

Initial Environmental Examination

December, 2011

India: North Eastern Region Capital Cities
Development Investment Program – Shillong Solid
Waste Management Subproject

Prepared by the State Investment Program Management and Implementation Unit (SIPMIU),
Urban Affairs Department for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 29 June 2011)

Currency unit	—	rupee (INR)
INR1.00	=	\$0.0222
\$1.00	=	INR 45.040

ABBREVIATIONS

ADB	—	Asian Development Bank
CBO	—	Community Building Organization
CLC	—	City Level Committees
CPHEEO	—	Central Public Health and Environmental Engineering Organization
CTE	—	Consent to Establish
CTO	—	Consent to Operate
DSMC	—	Design Supervision Management Consultant
EAC	—	Expert Appraisal Committee
EIA	—	Environmental Impact Assessment
EMP	—	Environmental Management Plan
GSPA	—	Greater Shillong 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	—	Multitranchise 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
PSP	—	Private Sector Participation
SEA	—	State-level Executing Agency
SEIAA	—	State Environment Impact Assessment Authority
SIPMIU	—	State-level Investment Program Management and Implementation Units
SMB	—	Shillong Municipal Board
SPS	—	Safeguard Policy Statement
TOR	—	Terms of Reference
UD&PAD	—	Urban Development & Poverty Alleviation Department
UAD	—	Urban Affairs Department
UDD	—	Urban Development Department
ULB	—	Urban Local Body

WEIGHTS AND MEASURES

dbA		decibels
ha		hectare
km	–	kilometer
km ²		square kilometer
l		liter
m	–	meter
m ²		square meter
M ³		cubic meter
MT		metric tons
MTD		metric tons per day

NOTES

- (i) In this report, "\$" refers to US dollars.
- (ii) "INR" and "Rs" refer to Indian rupees.

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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, Gangtok, Kohima, and Shillong through investments in urban infrastructure sectors. NERCCDIP will be implemented over a six-year period beginning in 2010, and will be funded by a loan via the Multitranche Financing Facility (MFF) of the Asian Development Bank (ADB).
2. The Ministry of Urban Development (MOUD) is the national Executing Agency. A State-level Investment Program Management and Implementation Units (SIPMIU) in each state are responsible for overall technical supervision and execution of all subprojects funded under the Investment Program. The SIPMIU is being assisted by design, management and supervision consultants (DMSC) who are designing the infrastructure, managing the tendering of contracts, and will supervise construction.
3. 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 Safeguards Policy Statement (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.
4. This Initial Environmental Examination (IEE) has been prepared for the Shillong Solid Waste Management Subproject specifically for the (i) construction of garage cum workshop shed & staff rest room at old land fill site, Marten; (ii) procurement of different type of bins and personal protective equipments; and (iii) procurement of primary and secondary collection vehicles and workshop machineries
5. The procurement of the goods will start in April 2012 and will be finished by March 2013. Civil works for the construction of associated facilities of the landfill site will start in December 2011 and be completed by November 2013.
6. The subproject site is located on a vacant land of existing landfill at Marten, about 8 km outside Shillong city.. There are no human habitation, protected areas, wetlands, mangroves, or estuaries. Trees, vegetation (mostly shrubs and grasses), and few domestic animals in the subproject site are those commonly found in built-up areas.
7. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure. No impacts were identified as being due to the subproject design or location. An Environmental Management Plan (EMP) is proposed as 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; (iii) public consultation and information disclosure; and (iv) grievance redress mechanism. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. A number of impacts and their significance have already been reduced by amending the designs.
8. During the construction phase, impacts mainly arise from the need to excavate areas which can result to increase in dust and noise levels. This is common impact of construction and there are well developed methods for their mitigation.

9. It is proposed that the subproject retain a buffer zone composed of at least 20 meters of greenbelt to be planted with tall trees and endemic species. The subproject will also try to employ in the workforce, people who live in the vicinity of construction sites to provide them with short-term economic gain; and ensure that people are employed in the longer term to maintain and operate the new facilities are residents of nearby communities.

10. Mitigation will be assured by a program of environmental monitoring to be conducted during construction stages. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on-site and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for remedial action will be reported to the SIPMIU.

11. The stakeholders were involved in developing the IEE through face-to-face discussions on site and public meetings held in the city, after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB website. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

12. Therefore 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. Based on the findings of the IEE, the classification of the Project as Category "B" is confirmed, and no further special study needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006).

I. INTRODUCTION

A. Purpose of the Report

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. Urban infrastructure and services improvement is proposed in the following sectors: (i) water supply; (ii) sewerage and sanitation; and (iii) solid waste management. The expected impact of NERCCDIP is increased economic growth potential, reduced poverty, and reduced imbalances between the North-Eastern Region (NER) and the rest of the country. The expected outcomes of the Investment Program will be an improved urban environment and better living conditions for the 1.65 million people expected to be living in the NERCCDIP cities by 2018. To this end, NERCCDIP will (i) improve and expand urban infrastructure and services in the cities, including slums; and (iii) strengthen urban institutional management and the financing capacity of the institutions, including the urban local bodies (ULBs). Based on considerations of economic justification, absorptive capacity and sustainability of the implementing agencies, subprojects have been identified in each city in the priority infrastructure sectors.

2. Though NERCCDIP aims to improve the environmental condition of urban areas, the proposed improvements of infrastructure facilities may exert certain adverse impacts on the natural environment. While developing urban infrastructure facilities, impacts during the construction stage are expected to be more severe than impacts during the operation phase, though for a short duration. Exceptions being some facilities such as solid waste landfills and sewage treatment plants, which may also exert adverse impacts during the operation phase, if due care is not taken.

3. NERCCDIP will be implemented over a six year period beginning in 2010, and will be funded by a loan via the Multitranche Financing Facility (MFF) of the Asian Development Bank (ADB). The Ministry of Urban Development (MOUD) is the national Executing Agency. State-level Investment Program Management and Implementation Units (SIPMIU) in each state are responsible for overall technical supervision and execution of all subprojects funded under the Investment Program. The SIPMIU is being assisted by design, management and supervision consultants (DMSC) who are designing the infrastructure, managing the tendering of contracts, and will supervise construction.

4. 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 Safeguards Policy Statement (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. ADB has provided on its part, a Project Preparatory Technical Assistance (TA 4348-IND) for the preparation of an urban sector profile of the North-Eastern states, followed by a Technical Assistance (TA 4779-IND) for Project Implementation and Urban Management in the North-Eastern Region (Phase I) to initiate the works under Tranche 1.

5. This Initial Environmental Examination (IEE) has been prepared for the Shillong Solid Waste Management Subproject as part of NERCCDIP -Tranche 2. The subproject covers (i) Construction of Garage cum workshop shed & staff rest room at old landfill site, Marten; (ii) Procurement of primary and secondary collection vehicles and workshop machineries; and (iii) Procurement of different type of bins, personal protective equipments.

6. This IEE report covers the general environmental profile of Shillong and includes an overview of the potential environmental impacts and their magnitude on physical, ecological, economic, and social and cultural resources within the subproject's influence area during design, construction, and operation stages. An Environmental Management Plan (EMP) is also proposed as part of this report which includes mitigation measures for significant environmental impacts during implementation of the Project, environmental monitoring program, and the responsible entities for mitigation and monitoring.

B. Extent of the IEE Study

7. This IEE report was prepared on the basis of detailed screening and analysis of all environmental parameters, field investigations and stakeholder consultations to meet the requirements for environmental assessment process and documentation per ADB's Safeguard Policy Statement (SPS, 2009) and the Government of India's Environmental Impact Assessment (EIA) Notification of 2006.

1. ADB Policy

8. ADB requires the consideration of environmental issues in all aspects of ADB'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.

9. **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 are screened for their expected environmental impact 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.

10. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. 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.

11. **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.

2. National Law

a. EIA Notification (2006)

12. The Government of India's 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.

13. Category A projects require 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 comprehensive Terms of Reference (TOR) for the EIA study, which are finalized within 60 days. On 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.

14. 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 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. The Notification 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.

15. The only type of infrastructure provided by the NERCCDIP that is specified in the EIA Notification is solid waste management. For the proposed work in Tranche II, An environmental clearance is not required for Construction of Garage cum workshop shed & staff rest room at old landfill site, Marten, Mawiong.¹

16. The Environmental Clearance has been received from SEIAA on 14th August 2009 for proposed landfill site at Marten, Mawiong dumpsite developed under Tranche 1.

b. Water (Prevention and Control of Pollution) Act (1974)

¹ Per EIA Notification (2006) and also Annex 1 of the Project's Environmental Assessment and Review Framework, EC is required for preparation of land by the project management except for securing the land.

17. Any component of urban infrastructure project 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 for Establishment (CFE) under Section 25 of the Act from Meghalaya State Pollution Control Board before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.

18. CFE is not required for the components proposed in Tranche II of this subproject. The CFE for the proposed landfill at Marten, Mawiong dumpsite to be developed under Tranche I has been received from MSPCB on 26th November 2009 with validity till October 2010 which is further extended by MSPCB.

c. Air (Prevention and Control of Pollution) Act (1981)

19. The subprojects having potential to emit air pollutants into the atmosphere have to obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 from Meghalaya 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.

20. CFE is not required for the components proposed in Tranche II of this subproject.

d. Municipal Solid Waste (Management and Handling) Rules (2000)

21. The Government of India notified Municipal Solid Waste (Management and Handling) Rules (2000) in exercise of the powers conferred by Sections 3, 6 and 25 of the Environment (Protection) Act (1986) with the objective of regulating the management and handling of the municipal solid waste. Under the Rules, the municipal authority is required to take all steps to ensure that the municipal solid wastes generated in their jurisdiction are handled and disposed of without causing any adverse impact on human health or environment. This subproject is required to obtain authorization for setting up waste processing and disposal facility (including landfills) from Meghalaya State Pollution Control Board.

e. Forest Legislation

22. Forest legislation in India dates back to 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-produce 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. Act also allows Government control over forest and lands not being the property of Government.

23. 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.

24. The Government of India's 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 the Government of India 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.

25. 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.

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

27. There will be no tree-cutting for the components proposed in Tranche II of this subproject thus clearance is not required from Forest Department. For the proposed landfill site at Marten, Mawiong dumpsite to be developed under Tranche I, Approval for use of forest land for developing sanitary waste treatment system at the site has been issued by the Ministry of Environment & Forest Department (Refer Appendix 2).

II. DESCRIPTION OF THE PROJECT

A. Type, Category and Need

28. **Type.** This is a solid waste management subproject intended to improve the current situation in Shillong in terms of providing a disposal area, improving the collection system, and raising the awareness of the community of their responsibility to place their waste at collection points, and to segregate waste that is suitable for recycling.

29. **Category.** Environmental examination indicates the proposed subproject falls within ADB's environmental Category B projects. The Project 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.

30. **Need.** The subproject is needed because the present solid waste infrastructure in Shillong is inadequate for the needs of the growing population. There are too few collection points and people deposit their solid waste on open grounds where it creates unhealthy environment and produces health hazard. Although the municipality collects the waste from these areas periodically, the service is irregular.

31. The primary objective of the subproject is to upgrade the existing SWM services to make them scientific and more efficient and to adopt sanitary landfilling for ultimate disposal as per Municipal Solid Waste (Management and Handling) Rule (MSW Rules) (2000) in the interests of health and economic well being of the people of Shillong. The other objective is to provide the long term (till 2041) solution of the problem of solid waste management by way of modernization of the system through modern household and community bins for separate collection of biodegradable and non- biodegradable wastes, and recyclables, closed body transportation of

garbage, dressing sanitary landfill site with bull dozers and compacting with land compactor, supplying Personnel Protective Equipment (PPE) to the laborers and rag pickers to protect their health. Besides, generation of revenue by better collection of user charges through effective creation of community awareness and selling of compost and recyclables.

B. Location and Implementation Schedule

32. The subproject is located in the Greater Shillong Planning Area (GSPA)². The subproject is to be implemented initially within area under Shillong Municipal Board (SMB) which is 10.25 square km. The subproject site is located on a vacant land of existing landfill site at Marten, Mawiong about 8 km outside Shillong city. Under future Tranche III, new sanitary landfill site is proposed in a government-owned land near Umsawli village, 12 km from Shillong city.

33. The procurement of the goods will start in April 2012 and will be finished by March 2013. Civil works for the construction of associated facilities of the landfill site will start in December 2011 and be completed by November 2013.

C. Description of the Subproject

1. Existing Solid Waste Management

34. **Management.** Solid Waste Management is managed by three different authorities for each town and village viz. (i) the Shillong Municipal Board (SMB) within the municipal area (ii) the Dorbars, outside the municipal area, and (iii) The Shillong Cantonment Board, within the cantonment area. The Meghalaya Government oversees all solid waste management in GSPA.

- (i) Shillong Municipal Board – The SMB is responsible for collection transportation and disposal of solid waste generated in Shillong city. The area covered by SMB is 10.25 square kilometers (km²). The Chief Executive Officer looks after the administration of SMB.
- (ii) The Dorbars – The 5 census towns of Shillong Urban Agglomeration (SUA) include Mawlai, Nongthymmai, Madanryting, Pynthorumkhras and Nongmynsong. Each town is divided into a number of Dorbar Shnongs and each Dorbar Shnong has a Headman. The Dorbar Shnong looks after the collection and transportation of solid waste generated in their respective localities.
- (iii) Shillong Cantonment Board (SCB) - This is a military area covering 1.84 km². The solid waste generated in the Cantonment area is collected and transported, separately by cantonment vehicles. The Cantonment Executive Officer (CEO) looks after the administration of Shillong Cantonment Board (SCB).

35. **Waste Generation.** The solid waste generated in GSPA is 159 metric ton per day (MTD) with waste generation rate at 400 gram per capita per day. The major solid waste generation sources are households (56 %), markets (23 %), hotels & restaurants (7 %), construction waste (2 %), and street sweeping (7 %).

² The GSPA is spread over an area of 173.87 km². It comprises three distinct areas, namely the Shillong Municipal Board (SMB) area, 6 other urban centers (Shillong Cantonment, Mawlai, Nongthymmai, Pynthorumkhras, Madanryting, and Nongmynsong towns) and rural areas with 32 settlements. GSPA, with its total population of 312,539 (2001 Census) accounts for 78% of the total urban population of Meghalaya.

36. **Segregation.** Waste segregation is not practiced in Shillong. The absence of segregation poses problems to the operation of the existing compost plant in Mawiong dumpsite.

37. However, as far as bio-medical waste is concerned, the system adopted by SMB is found to be satisfactory. The bio-medical waste is collected by a van designed for this purpose and the waste is disposed off at incinerator, installed at Mawiong dumpsite.

38. **Collection and Transportation System.** The Health and Conservancy Department (HCD) of SMB looks after the work of collection and transportation of solid waste generated within the SMB. Currently, SMB has 410 permanent workers and has appointed 50 people on Muster Roll basis for solid waste management.

39. House-to-house collection is at present in existence in a few Dorbars only. There are about 18 vehicles which would stop on particular location on the side of the road at a particular time and the households and shops handover the waste to these vehicles. Some of the vehicles are more than 10 years old and need urgent replacement. The SMB vehicles can only collect 57 MTD out of the generated 159 MTD. To facilitate collection, SMB has placed 60 masonry/reinforced cement concrete (RCC) dustbins of various capacities ranging from 1.8 to 4.5 cubic meters (m³) for areas not included in the house-to-house collection scheme. However, due to less coverage and delay of collecting vehicles, many households keep their waste on the streets, and dogs scatter these waste on the roads and create unhygienic, unhealthy conditions.

40. **Disposal.** The collected wastes are disposed at a disposal site located in Mawiong, located about 8 km from the city. The site has been operational since 1938. To improve the practice of dumping at the existing site and to comply with the requirements of MSW Rules, the component funded under NERCCDIP Tranche I is construction of an engineered landfill and associated infrastructures (leachate collection facilities, environmental protection measures etc.) in a portion of the site. The bid evaluation report for all the works under Tranche I has been approved by ADB on 12th March 2010 and the approval for issuance of acceptance letter for successful bidders has been issued on 1st April 2010. The work is expected to start by Jan.2012.

41. A compost plant with a capacity of 100 MTD was constructed in the Marten, Mawiong dumpsite in 2002. It is currently proposed for rehabilitation and expansion to 150 MTD capacity by the private operator who has been operating this plant on private-public partnership basis. An average residual waste for disposal is estimated to be 50 to 60 MTD.

2. Subproject Component

42. The subproject covers (i) Construction of Garage cum Workshop shed & staff rest room at old landfill site, Marten Mawiong; (ii) Procurement of primary and secondary collection vehicles and workshop machineries; and (iii) Procurement of different type of bins, personal protective equipments.

43. Details of the proposed subproject components are provided in **Table 1**. The descriptions shown in the table are based on the present proposals, which are expected to be substantially correct, although certain details may change as development of the subproject progresses.

Table 1: Shillong Solid Waste Management Subproject Components

Component	Location	Function	Description	Remarks
(i) Improvement in Primary Collection				
▪ Procurement of HDPE house hold bins	At each household	For collection of segregated waste from house hold	• 25 litres capacity	• 60,000 numbers • no physical interaction with the environment
▪ Procurement of HDPE Litter bins	Public places (garden, street corner etc)	For primary collection of waste	• 25/50 litres capacity	• 100 numbers • no physical interaction with the environment
▪ Procurement of Mobile Garbage Bin	Commercial area	For primary collection of waste	• 360 liters capacity	• 50 numbers • no physical interaction with the environment
▪ Procurement of Satellite Vehicles	Within city area	Garbage Tippers for primary collection of waste from house hold	• 1.5 cum. capacity	• 12 numbers • no physical interaction with the environment
▪ Procurement of personal protective equipments	To be distributed to workers engaged in solid waste management	personal protective equipments	• Hand Gloves – 460 nos., Gumboots – 460 nos., Cotton Masks – 4860 nos., Rain Coats – 460 nos.	• no physical interaction with the environment
(ii) Improvement in Secondary Collection				
▪ Procurement of Refuse Compactor Vehicles	For transferring compacted waste from transfer station to land fill site	For secondary collection of waste	• 7.0 m ³ capacity	• 2 numbers • no physical interaction with the environment
▪ Procurement of Heavy Duty trucks with folding cover	For transferring waste from transfer station to land fill site	For secondary collection of waste	• 4.5 m ³ capacity	• 2 numbers • no physical interaction with the environment
▪ Procurement of workshop equipment	Landfill site	For operation and maintenance of vehicles	• Air Compressor, Car Washing Machine, Welding Machine, Grinding Machine, Hand Drill Machine, Chain Pulley Block	• no physical interaction with the environment
(iii) Construction of associated infrastructure at old landfill site, Mawiong				
▪ Construction of garage cum workshop shed and staff rest rooms	Existing dumpsite	Maintenance of equipment	Garage and repair shop at existing dumpsite, rest rooms for staff	• No land acquisition required

Note: m³ = cubic meters; m² = square meters; m = meters; 1 lakh = 100,000; MFED – Meghalaya Forest and Environment Department; SMB = Shillong Municipal Board.

III. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location and Administrative Boundaries

44. Shillong, which had been the Capital of Assam, since 1874, was founded by Col. Henry Hopkins, the then Commissioner of Assam, in 1864. In 1972 it became the capital city of the State of Meghalaya. It falls under the East Khasi Hills District being one of the seven districts of the State. Popularly referred to as “The Scotland of the East”, Shillong functioned, during the British regime, as the administrative capital of the erstwhile Assam province apart from being the only major tourist destination in the region. Situated at 250 31’ 26” – 250 39 56”N Latitude and 910 47’ 20” E Longitude, the altitude of the city varies between 1400 to 1900 meters (m) above mean sea level (MSL). The National Highway NH-40 links Shillong with Guwahati and rest of the country. There is a minor airport at Umroi, 35 kilometers (km) from Shillong. Guwahati, the largest urban centre of the region, is located 120km from Shillong, is the nearest railhead and airport.

45. The Greater Shillong Planning Area (GSPA) is spread over on area of 173.87 sq.km. It comprises three distinct areas, comprising the Shillong Municipal Board (SMB) area, 6 other urban centers namely Shillong Cantonment, Mawlai, Nongthymmai, Pynthorumkhrah, Madanryting, and Nongmynsong and rural areas with 32 settlements.

46. Shillong is the only city, amongst the five project cities, which contains tribal areas falling under the VI Schedule³ of the Constitution. There are two distinct areas, one comprising the SMB, part of which does not fall within the power and ambit of the Autonomous District Councils (ADC), and the rest of the GSPA governed by the Sixth Schedule. Outside the SMB and within GSPA, the Autonomous District Council and Dorbar Shnongs,⁴ with the village heads play an important role in provision of civic services and in small development works particularly water supply.

47. **Location – Old Landfill Site.** The proposed garage cum workshop shed & staff rest room will be sited in the existing municipal landfill site at Marten, Mawiong. The Shillong Municipality has been given the land on lease for dumping solid waste since year 1938 so there is no land acquisition involved

2. Topography, Drainage, and Natural Hazards

³ Clause (2) of Article 244 of the Constitution of India, stipulates that the provisions of Sixth Schedule shall apply to the administration of the tribal areas in the state of Assam, Meghalaya, Tripura and Mizoram. In accordance to the Sixth Schedule each of these areas shall be an “autonomous district” the word “autonomous” Indicates a right of self-government. This essentially means that the tribal area of Meghalaya will be governed not by other provisions of the Constitution relating to the States or Union of the Union of India but by the provisions of the Sixth Schedule alone, which contain a self contained code for the governance of the tribal areas. Although the VI Schedule also applies to Tripura and Mizoram, neither Agartala nor Alzawi has tribal areas within the boundaries of the city.

⁴ These are grass root traditional institutions involved in the city. The Dorbar Shnong, is most powerful and active body at the local level. The headman of the Dorbar Shnong looks after (i) certain administrative, municipal and financial functions; (ii) law and order and common properties of the village; and (iii) conventional municipal services like water supply, sanitation, management of roads, footpaths and water sources. The Dorbar Shnongs draws their powers from the 6th Schedule of the Constitution although there is need for more clarity on their powers and functions.

48. **Topography.** Shillong falls on deeply dissected central upland of the Meghalaya Plateau. The relief of the city varies from 1400 to 1900m above mean sea level. The Khasi Hills range at the south descends at a slope of 200+ towards the city and acts as a water divide. The slope within the city ranges from 5% to 10%, except at the locations such as Happy Valley, Pynthorumkhrah and Polo Ground area, where slope are gentle within the range of up to 5%.

49. **Topography. – Old Landfill Site.** Shillong is situated in hilly environment hence availability of flat area is very rare. The proposed site is situated in hilly terrain with elevation ranging from 1385 to 1480 m.

50. **Drainage.** Wah Umkhrah, Wah Umshyrpi and Wah Umkhen are the three main streams draining the city through a number of second and third order tributaries.

51. **Drainage. – Old Landfill Site.** There are no natural drains within the existing old landfill site for carrying surface run off.

52. **Natural Hazards.** North-eastern region of India extending to the Himalayan arc in the north and Burmese arc to the east is among the most seismically active regions of the world. No major fault or thrust occurs within the Shillong Urban Zone but prominent lineament and a major shear zone (Tyrsad-Barapani Shear) occur in the vicinity. Shillong falls in the seismic Zone V, and is highly vulnerable to earthquakes. The base of Shillong group is marked by conglomerate bed containing cobbles and boulders of Archaen rocks. Other environmental factors like lithology, regolithic characteristics have very limited or no influence on the foundation, which is already found to be suitable, and the area is free from landslide problems.

3. Geology and Soils

53. **Geology.** Shillong lies on low-grade metamorphic rocks of Shillong Group. The rock types are predominantly of Quartzite with subordinate of phyllites and slates followed by schist and gneisses. The Quartzite band dips at 200 to 400 in North-North East to South-South West direction. The rock band is found at a depth of one to three meters from the topsoil level, except at places where the crusted Quartzite bands are exposed. Four sets of joints have been noted in these quartzite, which have rendered them splintery at places where all the sets are intensely developed. The quartzite exhibits broad open folds.

54. **Soils.** The soil in Shillong is mainly laterite soil, deficient in phosphorus and potash content but rich in nitrogen and organic matter. The soils are mildly acidic in nature. pH ranges from 4.8 to 6.2. Some areas have alluvial fills, which are heavy loams and contain larger amount of organic matter. The thickness of the soil varies from 1 to 10 meters.

4. Climate

55. The climate of Shillong is characterized by moderate warm wet summers and cool dry winters. Shillong experiences a humid sub tropical climate. There are four distinct seasons: mild summer (March to and mid May), rainy season (mid May to mid October), autumn (mid October to November) and winter (December to February). The average maximum and minimum temperature is around 17°C and 7.5°C respectively. The average annual rainfall in Shillong is about 2100mm. Shillong experiences a prolonged rainy seasons with intermittent rain for almost throughout the year, since it is located close to “Cherrapunjee”. The wettest place in the World (aerial distance approximately 30km). Two thirds of the rainfall occurs in months from June to September from southwest monsoons. The relative humidity is highest during rainy season

(above 80%). The humidity is generally more than 50% for all throughout the year (except March).

5. Air Quality

56. The Meghalaya State Pollution Control Board is monitoring the Ambient Air Quality at 2 (two) stations in the state capital Shillong under the National Air Monitoring Program (NAMP) sponsored by Central Pollution Control Board. The frequency of monitoring is twice a week. Parameters monitored are Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM), Sulfur Dioxide (SO₂), Oxides of Nitrogen (NO_x). There are no major air-polluting industries in Shillong 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).

57. **Air Quality – Future Landfill Site.** As there are no major air pollution potential sources, the air quality of the disposal site is generally good.

6. Noise Level

58. Ambient noise level has been monitored by Shillong Pollution Control Board at various locations i.e. residential, commercial and silence zones. Since there are no major industrial units or areas within the planning area, the monitoring for industrial zones has been excluded. The monitoring results show that (i) out of the 9 monitoring locations in residential areas, 6 locations the noise levels are exceeding national standards (55 dBA); (ii) ambient noise levels in all monitored commercial areas exceed the national standards of 65 dBA; and (iii) in all deemed silence zone areas, noise levels exceeded the permissible limit of 50 dBA.

59. **Noise Level – Future Landfill Site.** The sub-project site is in a rural area without any industry or commercial activity and hence the noise level is within the standards.

7. Surface Water

60. The Umkhrah and Umshyrpi Rivers are the two major rivers of Shillong city. These two rivers are running in the centre of the city and it is approximately 12 km away from proposed disposal site. These two rivers finally joins the Umiyam Reservoir. These are basically the second order rivers that flow across the city from south-east towards north-west directions and then join together to form River Wah Ro Ro near Sunapani after a sudden fall known as “Beardon and Bishop Falls” prior to its confluence with the River Umiyam further downstream. The water of these rivers is mostly used for irrigation, bathing and washing purposes. This river flows north into Lake Barapani (Umiyam reservoir) and ultimately into Brahmaputra River. Other Rivulets such as Wah Demthring, Wah Nongrimbah flows towards the southeastern side and rivers Wah Dieng Lieng, Wah UmJasai flows towards the western side of the city.

61. Results of analysis of water quality of the Umkhrah and Umshyrpi Rivers show, low dissolved oxygen (DO), higher bio-chemical oxygen demand (BOD) and chemical oxygen demand (COD) values and higher values of Total Coliform (TC), Faecal Coliform (FC) and Nitrite (N) during 1997 and 1998 (lean season) as compared to those recorded during the year 2000 (peak monsoon season). The reason being that high dilution takes place during the monsoon months. During the monsoon, even with maximum dilution, the BOD values are normally more than 30 mg/L (exceeding the maximum permissible limits of BOD concentration in industrial effluents for discharge into inland surface water bodies). As a consequence, the

river Umkhrah and Umshyrpi have become polluted, hence the high BOD and low DO levels. Direct discharge into drains is also a common practice.

62. Results of analysis of water quality of the Umiam Lake indicate moderately polluted according with respect to BOD levels.

63. **Surface Water – Old Landfill Site.** There are no natural drains within the old landfill site for carrying surface run off. Umiam Lake is located approximately 3.0 km away from the site.

8. Groundwater

64. **Surveys carried out by the Central Ground Water Board (CGWB)** reveal that the aquifer system in the Shillong possesses good potential. The depth of the water table in both pre-monsoon and post-monsoon seasons range between 3 to 5 m with net seasonal fluctuations ranging between 0.5 to 1 m.

65. Ground water extraction for public use is insignificant in Shillong. Results of analysis from 1998 to 2000 of groundwater quality from 11 deep tube well located in different part of the city indicate that iron (Fe) concentration is high as well as average pH value is below 7.

66. **Groundwater - Old Landfill Site.** Water table of the site is not shallow and expected to vary from 5 m to 10 m. Ground water at the site is not contaminated.

B. Biological Resources

67. **Forests and Vegetation.** Within the Shillong Master Plan area of 174 km², there exists about 6.0 km² of Reserved Forests in three pockets and another 12 km² of Protected Forests. The Reserve Forests in Greater Shillong Area are:

- (i) Riat Laban
- (ii) Laitkor Protected Forest
- (iii) Raid Laban (Forest committee under long term lease to MFED)
- (iv) Riat Khwan Reserve Forest (Catchment of Umiam)
- (v) Shyrwat Reserve Forest
- (vi) Short round Reserve Forest (Golf Link area)

68. The Upper Shillong Protected Forest and adjacent areas (Riat Laban Reserve Forest and Laitkor Protected forest) are located close to Shillong city. The forest around Shillong peak is a traditional Sacred Grove⁵.

69. While a major area of these forests is sub-tropical pine forest, there exist small pockets of wet temperate broad leaf forests. In the upper Shillong, Riat Laban and Laitkor, sub-tropical pine and broad leaf vegetation are seen. The pine forests have only Khasi Pine (*Pinus kesiya*). Among broad leafed trees, a few flowering trees such as *Rhododendron formosum*, *R. arborea*

⁵ The sacred groves of Meghalaya largely fall under the temperate type and are the relic type evolved through millions of years. These are rich storehouse of vegetation wealth incomparable to any other type of forests in the State. These isolated pockets are untouched due to the religious beliefs and myths attributed to them. Many of the endangered species of the State are presently confined to these pockets only. *Fagaceae* members dominate over others in these sacred forests. Epiphytic flora is quite abundant and again dominated over by ferns and orchids.

and *Pyrus pashia* are observed. A prominent timber species of the forests is the Oak (*Quercus griffithii*)

70. However in some areas of GSPA the luxuriant sub tropical pine forest has become degraded to almost barren land as a consequence of forest clearing and *jhum* cultivation. The secondary formations are of negligible density and number. Some of the common trees are: Amari, Bonsum, Gamari, Gonsordi, Hollock, Hingori, Hatipolia, Jutuli, Kadam, Kowla, Kharikasopa, Makahi, Nahar, Outenga, Pichola, Sam, Champ, Kathal, Simul, Pine, Oak, Sal, Bhura, Maksi, and Teak.

71. **Forests and Vegetation – Old Landfill Site.** The old landfill site is the part of Riathkwan Reserve Forest, however, Shillong Municipality has been officially granted lease since 1938 to use the land for solid waste disposal purposes. The proposed garage cum workshop and rest rooms will be located on vacant land where no tree cutting is required.

72. **Phyto-diversity of Shillong.** A phyto diversity survey and analysis was carried out at the subproject locations in GSPA⁶ using the Shannon-Wiener Diversity Index, and evenness with the Evenness index. The indices show that the diversity in terms of flora is not significant, and the indices reveal that all locations fall short of that a primary forest. The trees are mostly timber yielding. While some species exist in locations away from the inhabited areas, that are important, they are not unique. In none of the project locations, rare/endangered tree/plant species have been identified that need to be taken up for conservation or special protection in the project. However, it is included in the mitigation measures to minimize loss and clearance of vegetation shall be complied with to ensure loss of vegetation.

73. **Fauna.** As per the survey carried out by Zoological Survey of India in 1986, there are diverse terrestrial and aquatic fauna found within Greater Shillong Area. However, none of these are endangered. These include: Lepidoptera (*Mucalis mineus* – Dark brand bush brown Butterfly, *Pelopidas mathais* – Small branded swift, *Euploe core* - Common Crow Butterfly, *Eurema hecabe* - Common Grass Yellow Butterfly), Odonota (*Crocothemis* sp – Common skimmer, *Orthetrum* sp. – Dragon fly), Crustacean (Prawns), Reptilla (*Calotes versicolor* - Changeable Lizard), and Amphibia (*Rana limnocharis* - Grass frog, *R. cyanophlyctis* - Indian skipper frog).

74. **Fauna – Old Landfill Site.** There is no protected area in proximity of the old landfill site hence no wild life is likely to be affected.

75. **Biodiversity.** There are four sites in GSPA which are highly ranked in terms of biodiversity. These areas are: Umshing, Shillong, Laitkor Peak, Mawphlang. These areas are also designated as Important Bird Area and Endemic Bird Area. The prominent species include Brown Shrike (*Lanius C. cristatus*), Grey Backed Shrike (*Lanius T. tephronotus*), Grey Headed Myna (*Stumus M. malebaricus*) and Jungle Crow (*Corvus Macrohynchos*). However, as per Meghalaya State Biodiversity Action Plan⁷, there are no biodiversity conservation hotspots within the Shillong Master Plan area.

⁶ A phyto diversity survey was carried out at the following identified locations in GSPA: Barapani (Kalikhola), Riathkwan, Umkhrah River Bank, Lumshillong, Mawphlang, and New Shillong.

⁷ Prepared as part of the National Biodiversity Strategy and Action Plan (NBSAP), Government of India.

C. Economic Development

1. Land Use

76. GSPA covers an area of around 17,400 hectares (174 km²) and includes 6 urban areas and 32 rural settlements. Of the total area, 31.58% is developed area, 9.04% is undevelopable area, 29.18% is developable area, 4.62% is under urban agriculture and rest are covered by forests and water bodies.

77. **Land Use – old Landfill Site.** The existing old landfill site is the part of Riatkhwan Reserve Forest, however, Shillong municipality has been granted lease to use the land for solid waste disposal purposes since year 1938 for 18 acres of land. The Government of Meghalaya Forest & Environment Department has extended the lease to the Shillong Municipality in Riat Khwan Forest Compartment No-4 (Plot No-1, Plot No-2 and Plot-3) during year 2000, approval on this matter has been issued by The Ministry of Environment & Forest Department.

2. Local Economy – Commerce, Industry and Agriculture

78. Industrial activities in the area are negligible, due to inherent problems like hilly terrain, non-availability of plain land, lack of entrepreneurship and high transportation cost. There is only one industrial estate in Shillong located at Short Round Road with an area of 4.1 Ha. The estate has 9 industries, all small-scale units.

79. Most of mentioned industries in the industrial estate are non-polluting except flourmill, which generates liquid effluents. The other small scale units of Shillong relate to automobile repairing and servicing workshops, steel and wooden furniture, tire retreading, printing press, bakeries and confectionaries, flour mills, rice mills and other handicraft units. Automobile repairing and servicing workshops is the prominent activity.

3. Infrastructure

80. **Water Supply.** The main source of water supply for Greater Shillong is River Umiew situated at a distance of 24km to the southwest of the city. Across the river Umiew, a 50 meter high dam has been constructed by the Public Health Engineering Department (PHED) at Mawphlang, having a live storage of 7.21 million cubic meters and dead storage of 1.94 million cubic meters. Water is lifted from the river and pumped to the inlet of treatment plant at an elevation of 1847 m through a three pumping with a total static lift of 302 meter (m). Water production and distribution in the Greater Shillong Area is managed by three agencies – PHED, SMB, and the Cantonment. Production and distribution for areas outside the municipal boundaries is under PHED, while distribution within the municipality is under SMB.

81. **Sewerage and Sanitation.** At present, Shillong does not possess any sewerage system. All the house sullage (kitchen and bath room waste water) drains either into the Um Shyrpi in the south or in the Um Khrah in the north. Sewage disposal from households is predominantly through septic tanks and soak pits with many households releasing their soak pit effluents into streams or springs. As a consequence, the river Umkhrah and Umshyrpi have become highly polluted. Direct discharge into drains is also a common practice.

82. **Roads and Transportation.** Shillong is connected to Guwahati towards the north through NH-40 and to Silchar towards the south-east through NH-44. The total road length of Shillong is 142.5 km with a road density of 0.8 km/sq km. The main constraints and problem

areas with regards to roads in Shillong are narrow and winding hilly roads with poor geometrics lack of parking spaces and lack of pedestrian facilities.

83. **Access to old landfill site** is available through well maintained NH-40.

84. **Drainage.** The drains are Kutcha⁸ in Greater Shillong Area except for Shillong Municipality, where the drains are Pucca. The natural flow of the drains has been blocked due to dumping of garbage in the drains. The wastewater from households and commercial areas also flows down these drains and ultimately draining into the rivers Umkhrach and Umshyrpi. The municipal drain of Shillong either terminates directly in these two rivers or into their secondary or tertiary tributaries. It is therefore observed that the natural streams in most parts of Shillong are gradually being converted from storm water drains to sewage canal carrying the sewage of the city. As such there are no instances of flooding within Greater Shillong Area but flooding during the rainy season does occur in the Polo Ground area.

85. **Health Facilities.** There are 8 hospitals, one family planning center, one maternity and child welfare center, one T.B center and ten dispensaries. There are altogether 1124 beds in the different medical centers within Shillong Municipality.

86. **Slum Upgradation.** There are 19 notified slum pockets within GSPA. Nearly 22% of the city's population lives in these slums. The slums in Shillong have a unique characteristic as compared to other slums. While in the rest of the country, slums and squatter settlements are formed by squatting on government lands, the slums in Shillong are located on private lands, in most cases with the permission of the landlord. However, the cause of formation of slums remains the same i.e. poor access to services and infrastructure. The localities with the largest concentration of slum population include Lumparing, Laban, Pynthorumkhrach, Laitumkhrach, and Lummaur.

87. **Education Facilities.** In Shillong Urban Agglomeration there are 109 Primary Schools, 52 Junior Secondary and Middle Schools, 64 Secondary Schools, 12 Colleges, 20 Vocational institutions and 1 university. Many new national level educational and vocational institutes viz RGIIIM, NIFT, IIHM are also coming up in and around Shillong. The city has sufficient number of educational institutions, but lacks in specialized educational facilities such as technical and medical colleges.

D. Social and Cultural Resources

88. **Demography.** GSPA with its total population of 312,539 which accounts for 78% of the total urban population of Meghalaya. Only 14% of the total geographical area of Greater Shillong, i.e., the core area is supporting 82% of the total population. While the population growth rate in Shillong Municipal Area and the Cantonment has continuously declined, the urban centers within the SUA i.e., Pynthorumkhrach and Madantring (classified as urban in 1981) have shown high growth rates.

89. **Migration Pattern.** Unlike other project cities more than 82.8% of the people are born within Shillong. Migration is not common within GSPA.

⁸ Kutcha drains are earthen drain and Pucca drains are generally of masonry or RCC construction.

90. **Sex Ratio.** Sex ratio in the city was quite low in 1991 at 892 females per 1000 males. However, as per Census 2001, the figure has increased to 1009 females per 1000 males more than the national average of 933.

91. **Literacy and Education (For Population Above 6 years).** The literacy rate in GSPA is 88%, which is more than the national average of 65.4% (Census 2001). In terms of education around 15% of the population is having education up to class V.

92. **Work Participation Rate.** The work participation rate within the city is 27.6% much less than the national average of 39.3%. Though there has been a significant increase in the total main workers from 14% in 1991 to 31% in 2001 the percentage of non-workers has also increased tremendously from 27% in 1991 to 67.1% in 2001 indicating towards growing unemployment.

93. **Occupational Profile.** Occupational profile of the city reflects a predominance of tertiary sector with 39% of the population engaged in government services followed by 25% in other non-defined services.

94. **History, Culture, and Tourism.** Shillong has numerous waterfalls viz. Elephant Falls in Upper Shillong, Sweet falls in Happy Valley and the Bishop Bidon falls in Mawlai. There are several beautiful Cathedrals in and around the city. Shillong has one on the oldest natural golf courses in the world. There is no heritage building nor is there any property related to cultural activities in the surroundings of the proposed sanitary landfill site.

95. **Indigenous People.** In Shillong and the entire state of Meghalaya, the tribes constitute the mainstream society Shillong has predominantly tribal population (77% of the total population) with Khasis being the dominant tribe followed by Jaintia, Bhoi, War and Garo. All the tribal communities are into modern means of livelihood. They have the same traditions, customs and usage with a little variation owing to geographical divisions. The most predominant indigenous group is Khasi accounting for 85% of the total IPs. The Khasi speak the language of Khasi and most follow Christianity.

IV. ANTICIPATED IMPACTS AND MITIGATION MEASURES

96. 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 landfill site; (ii) main routes/intersections which will be traversed by construction vehicles; and (ii) quarries and borrow pits as sources of construction materials.

97. The improvement in collection and transportation component of subproject involves only procurement of vehicles and equipment and hence no impacts are anticipated during execution of this component. However, impacts are anticipated during construction of approach road and boundary wall with fencing of proposed land fill site. All vehicles purchased for transportation of waste shall meet the standards prescribed by MOEF. Appropriate protective gears shall be provided to the workers at the site.

98. The ADB Rapid Environmental Assessment Checklist for Solid Waste Management in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp was used to screen the subproject for environmental impacts and to determine the scope of the IEE

investigation. The completed Checklist is found in **Appendix 1**. No proposed subproject components, except the construction of associated facilities for proposed landfill site, will interact physically with the environment.

99. 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 involves excavation and earth movements, will not cause direct impact on biodiversity values. The subproject will be in properties owned and acquired by the Meghalaya government and access to the subproject locations is through public Right of Way and existing roads hence, land acquisition and encroachment on private property will not occur.

A. Pre-construction – Location and Design

100. **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.

101. **Environmental Clearances.** No Environmental Clearance is required for the construction of associated facilities viz. garage cum workshop and rest rooms at old landfill site. Land acquisition and resettlement impacts are not envisaged. No temporary impacts such as temporary land occupation and temporary loss of access to resources and services during construction are anticipated. No removal of encroachments or squatters is envisaged as these are vacant lands and free from informal settlers and encroachments.

102. **Social and Cultural Resources.** There is a risk that any work involving ground disturbance can uncover and damage archaeological and historical remains. For proposed components in this subproject, small scale excavation will occur hence no such risk or impacts.

103. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** The scale of work may not necessitate the establishment of construction camps and if required will be located near the subproject location. 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 water supply 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.

104. **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. Material requirement will be less due to small scale of work and re-utilization of excavated material from site itself however 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 given to sites already being utilized for this purpose. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of authority.

105. **Security.** The boundary walls will be marked and a billboard will be placed at the gate of the landfill site to indicate that unauthorized access, are prohibited.

B. Construction

1. Screening of No Significant Impacts

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

- (i) All the activities will be within existing landfill site thus could be constructed without causing impacts to biodiversity;
- (ii) All the sites are located on an government-owned land which is not occupied or used for any other purpose;
- (iii) Overall construction program will be relatively short and is expected to be completed in 18 months with activities to conducted by small teams and specified location so most impacts will be localized and short in duration; and
- (iv) 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.

107. 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 2**. These environmental factors are screened out presently but will be assessed again before starting of the construction activities.

Table 2: 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.
Flora and Fauna	No rare or endangered species in the sites.
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.
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 subproject sites.
Historical, Archaeological, Paleontological, or Architectural sites	No scheduled or unscheduled historical, archaeological, paleontological, or architectural sites

2. Construction Method

108. The civil works involved in construction of garage cum workshop and rest rooms are: (i) Preparation of land by site cleaning and grubbing which consists of removing of all materials

such as bushes, weeds, rubbish, and top soil. The excavation will be carried out by manually or mechanical means through Excavator cum Loader. (ii) construction of foundation and (iii) construction of super structure through RCC and brick masonry using steel, fine & coarse aggregates and cement.

3. Anticipated Impacts and Mitigation Measures

109. Construction of the subproject components involves quite simple techniques of civil work, which will not have any major impacts on the environment. 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; and (ii) following all the health and safety norms during construction as per standard norms.⁹

110. **Sources of Materials.** 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 & Implementation Unit (SIPMIU); and
- (iii) Submit to DSMC on a monthly basis documentation of sources of materials.

111. **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, sulfur 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) Dug material is to be 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.

112. **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:

⁹ Occupational Health and 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) Dispose any wastes generated by construction activities in designated sites; and
- (v) Conduct surface quality inspection according to the EMP.

113. **Noise Levels.** Noise will be for a short term 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) Require horns not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
- (iii) 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
- (iv) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.

114. **Landscape and Aesthetics.** The construction work is not likely to generate significant quantities of waste soil and 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) Coordinate with authority for beneficial uses of excess excavated soils or immediately dispose to designated areas;
- (iv) Recover wood, metal, used oil, and lubricants and reuse or remove from the sites;
- (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (vii) Request SIPMIU/DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.

115. **Socio-Economic – Employment.** Manpower will be required during the 24 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 labor 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.

116. 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 and 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 and S Training¹⁰ 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 and 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 eight hours per day without hearing protection. The use of hearing protection shall be enforced actively.

117. Community Health and Safety. Hazards posed to the public, may include traffic accidents and vehicle collision. In this case, location of project site at isolated area, hence health and safety risk to community is almost none. However, construction contractor will be required to:

- (i) Plan routes to avoid times of peak-traffic activities.
- (ii) Liaise with SIPMIU/DSMC in identifying risk areas on route cards/maps.

¹⁰ 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.

- (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.

118. **Quarry Sites and Borrow Pits.** Extraction of approximately 28,000 m³ of clay, soils, stones, aggregates, and loose materials other than stones can cause disruption of natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, and sedimentation/siltation of surface waters. Potential impacts are of small magnitude, negative and can be 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.

119. **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.

120. **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;

- (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

121. The storage bins will be placed in fixed and relatively small areas within the town. Collection vehicles will be confined to pre-determined routes and will not need to traverse inside communities as collection points will be established. Thus there are several fields that are not expected to have significant impacts during the operation and maintenance stage of the subproject.

Table 4: 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.

C. 2. Mode of Operation

122. **Management.** The operator responsible for management and implementation of the solid waste management system, will distribute bins to households in the town (two bins per household) for temporary waste storage. This will be supported by a public education campaign, through which citizens will be requested to segregate their biodegradable and general domestic waste into separate bins, and will be informed about the waste collection and management system.

123. **Collection.** For door-to-door primary waste collection, smaller vehicles (TATA ACE) will collect waste from each household on a regular cycle and the segregated waste will be deposited into separate transfer locations in the locality. Waste will also be removed from bins placed in market places and debris from street sweeping and be deposited into the transfer locations. These will be removed by larger garbage vehicles.

124. **Transportation.** Larger garbage vehicles will transport and deposit the waste in the transfer station prior to the landfill area.

125. **Disposal.** The existing dump site will be utilized until a new sanitary landfill is developed.

126. .

3. Anticipated Environmental Impacts and Mitigation Measures

127. **Dust Control.** On-site dust will be controlled by use of water sprinkling. Water will be used for dust control only in those areas where no potential for creating leachate exists (such as access roads located outside the refuse filling area). In addition to watering, following methods to control dust to be used:

- (i) Continuous attention is given to proper maintenance of haul roads;
- (ii) Water spray or dust palliative will be applied on soil-covered work areas when conditions may result in fugitive dust; and

128. Specific dust control measures may be implemented within the service area, if necessary. The options will be:

- (i) Dust control at temporary access roads and service area.

129. **Litter Control.** If waste is collected regularly from houses, litter bins and elsewhere and the storage bins are emptied daily as intended, there should be no direct impacts on the physical environment. Authority will attempt to minimize windblown or dropped materials on-site. The sites will be checked daily for waste that has been blown or fallen from the collection vehicles. Ditches will be kept clear of litter material to maintain hydraulic properties and will be checked regularly. Waste collectors will be instructed to cover loads and vehicles with improper covered loads will be reprimanded. Public roads adjacent to the site will be checked daily for waste materials.

130. **Vector Control.** The main concern is that if vectors are allowed to thrive in SWM facilities, diseases could pose a threat to human health and/or the environment. Poorly-managed SWM facilities can cause negative ecological impacts by allowing the development of large colonies of scavenging birds, rodents and other vermin, which can then be a nuisance and health hazard in nearby communities, and can reach pest levels on surrounding agricultural land. Operator will operate the facilities in a manner that it will not be a haven for rodents and insects. Special attention will be given to maintenance of proper drainage. In the event that rodent, bird and/or insect activity becomes apparent, supplemental vector control measures may need to be initiated.

- (i) Rodent control – rats and mice are problems at many SWM facilities. Rats and mice will be controlled by placement of cover. An important step is to get rid of waste piles and places where these vectors can live. Setting traps is also a common way to determine if rats and mice are present at the SWM facilities. By tracking the results of the trapping of one can determine not only if there is a problem with rats and/or mice, but also whether or not the problem is increasing. If determined that the SWM facilities have a problem with rats and mice, mitigation measures will include (a) using grain poison however care must be taken that other animals (such as protected birds) do not ingest it; (b) using traps to reduce the number of rats and mice; and (c) removing or covering exposed refuse: and
- (ii) Fly control – flies are problem for SWM facilities that receive large amount of putrescible wastes, especially if the waste is not completely covered at the end of

each working day. The simplest way to avoid having a fly problem at the SWM facilities is to cover all garbage at the end of each working day.

131. **Odor Control.** Odors at SWM facilities are often results of refuse that is being unloaded or is improperly covered. During SWM facilities operation, regular cover placement will help control odors. Refuse compaction will also help control odor. Planting trees, shrubs, flowers, and other vegetation around the perimeter of the SWM facilities will help mitigate some of the SWM facilities odors.

132.

133. **Noise Abatement.** The noise associated with the operation of the SWM facilities will be decreased by fitting all equipment with sound dampening devices (such as mufflers) and keeping the vehicles in good working conditions. Maintenance of the vehicles and equipment will be conducted periodically in accordance with the SWM facilities O&M Manual.

134. **Periodic Routine Inspections.** Operator will maintain the individual facilities and the waste management system and ensure that it will be kept in good working order in accordance to the SWM facilities O&M Manual. It will also ensure that no waste will accumulate in streets and on open ground.

135. **Ecology.** There can be small ecological gains as well as improvements in the appearance of such sites if trees are planted on and around premises so this should be done.

136. **Economic Development.** Business and small industry in the town should operate more efficiently if their waste is removed speedily and efficiently, so there should be small economic gains once the system is in place. The main economic benefit may be obtained by the companies that are involved in operating the waste management system, either in partnership with the authority or through direct employment.

137. **Social and Cultural Resources.** The main beneficiaries of the improved system of waste management will be the citizens of the town, whose general environment, and in some cases living conditions, will be improved considerably. The unsightly mounds of garbage should no longer be evident in the town, and the attendant appearance, smell and public health risk should be removed.

138. There will also be socio-economic benefits for people who are able to gain employment with companies involved in operating the system, or with the authority, who will need to increase their manpower.

139. **Occupational Health and Safety.** It is important that employees understand the risks they may be exposed to. Authority will at least tell them (i) the likely exposure and the risks; (ii) what authority is doing to control risks and exposures; (iii) where and how people can obtain protection; (iv) how to report defects in protection and control equipment; and (v) what they shall do to minimize the risk, such as the proper way to use protection and other control equipment, how to look after it and store it, and where to use it. This information will be given in a way the employee can be expected to understand.

140. **Community Health and Safety.** Vehicle movements may cause some of the serious accidents. Vehicles will be fitted with highly audible reversing alarms and mirrors. These will be checked at least daily and maintained in good working order. Only authorized and competent

workers will be allowed to operate the vehicles. Collection routes will be planned to avoid times of high-pedestrian activities. Authority will liaise with communities to position collection points in safe positions and/or collect at quiet times.

D. Cumulative Impact Assessment

141. Cumulative and indirect impacts were identified through extensive and on-going consultation with statutory and non-statutory organisations throughout the assessment. The consultation exercise was used to collect baseline environmental data and the opinions and concerns of those consulted. On a number of occasions joint meetings were held with various statutory bodies in order to identify key issues.

142. 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 interaction of residual effects associated with multiple projects and/or activities can result in cumulative impacts, both positive and negative. 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..

143. In addition, the CIA considered the scope or influence of the subproject. Two boundaries, spatial and temporal,¹¹ were used.

144. 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. Other foreseeable projects that will overlap with the subproject are the future construction of the other solid waste management components, in particular the transfer stations, landfill and associated facilities, and composting plant. The spatial and temporal boundary of the subproject is the whole Shillong Area.

145. Air quality effects will occur during construction and operation. 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.

¹¹ 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.

146. The incremental GHG emissions from the subproject (considering construction of associated facility at old landfill site) will have a contribution to the State and National GHG emission reduction goals, although design characteristics and mitigation measures are intended to reduce the overall impact. During operation, the landfill can be brought under the preview of Clean Development Mechanism (CDM) project where the investment incurred for the technological installation for GHG emission mitigation can be recovered by the transaction cost gained by trading-off the CER:

147. 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 affected receptors. While building damage due to ground vibrations is unlikely, there may annoyance to spatially located receptors during construction. Noise levels associated with the project operations will be largely imperceptible as the old landfill site is located far from the city proper.

148. 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, traffic delays and detours, parking modifications, and increased volumes of construction-related traffic. Since the subproject will be built in undeveloped land earmarked for solid waste management purposes, it will not conflict with existing or planned land use.

149. 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.

150. Implementation of the subproject will have negligible effect on the aesthetic character of the local area because it will involve the development of a vacant lot. By incorporating standard mitigation measures and local regulatory requirements, the subproject will positively change the aesthetic character of the area by providing new engineered and planned structures.

151. Adverse impacts such as localized disruption of vehicle traffic, parking, 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. However, upon completion of construction the socio-community will benefit from improved solid waste management. This is considered a long-term cumulative benefit.

152. Development at the old landfill site and in the vicinity of the subproject may result in impacts relative to water quality and soils, but each impacts are independent of one another and are 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.

153. 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.

154. 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 solid waste management and community livability in Shillong.

V. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Project Stakeholders

155. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders are:

- (i) Public representatives and prominent citizens
- (ii) Shillong Municipal Board
- (iii) SIPMIU
- (iv) Dorbar Shnongs¹²

156. Secondary stakeholders are:

- (i) Other concerned government institutions (utilities, regulators, etc)
- (ii) NGOs and CBOs working in the affected communities;
- (iii) Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- (iv) The beneficiary community in general; and
- (v) ADB as the funding agency

B. Consultations and Disclosures Conducted

157. A series of public consultation meetings were conducted during the project preparation. Various forms of public consultations (consultation through ad hoc discussions on site and town-level consultation) have been used to discuss the project and involve the community in planning the project and mitigation measures.

158. Focus group discussions are done on 26 November 2010 and 5 December 2010 which were attended by 30 participants and 20 participants respectively. Community consultations are done on 27 January 2011 and 30 January 2011 with Dorbar Shnong at office of their headmen.

¹² These are grass root traditional institutions involved in the city. The Dorbar Shnong, is most powerful and active body at the local level. The headman of the Dorbar Shnong looks after (I) certain administrative, municipal and financial functions (II) law and order and common properties of the village and (III) conventional municipal services like water supply, sanitation, management of roads, footpaths and water sources. The Dorbar Shnongs draws their powers from the 6th Schedule of the Constitution.

Stack holders consultation were done on 7 December 2010, 15 December 2010, 11 January 2011 and 25 March 2011 which were attended by representatives from public and agencies like SIPMIU.

159. The records of public of consultations are attached as **Appendix 3**. Following are the comments/suggestions of the participants:

- (i) Collection of waste should cover the whole city;
- (ii) Proper arrangement of more dustbins;
- (iii) Frequency of collection should be increased as per need of the people;
- (iv) Need for identification of proper disposal sites and disposal mechanism;
- (v) All medical institutions should follow the proper disposable mechanism;
- (vi) Public awareness for proper solid waste management including source segregation;
- (vii) Public should be made aware about the health hazard due to improper solid waste management; and
- (viii) Involvement of other agencies and nongovernment organizations (NGOs) may be fruitful.

160. English version of the Environmental Assessment and Review Framework (EARF) has been placed in the offices of SMB and SIPMIU. Local language versions of the EARF and this IEE will be provided during workshops to ensure stakeholders understood the objectives, policy, principles, and procedures.

C. Future Consultation and Disclosure

161. UAD extended and expanded the consultation and disclosure process significantly during implementation of NERCCDIP. They have appointed a DSMC to handle this key aspect of the program which continuously (i) conducts a wide range of activities in relation to all subprojects in the city; and (ii) ensures the needs and concerns of stakeholders are registered and are addressed in subproject design.

162. For this subproject, DSMC will develop, in close coordination with SIPMIU, a public consultation and disclosure program which is likely to include the following:

- (i) Consultation during detailed design:
 - (a) Focus-group discussions with affected persons and other stakeholders (including women's groups, NGOs and community-based organizations [CBOs]) to hear their views and concerns, so that these can be addressed in subproject design where necessary; and
 - (b) Structured consultation meetings with the institutional stakeholders (government bodies and NGOs) to discuss and approve key aspects of the project.
- (ii) Consultation during construction:
 - (a) 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
 - (b) 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:
 - (a) 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;
 - (b) 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
 - (c) 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.

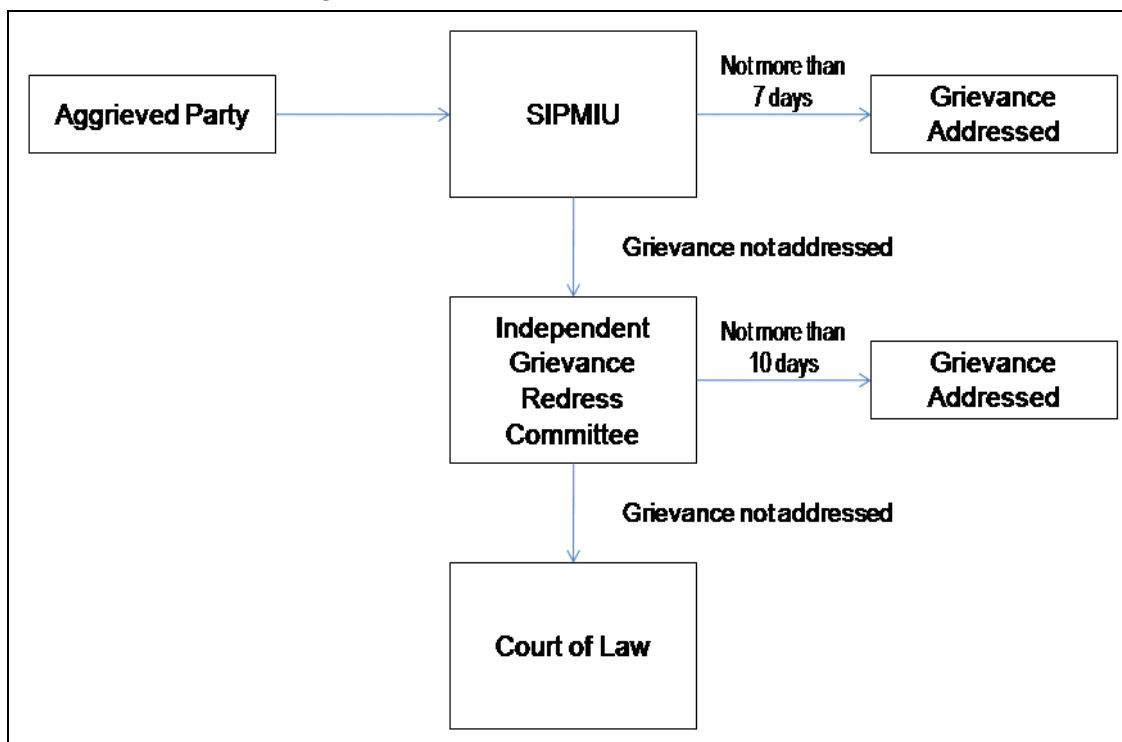
163. Based on ADB requirements, the following will be posted on ADB website: (i) this IEE, upon receipt; (ii) a new or updated IEE, if prepared, reflecting significant changes in the Project during design or implementation; (iii) corrective action plan prepared during Project implementation to address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

VI. GRIEVANCE REDRESS MECHANISM

164. Grievance redressal is being handled by SIPMIU. Grievances not redressed by the SIPMIU will be brought to the Independent Grievance Redress Committee (IGRC) set up to monitor project implementation in Shillong. The IGRC, is chaired by the Secretary¹³, Urban Affairs Department with representatives from the ULB, state government agencies, community-based organizations (CBOs) and NGOs. The IGRC will determine the merit of each grievance, and resolve grievances within 10 days of receiving the complaint. Grievance not redressed by the IGRC will be referred to the appropriate courts of law. The DSMC will keep records of all grievances received including: contact details of complainant, date that the complaint was received, nature of grievance, agreed corrective actions and the date these were effected, and final outcome. The grievance redress process is shown in **Figure 1**.

165. All costs involved in resolving the complaints will be borne by the SIPMIU. The IGRCs will continue to function throughout the project duration.

¹³ The Secretary, Urban Affairs Department with the Secretaries of all the concerned departments as members, will chair the Independent Grievance Redress Committee (IGRC). The Program Director would be the Secretary of the Committee. The IGRC will be responsible to take decisions in all matters related to grievance redressal of the Project.

Figure 1: Grievance Redress Mechanism

SIPMIU= State-level Investment Program Management and Implementation Units.

VII. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangements

166. The main agencies involved in managing and implementing the subproject are:

- (i) The national-level Executing Agency (NEA) for the Investment Program is MOUD;
- (ii) Investment Program Coordination Cell (IPCC) is established in MOUD. IPCC is responsible for overall management of the Investment Program in the city and they include social/environmental safeguard specialists whose tasks include monitoring Program implementation and reviewing and screening the subprojects submitted by State in accordance with subproject selection criteria, including the environmental provisions;
- (iii) State Investment Program Management and Implementation Unit (SIPMIU) established in SEA and headed by a Program Director (PD). SIPMIU will oversee the Program's environment and resettlement planning. This includes the preparation of all documentation needed for decision-making, contracting, and supervision of work and providing progress-monitoring information to the PD;
- (iv) The SIPMIU shall comprise of a Safeguards and Social Cell staffed with an Environmental Officer (EO). The EO shall be responsible for implementing the environmental safeguard provisions in the project including (i) ensuring environmental criteria for subproject selection in the EARP are followed, (ii) ensuring mitigation requirements are in contractor bidding documents, and (iii) liaising with various Central and State government agencies on compliance

- matters. The SIPMIU will appoint and manage Construction Contractors (CC) to build elements of the infrastructure who are required to submit Environmental Implementation Plans (EIPs) for SIPMIU approval;
- (v) The SIPMIU is assisted by the DSMC, who is responsible for design the infrastructure, manage tendering of contracts, and supervise the construction process; and
 - (vi) An Environmental Specialist (ES) in the DSMC is responsible for addressing the environmental issues in the project components during design and implementation. The ES will ensure all mitigation requirements are in contractor bidding documents and EIPs, and will supervise the effective implementation of environmental provisions during construction. In addition, the ES will assist the SIPMIU on the procurement needs and other project implementation aspects and shall play a central role in ensuring capacity building on environmental management of the SIPMIU, Contractor and Line Departments through capacity development support and training;

1. Responsibilities of SIPMIU

167. The execution of this subproject comprising of construction of sanitary land fill site and associated facilities for solid waste management components through competitive bidding on item rate basis. The comprehensive contract management including billing and payment shall be the responsibility of unit.

168. **Contract Management.** Interpretation of contract clauses, time management and monitoring, of construction problems and delays (if any) shall be the responsibility of the SIPMIU which shall initiate all efforts to resolve these problems. Time Management shall be effected at Site by prioritizing and allocating the works monthly, weekly and daily. Dispute settlement, issuing notices to contractors on work related issues, levying of liquidated damages for non fulfillment of contractual obligations, issuing of statutory certificates agreed upon in the contract agreement ,settling contractor's claims etc shall also be the responsibility of the unit.

169. **Supervision of Work–Preliminaries.** The formal handing over of the site to the contractor shall be the responsibility of the unit. Utility shifting, if found essential, shall be initiated after assessing the requirement and preparing and submitting the request with drawings to the concerned owner. Making request for diversion of traffic to the concerned authority and managing diversion shall also be done by the unit. Scrutiny of construction - drawings, issuing approval.

170. **Supervision of Work–Concreting and Other Civil Works.** Collecting and sending samples for testing, certifying quality of materials, verifying water to cement ratio/ compaction / curing, certifying formwork and accepting quality of the finished structure shall also be taken care of by the implementing unit.

171. **Supervision of Work–Electrical and Mechanical Works.** The unit shall ensure the conformity of supplied materials to specification, check the installation and witness satisfactory trial run of the electro mechanical units & accessories.

172. **Supervision of Work–Daily Supervision.** On site daily supervision, taking pre-measurements and measurements, recording measurements in Measurement Books ,taking check measurements and checking of "as built" drawings shall be the responsibility of SIPMIU.

173. **Supervision of Work–Billing and Payment.** The implementing unit shall conduct pre & final verification of the measurements & bills and quality certificates pass the bill and effect payment to the contractors. Post auditing of all the accounts related to contract settlements shall be invariably done by the unit.

174. **Supervision of Work–Obtaining Power Connection.** The unit shall also take care of the contractors request for obtaining connection both temporary for the site and permanent for the subproject.

175. **Supervision of Work–Completion and Handing Over.** Issuing completion certificate, ensuring compliance to warranty during Defect Liability Period, preparation of O&M plan and final report on the contract shall be systematically ensured by the implementing unit at the final stage of the works.

176. **Supervision of Work–Variation in Quantity and Time.** In case additional and excess quantity of works are found essential, suitable decision shall be taken by the SIPMIU after checking the design & schedule and recommending to the Technical Committee for approval.

177. **Supervision of Work–Environmental Monitoring** The SIPMIU shall be responsible for establishing a system for monitoring /review of the environmental impact of the construction activities of the contractor and suggest remedial action, if any, found necessary.

178. The complete management of the works at site shall be the responsibility of the technical wing of the SIPMIU. Some of the routine duties are:

- (i) Visit the project site regularly and monitor day-to-day activities.
- (ii) Ensure time management through effective monthly, weekly and daily allocation of works.
- (iii) Prioritize the works in consultation with the DSMC and the Contractor.
- (iv) Ensure proper planning of diversion of traffic during the work and coordinate with police and transport departments in this regard.
- (v) Ensure that prior notice is given to the public about the disruption of water, electricity and/or communication lines during the execution of works and the situation brought back to normalcy within minimum time.
- (vi) Ensure that caution boards are erected at prime locations displaying the nature of works.
- (vii) Check the line, level and layout of the progressing construction works to ensure conformity with the approved estimate and drawing.
- (viii) Ensure adherence to the contract conditions and laws of the government regarding labor and labor welfare measures and ensure availability & proper utilization of adequate safety equipments at the site.
- (ix) Maintain control over quality and quantity of various items of works executed.
- (x) Get the tests conducted as per the required frequency & supervise the testing of samples at specified laboratories. Whenever the test fails, the materials shall not be used. The work where this test fails shall have to be got redone.
- (xi) Conduct joint measurement along with DSMC & Contractor and record the measurement in the measurement book.
- (xii) Inspect the works regularly to see that the works are executed strictly as per approved drawings and specifications. Any changes from the approved drawings for any reason needs to be got approved by competent authority.

- (xiii) Ensure checking 100 % of the bills submitted by the Contractor with reference to the measurement rate and ensure the satisfactory quality certification from the DSMC before processing the bills for release of payment.
- (xiv) Consider issuance of variation orders during the course of work, if necessary. Such variation due to change in material, specification, size, soil classification etc., from the approved agreement should be brought to the notice of the TC for consideration.
- (xv) Co-ordinate with the DSMC in the preparation of the Final Report summarizing the construction activities undertaken indicating, among other things, contract changes, claims or disputes or any other substantive matters having effect on the cost and progress of the work.
- (xvi) Co-ordinate with the DSMC in the preparation of the Project Completion Report.
- (xvii) Provide any information called for from SMB and perform any other duties/responsibilities assigned from time-to-time.
- (xviii) Prepare satisfactory reports to audit enquires with respect to works & contracts.
- (xix) Exercise a thorough and efficient control and check on all the project components till the end of handing over the project.

179. **Quality Control.** The subproject shall be executed adhering to the bid specifications. The Manuals on Quality Control and Quality Assurance (QA/QC Manual) and the volume of Standard Specifications prepared by the SIPMIU for the Program will supplement the bid specifications.

2. Responsible for carrying out mitigation measures

180. During construction stage, implementation of mitigation measures is the construction contractor's responsibility while during operation stage, Government will decide agency that will be responsible for the conduct of maintenance or repair works.

181. To ensure implementation of mitigation measures during the construction period, contract clauses (**Appendix 4**) for environmental provisions will be part of the civil works contracts. Contractors' conformity with contract procedures and specifications during construction will be carefully monitored by SIPMIU and DSMC.

3. Responsible for carrying out monitoring measures

182. During construction, Environmental Specialist (ES) of DSMC and the Environmental Officer (EO) of SIPMIU will monitor the construction contractor's environmental performance.

183. During the operation stage, monitoring will be the responsibility of an operator appointed by authority as well as Meghalaya Pollution Control Board.

4. Responsible for reporting

184. DSMC will submit periodic monitoring and implementation reports to SIPMIU, who will take follow-up actions, if necessary. SIPMIU will submit monitoring reports to the PD who will then submit to ADB. SIPMIU will also prepare annual monitoring reports for IPCC and assist IPCC in preparing an annual monitoring report to ADB. The annual report is to focus on the progress of implementation of the EMP and EARP and issues encountered and measures adopted, follow-up actions required, if any, as well as the status of Program compliance with

subproject selection criteria, and relevant loan covenants. IPCC will seek clearance for submission and disclosure of the annual environmental monitoring report to ADB.

5. Capacity Building

185. The proposed training program along with the frequency of sessions is presented in **Table 4**.

Table 4: Training Program for Environmental Management

Program	Description	Participant	Form of Training	Duration/ Location	Training Conducting Agency	Source of Funds
Pre-Construction						
Module I	Introduction to Environment: <ul style="list-style-type: none"> • Basic Concept of environment • Environmental Regulations and Statutory requirements as per Government of India and ADB 	Secretaries, Chief Engineer Superintendent Engineers of PHED and UAD, the Development Commissioner, CEO of SMB and Program Director (PD) and Environmental Officer (EO) of the SIPMIU ,SWM Division of SMB SIPMIU (Technical Unit) and SIPMIU (Environmental Unit)	Lecture	½ Working Day	Environmental Specialist of the Design and Supervision Consultants	Included in the project cost.
Module II	Environmental Considerations in Urban Development and Solid Waste Management (SWM) Projects: <ul style="list-style-type: none"> • Environmental components affected by urban development and SWM in construction and operation stages • Activities causing pollution during construction and operation stages • Environmental Management Good Practices in Urban Infrastructure and SWM Projects • MSW Handling Rules, 2000 monitoring requirements. 	SWM Division of SMB, SIPMIU (Technical Unit) and SIPMIU (Environmental Unit including the EO)	Workshop	½ Working Day	Environmental Specialist of the Design and Supervision Consultants	Included in the project cost.
Module III	Review of IEE and its	SWM Division	Lecture and	½	Environmental	Included

Program	Description	Participant	Form of Training	Duration/ Location	Training Conducting Agency	Source of Funds
	Integration into Designs: <ul style="list-style-type: none"> • IEE Methodology • ADB and Gol requirements • Environmental Provisions in NERCCDIP • Implementation Arrangements • Methodology of Assessment of Pollution Monitoring • Methodology for site selection of borrow areas, waste disposal areas etc. 	of SMB, SIPMIU (Technical Unit) and SIPMIU (Environmental Unit including the EO)	field visit	Working Day	Specialist of the Design and Supervision Consultants	in the project cost.
Construction Stage						
Module IV	Role during Construction <ul style="list-style-type: none"> • Roles and Responsibilities of officials/ contractors/ consultants towards protection of environment • Implementation Arrangements • Monitoring mechanisms 	SIPMIU (Technical Unit) and SIPMIU (Environmental Unit including the EO)	Lecture/ Interactive sessions	1/2 Working Day	Environmental Specialist of the Design and Supervision Consultants	Included in the project cost.
Module V	Monitoring and Reporting System <ul style="list-style-type: none"> • Monitoring mechanisms • MSW Handling Rules, 2000 monitoring requirements. 	SIPMIU (Technical Unit) and SIPMIU (Environmental Unit including the EO);	Lecture/ Interactive sessions	1/2 Working Day	Environmental Specialist of the Design and Supervision Consultants	Included in the project cost.

B. Environmental Mitigation Plan

186. **Tables 4 and 6** show 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.

Table 5: Anticipated Impacts and Mitigation Measures – Pre-construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains	(i) Consult SIPMIU to obtain an expert assessment of the archaeological potential of the site; (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	SIPMIU & DSMC	Chance Finds Protocol

		recognised and measures are taken to ensure they are protected and conserved.		
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.	Disruption to traffic flow and sensitive receptors	(i) Prioritize areas within or nearest possible vacant space in the subproject location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community.	SIPMIU and DSMC to determine locations prior to award of construction contracts.	List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.
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.	(i) Prioritize sites already permitted by the Mining Department; (ii) If other sites are necessary, inform construction contractor that it is their responsibility to verify the suitability of all material sources and to obtain the approval of SIPMU and (iii) If additional quarries will be required after construction is started, inform construction contractor to obtain a written approval from SIPMU.	SIPMIU and DSMC	(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.

Table 6: Anticipated Impacts and Mitigation Measures – Construction Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Sources of Materials	Extraction of rocks and material may cause ground instability	(i) Use quarry sites and sources permitted by government; (ii) Verify suitability of all material sources and obtain approval of State Investment Program Management & Implementation Unit (SIPMIU); and (iii) Submit to DSMC on a monthly basis documentation of sources of materials.	Construction Contractor	Construction Contractor documentation
Air Quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction resulting to dusts and increase in concentration of vehicle-related	(i) Consult with SIPMIU/DSMC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials; (ii) Dug material is to be used immediately, avoiding the need to stockpile on site; (iii) Damp down exposed soil	Construction Contractor	(i) Location of stockpiles; (ii) Complaints from sensitive receptors; (iii) Heavy equipment and machinery with air pollution

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons)	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.		control devices; (iv) Ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (v) Vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons
Surface water quality	Mobilization of settled silt materials, run-off from stockpiled materials, and chemical contamination from fuels and lubricants during construction works can contaminate nearby surface water quality.	(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).	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and 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.
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	(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	Construction Contractor	(i) Complaints from sensitive receptors; (ii) Use of silencers in noise-producing

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		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) 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 (v) Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at a distance of 10 m or more from the vehicle/s.		equipment and sound barriers; (iii) Equivalent day and night time noise levels
Landscape and Aesthetics	Solid wastes as well as excess construction materials	(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 SIPMIU for beneficial uses of excess excavated soils or immediately dispose to designated areas; (v) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (vi) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vii) Request SIPMIU/DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	Construction Contractor	(i) Waste Management Plan; (ii) Complaints from sensitive receptors; (iii) SIPMIU/DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.
Socio-Economic - Employment	Generation of contractual employment and increase in local revenue	(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.	Construction Contractor	(i) Employment records; (ii) records of sources of materials
Occupational Health and Safety	Occupational hazards which can arise during work	(i) Develop and implement site-specific Health and Safety (H and 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 and S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of	Construction Contractor	(i) Site-specific Health and Safety (H and S) Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers;

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		<p>work-related accidents;</p> <p>(ii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</p> <p>(iii) Provide medical insurance coverage for workers;</p> <p>(iv) Secure all installations from unauthorized intrusion and accident risks;</p> <p>(v) Provide supplies of potable drinking water;</p> <p>(vi) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) Provide H and 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;</p> <p>(viii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;</p> <p>(ix) Ensure moving equipment is outfitted with audible back-up alarms;</p> <p>(x) 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</p> <p>(xi) 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.</p>		<p>(iv) Number of accidents;</p> <p>(v) Supplies of potable drinking water;</p> <p>(vi) Clean eating areas where workers are not exposed to hazardous or noxious substances;</p> <p>(vii) record of H and S orientation trainings</p> <p>(viii) personal protective equipments;</p> <p>(ix) % of moving equipment outfitted with audible back-up alarms;</p> <p>(xi) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.</p>
Quarry Sites and Borrow Pits	Extraction of approximately 6000 m ³ of clay, soils, stones, aggregates, and loose materials other than stones can cause disruption of natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns,	<p>(i) Verify suitability of all material sources and obtain approval of DSMC;</p> <p>(ii) Prioritize government-approved quarries and borrow pits;</p> <p>(iii) Obtain approval of DSMC if new quarries and borrow sites are necessary;</p> <p>(iv) Request DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.</p>	Construction contractor	<p>(i) List of approved quarry sites and borrow pits;</p> <p>(ii) SIPMIU/DSMC report in writing that all necessary environmental restoration work has been</p>

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	and sedimentation/siltation of surface waters.			adequately performed before acceptance of work.
Work Camps	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants	(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.	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
Social and Cultural Resources – Chance Finds	Risk of archaeological chance finds	(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; (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.	Construction Contractor	Records of chance finds

Table 7: Anticipated Impacts and Mitigation Measures – Operation and Maintenance Environmental Mitigation Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Dust Control	increased PM level	(iii) Continuous attention is given to	O&M Operator	(i) Records available

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		proper maintenance of haul roads; (iv) Water spray or dust palliative will be applied on soil-covered work areas when conditions may result in fugitive dust; and		
Litter Control	clogging of drains, unsightly environment	(i) Minimize windblown or dropped materials on-site; (ii) Daily check for waste that has been blown or fallen from the collection vehicles; (iii) Clear drains of litter material; (iv) Instruct waste collectors to cover loads and vehicles; (v) Reprimand waste collectors with uncovered loads	O&M Operator	(i) Records available
Vector control	threat to human health and/or the environment	(i) Develop Rodent and Fly Control Plan	O&M Operator	Rodents and Flies Control Plan included in O&M Manual
Noise Abatement	nuisance to sensitive receptors	(i) Fit all equipment with sound dampening devices (such as mufflers); (ii) Keep vehicles in good working conditions; (iii) Maintain vehicles and equipment periodically	O&M Operator	(i) Noise Abatement Plan included in O&M Manual; (ii) complaints from sensitive receptors; (iii) Records of Periodic Maintenance available
Occupational Health and Safety	Adverse impacts on the appearance of surrounding environment and exposure of workers to hazardous debris	Authority will at least tell them: (i) The likely exposure and the risks; (ii) What is being done to control risks and exposures; (iii) Where and how people can obtain protection; (iv) How to report defects in protection and	O&M Operator	(i) Records of training available; (ii) H and S Plan included in O&M

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
		control equipment; and (v) What they shall do to minimize the risk, such as the proper way to use protection and other control equipment, how to look after it and store it, and where to use it. This information will be given in a way the employee can be expected to understand		
Community Health and Safety	Vehicle movements cause deaths and some of the most serious accidents.	(i) Fit vehicles with highly audible reversing alarms and mirrors and check at least daily and maintained in good working order. (ii) Allow only authorized and competent workers to operate the vehicles; (iii) Plan collection routes to avoid times of high-pedestrian activities. (iv) Liaise with communities to position collection points in safe positions and/or collect at quiet times;	O&M Operator	(i) Records available

C. Environmental Monitoring Program

187. **Tables 8 and 9** show 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 form 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 8: Pre-construction Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Social and Cultural Resources	As per site requirement	SIPMIU and DSMC	Chance Finds Protocol	Checking of records	Chance Finds Protocol provided to construction	Once	SIPMIU

					contractors prior to commencement of activities		
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	Once	SIPMIU
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.	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.	Once	SIPMIU

Table 9: Construction Environmental Monitoring Program

Mitigation Measures	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	(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	Monthly for checking records	DSMC/ SIPMIU in coordination with State Pollution Control Board

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			particulate matter (RPM) and suspended particulate matter (SPM); (v) vehicular emissions such as sulphur dioxide (SO ₂), nitrous oxides (NO _x), carbon monoxide (CO), and hydrocarbons (HC)		Ambient Quality Standards for ambient air quality; (v) GOI Vehicular Emission Standards for SO ₂ , NO _x , CO and HC.		
Surface Water Quality	(i) Construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials;	Construction Contractor	(i) Areas for stockpiles, storage of fuels and lubricants and 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.	visual inspection	(i) Designated areas only; (ii) silt traps installed and 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	Monthly	DSMC/ SIPMIU in coordination with State Pollution Control Board
Noise Levels	(i) Construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work	Construction Contractor	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night	(i) Checking of records; (ii) visual inspection	(i) Complaints from sensitive receptors satisfactorily addressed; (ii) silencers in noise-producing equipment functioning as design; and	Monthly	DSMC/ SIPMIU in coordination with State Pollution Control Board

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
	camps		time noise levels		(iii) sound barriers installed where necessary		
Landscape and Aesthetics	(i) Construction sites; (ii) areas for stockpiles, storage of fuels and lubricants and waste materials; (iii) work camps	Construction Contractor	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) SIPMIU/DSMC to report in writing that the necessary environmental restoration work has been adequately performed before acceptance of work.	(i) Checking of records; (ii) visual inspection	(i) No accumulation of solid wastes on-site; (ii) implementation of Waste Management Plan; (iii) complaints from sensitive receptors satisfactorily addressed.	Monthly	DSMC/ SIPMIU
Socio-Economic - Employment	construction sites	Construction Contractor	(i) Employment records; (ii) records of sources of materials	Checking of records	Number of employees from Shillong equal or greater than 50% of total workforce	Quarterly	DSMC/ SIPMIU
Occupational Health and Safety	construction sites	Construction Contractor	(i) Site-specific Health and Safety (H and 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 and S orientation trainings (viii) personal protective	(i) Checking of records; (ii) visual inspection	(i) Implementation of H and 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/ SIPMIU

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			equipments; (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 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/ SIPMIU
Quarry Sites and Borrow Pits	All quarries and borrow pits	Construction Contractor	(i) List of approved quarry sites and borrow pits; (ii) SIPMIU/DSMC report in writing that all necessary environmental restoration work has been adequately performed before acceptance of work.	Visual inspection	(i) Sites are permitted; (ii) Report submitted by construction contractor monthly (until such time there is excavation work)	Quarterly	DSMC/ SIPMIU
Work Camps	Work camps	Construction Contractor	(i) Complaints from sensitive receptors; (ii) water and sanitation facilities for employees; and (iii) SIPMIU/DSMC report in	Visual inspection	(i) Designated areas only; (ii) complaints from sensitive receptors satisfactorily addressed	Quarterly	DSMC/ SIPMIU

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
			writing that the camp has been vacated and restored to pre-project conditions				
Chance Finds	Construction sites	Construction Contractor	Records of chance finds	Checking of records	Implementation of Chance Finds Protocol	As needed	DSMC/ SIPMIU

Table 10: Operation and Maintenance Environmental Monitoring Program

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Dust Control	SWM facilities site and service area	O and M Operator	(i) Records available	Checking of relevant records	complaints from sensitive receptors satisfactorily addressed	as needed	Meghalaya government
Litter Control	Land fill site	O and M Operator	(i) Records available	Checking of relevant records	complaints from sensitive receptors satisfactorily addressed	as needed	Meghalaya government
Vermin Control	SWM facilities site	O and M Operator	Rodents and Flies Control Plan included in O&M Manual	Checking of O&M Manual	complaints from sensitive receptors satisfactorily addressed	as needed	Meghalaya government
Noise Abatement	SWM facilities site and service area	O and M Operator	(i) Noise Abatement Plan included in O&M Manual; (ii) complaints from sensitive receptors; (iii) Records of Periodic Maintenance available	Checking of O&M Manual	complaints from sensitive receptors satisfactorily addressed	as needed	Meghalaya government
Occupational Health and Safety	SWM facilities site and service area	O and M Operator	(i) Records of training available; (ii) H and S Plan included in O and M	Checking of records and training module	(i) complaints from sensitive receptors satisfactorily	as needed	Meghalaya government
Community Health and	SWM facilities	O and M Operator	(i) Records available	Checking of records	i) complaints	As needed	Meghalaya government

Mitigation Measures	Location	Responsible for Mitigation	Monitoring of Mitigation	Method of Monitoring	Indicators/ Standards	Frequency	Responsible for Monitoring
Safety	site and service area				from sensitive receptors satisfactorily		
Water Quality	(i) SWM facilities waste water; (ii) nearby water bodies	O and M Operator	(i) Inland parameters: color and odor, suspended solids, particle size of suspended solids, pH value, temperature, oil and grease, total residual chlorine, ammonical nitrogen, total Kjeldahl nitrogen, free ammonia, biochemical oxygen demand, chemical oxygen demand, heavy metals, cyanide, fluoride, dissolved phosphates, sulfide and phenolic compounds. (ii) Land for Irrigation: color and odor, suspended solids, pH value, oil and grease, biochemical oxygen demand, arsenic, and cyanide	Sample collection and laboratory analyses	GOI Standards for Discharges to Inland Waters and Land for Irrigation	Quarterly or as prescribed by CPCB	Meghalaya government

D. Environmental Management Plan Costs

188. Most of the mitigation measures require the Contractors to adopt good site practices, which are part of their normal procedures, so there are unlikely to be major costs associated with compliance. These costs of mitigation by the contractors are included in the budgets for the civil works. Mitigation and monitoring provided by the SIPMIU or its DSMC will be part of incremental administration costs. Costs required for environmental quality monitoring during construction is indicated in **Table 11**.

Table 11: Environmental Management and Monitoring Costs (INR)

Item	Quantity	Unit Cost	Total Cost	Source of Funds
1. Implementation of EMP (2 years)				
Design Supervision and Management Consultant – DSMC Environment Specialist	1 x 3 month	160,000 ¹⁴	480,000	DSMC (cost already allotted)
Survey Expenses during Construction - Air, noise, and water (Specific sites will be provided to construction contractors after awarding of the project)	Lump sum	479,000	479,000	Construction Contractor
3. Environmental mitigation measures including security, signages, and buffer zone development	Lump sum	1,000,000	1,000,000	Included in project cost (considered during detailed engineering design)

Specific sites will be provided to construction contractors after awarding of the project.

VIII. FINDINGS AND RECOMMENDATIONS

189. The process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed for the Shillong Solid Waste Management Subproject. Potential negative impacts were identified in relation to construction and operation of the improved infrastructure, but no impacts were identified as being due to either the subproject design or location. Mitigation measures have been developed 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.

190. During the construction phase, impacts mainly arise in form of dust and noise generation. These are common impacts of construction in and around urban areas, and there are well developed methods for their mitigation.

191. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example it is proposed that the project will employ the workforce people who live in the vicinity of construction sites, if possible, to provide them with a short-term economic gain; and plant trees on and around completed parts of the SWM facilities site to improve the appearance and provide a small ecological gain.

¹⁴ Unit costs of domestic consultants include fee, travel, accommodation and subsistence.

192. Mitigation will be assured by a program of environmental monitoring conducted during construction to ensure that all measures are implemented, and to determine whether the environment is protected as intended. 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. There will also be a longer-term survey to monitor the expected improvements in the town environment from the improved solid waste management.

193. Finally, stakeholders were involved in developing the IEE through face-to-face discussions on site and a large public meeting held in the town (Refer MOM in Appendix 2), after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations in the town and will be disclosed to a wider audience via the ADB website. The consultation process will be continued and expanded during project implementation, to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

IX. CONCLUSIONS

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

195. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further special study needs to be undertaken to comply with ADB SPS (2009) or GoI EIA Notification (2006) for tranche II components.

Appendix 1: ADB Rapid Environmental Assessment Checklist for Solid Waste Management

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area...			
• Densely populated?		✓	The project site is located at old landfill site, Marten, Mawiong is almost 8 km away from the Shillong city. The area is at present uninhabited.
• Heavy with development activities?		✓	Surrounding area is vacant land. No development activity is going on currently.
Adjacent to or within any environmentally sensitive areas?		✓	
• Cultural heritage site		✓	
• Protected Area	✓		Old landfill site is part of Riat Khwan Reserve Forest and is given to Shillong Municipality on lease for municipal solid waste dumping since 1938.
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay		✓	
B. Potential Environmental Impacts Will the Project cause...			
• Impacts associated with transport of wastes to the disposal site or treatment facility		✓	No transport of waste as project components includes construction of associated facilities only.
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	There are no historical/cultural monuments/areas adjacent or within the vicinity of the project site.
• Degradation of aesthetic and property value loss?		✓	The land is vacant and unproductive so any loss of aesthetic and property value is very unlikely.
• Nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.?		✓	Not expected.
• Dislocation or involuntary resettlement of people?		✓	No dislocation or involuntary resettlement as proposed works is located on vacant land.
• Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not applicable. The subproject will not affect indigenous peoples or other vulnerable group..
▪ Risks and vulnerabilities related occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		✓	Risks and vulnerability during construction are temporary, reversible and short-term in duration. The EMP includes mitigation measures related to occupational health and safety.
▪ Public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats?		✓	The subproject will not involve construction of the associated facilities of landfill site only. However, for the subsequent tranche, An Operations and Maintenance (O&M) Manual will be developed as part of the subproject.
• Deterioration of water quality as a result of contamination of receiving waters by leachate from land disposal system?		✓	The subproject in Tranche 2 will involve construction of the associated facilities at old land fill site hence no case of leachate generation.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> Contamination of ground and/or surface water by leachate from land disposal system? 		✓	The subproject will not involve construction of the landfill site hence no case of leachate generation.
<ul style="list-style-type: none"> Land use conflicts? 		✓	The existing landfill site is the part of Riakthwan Reserve Forest and Shillong Municipality has been given this area on lease since 1938 for solid waste dumping. Lease renewal is carried out in year 2000 and in principle approval in this matter has been issued by The Ministry of Environment & Forest Department.
<ul style="list-style-type: none"> Pollution of surface and ground water from leachate coming from sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site? 		✓	The subproject will not involve construction of the landfill hence no case of leachate and methane gas generation.
<ul style="list-style-type: none"> Inadequate buffer zone around landfill site to alleviate nuisances? 		✓	The subproject will not involve construction of the new landfill site.
<ul style="list-style-type: none"> Road blocking and/or increased traffic during construction of facilities? 		✓	Road blocking or traffic diversion will not be required during the construction of access road and boundary walls. However, vehicular movement and materials deliveries will temporarily increase the traffic volume during construction. This will be site-specific and short-term in nature. The environmental management plan (EMP) will ensure measures are included to mitigate the impacts.
<ul style="list-style-type: none"> Noise and dust from construction activities? 	✓		Expected during construction activities. However, impacts are temporary and short-term in duration. The EMP will ensure measures are included to mitigate the impacts.
<ul style="list-style-type: none"> Temporary silt runoff due to construction? 		✓	As the subproject area is hilly and terrain is rocky, run-off during construction will be more but erosion will be less. However, impacts are temporary and short-term in duration. The EMP will ensure measures are included to mitigate the impacts. Construction contractors will be required to include channelization where it required.
<ul style="list-style-type: none"> Hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation? 		✓	The subproject will involve construction of the associated works at old landfill site only.
<ul style="list-style-type: none"> Emission of potentially toxic volatile organics from land disposal site? 		✓	The subproject will involve construction of the associated facility at old landfill site only hence no emission of toxic gases.
<ul style="list-style-type: none"> Surface and ground water pollution from leachate and methane gas migration? 		✓	The subproject in Tranche 2 will involve construction of associated facilities at old landfill site hence no leachate or methane gas generation.
<ul style="list-style-type: none"> Loss of deep-rooted vegetation (e.g. trees) from landfill gas? 		✓	The subproject in Tranche 2 will involve construction of associated facilities at old landfill site only.
<ul style="list-style-type: none"> Explosion of toxic response from accumulated landfill gas in buildings? 		✓	The subproject will involve construction of the associated facilities at old landfill site only.
<ul style="list-style-type: none"> Contamination of air quality from incineration? 		✓	The subproject will not involve incineration.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> Public health hazards from odor, smoke from fire, and diseases transmitted by flies, rodents, insects and birds, etc.? 		✓	The subproject will not involve construction of the landfill site but involves only associated facilities at old landfill site.
<ul style="list-style-type: none"> Health and safety hazards to workers from toxic gases and hazardous materials in the site? 		✓	Workers will be provided with the required PPEs although generation of toxic gases is not expected during construction works.
<ul style="list-style-type: none"> Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		✓	Priority in employment will be given to local residents to the extent possible. Construction contractors will be required to provide workers camp with water supply and sanitation.
<ul style="list-style-type: none"> social conflicts if workers from other regions or countries are hired? 		✓	Priority in employment will be given to local residents.
<ul style="list-style-type: none"> 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.
<ul style="list-style-type: none"> Community safety risks due to both accidental and natural hazards, especially where the structural elements or components (e.g., landfill or incinerator) 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 worker and project concerned members will be allowed to visit the operational sites.
Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	Yes	No	
<ul style="list-style-type: none"> Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)? 		✓	No major fault or thrust occurs within the Shillong Urban Zone but prominent lineament and a major shear zone (Tyrpad-Barapani Shear) occur in the vicinity. Shillong falls in the seismic Zone V, and is highly vulnerable to earthquakes. The base of Shillong group is marked by conglomerate bed containing cobbles and boulders of Archaen rocks. Other environmental factors like lithology, regolith characteristics have very limited or no influence on the foundation, which is already found to be suitable, and the area is free from landslide problems. Any facilities will require compliance with government rules for seismic design in hilly areas.
<ul style="list-style-type: none"> Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost? 		✓	
<ul style="list-style-type: none"> Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, 		✓	Proposed project will not impact any marginalized population, rural-urban migrants, illegal settlement etc.

Screening Questions	Yes	No	Remarks
ethnic minorities, women or children)?			
<ul style="list-style-type: none"> • Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)? 		✓	No such possibility of vulnerability increase of the surrounding area.

Appendix 2: MOEF approval letter for old Solid Wastes Disposal Site at Martern



MINISTRY OF ENVIRONMENT & FORESTS
NORTH EASTERN REGIONAL OFFICE
LAW-U-SIB, LUMBATINGEN
NEAR M.T.C. WORKSHOP, SHILLONG-793021
PHONE NO: 0364-2537609
FAX NO: 0364-2536041
GRAM: PARYAVARAN, SHILLONG.

No. 3-MG C 074/2010-SHI/2591-92

21th November 2011

To
✓ The Commissioner & Secretary
Forest & Environment Department
Government of Meghalaya
Shillong

Sub: Proposal under the Forest (Conservation) Act, 1980 for diversion of 7.28 ha of Reserve Forest land for construction of Sanitary System for disposal of Shillong City Garbage in East Khasi Hills District, Meghalaya.

Sir,

Please refer to the State Government's letter No. FOR.76/99/244 dated 13.04.2011 on the subject mentioned above, seeking approval of the Central Government in accordance with Section 2 of the FCA, 1980, and to say that the proposal has been examined by the State Advisory Group Committee, approval was granted vide this office letter of even number dated 21.07.2011 subject to fulfillment of certain conditions. The State Government has furnished compliance report in respect of the conditions stipulated in the in-principle approval and has requested the Central Government to grant final approval.

In this connection, I am directed to say that on the basis of the compliance report furnished by the State Government vide letter No. FOR.76/99/257 dt. 03.11.2011, final approval of the Central Government is hereby granted under Section-2 of the Forest (Conservation) Act, 1980 for diversion of 7.28 ha of Reserve Forest land for construction of Sanitary System for disposal of Shillong City Garbage in favour of Chief Executive Officer, Municipal Board, Shillong in East Khasi Hills District, Meghalaya, subject to the following conditions:

- (i) Legal status of the Forest land shall remain unchanged.
- (ii) Compensatory afforestation shall be carried out over 14.56 Ha identified at Umdiker proposed Protected Forest in one compact Block as per the fund deposited by the User Agency.
- (iii) In addition to the above normal compensatory afforestation, Penal Compensatory Afforestation equivalent to above CA i.e. 14.56 Ha. is to be carried over the identified land for raising Penal C.A..
- (iv) Tree felling shall be done only when it is unavoidable under strict supervision of the State Forest Department.
- (v) No damage to the flora and fauna of the surrounding area shall be caused.

- (vi) The forest land shall not be used for any purpose other than that specified in the proposal.
- (vii) No labour camps shall be established either inside the diverted area or other forest land.
- (viii) The forest land proposed to be diverted shall under no circumstances be transferred to any other agency, department or person either through lease or otherwise.
- (ix) The layout of the plan of the proposal shall not be changed without the prior approval of the Central Government.
- (x) The matter of violation of F (C) Act, 1980 has been kept presently in abeyance as the Govt. of the State is in urgent need of land for the sake of public health and sanitation; but this approval shall be subject to the final decision of the competent authority in the matter of related violation of F (C) Act, 1980.
- (xi) Any other conditions as may be found appropriate in future for the betterment of environment & wildlife, may be imposed by CCF (C), North Eastern Regional Office.

Yours faithfully,



(B. S. Kharmawphlang)
Conservator of Forests (C)

Copy to:

1. Principal Chief Conservator of Forests & Head of Forest Force, Department of Forests & Environment, Government of Meghalaya, Shillong

Conservator of Forests (C)

Appendix 3: Records of Public Consultations and Information Disclosure
Details of Focus Group Discussion done at Shillong

Particulars	Location	Date	No. of Participant	Issues discussed & outcome
Meeting with Self Help Groups Leaders	Mawlai, Shillong	26 th November 2010	30	The objective of the meeting was to brief them about the project activities and understand the existing system of the solid waste management and sanitation in their localities. It has been shared by the members that the solid waste is being managed by the Dorbar in their respective localities. They also shared that there is no sewerage system in their localities. During the discussion it was found that most of the members are not aware about importance of the solid waste management and proper sewerage system as well as their impact on health. This is a very important aspect that needs to be addressed through proper awareness campaign strategy. All the members expressed their whole hearted support during the implementation of the project.
Meeting with the members from the Domestic Workers Association	Malki, Shillong	5 th December 2010	20	The issues emerged from the discussion are: <ul style="list-style-type: none"> • There is no proper sewerage system in Malki. • Most of the households are having the septic tank facilities. • There are some households who are using public toilets as they don't have toilets in their houses. • There is a stream flowing from Cliff Colony to Malki which is almost contaminated from its source and stinks badly. As a result, health problems are most common among the habitants of Malki • No proper efforts have been made to clean the stream and maintain it properly. • During the rainy season, almost all the septic tanks are overflowed and the effluents are flowing to the stream • There is no segregation of wastes done at the household level. • Household wastes are being collected by SMB twice a week. • Every year there is a cleaning drive facilitated by the Dorbar, where all the community people are participating to clean their respective localities. • Awareness level on the importance of proper management of Solid waste and sewerage system is very low among the participants.

Consultation with NGOs in Shillong

Name & Address of NGO	Major Activities of NGO	Tool	Scope of Consultation
North Eastern Regional Domestic worker Association (NERDWA) Contact person: Sister Teresa Joshop, Maria Villa- 2 nd Floor, Dhankheti, Malki, Shillong	<ul style="list-style-type: none"> • Empowerment programme through awareness and information sessions • Formation of SHGs and micro credit activities • Working for social Security measure and livelihood development • Campaign on the rights of the children and implementation on the ban on child labour • Informal literacy schemes • Capacity building programme 	Informal meeting/ Discussion	Introduction of project, project components, Possibilities of involvement of communities
People's Learning Centre	<ul style="list-style-type: none"> • Promote water Literacy across all stakeholders groups 	Informal meeting/	Introduction of project, project

Ms. Farida, Director, Matti-i-Mei, Mawlai Mawroh- Shillong	<ul style="list-style-type: none"> • Create a dedicated, environmentally conscious youth base • Facilitate dialogue between traditional institution and government departments to decentralise solid waste management • Facilitate citizen action in reducing pollution to protect environment 	Discussion	components, Possibilities of involvement of communities
Women for Integrated Sustainable Empowerment (WISE) Contact Person: Sister Judith, St. Marry Convent, Laitumkhrah, Shillong	<ul style="list-style-type: none"> • Vocational Skill Training • Organising legal awareness and adult literacy campaign • Capacity building on resource management 	Informal meeting/ Discussion	Introduction of project, project components, Possibilities of involvement of communities
Bethany Society Contact person: Mr. Carmo Noronha, Executive Director, Lady Veronica Lane, Laitumkhrah, Shillong	<ul style="list-style-type: none"> • Facilitating the formation of Disabled People's Organisations (DPOs) in every District of Meghalaya. • Developing the Capacity of SHGs of persons with disability and made available Micro-credit • Mobilizing communities to form Self Help Groups (SHGs) and thus enhancing opportunities for improving livelihoods. • Conducting trainings in for building capacities of communities 	Informal meeting/ Discussion	Introduction of project, project components, Possibilities of involvement of communities
Don Basco Reach Out Rilang Shalter Home, NONGTHYMMAI, NONGCHILIANG, Shillong Contact person: Mr. Rodrek	<ul style="list-style-type: none"> • Facilitating Micro Credit and Micro Enterprise • Enhancing food security through Promotion of Agriculture and livestock development • Promotion of Gender Equity • Facilitating Traditional Governing Institution to promote sustainable development • Working on the issues of the Health 	Informal meeting/ Discussion	Introduction of project, project components, Possibilities of involvement of communities

Consultation with members of Association of Headmen

Minutes of Stakeholder Consultation Meeting with members of Synjuk Rangbah Shnong, Shillong on implementation of ADB/MoUD funded NERCCDIP held in the Conference Hall, Raitong Building on 7TH December 2010.

Members Present: As per list attached.

At the outset, Shri. B. Dutta, the Project Director, SIPMIU welcomed all the Rangbah Shnongs who were present for the first stakeholder consultation meeting with the Synjuk Rangbah Shnong, Shillong and gave a brief introduction about North Eastern Region Capital Cities Development Investment Programme (NERCCDIP), its funding pattern, implementation process and institution development requirements. He mentioned that Shillong has grown at a fast pace and most of the growth has taken place outside the municipal limits. He also informed that the project presents an opportunity to think about how Shillong should be managed in future and to put in place a formal urban governance structure involving all stakeholders. He stated that this is one of the requirements which has to be fulfilled as part of the project commitment.

This was followed by a brief presentation from Shri H K Mazhari, Team Leader, Institutional Development Consultant viz. M/s PricewaterhouseCoopers Pvt, Ltd. Gurgaon, who spoke on the objective of the urban governance structure and the need for such a structure for Greater Shillong. He also spoke of the implications and issues that needs to be addressed by the stakeholders for which the views of the Synjuk Rangbah Shnong, Shillong are also sought.

The Community Participation Specialist of the Design, Supervision and Management Consultant, viz. M/s Mott McDonalds Pvt. Ltd. made a presentation on the Sewerage and Solid Waste Management projects that are being taken up under this project. He stressed the need for community participation in planning and implementation of the projects especially the roles of the Dorbar Shnongs and the involvement required from them.

After the presentations were made, the views and comments of the participants were sought.

Shri H. Syiem, Rangbah Shnong of Jaiaw Shyiap & Lumpyllon sought a few clarifications viz. Whether the SWM & Sewerage projects are also the same which were projected in the City Development Plan prepared under JNNURM. How and where the sewer lines and Sewerage Treatment Plants will be located? Whether the Dorbar Shnongs are considered as CBO's? Since a sewerage system needs a lot of water, can such a system work in Shillong?

It was clarified to him that the SWM & Sewerage projects are taken under the NERCCDIP and not under JNNURM although the same were projected in the City Development Plan (CDP) prepared under JNNURM. It was also clarified that the investments required for different sectors for the city will be sought from various sources. With regards to the sewer lines and Sewerage Treatment Plants, the process is at the survey stages and once the topographical survey is completed, the DPR will be finalized. Further, it was clarified that the Dorbar Shnongs are not considered as CBO's. It was accepted that a sewerage system needs a lot of water, however, the project was considered taking into account that the 3rd phase of augmentation of the GSWSS is expected to provide 135 lpcd of water by the time it is completed.

Shri H P Oflyn Dohling, Rangbah Shnong of Malki and President, SRS asked whether the traditional institutions needs to come under the election process in the new governance structure. The Team Leader, IDC informs him that election process is one of the principles of urban governance. The President, SRS raised the need of a new municipal act and said that the same should be framed to suit the conditions in Shillong and Meghalaya as a whole. After a detailed discussion, it was felt that the proposal can be looked into as long as it is tenable under the law and representations of all the stakeholders including women are considered.

The role of the traditional institutions was discussed, and it was felt that they need to have a more formal role in management of civic affairs. It was also discussed that since most of the projects like water supply, sewerage, drainage and solid waste management extends and requires attention even beyond the municipal boundary, it is necessary to consider the areas outside the present municipal boundary for the urban governance structure.

Shri B Naji, Rangbah Shnong, Lumdiengsoh & Chairman, Nongthymmai Dorbar Pyllun while expressing the need for proper drainage facility in Nongthymmai area and suggested measures to address the issue. He also enquired as to whether the setting up of the urban governance structure in areas outside the present municipal boundary is to bring panchayati raj institutions and will it not conflicts with the Sixth Schedule of the Constitution. Further, he wanted to know the function of the Meghalaya Urban Development Authority and if it won't conflict with the municipal functions.

The Project Director, SIPMIU clarified that it is not the intention to bring in the panchayati raj system but to evolve an urban governance set up for Greater Shillong area. He also informed the participants that as part of the consultative process, representatives of the various Dorbar shnongs and members of the public residing outside the municipal limits

will be consulted over the next few months and it was agreed that this matter needs to be discussed in detail with all stakeholders.

Shri D Syiemlieh, Rangbah Shnong, Lumdiengjri reminded the participants that as Government always sought their help for Law & Order issues, he suggested that the traditional institutions should also be considered in a policy making body or committee. Further, he wanted to know whether election is a condition for implementation of this project. He was informed that it is required and therefore consensus needs to be built on the urban governance structure to be set up for Greater Shillong area.

The other points suggested during the meeting by some of the Rangbah shnongs are:

- a. If any survey is being conducted, the boundary of the respective dorbar shnong may be demarcated with the help of the Rangbah shnongs,
- b. Delimitation of the ward boundaries making them co terminus with the Dorbar Shnong boundaries and to consider two or more than two Dorbar Shnong under one ward or constituency.
- c. Address the issues of corruption in the system.

It was decided that copies of the power point presentation will be provided to all the members of the Synjuk Rangbah Shnong and that the Synjuk will communicate their formal view on the issue of an urban governance structure for the entire city preferably within one month's time considering the fact that the implementation of the project is time bound.

The meeting ended with Shri. B. Dutta, the Project Director, SIPMIU thanking the participants for attending the stakeholder meeting and hope for their suggestions and participations on the subject matter in the near future.

Sdt
(Shri B Dutta)
Project Director
SIPMIU, Shillong.


Memo No. SIPMIU/MEG/26/2010/166 – A,

Dated Shillong the 23rd Dec, 2010.

Copy to:-

1. The Under Secretary to the Govt. of Meghalaya, Urban Affairs Deptt. for favour of information.
2. All members present.

Shri. S. K. Bhattacharya,
Team Leader DSMC.


(Shri B Dutta)
Project Director
SIPMIU, Shillong.

Member Present in the Meeting of Public Consultation with the Rangbah Shnong of Shilong held on 7th Dec, 2010 at 2:00 p.m. in the Conference Room of Urban Affairs Deptt.

- | | |
|--|------|
| 1. Shri. H. P. Oflyn Dohling,
President,
Rangbah Synjuk Rangbah Shnong
Rangbah Shnong, Malki. | Sd/- |
| 2. Bah. H. Syiem,
Rangbah Shnong,
Jaiaw Shyiap and Lumpyllon. | Sd/- |
| 3. Bah. R. V. Dkhar,
Rangbah Shnong,
Lumiablot, Nongthymai. | Sd/- |
| 4. Shri. W. B. Najiaw,
Chairman,
Nongthymmai Pyllun. | Sd/- |
| 5. Mr. M. Syiem,
Secretary, Dorbar Shnong,
Lumiablot, Nongthymai. | Sd/- |
| 6. Donkumar War,
Secretary,
Mission Compound. | Sd/- |
| 7. D. Syiemlieh,
Rangbah Shnong,
Lumdiengjri. | Sd/- |
| 8. Shri. J. Dkhar,
Rangbah Shnong,
Lawmali Pyllun. | Sd/- |
| 9. Shri. C. Kyndyke,
Jaiaw Upper Lansonalan. | Sd/- |
| 10. Shri. C. Lytan,
Rangbah Shnong,
Dymmiew. | Sd/- |
| 11. Shri. H. C. Massar,
General Secertary,
Qualapatty. | Sd/- |

- | | |
|--|------|
| 12. Martamlin Pyrbot,
Rangbah Shnong,
Qualapatty. | Sd/- |
| 13. Mr. Wanjop Pyrbot,
Rangbah Shnong,
Mawprem. | Sd/- |
| 14. D. Lamo,
Joint Secretary,
Dorbar Shnong Mawprem. | Sd/- |
| 15. B. Nongbah,
Rangbah Shnong,
Wahdienglieng. | Sd/- |
| 16. K. A. Pariat,
Rangbah Shnong,
Jaiaw Pdeng. | Sd/- |
| 17. D. Dkhar,
Rangbah Shnong,
Wahingdoh. | Sd/- |
| 18. L. Jyrwa,
Rangbah Shnong,
Risa Colony. | Sd/- |
| 19. O. Shanpru,
Rangbah Shnong,
Lower Lumparing. | Sd/- |
| 20. Shri. B. Dutta,
Project Director,
SIPMIU. | Sd/- |
| 21. Shri. K. Kharumnuid,
Addl. Project Director,
SIPMIU. | Sd/- |
| 22. Shri. G. W. Lakadong,
Assistant Engineer,
SIPMIU. | Sd/- |
| 23. Shri. H. K. Mazhari,
Team Leader, IDC. | Sd/- |

24. Shri. B. Rajesh,
Project Manager, IDC.

Sd/-

25. Marylyne Nongkynrih,
IDC.

Sd/-

26. Shri. Tapas Satpathy,
DSMC.

Sd/-

27. Shri. K. Santhakumar,
Sewerage and Sanitation Engineer,
DSMC.

Sd/-

Filled in Questionnaire by Lumkshaid Dorbar Shnong

QUESTIONNAIRE FOR DORBAR SHNONG

1. Name of the Dorbar : LUMKSHAI D.
2. Full Address : LUMKSHAI D.
3. a) Name of Rangbah Shnong : SHRI. P.N. CHYNE.
Contact No. 0364-2548140 . M-9862917201.
 - b) Name of Chairman : _____
Contact No. _____
 - c) Name of General Secretary : SHRI. LOUIS PERBOT.
Contact No. 94361-77512.
4. Full Address: LUMKSHAI D. Contact No. x
5. Activities in General :
Cleaning drive, youth festival, food festival, law and orders
Residential Certificates, Tenant,
6. Activities in the field of Solid Waste Management :
 - (i) Total Population of the Shnong : 3000 Approx.
 - (ii) Total quantity (in M ton or Kg) of waste generated in the shnong per day : @ 500-600kg.
 - (iii) Waste generated from (mention quantities in M.ton or Kg per day :

<input checked="" type="checkbox"/>	Household	<input checked="" type="checkbox"/>	Institutional
<input checked="" type="checkbox"/>	Commercial	<input checked="" type="checkbox"/>	Industrial
<input checked="" type="checkbox"/>	Biomedical (Hospital or any kind of health. Care establishment)		
 - (iv) Is road sweeping done? ☒ Yes ☐ No.
If yes, please state how frequently. Is sweeping carried out in all the roads?
daily, by. S.M.B. Sweepers / Dorbar will Monitor the process.
- (iv) Collection of Solid Waste
 - a) Is scientific disposal of solid waste a priority in your Shnong? Do you want any improvement on this sector?
yes, I.

- b) Whether house to house collection is practised? ☒ Yes ☐ No

If yes, from how many households in the Shnong house to house collection is done?

out of 4 blocks. only in 2 blocks. is carried out.

- c) Whether any private Agency is engaged for the same? If yes, then give details of the Agency :

Name X

Address Y

Contact No. X

- d) Whether any segregation is carried out at source? If yes, how? Please state.

- e) Whether recycling of waste (paper, plastic material pet bottles, glass materials etc) is carried out at the household level ☐ Yes ☒ No.

If yes, how are they disposed of?

- f) Whether any rag picking is carried out at dustbins by rag pickers ☒ Yes ☒ No

If yes, please give the following information.

Usual number of rag pickers 2 to 3

Items recovered plastic, paper, steel, bottles.

Average earning by individual rag pickers, any idea? Rs. _____ per day.

- g) Number of community dustbins in the Shnong : NO

Other details

Type:-

i) ☒ Concrete

ii) ☒ Metallic Container

- h) No of sweepers in the roll of the Shnong and total amount spent on their salaries/wages

4 Nos. paid by S.M.B.

- i) Number of markets, schools, hostels, commercial establishments existing in the Shnong? Do you have any idea about how much quantities of waste generated per day from the above source and how they are disposed of?

NO

- j) Is there any slaughter house in your Shnong? If yes, how many?

NO

(vi) Transportation

- a) Number of Vehicles owned by the Shnong. If no vehicle is owned, how are they handling transportation of the waste?

- b) Does the Dorbar have any vehicle supplied by MUDA? If yes, how many?

NO

NO

- c) Has any vehicle been purchased by Dorbar under MP LAD/MLA Lad programme? If yes, how many? X

(d) The details of the vehicle

- i) Make : X ii) Model : X
 iii) Capacity (m³): X iv) Payload in Metric Tons : X
 v) Purchase Cost: X
 vi) Expenditure (monthly/yearly) on P.O.L.: _____
 vii) Cost of repairs (monthly/yearly) : _____
 viii) Number of drivers employed on monthly basis and their salaries : _____
 ix) Numbers of attendants employed on monthly basis and their salaries/wages.

(vi) Disposal :

- a) Whether waste is transported to dumping ground by the Shnong for final disposal?
☐ Yes ☒ No
 b) Whether any backyard composting is carried out in the Shnong? If Yes , how many households do practise this ? : NO
 c) Is there any degradation of waste before composting? If yes, how?
X

(viii) Finance :

- i) Amount (approx) spent on Solid Waste Management by Dorbar Shnong.
Rs. 8000.
 ii) How much percent (approx) of the total collection by the dorbar shnong is spent on Solid Waste Management (SWM)?
X
 iii) Any fees collected from households for collection of Solid waste? If yes give an idea about the fees collected from each household and the total monthly collection in Rupees 30/- Directly paid to waste collector.
 iv) Do all household pay the fees? If no, please inform who are exempted.
NO
 v) Are households/other establishments in your areas willing to pay an additional amount for handling and disposal of solid waste? If yes, how much are they capable? If not, reasons?
NO

** NOT INCLUDED,*
(ix) What is the Dorbar Shnong's view on operation and maintenance of Solid Waste Management for the locality and the City as a whole? Whether it should be

- a) Through the Government or its agencies?
- b) Through the Dorbar Shnong?
- c) Through SHG's, NGO's involve in Solid Waste Management?
- d) By outsourcing through private contractors?
- e) If any other, please suggest.

(x) Do you have any other suggestion in this regards? If yes, please give.

Sewerage

1. How many houses in your Shnong have individual toilets:
 - i) with septic tank without soak pits 530.
 - ii) with septic tank and soak pits —
 - iii) without any septic tanks or soak pits 6.
2. How many houses in your Shnong do have shared toilet? : NO.
3. How many houses in your Shnong do have pit latrines? : 9 NO.
4. Is provision of sewerage system a priority for your Shnong? : YES.
5. How many houses in your Shnong will take connection to the sewerage system, if provided by the Government? : NOT KNOWN
6. How many money can a household spend for obtaining your connection to the sewerage system? Rs. NOT KNOWN
7. What amount would be convenient for a household to pay quarterly user fees? Rs. NOT KNOWN

2 (T. N. C. Gupta)
Rangbah Shnong
Dorbar Shnong Lumkshaid

Filled in Questionnaire by R & R Colony Welfare Society Dorbar Shnong

QUESTIONNAIRE FOR DORBAR SHNONG	
1. Name of the Dorbar :	R & R COLONY WELFARE SOCIETY
2. Full Address :	R&R COLONY, SHILLONG-793006, MEGHALAYA.
3. a) Name of Rangbah Shnong :	SHRI NILANJAN BHATTACHARJEE
Contact No.	9436161531
b) Name of Chairman :	_____
Contact No.	_____
c) Name of General Secretary :	SHRI DEBOPRIYO DEB
Contact No.	9856001599
4. Full Address :	R&R COLONY, SHILLONG-6 MEGHALAYA
Contact No.	9856001599 0364-2537877
5. Activities in General :	PROVIDING BASIC UTILITY SERVICES LIKE WATER SUPPLY, STREET LIGHT, GARBAGE DISPOSAL, LPG DELIVERY, LIASIONING WITH DISTRICT ADMINISTRATION, STATE GOVERNMENT DEPARTMENTS & MAINTAINING LAW & ORDER ETC.
6. Activities in the field of Solid Waste Management :	
(i) Total Population of the Shnong :	4800 (APPROX)
(ii) Total quantity (in M ton or Kg) of waste generated in the shnong per day :	1.8 TON/DAY
(iii) Waste generated from (mention quantities in M. ton or Kg per day :	
	1.4 TON Household
	_____ Institutional
	0.4 TON Commercial
	_____ Industrial
	_____ Biomedical (Hospital or any kind of health. Care establishment)
(iv) Is road sweeping done?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No. MAIN ROADS ONCE IN 3 DAYS BYLANES ONCE IN A WEEK.
If yes, please state how frequently. Is sweeping carried out in all the roads?	
(v) Collection of Solid Waste	
a) Whether house to house collection is practised?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If yes, from how many households in the Shnong house to house collection is done?	
ALL THE HOUSES.	

- b) Whether any private Agency is engaged for the same? If yes, then give details of the

Agency : NO (DONE BY R & R COLONY WELFARE SOCIETY).

Name _____

Address _____

Contact No. _____

- c) Whether any segregation is carried out at source? If yes, how? Please state. NO

- d) Whether recycling of waste (paper, plastic material pet bottles, glass materials etc) is carried out at the household level ☐ Yes ☒ No.

If yes, how are they disposed of?

- e) Whether any rag picking is carried out at dustbins by rag pickers ☐ Yes ☒ No
If yes, please give the following information.

Usual number of rag pickers _____

Items recovered _____

Average earning by individual rag pickers, any idea? Rs. _____ per day.

- f) Number of community dustbins in the Shnong : NIL

Other details

Type:-

i) ☐ Concrete

ii) ☐ Metallic Container

- g) No of sweepers in the roll of the Shnong and total amount spent on their salaries/wages

5 NDS & TOTAL SALARY - Rs 10,000/- per month.

- h) Number of markets, schools, hostels, commercial establishments existing in the Shnong?

Do you have any idea about how much quantities of waste generated per day from the above source and how they are disposed of?

4 SCHOOLS, 6 NDS (APPROX), SMALL SHOPS, 0.4 TONS/DAY, DISPOSED AT MARTEN.

- i) Is there any slaughter house in your Shnong? If yes, how many?

NO

(Main Pong Dumping Ground)

- (vi) Transportation

- a) Number of Vehicles owned by the Shnong. If no vehicle is owned, how are they handling transportation of the waste? 1 (ONE)

- b) Does the Dorbar have any vehicle supplied by MUDA? If yes, how many? NO

- c) Has any vehicle been purchased by Dorbar under MP LAD/MLA Lad programme? If yes, how many? YES, 1 (ONE) UNDER MPLAD SCHEME.

- d) The details of the vehicle

i) Make : TATA

ii) Model : 207

iii) Capacity (m³): iv) Payload in Metric Tons :

v) Purchase Costs Rs. 4,62,000/-

vi) Expenditure (monthly/yearly) on P.O.L.: Rs. 60000/YEAR.

vii) Cost of repairs (monthly/yearly) : Rs. 15000/YEAR.

viii) Number of drivers employed on monthly basis and their salaries : Rs. 2000/- For 1 DRIVER.

ix) Numbers of attendants employed on monthly basis and their salaries/wages.

(vi) Disposal : 4 NOS @ 2000/- P.M TOTAL RS. 8,000/- Out of 1 1 with
3 for loading and rest
unloading of garbage

a) Whether waste is transported to dumping ground by the Shnong for final disposal?

☒ Yes ☐ No

b) Whether any backyard composting is carried out in the Shnong? If Yes, how many households do practise this? : ND.

c) Is there any degradation of waste before composting? If yes, how? ND.

(viii) Finance :

i) Total budget of Dorbar Rs. 4,20,000/ANNUM.

ii) How much percent of the budget is spent on Solid Waste Management (SWM)?

APPROX 40% P.A.

iii) Any fees collected from households for collection of Solid waste? If yes give an idea about the fees collected from each household and the total monthly collection in rupees

RS 40/HOUSE & TOTAL COLLECTION RS. 22,000/MONTH.

iv) Do all household pay the fees? If no, please inform who are exempted.

70% HOUSEHOLD PAYS THE BILL.

30% keep away but

(ix) Do you have any expectation from the Government in respect of SWM in your Shnong?

Do you have any suggestion in this regards? If yes, please give. Is scientific disposal of solid waste is a priority in your shnong? Are households/other establishments in your areas willing to pay for handling and disposal of solid waste? If yes, how much per month? Rs.

ND.

No of households - 22000
40
= 550
No of households - 300

Jeeps under Co-operation

Sewerage

1. How many houses in your Shnong have individual toilets
 - i) with septic tank but without soak pit ALL
 - ii) with septic tank and soak pit 90% (SEPTILTANK) &
 - iii) without any septic tank or soak pit 10% (SEPTIC TANK)
2. How are the septic tanks cleared? THRU S.M.B.
3. How many houses in your Shnong do have shared toilets? : 20% (Sharing by tenants and owners toilet is located within the premises)
4. How many houses in your Shnong do have pit latrines? : —
5. Is provision of sewerage system a priority for your Shnong? : YES.
6. How many houses in your Shnong will take connection to the sewerage system, if provided by the Government? : DATA NOT AVAILABLE AT PRESENT
7. How much money can a household spend for obtaining connection to the sewerage system? Rs. _____
8. What amount would be convenient for a household to pay as quarterly user fees?

Water Supply

1. What is the source of water supply to the Dorbar?
 - a) Municipal supply
 - ☒ b) Supply by the PHE Department
 - ☒ c) Borewell D.P.N.S. - 4 NOS.
 - d) Open well
 - e) Any other source
2. No. of house connections in the Dorbar 275 (RRR colony), 100 (APRA) AT LUMSHINGA IN.
3. Total hours of supply by the Municipality/ PHE Department 1 Hr.



(Signature)
 (N. BHATTACHARJEE)
 HEADMAN COM PRESIDENT
 R.R.R. COLONY WELFARE
 SOCIETY.
 Shillong-6

Appendix 4: Suggested Contract Clauses (Construction)

Sources of Materials

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

Air Quality

- (i) Consult with SIPMIU/DSMC on the designated areas for stockpiling of clay, soils, gravel, and other construction materials;
- (ii) 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.

Surface Water Quality

- (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).

Noise Levels.

- (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 chiseling;
- (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.

Landscape and Aesthetics

- (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 SIPMIU 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.

Socio-Economic – Income

- (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.

Socio-Economic – Employment

- (i) Employ at least 50% of the labor 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.

Occupational Health and Safety

- (i) Develop and implement site-specific Health and Safety (H and 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 and S

- Training¹ 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 and 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.

Community Health and Safety

- (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.

Quarry Sites and Borrow Pits

- (i) Verify suitability of all material sources and obtain approval of DSMC;
- (ii) Prioritize government-approved quarries and borrow pits;

¹ 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.

- (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.

Work Camps

- (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.

Social and Cultural Resources – Chance Finds

- (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;
- (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.