (O&M)	to be determined	UD&PAD Cost
a. Effluent Monitoring (annual)	to be determined	
b. Sludge Monitoring (annual)	to be determined	
Tree plantation (after construction)	to be determined	SIPMIU Cost
Maintenance of tree plantations (3 years)	to be determined	SIPMIU Cost
Capacity Building (Total)	11.5	SIPMIU Cost
Training Sessions (pre-construction)	to be determined	SIPMIU Cost
Training Sessions (construction)	to be determined	SIPMIU Cost

IX. FINDINGS AND RECOMMENDATIONS

135. The environmental impacts of elements of the infrastructure proposed under the Aizawl Septage (Bio digester) were assessed. Potential negative impacts were identified in relation to both construction and operation of the improved infrastructure, but no major impacts were identified as being due to either the project design or location. Mitigation measures have been developed in generic way to reduce all negative impacts to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the outline designs for the infrastructure. This means that the number of impacts and their significance has already been reduced by amending the design.

136. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and from the disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation.

137. Once the system is operating, most facilities will operate with routine maintenance, which should not affect the environment. Leaks in the Septage network will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only. It will also be conducted in areas that have already been excavated, so there will be no need to protect archaeological material.

138. The main impacts of the operating Bio Digester Septage system will be beneficial as the citizens of Aizawl will be provided with a good system of sanitation, which will serve a greater proportion of the population. Water borne diseases will be reduced, which should lead to economic gains as people will be away from work less and will spend less on healthcare, so their incomes should increase.

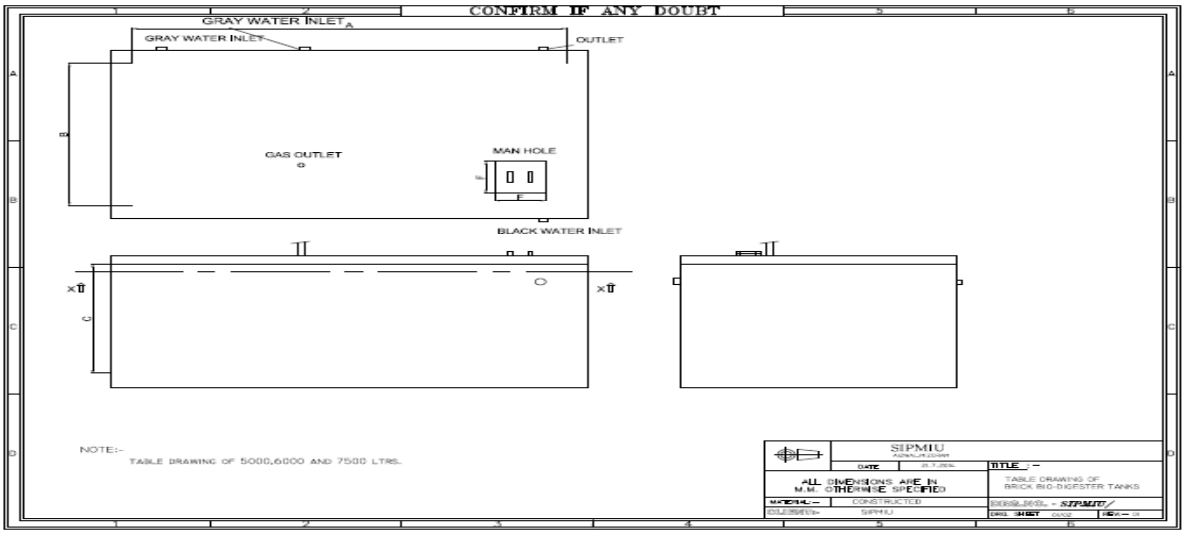
139. Mitigation will be assured by a program of environmental monitoring conducted during both construction and operation to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the SIPMIU.

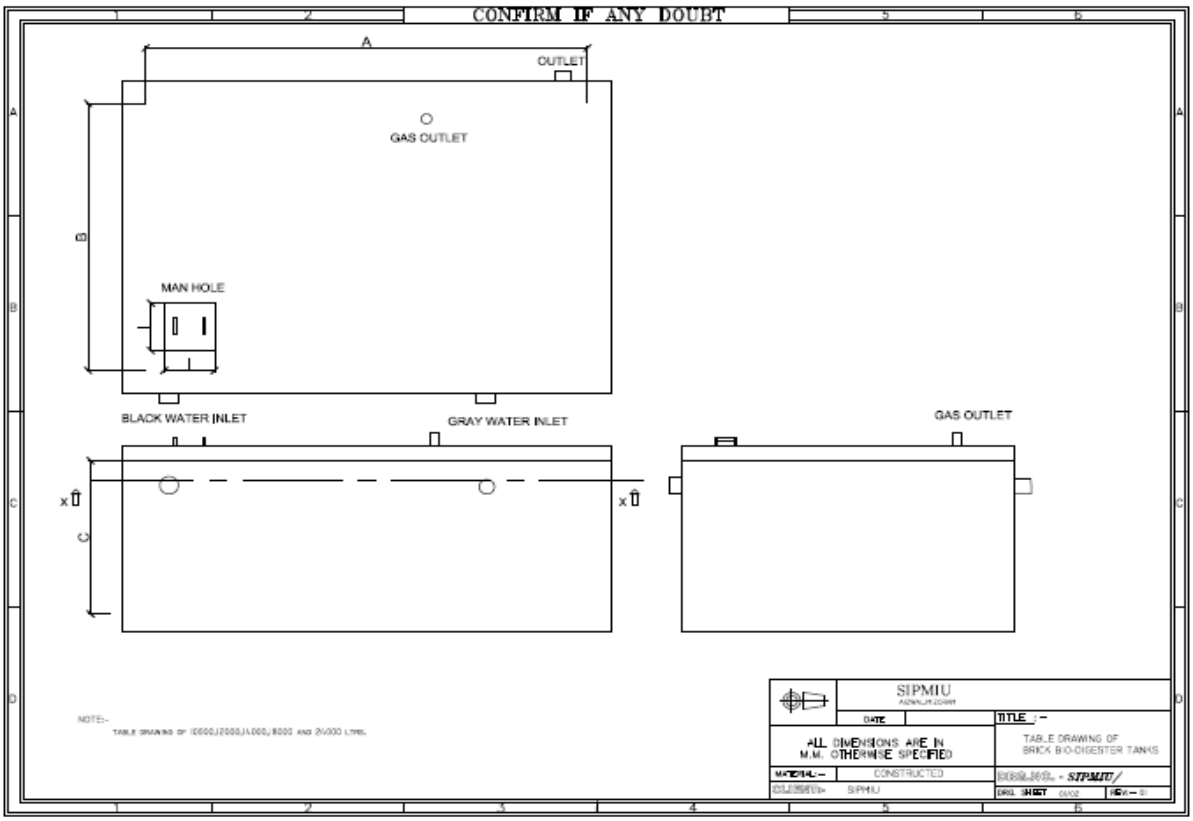
X. CONCLUSIONS

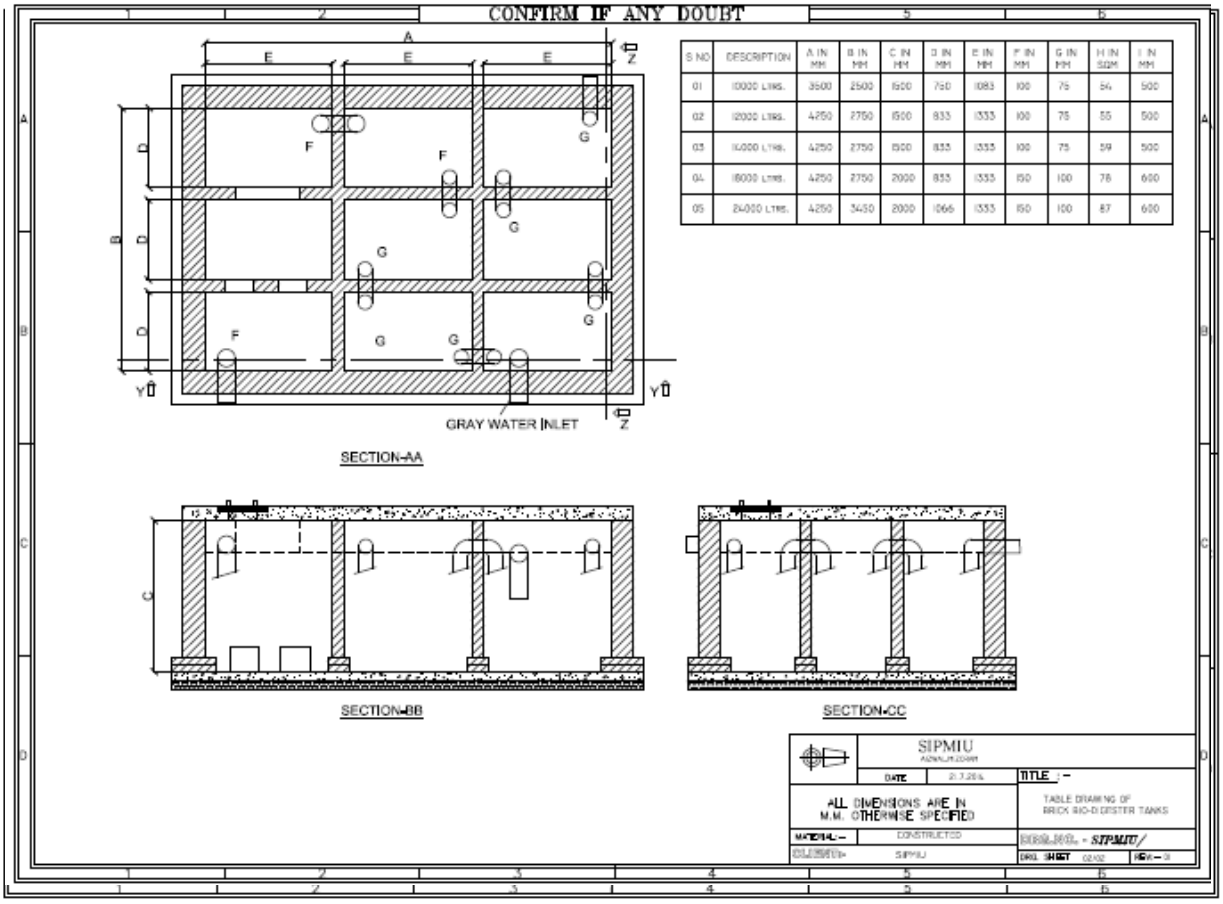
140. The subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

141. Based on the findings of the Environmental impact Statement (EIS), the classification of the Project as Category “C” is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006)

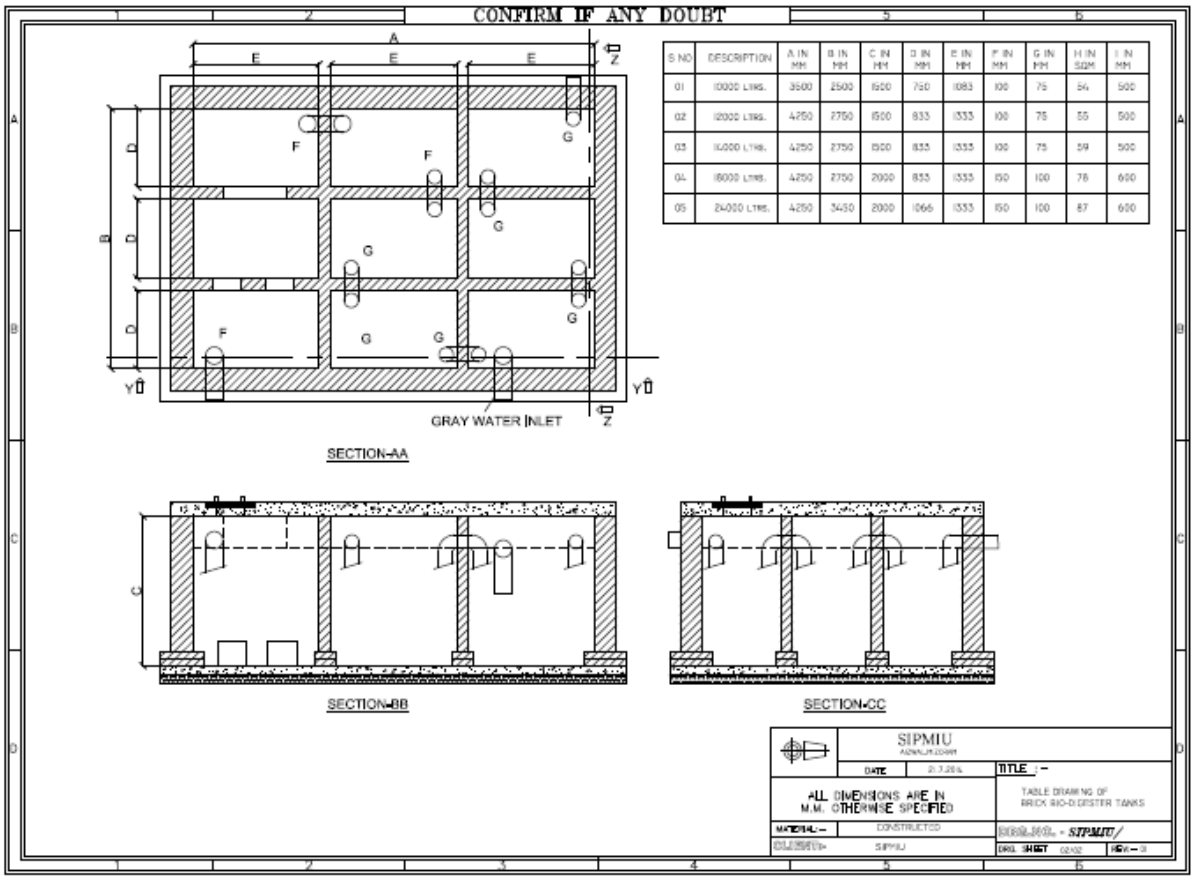
APPENDIX 1: TYPICAL DRAWINGS OF BIO – DIGESTER SEPTAGE



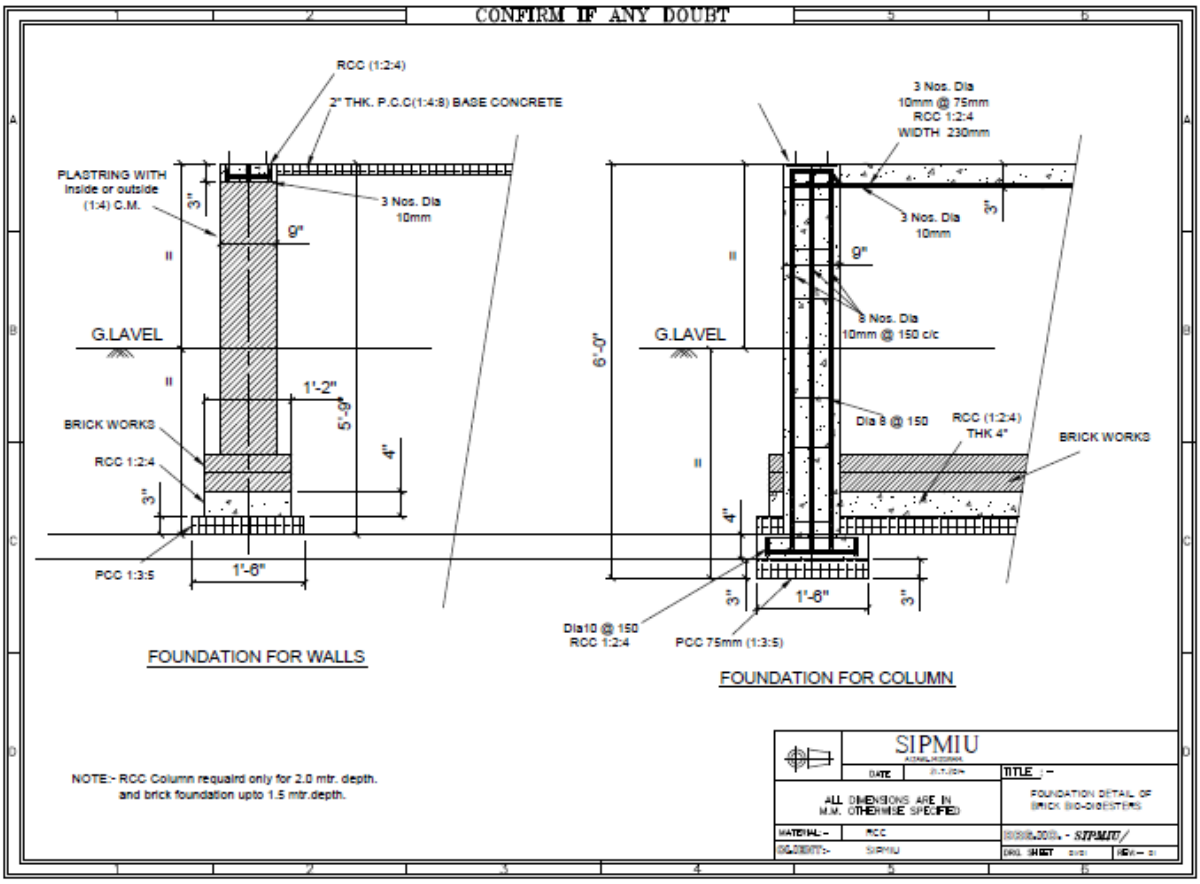


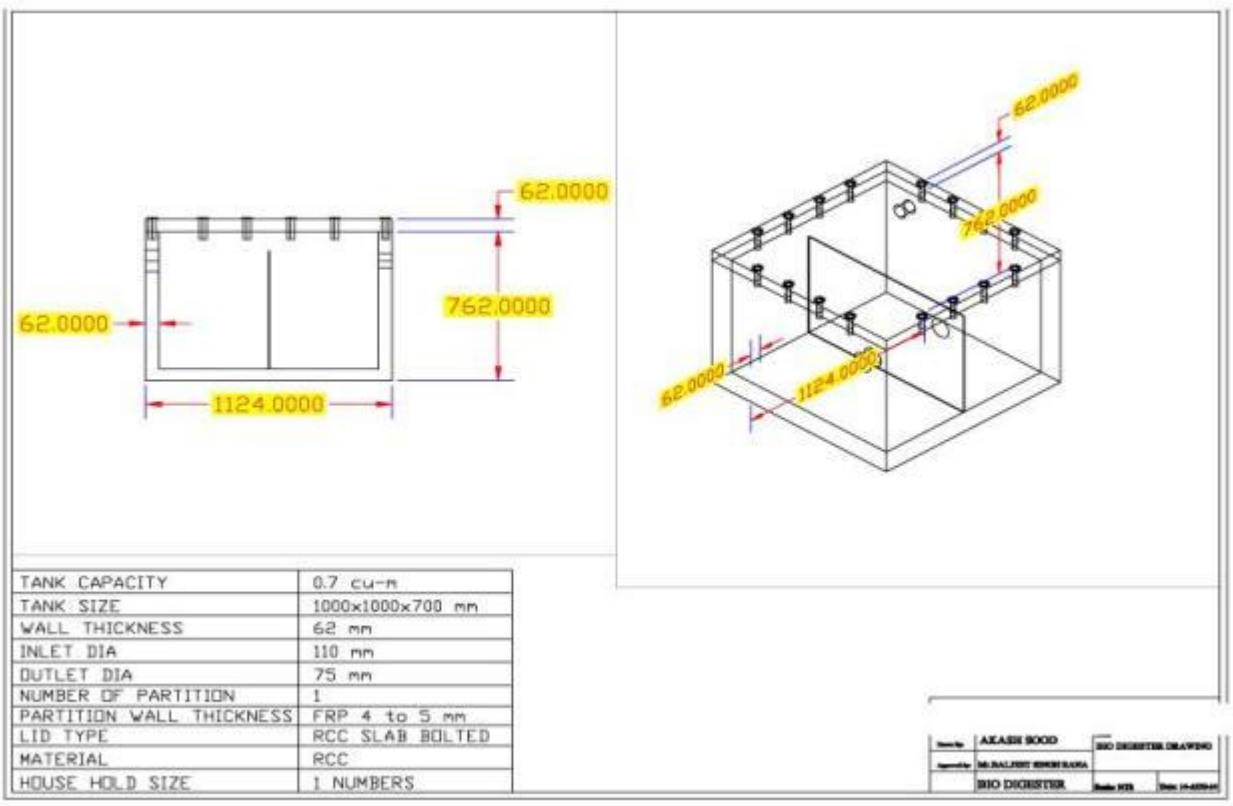


S.NO	DESCRIPTION	A IN MM	B IN MM	C IN MM	D IN MM	E IN MM	F IN MM	G IN MM	H IN SQM	I IN MM
01	10000 LTRS.	3500	2500	1500	750	1083	100	75	54	500
02	12000 LTRS.	4250	2750	1500	833	1333	100	75	55	500
03	14000 LTRS.	4250	2750	1500	833	1333	100	75	59	500
04	18000 LTRS.	4250	2750	2000	833	1333	150	100	78	600
05	24000 LTRS.	4250	3450	2000	1066	1333	150	100	87	600



S NO	DESCRIPTION	A IN MM	B IN MM	C IN MM	D IN MM	E IN MM	F IN MM	G IN MM	H IN SQM	I IN MM
01	10000 LTRS.	3500	2500	1500	750	1083	100	75	54	500
02	12000 LTRS.	4250	2750	1500	833	1333	100	75	55	500
03	15,000 LTRS.	4250	2750	1500	833	1333	100	75	59	500
04	18000 LTRS.	4250	2750	2000	833	1333	150	100	78	600
05	24000 LTRS.	4250	3450	2000	1066	1333	150	100	87	600

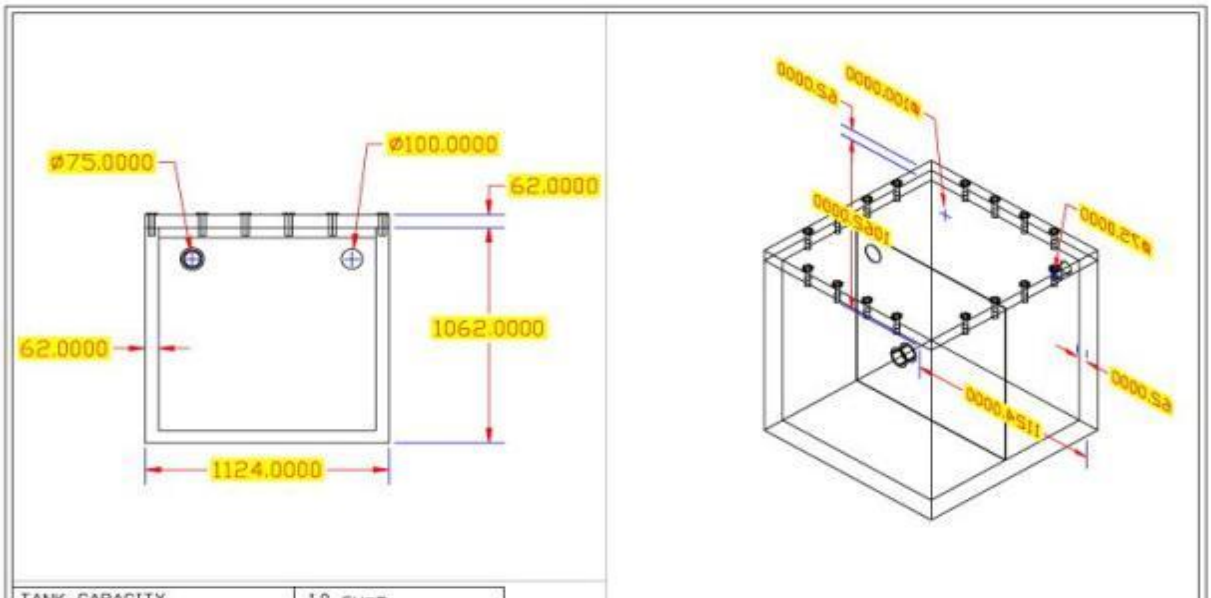

CONFIRM IF ANY DOUBT
RCC (1:2:4)
2" THK. P.C.C(1:4:8) BASE CONCRETE
PLASTRING WITH
inside or outside
(1:4) C.M.
3"
3 Nos. Dia
10mm
9"
G.LAVEL
1'-2"
5'-9"
BRICK WORKS
RCC 1:2:4
4"
3"
PCC 1:3:5
1'-6"
FOUNDATION FOR WALLS
3 Nos. Dia
10mm @ 75mm
RCC 1:2:4
WIDTH 230mm
3 Nos. Dia
10mm
9"
6'-0"
G.LAVEL
8 Nos. Dia
10mm @ 150 c/c
Dia 8 @ 150
RCC (1:2:4)
THK 4"
BRICK WORKS
4"
3"
1'-6"
3"
Dia10 @ 150
RCC 1:2:4
PCC 75mm (1:3:5)
FOUNDATION FOR COLUMN
NOTE:- RCC Column requaird only for 2.0 mtr. depth.
and brick foundation upto 1.5 mtr.depth.
SIPMIU
DATE
TITLE :-
FOUNDATION DETAIL OF
BRICK BIO-DIGESTERS
ALL DIMENSIONS ARE IN
M.M. OTHERWISE SPECIFIED
MATERIAL :-
RCC
DRG. SHEET
REV.-



TANK CAPACITY	0.7 cu-m
TANK SIZE	1000x1000x700 mm
WALL THICKNESS	62 mm
INLET DIA	110 mm
OUTLET DIA	75 mm
NUMBER OF PARTITION	1
PARTITION WALL THICKNESS	FRP 4 to 5 mm
LID TYPE	RCC SLAB BOLTED
MATERIAL	RCC
HOUSE HOLD SIZE	1 NUMBERS

AKASH SOOD

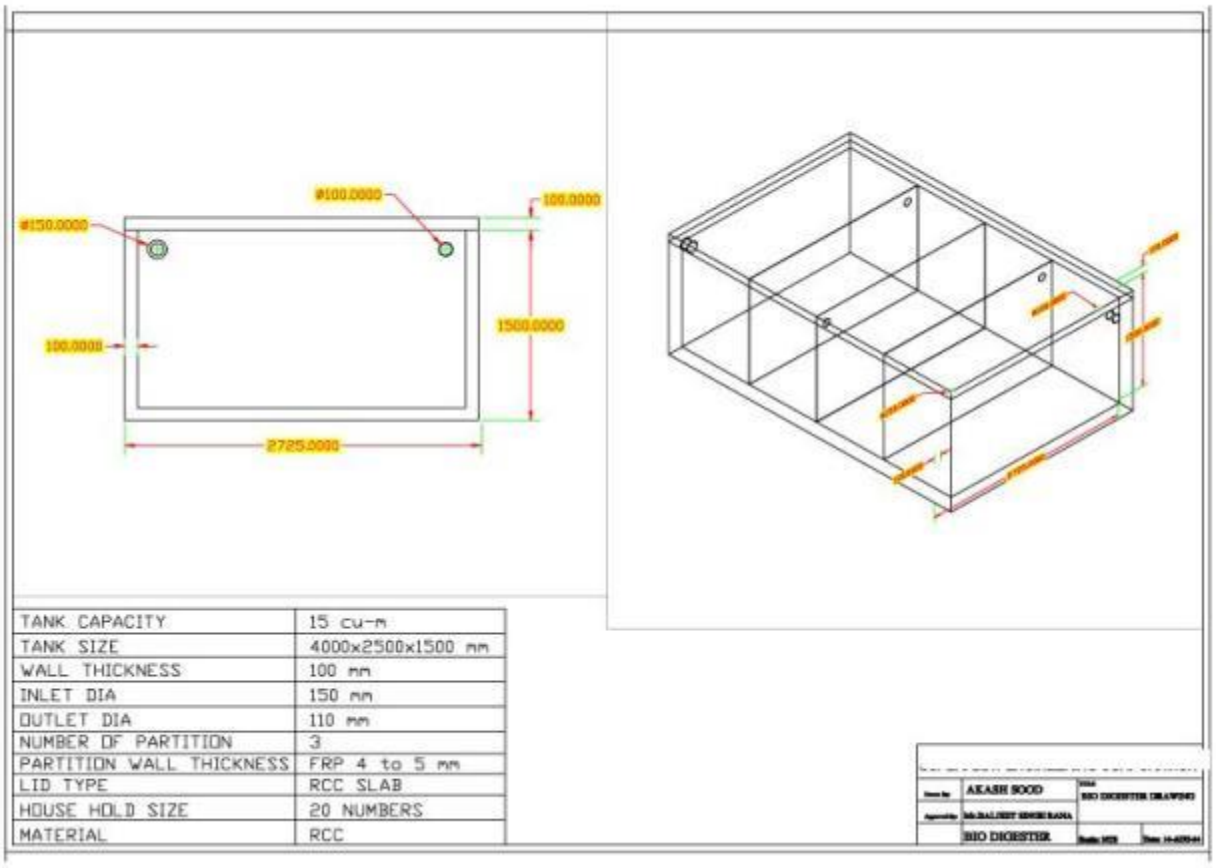
BIO DIGESTER



TANK CAPACITY	1.0 cu-m
TANK SIZE	1000x1000x1000 mm
WALL THICKNESS	62 mm
INLET DIA	110 mm
OUTLET DIA	75 mm
NUMBER OF PARTITION	1
PARTITION WALL THICKNESS	FRP 4 to 5 mm
LID TYPE	RCC SLAB BOLTED
MATERIAL	RCC
HOUSE HOLD SIZE	1 NUMBERS

AKASH SOOD

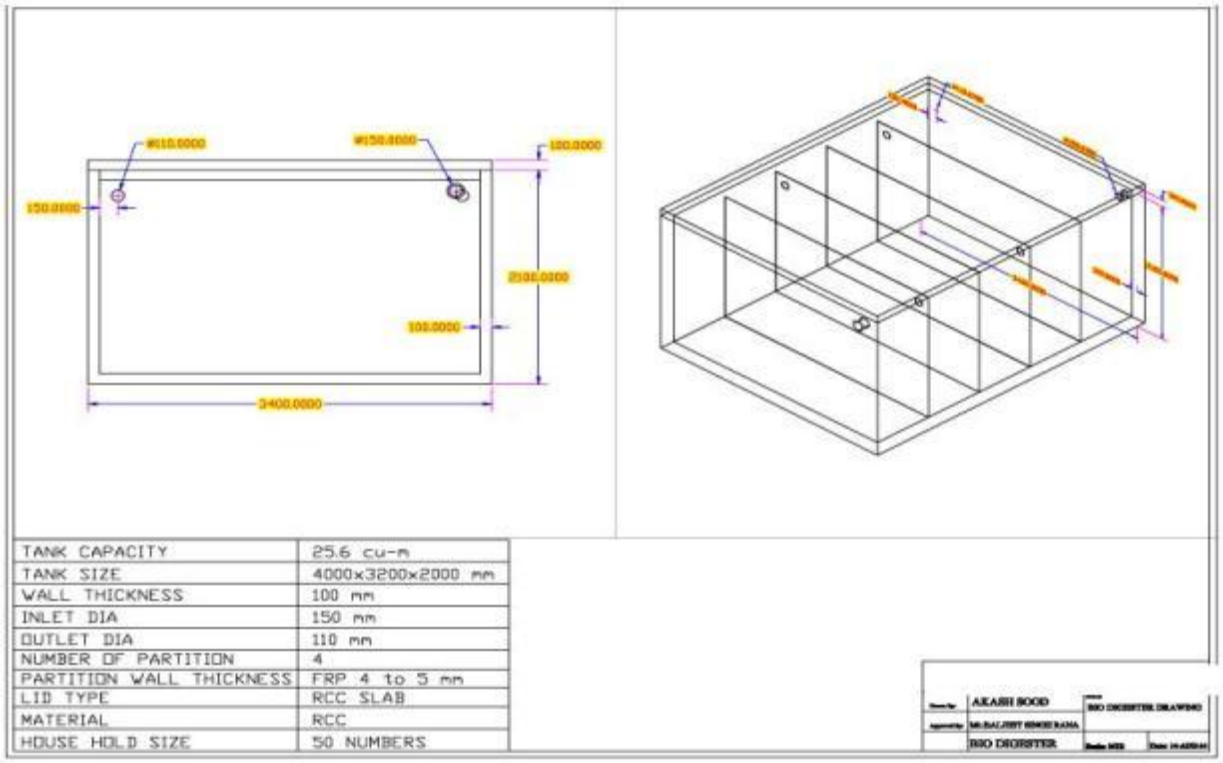
BIO DIGESTER



TANK CAPACITY	15 cu-m
TANK SIZE	4000x2500x1500 mm
WALL THICKNESS	100 mm
INLET DIA	150 mm
OUTLET DIA	110 mm
NUMBER OF PARTITION	3
PARTITION WALL THICKNESS	FRP 4 to 5 mm
LID TYPE	RCC SLAB
HOUSE HOLD SIZE	20 NUMBERS
MATERIAL	RCC

AKASH SOOD

BIO DIGESTER



TANK CAPACITY	25.6 cu-m
TANK SIZE	4000x3200x2000 mm
WALL THICKNESS	100 mm
INLET DIA	150 mm
OUTLET DIA	110 mm
NUMBER OF PARTITION	4
PARTITION WALL THICKNESS	FRP 4 to 5 mm
LID TYPE	RCC SLAB
MATERIAL	RCC
HOUSE HOLD SIZE	50 NUMBERS

AKASH SOOD

BIO DIGESTER

APPENDIX 2: RAPID EIA SCREENING QUESTIONS

Screening Questions	Yes	No	Remarks
A. Project Siting Is The Project Area…			
• Densely populated?		✓	Aizawl is not densely populated. There are no heavy development activities in the subproject area. The area is predominantly residential and commercial.
• Heavy with development activities?		✓	
Adjacent to or within any environmentally sensitive areas?			No protected areas/ecologically sensitive areas within 10 km radius of the subproject.
• Cultural heritage site		✓	
• Protected area		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay		✓	
B. Potential Environmental Impacts Will the project cause…			
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	Not applicable. There are no historical/cultural monuments/areas within or adjacent to subproject sites.
• Interference with other utilities and blocking of access to buildings?		✓	Not anticipated. Small-sized bio-digesters require minimal areas and will be constructed in vacant spaces within the household clusters. The STPs will also be small requiring minimal land area thus will not interfere with utilities and buildings.
• Nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?		✓	Not anticipated. Bio-digester and STP O&M manuals will include mitigation measures to control insects, vectors, etc. Households connected to bio-digesters will be provided with trainings on small-scale maintenance (do's and don'ts).
• Dislocation or involuntary resettlement of people?		✓	Not applicable.
• Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?		✓	Not applicable.
• Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		✓	Not anticipated.
• Overflows and flooding of neighboring properties with raw sewage?		✓	Not anticipated. The subproject will improve current situation of discharging raw sewage and sludge to open drains.
• Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		✓	Not anticipated. The bio-digester developed by DRDO is maintenance-free system. Design of the STPs ensures sludge and effluent will comply with Indian standards. Reuse of dewatered and dried sludge will follow internationally-accepted

Screening Questions	Yes	No	Remarks
			best practices. STP O&M manual will include environmental monitoring program.
• Noise and vibration due to blasting and other civil works?	✓		Anticipated during construction activities. However, impacts are temporary, short in duration and confined within the designated areas. The EMP ensures measures are included to mitigate the impacts.
• Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?		✓	Not anticipated. The EMP ensures occupational health and safety measures are included. Chemicals will not be used during construction and operation activities.
• Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		✓	Not applicable as per nature of work.
• Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		✓	Not applicable.
• Road blocking and temporary flooding due to land excavation during the rainy season?		✓	Not anticipated. Construction activities will be conducted during non-monsoon season.
• Noise and dust from construction activities?	✓		Anticipated during construction activities. The impacts are negative but short-term and site-specific within relatively small areas and reversible through mitigation measures. Good construction practices will mitigate noise and dust, and will be specified in the EMP.
• Traffic disturbances due to construction material transport and wastes?	✓		Anticipated during construction activities. The impacts are negative but short-term and site-specific within relatively small areas and reversible through mitigation measures. Traffic management will be specified in the EMP.
• Temporary silt runoff due to construction?		✓	Due to excavation and run-off from stockpiled materials. The impacts are negative but short-term and site-specific within relatively small areas and reversible through mitigation measures. Good construction practices will mitigate soil erosion and silt runoff and will be specified in the EMP.
• Hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		✓	Not anticipated.
• Deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		✓	Not anticipated.
• Contamination of surface and ground waters due to sludge disposal on land?		✓	Not anticipated. Reuse of dewatered and dried sludge will follow internationally-

Screening Questions	Yes	No	Remarks
			accepted best practices. STP O&M manual will include environmental monitoring program.
• Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?		✓	Not anticipated. Workers health and safety, specifically the use of personal protective equipment and trainings, will be included in the STP O&M manual.
• Large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		✓	Not anticipated. The contractor will be encouraged to hire local workers from the local labor force.
• Social conflicts between construction workers from other areas and community workers?		✓	Not anticipated. The contractor will be encouraged to hire local workers from the local labor force.
• Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Not applicable. Construction will not involve use of explosives and chemicals. Trenching will be done manually.
• Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	Operational area will be clearly demarcated and access will be controlled. Only workers and project-concerned members will be allowed to visit the sites.

Screening Questions		Score	Remarks[11]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	0	Bio-digester and STP locations are not in flood plains etc.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	Biodigesters and STPs are designed to handle peak flow demands.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	No significant effect
	Would weather, current and likely future climate	0	No significant effect

[11] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

	conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?		
Performance of project outputs	Would weather/climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	No significant effect

Options for answers and corresponding score are provided below:

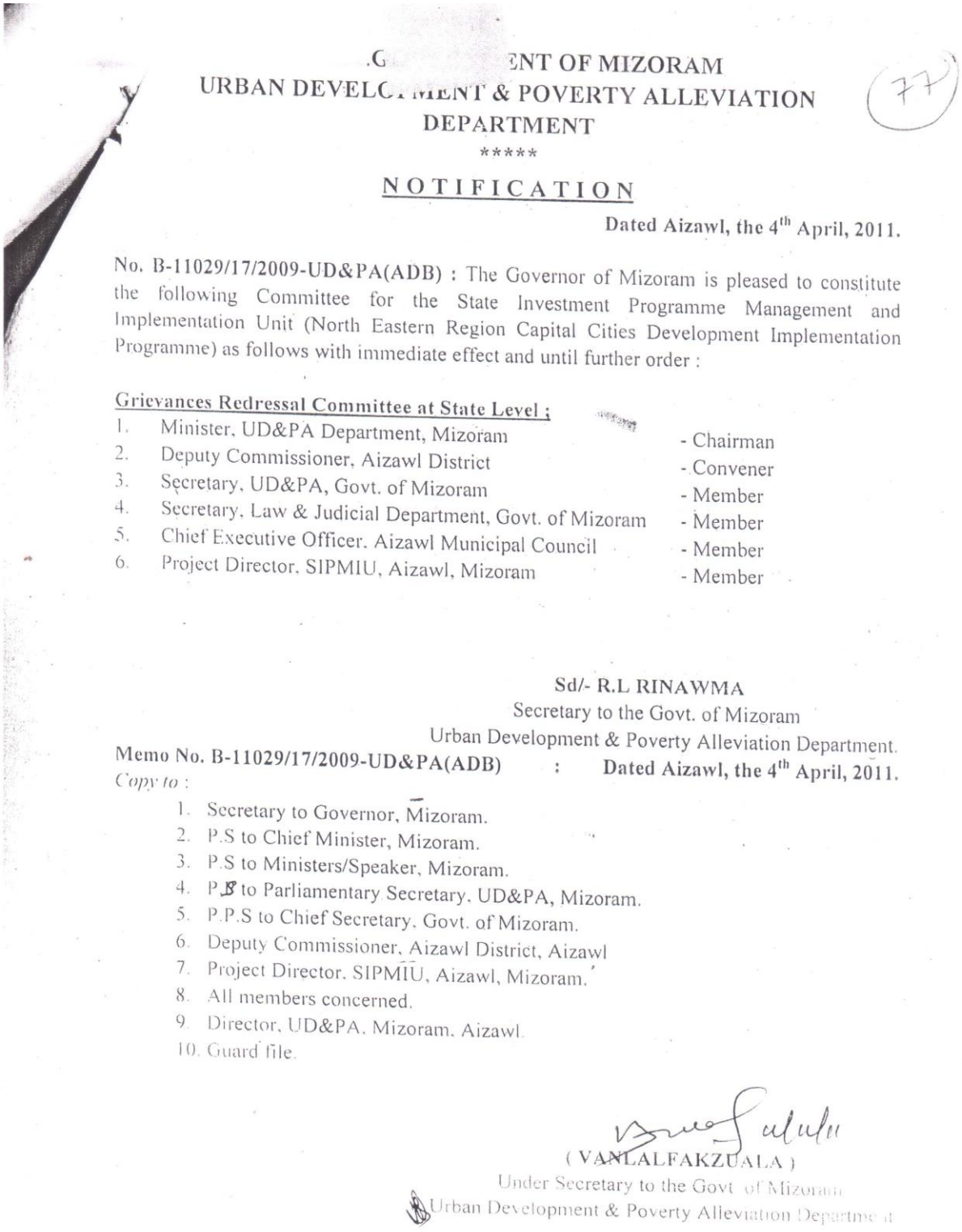
Response	**Score**
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): Low Risk

APPENDIX 3: GRIEVANCE REDRESSAL COMMITTEE (STATE LEVEL)

Grievance redressal committee (city level)



.G ENT OF MIZORAM
URBAN DEVELOPMENT & POVERTY ALLEVIATION
DEPARTMENT
*****

77

NOTIFICATION

Dated Aizawl, the 4th April, 2011.

No. B-11029/17/2009-UD&PA(ADB) : The Governor of Mizoram is pleased to constitute the following Committee for the State Investment Programme Management and Implementation Unit (North Eastern Region Capital Cities Development Implementation Programme) as follows with immediate effect and until further order :

Grievances Redressal Committee at State Level ;

1. Minister, UD&PA Department, Mizoram - Chairman
2. Deputy Commissioner, Aizawl District - Convener
3. Secretary, UD&PA, Govt. of Mizoram - Member
4. Secretary, Law & Judicial Department, Govt. of Mizoram - Member
5. Chief Executive Officer, Aizawl Municipal Council - Member
6. Project Director, SIPMIU, Aizawl, Mizoram - Member

Sd/- R.L RINAWMA
Secretary to the Govt. of Mizoram
Urban Development & Poverty Alleviation Department.

Memo No. B-11029/17/2009-UD&PA(ADB) : Dated Aizawl, the 4th April, 2011.

Copy to :

1. Secretary to Governor, Mizoram.
2. P.S to Chief Minister, Mizoram.
3. P.S to Ministers/Speaker, Mizoram.
4. P.S to Parliamentary Secretary, UD&PA, Mizoram.
5. P.P.S to Chief Secretary, Govt. of Mizoram.
6. Deputy Commissioner, Aizawl District, Aizawl
7. Project Director, SIPMIU, Aizawl, Mizoram.
8. All members concerned.
9. Director, UD&PA, Mizoram, Aizawl.
10. Guard file.

(VANLALFAKZUALA)
Under Secretary to the Govt. of Mizoram
Urban Development & Poverty Alleviation Department

GOVERNMENT OF MIZORAM
URBAN DEVELOPMENT & POVERTY ALLEVIATION DEPARTMENT

*****

NOTIFICATION

Dated Aizawl, the 4th April, 2011.

No. B-11029/17/2009-UD&PA(ADB) : The Governor of Mizoram is pleased to constitute Grievances Redressal Committee at City Level (Aizawl) for the State Investment Programme Management and Implementation Unit (North Eastern Region Capital Cities Development Implementation Programme) as follows with immediate effect and until further order :-

Grievances Redressal Committee at City Level (Aizawl) :

1.	Deputy Commissioner, Aizawl District	- Chairman
2.	Chief Executive Officer, Aizawl Municipal Council	- Member
3.	Councillor/Chairman of Ward Committee of the concerned Ward (where the Grievances occurred)	- Member
4.	Chairman, concerned Local Council (where the Grievance has occurred)	- Member
5.	Chief Engineer, PHE Department	- Member
6.	Chief Engineer, PWD	- Member
7.	Director, UD&PA	- Member
8.	President, Central YMA	- Member
9.	President, MUP	- Member
10.	President, MHIP	- Member
11.	President, Mizoram Consumers Union	- Member
12.	Project Director, SIPMIU, Mizoram, Aizawl	- Convener

Sd/- R.L RINAWMA
Secretary to the Govt. of Mizoram
Urban Development & Poverty Alleviation Department.

Memo No. B-11029/17/2009-UD&PA(ADB) : Dated Aizawl, the 4th April, 2011.

Copy to :

1. Secretary to Governor, Mizoram.
2. P.S to Chief Minister, Mizoram.
3. P.S to Ministers/Speaker, Mizoram.
4. P.S to Parliamentary Secretary, UD&PA, Mizoram.
5. P.P.S to Chief Secretary, Govt. of Mizoram.
6. Deputy Commissioner, Aizawl District, Aizawl for information.
7. Project Director, SIPMIU, Aizawl, Mizoram.
8. All members concerned.
9. Director, UD&PA, Mizoram, Aizawl.
10. Guard file.

Sample Grievance Registration Form
(To be available in Hindi, English or local language, if any)

The **NERCCDIP** welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		**Place of registration**			
Contact Information/Personal Details					
Name		**Gender**	**Male Female**	**Age**	
Home Address					
Village / Town					
District					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below: **If included as attachment/note/letter, please tick here:**					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
If – then mode: ■ **Note/Letter** ■ **E-mail** ■ **Verbal/Telephonic**	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	■ **Yes** ■ **No**
Means of Disclosure:	

GRIEVANCES RECORD AND ACTION TAKEN

Sr. No.	Date	Name and Contact No. of Complainer	Type of Complain	Place	Status of Redress	Remarks

LOCAL LANGUAGE

এন, ই, আর, সি, সি, ডি, আই, পি প্রকল্প বাস্তবায়ন সংক্রান্ত অভিযোগ, পরামর্শ, প্রশ্ন এবং মন্তব্য স্বাগত জানায়. আমরা শোধন এবং প্রতিক্রিয়ার জন্য আপনার সাথে যোগাযোগ পেতে সক্ষম তাদের নাম এবং যোগাযোগের তথ্য প্রদান অভিযোগ ব্যক্তিদের উত্সাহিত করি.

আপনি আপনার ব্যক্তিগত বিবরণ অন্তর্ভুক্ত করতে কিন্তু যে তথ্য গোপন থাকা চাই উচিত, আপনার নামের উপরে / টাইপ * (গোপনীয়) * লিখে আমাদের অবহিত করুন.

আপনাকে ধন্যবাদ.

তারিখ		নিবন্ধন স্থান			
যোগাযোগ তথ্য / ব্যক্তিগত তথ্য					
নাম		লিঙ্গ	পুরুষ / মহিলা	বয়স	
বাড়ির ঠিকানা					
গ্রাম / শহর					
জেলা					
ফোন নম্বর					
ইমেল					
অভিযোগ / পরামর্শ / মন্তব্য / প্রশ্ন (কে, কি, কোথায় এবং কিভাবে) নীচের আপনার অভিযোগের বিবরণ প্রদান করুন: সংযুক্তি / নোট / চিঠি হিসাবে অন্তর্ভুক্ত করা হয়, এখানে টিক্ করুন:					
কিভাবে আপনি আপনার মন্তব্য / অভিযোগ প্রতিক্রিয়া বা আপডেটের জন্য আপনি পৌঁছাতে চান?					

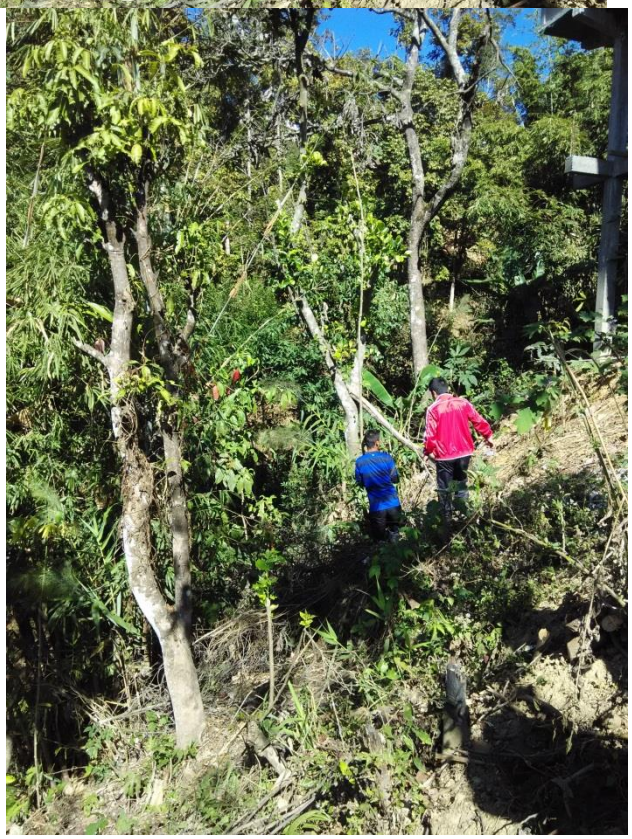
শুধুমাত্র সরকারী ব্যবহারের জন্য

(অফিসিয়াল নিবন্ধনের অভিযোগ নাম): দ্বারা নিবন্ধিত	
- তারপর মোড: ▪ উল্লেখ্য / পত্র ▪ ইমেল ▪ মৌখিক / টেলিফোনে	
পর্যালোচনা: (নাম / অফিসিয়াল (গুলি) পর্যালোচনা অভিযোগ পজিশন)	
গৃহীত পদক্ষেপ:	
যতই কর্ম প্রকাশ নেওয়া:	▪ হাঁ ▪ না
প্রকাশ মাধ্যম:	

অভিযোগ তালিকা ও গৃহীত পদক্ষেপ

ক্রমিক সংখ্যা	তারিখ	অভিযোগকারীর নাম এবং যোগাযোগের বিশদ	অভিযোগের প্রকার	স্থান	প্রতিকারের অবস্থান	মন্তব্য

APPENDIX 4: SOME PHOTOGRAPH (AWARENESS PROGRAMME)



APPENDIX 5: NO OBJECTION CERTIFICATE FROM 26 LOCAL COUNCIL CHAIRMAN

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

24/9/14

(C. LALZAMLOVA)

Chairman

Local Council _____

Chairman
Zotlang Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

24/9/2014

(ZOHMINGTHANGI)
Chairman
Sakaortuichhun Local Council
Aizawl

Chairman

Local Council _____

Mizo Version

No Objection Certificate

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version

No Objection Certificate

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

24/9/14

(LALSIAKZULIANA .)

Chairman

Local Council

Chairman
Luangmual Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

24/9/14

(H. LALCHHANGKIMA)

Chairman

Local Council Maubawk

Chairman
Local Council Maubawk
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

23/9/2014.

(LALRINSANGA)

Chairman

Local Council _____

Chairman
Lawipu Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

Rinnga
(R. CALVENRINGA)

Chairman

Local Council Zuangtui

Chairman
Zuangtui Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

22/9/14

(LALROTHUAMA)

Chairman
Durtlang Local Council
Aizawl

Chairman

Local Council DURTLANG

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(SAITHANKHUMA)

Chairman

Chairman
Durtlang 'N' Local Council
Aizawl

Local Council

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(KAPMAWIA)

Chairman
Durtlang Leitan Local Council
Aizawl

Chairman
Local Council

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(LALROPIANGA)

Chairman
Local Council

Chairman
Thuampui Local Council
Aizawl

Mizo Version

No Objection Certificate

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version

No Objection Certificate

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

23/9/2014

(DAVID-A)

Chairman

Local Council Zemabawk

Chairman
Zemabawk Local C.
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(LALTHANPUIA KHAWLHRING)

Chairman

Local Council

Chairman
Zemabawk North Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(HRANGZUALA)

Chairman

Local Council Muanna Veng

Chairman
Muanna Veng Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

Zthangs 23/9/14

(ZORAMTHANGA)

Chairman

Local Council _____

Chairman
Saikhamakawn Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(CLALRINTHUANGA)

Chairman

Local Council _____

Chairman
Melthum Local Council
Aizawl : Mizoram

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

23/9/14

(LALHMINGLIANA)

Chairman

Local Council HLIMEN

Chairman
Hlimen Local Council.
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

23/9/2014

(H. MALSAWMTLUANGA)

Chairman
Falkland Local Council
Aizawl

Chairman

Local Council _____

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(LIANHMINGTHANGA)

Chairman

Local Council

Chairman
Tlangnuam Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

22/9/14

(C. MALSAWMTLUANGA)

Chairman

Local Council Tanhril

Chairman
Tanhril Local Council
Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

22/9/14
ZORAILOVA
(Chairman)
Chairman
Govt. Complex Local Council
Aizawl.

Local Council _____

Mizo Version

No Objection Certificate

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version

No Objection Certificate

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

22/9/14

(K.ZAHLUNA)
Chairman
Chawlhmun Local Council
Aizawl

(_____)

Chairman

Local Council _____

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

20/9/14.

(R. LALBIAKTHANGA)

Chairman
Chawnpui Local Council
Aizawl

Chairman
Local Council _____

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

20/9/14

((R. LALRINPUIA))

Chairman

Local Council Chairman Local Council Edenthar Aizawl

Mizo Version **No Objection Certificate**

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version **No Objection Certificate**

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(CHARCHHINMAWIA)

Chairman

Local Council Hunthar Local Council Aizawl

Mizo Version

No Objection Certificate

Kan Local Council huam chhunga, SIPMIU in an Project pakhat Septage Management atana Bio-digester bunna tur ram an en ah hian remtih lohna ka nei lo e.

English Version

No Objection Certificate

I do hereby solemnly declare that I have no objection to install Bio-Digester at the site selected within our jurisdiction of land under Septage Management Project undertaken by SIPMIU.

(LALRUATKIMA)
Chairman
Zonuam Local Council
Aizawl

(_____)
Chairman

Local Council _____.