



# Semi-Annual Environmental Monitoring Report

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December 2014

Period: July 2014 - December 2014

## IND: North-Eastern Region Capital Cities Development Investment Program – Shillong Solid Waste Management Subproject (Tranche 1) – Shillong, Meghalaya

Prepared by

State Investment Program Management and Implementation Unit

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## Asian Development Bank

## 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	— Multi tranche 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 Project Management and Implementation Unit
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

## **I. INTRODUCTION**

### **A. BACKGROUND**

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. An Initial Environmental Examination (IEE) has been prepared for the Shillong Solid Waste Management Subproject as part of NERCCDIP -Tranche 1. Under the NERCCDIP Tranche-1 programme, the subproject covers construction of a short-term sanitary landfill site over an area of 6500 sqm.

#### **Extent of the IEE Study**

6. The 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.

#### **ADB Policy**

7. 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.

8. **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.

9. **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.

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

- (i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- (ii) Final or updated EIA and/or IEE upon receipt; and
- (iii) Environmental Monitoring Reports submitted by SIPMIU during project implementation upon receipt.

## B. PROJECT PROFILE

### Type, Category and Need

11. **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.

12. **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.

13. **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 not systematic. Similarly for the final disposal of the waste generated by the city, although there is a 100 TPD compost plant in operation, there is no systematic and scientific way for the final disposal of the rejects from the compost plant.

14. The primary objective of the subproject is to adopt sanitary landfilling for ultimate disposal of the rejects from the compost plant as per Municipal Solid Waste (Management and Handling) Rule (MSW Rules) (2000) in the interests of health and economic wellbeing of the people of Shillong.

### Location and Implementation Schedule

15. The subproject site is located on a vacant land within the existing landfill site at Marten about 8 km outside Shillong city.

16. Although implementation was originally scheduled to start from 2010-2011, actual implementation could only start during March 2012. The original completion period for the work was 18 months. However, due to change in design and quantum of work, the completion period is expected to be completed by June 2015.

## Description of the Subproject

### 1. Existing Solid Waste Management

17. **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 (km<sup>2</sup>). The Chief Executive Officer looks after the administration of SMB.
- (ii) The Dorbars – The 10 census towns of Shillong Urban Agglomeration (SUA) include Mawlai, Nongthymmai, Madanryting, Pynthorumkhrah, Nongmynsong, Mawpat, Umpling, Nongkseh, Umlyangka and Lawsohtun. 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 km<sup>2</sup>. 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).

18. **Waste Generation.** The solid waste generated in GSPA is 149 metric ton per day (MTD) with waste generation rate at 356 grams per capita per day in Shillong Urban Agglomeration (SUA) area and 262 grams per capita in the areas outside SUA but falling under GSPA. The major solid waste generation sources are households (56 %), markets (23 %), hotels & restaurants (7 %), construction waste (2 %), and street sweeping (7 %).

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

20. 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 Marten dumpsite.

21. **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.

22. House-to-house collection is at present in existence in a few localities only. There are about 23 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 collect only from SMB area which generates about 50 MTD of waste out of the total generation of 135 MTD from GSPA. SMB has provided 11 trucks, 3 compactors and 9 primary collection vehicles. 257 road sweepers, 5 conservancy supervisors, 6 sanitary inspectors and a chief medical and health officer. As per the SMB, there are 105 dustbins within the area of 10.8 sq. km. 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.

23. **Disposal.** The collected wastes are disposed at a disposal site located in Marten, located about 8 km from the city. A 100 TPD compost Plant is in operation in the same site. The disposal site has been in existence since 1938. To improve the practice of dumping of rejects from the compost plant 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 covering an area of 6500 sqm in Tranche-1.. The bid evaluation report for all the works under Tranche I has been approved by ADB on 12<sup>th</sup> March 2010 and the approval for issuance of acceptance letter for successful bidders has been issued on 1<sup>st</sup> April 2010. The actual work has started from March 2012.

24. A compost plant with a capacity of 100 MTD was constructed in the Marten 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**

25. The subproject covers construction of a short-term sanitary landfill site with associated works over an area of 6500 sqm at Marten and as detailed in Table-1 below.



Table 1: Shillong Solid Waste Management Subproject Components

Component	Location	Function	Description	Remarks
<b>(i) Civil Works</b>				
Development of emergency sanitary landfill measuring 6,500 m <sup>2</sup>	Marten, Mawlai	Final disposal of the rejects/ inerts materials of the waste collected from the city.	It is proposed to develop a sanitary landfill for an area of 6,500 sqm in Tranche – 1	No land acquisition required
Reinforced cement concrete (RCC) counterfort retaining wall	Marten, Mawlai	To protect the waste from sliding.	7.5 Mtr To 12.5 mtr	All required clearances and approvals obtained for 15,000 m <sup>2</sup> emergency landfill site including 6500 m <sup>2</sup> . ✓
Leachate holding and treatment system	Marten, Mawlai	To treat the leachate collected from the landfill area.	Capacity of the leachate holding tank and material proposed.	
Concrete drains for surface run off	Marten, Mawlai	As surface drains	250X250 (L= 150 meter)	
Approach Road	Marten Mawlai	Access	Length of approach road is 583 meter and width 3.5	
Construction of leachate holding	Marten Mawlai	Collection of leachate	1 No.	
Tube well with pumping main and pump set	Marten Mawlai	Water supply for maintenance and monitoring of ground water.	248m deep	
Construction of ground level service reservoir	Marten Mawlai	Storage of water for maintenance	1 lakh litres capacity (1no)	

## II. ENVIRONMENT ASSESSMENT& REVIEW FRAMEWORK

### A. ENVIRONMENT LEGAL REQUIREMENT

#### EIA Notification (2006)

26. 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.

27. Category A projects requires Environmental Clearance from the National Ministry of Environment and Forests (MOEF). The proponent is required to provide preliminary details of the project in the form of a Notification, after which an Expert Appraisal Committee (EAC) of the MOEF prepares 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.

28. 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.

29. The only type of infrastructure provided by the NERCCDIP that is specified in the EIA Notification is solid waste management.<sup>1</sup>

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

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<sup>1</sup> 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.

**Water (Prevention and Control of Pollution) Act (1974)**

31. 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.

32. The CFE for the proposed landfill at Marten dumpsite to be developed under Tranche I has been received from MSPCB on 26th November 2009 with validity till October 2010 which is further is extended by MSPCB. ✓

**Air (Prevention and Control of Pollution) Act (1981)**

33. 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.

**Municipal Solid Waste (Management and Handling) Rules (2000)**

34. 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.

## Forest Legislation

35. 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.

36. 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.

37. 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.

38. 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.

39. 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. The SMB with the assistance of the State Government has made a payment of INR 78,76,400/- to the State Forest Department for compulsory afforestation and net present value as per directive of the Govt. of India.

**Table 2: Present status of environment& forest and other clearances**

<b>Town</b>	<b>Work Package</b>	<b>Applicable Legislation/ Type Of Clearance</b>	<b>Clearance Given By And Date</b>	<b>Subject/ Issue</b>	<b>Remark/ Action Needed</b>
SHILLONG	Tranche I SWM Landfill site	EIA Notification 2006	SEIAA, Meghalaya 14 August 2009	Environmental Clearance	Already received
		Forest Conservation Act 1980	MOEF 21 November 2011	Forest Clearance	Already received
		Air Act 1981 and Water Act 1974	Meghalaya PCB 26 November 2009	Consent To Establish (CTE)	Already received

**C. COMPLIANCE ON ENVIRONMENTAL LOAN COVENENTS**

40. The Environment Loan Covenants under NERCCDIP requires the design, construction, operation and implementation of all sub-project facilities is carried out in accordance with the environmental assessment and review procedures and Initial Environmental Examinations (IEEs) for core sub-components agreed upon between the Government and ADB, and complies with the Government's environmental laws and regulations and ADB's Environment Policy (2002). Any adverse environmental impacts arising from the construction, operation and implementation of sub-component facilities will be minimized by implementing the environmental mitigation and management measures, and other recommendations specified in environmental assessment reports (e.g., IEEs). The Government will ensure environmental requirements will be incorporated in bidding documents and civil works contracts. . Issuance of bid documents will be made after review and clearance of IEE/EIA by ADB and SEIAA or MOEF. GoI will prepare and submit annually to ADB an environmental monitoring report that describes progress in implementation of the EMP and EARP and issues encountered and measures adopted; and compliance with the relevant assurances and loan covenants.

41. The sub project in Shillong is categorized as "B" and accordingly an IEE report has been prepared. The IEE maps the potential environmental impacts and mitigation measures and also specifies an environmental budget for environmental mitigation measures, monitoring requirements and capacity building at various stages of project implementation. IEE was made a part of the bidding document. In view of the fact that the actual

implementation of the sub project has started in March 2012. The details of compliance with the environmental loan covenants are reflected in following Table-3.

**Table 3: Compliance of Environmental Loan Covenants**

Project Specific Covenants	Status/Issues
Preparation of IEE	Prepared and uploaded in SIPMIU website
Environmental Management Plan	Part of IEE report
Environmental budget	Part of IEE report
IEE to be part of bidding document	Incorporated
Semi-annual environmental monitoring report	To be submitted in January 2015.

## **D. ENVIRONMENTAL ORGANISATION AND MANAGEMENT**

### **1. Details of Environmental cells setup in SIPMIU and DSMC**

42. An Environmental Expert with intermittent input has been provided in DSMC with assistance being provided by an Engineering Assistant. SIPMIU has posted an Assistant Environmental expert being assisted by an administrative staff.

<b>Sl. No.</b>	<b>Officer's Name</b>	<b>Designation</b>	<b>Mobile No</b>	<b>Email Address</b>
1.	Sri Biswajit Dutta	Project Director	---	b_dutta59@yahoo.co.in
2.	Shri. F. B. Chyne	Project Manager and Solid Waste Management Specialist, SIPMIU.	9436100719	f.b.chyne@gmail.com
3.	Shri. L. C. J. Lyngdoh	Assistant Environment Specialist, SIPMIU	9774591279	carrylaw85@gmail.com
4.	Shri Sanjiva Kumar Sharma	Team Leader, DSMC		sanjeev.sharma@mottmac.com
5.	Anjay Kumar	Environmental Specialist, DSMC	9313329631	anjay.kumar@mottmac.com
6.	Dhirendra Chaudhary	Assistant Engineer, DSMC	9774276153	dhirendra.chaudhary@mottmac.com
7.	T. Subramani up to September 2014	Solid Waste Management Expert	7204291564	smani98@yahoo.co.in

### **2. Responsibilities for supervision of environmental matters**

43. To ensure proper compliance of environmental safeguards, the Environmental Experts of DSMC and Environmental Officer SIPMIU will monitor environmental matters and report to the Project Manager who shall advice the Project Director.

### **3. Responsible for carrying out mitigation measures**

44. 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.

45. To ensure implementation of mitigation measures during the construction period, contract clauses 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.

#### **4. Responsible for carrying out monitoring measures**

46. During construction, Environmental Specialist (ES) of DSMC and the Assistant Environmental Specialist (AES) of SIPMIU will monitor the construction contractor's environmental performance.

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

#### **5. Responsible for reporting**

48. 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.

#### **6. Third Party Agency for EMP**

49. No Third Party Agency has been engaged.

#### **7. GRIEVANCE REDRESS MECHANISM**

50. 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 Principal Secretary, Urban Affair 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 Annexure-2.

51. There have been no complaints or grievance reported on the sub project till date.



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

### III. EMP COMPLIANCE STATUS

53. Following Table 4 reflects the requirement and status of implementation of the Environmental Management Plan.

**Table 4: Compliance with Environmental Monitoring Plan**

Description of Impact	Monitoring of Mitigation	Frequency of Monitoring	Monitoring Conducted by	Compliance Status
Top soil conservation & Adequate Drainage arrangements within / around the disposal site	Stockpiles of earth not to be higher than 2 and side slopes shall not be more than 1:2. Proper Drainage arrangements to prevent any water logging within / around the site especially in the area around the leachate pits.	Quarterly verification with site activities	DSMC / SIPMIU	Steps are being taken for conservation of soil.
Sources of Materials	Construction Contractor documentation	Quarterly submission for construction contractor As needed for DSMC	DSMC / SIPMIU	Material being sourced from the local market.
Air Quality	(i) Location of stockpiles; (ii) complaints from sensitive receptors; (iii) heavy equipment and machinery with air pollution control devices; (iv) ambient air for respirable particulate matter (RPM) and suspended particulate matter (SPM); (v) vehicular emissions such as sulphur dioxide (SO <sub>2</sub> ), nitrous oxides (NO <sub>x</sub> ), carbon monoxide (CO), and hydrocarbons (HC)	Twice a year for checking records	Contractor/ DSMC / SIPMIU	Meghalaya Pollution Control Board has conducted the 1 <sup>st</sup> round of Environmental Monitoring given in <b>Annexure - 6</b>
Surface Water Quality	(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.	Thrice a year	Contractor/ DSMC/SIPMIU	No such instances found on the site. Meghalaya Pollution Control Board has conducted the 1 <sup>st</sup> round of Environmental Monitoring given in <b>Annexure – 6</b> . 2 <sup>nd</sup> round of monitoring has been conducted in November 2014 and results awaited.

Description of Impact	Monitoring of Mitigation	Frequency of Monitoring	Monitoring Conducted by	Compliance Status
Noise Levels	(i) Complaints from sensitive receptors; (ii) use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and night time noise levels	Twice a year	Contractor/ DSMC/ SIPMIU	Meghalaya Pollution Control Board has conducted the 1 <sup>st</sup> round of Environmental Monitoring given in <b>Annexure - 6</b>
Landscape and Aesthetics	(i) Waste Management Plan; (ii) complaints from sensitive receptors; (iii) SIPMIU/DSMC to report in writing that the necessary	Quarterly	DSMC/ SIPMIU	There is no sensitive receptor at the construction site.
Socio-Economic - Employment	(i) Employment records; (ii) records of sources of materials	Quarterly	DSMC/ SIPMIU	All labours are from the local area.
Occupational Health and Safety	(i) Site-specific Health and Safety (H&SH&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&SH&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible back-up alarms; (x) sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal.	Quarterly	Contractor/ DSMC/ SIPMIU	(i) The contractor has prepared site safety plan and submitted to SIPMIU given in <b>Annexure-5</b> . The same will be provided in the vernacular language and kept in the conspicuous place in the site office of contractor. (ii) Contractor has been instructed to keep the first aid box in the office (iii) Medical insurance to be taken by the contractor, (iv) No accident reported, (v) Contractor supply drinking water, (vi) a shelter has been created for eating area for the labours, (vii) Briefing by the Environmental specialist was providing during the site visit on 21 June 2014. (viii) Helmets, safety shoes and mask have been supplied, (ix) JCB-1No., Tipper - 5No.have back-up alarm fitted. (x) No hazardous area on the project site.
Community Health and Safety	(i) Traffic Management Plan; (ii) complaints from sensitive receptors	Quarterly	Contractor/ DSMC/ SIPMIU	There is no intervention from any community with the project.
Quarry Sites and Borrow Pits	(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.	Quarterly		Materials are procured from the local market. So, there is no borrow pits and quarry site.

Description of Impact	Monitoring of Mitigation	Frequency of Monitoring	Monitoring Conducted by	Compliance Status
Work Camps	(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	Quarterly	Contractor/DSMC / SIPMIU	There is no sensitive reception near the site and work camp. Drinking water is supply by the contractor.

#### OBSERVATION RECOMMENDATION AND ACTION TAKEN

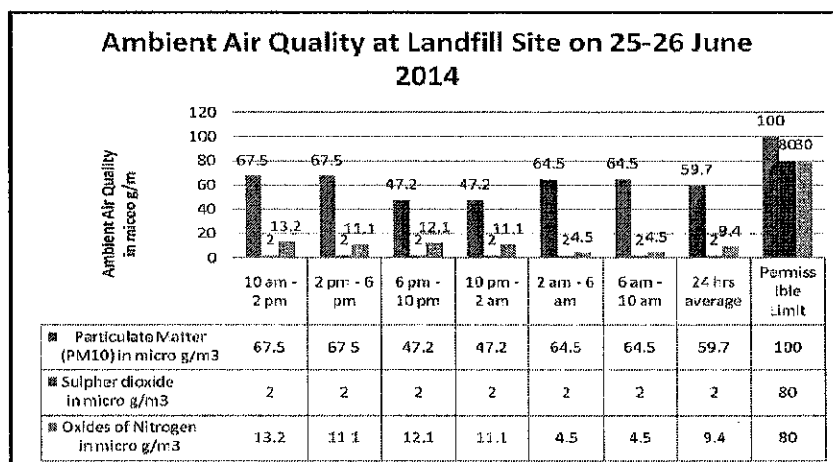
54. The work under the sub project has started in March 2012 and expected completion is June 2015 and the contractor has been made to understand that he has to comply strictly with all the EMP mitigation measures as indicated in the IEE report. The contractor has taken all steps and precautions in complying with the same. However, it has been observed that this being a first ADB project in the State, the procedures for compliance have to be explained properly to the contractors.

55. The excavated soil is disposed into a privately owned land situated near the National Highway.

#### Ambient Air Quality

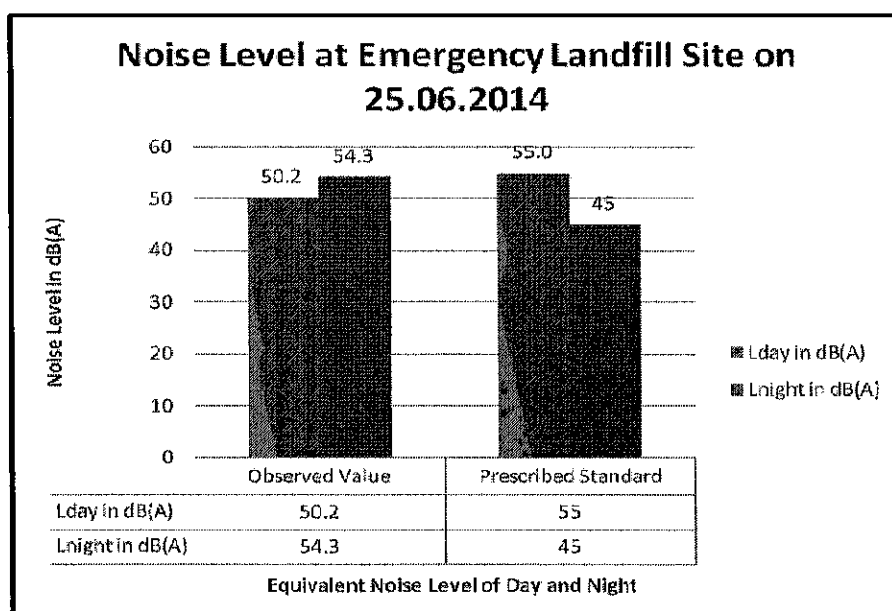
56. Ambient Air Quality monitoring at the landfill site was conducted on 25 and 26 June 2014. The concentration of Particulate Matter ( $PM_{10}$ ) is well within the permissible limit of 100 micro gram per cubic meter. The 24 hour average concentration is 59.7 microgram per cubic meter.

57. The concentration of sulphur dioxide and oxides of nitrogen are also well within the permissible limit of 80 microgram per cubic meter. The 24 hour average concentration of sulphur dioxide is 2 microgram per cubic meter. The 24 hour average concentration of oxides of nitrogen is 9.4 micro gram per cubic meter. The concentrations of Ambient Air Quality are also given in the Chart below.



### Noise level

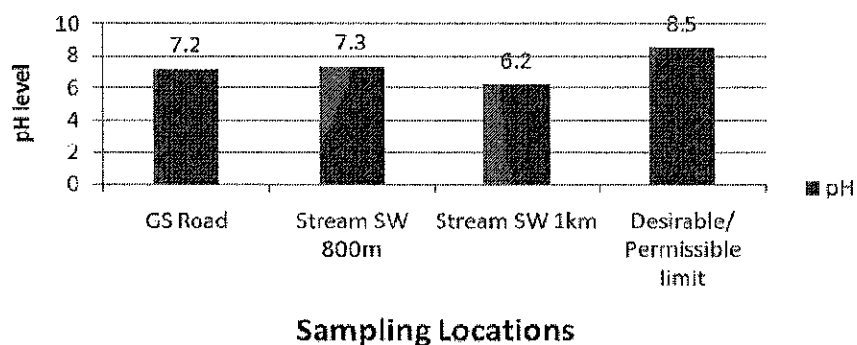
58. The ambient noise level near the construction site of RCC counterfort wall has been conducted 25 June 2014. The day time noise level is 50.2 dB(A) and night time 54.3 dB(A). The day time noise level is well within the permissible limit of 55 dB(A) while night time exceeds the permissible limit of 45 dB(A). This exceeding is due to the local night traffic on the Shillong to Guwahati national highways. The construction work is not taken up in the night time. The level of noise are also given in the chart below.



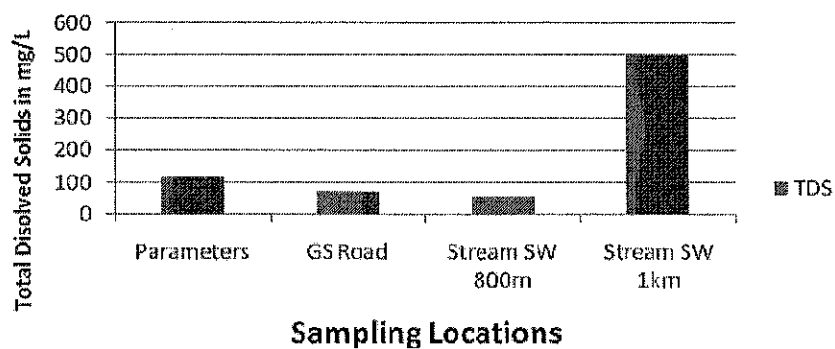
### Water Quality

59. Samples of all location have pH value, total dissolved solids (TDS), total suspended Solids (TSS), dissolved oxygen, Chlorides, Zinc. Total Hardness and nitrates are within the desirable limits or permissible limits. Heavy metals tested for Lead, Arsenic, Copper, Cadmium and Nickel are below detectible limits (BDL). The bar chart are given below.

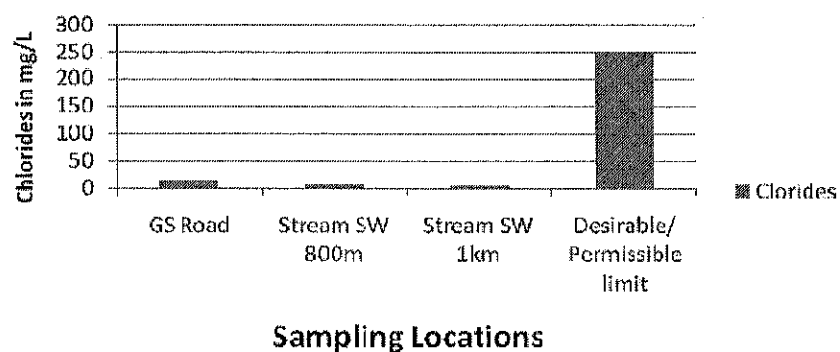
### pH - Water Sampling dated 25.06.2014

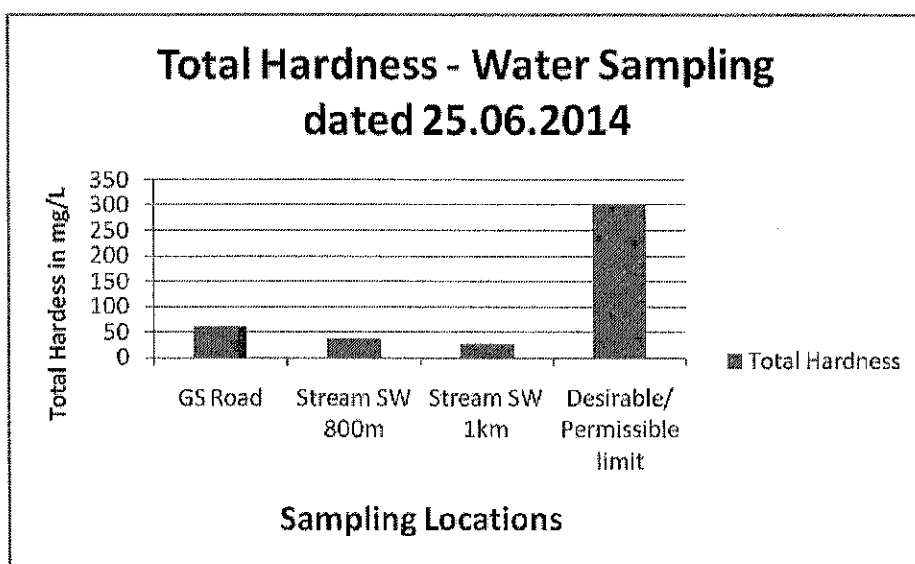
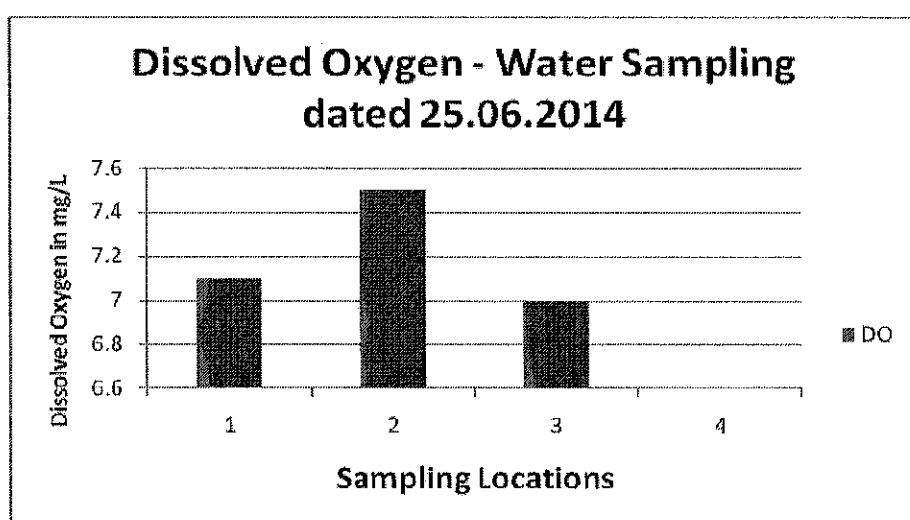
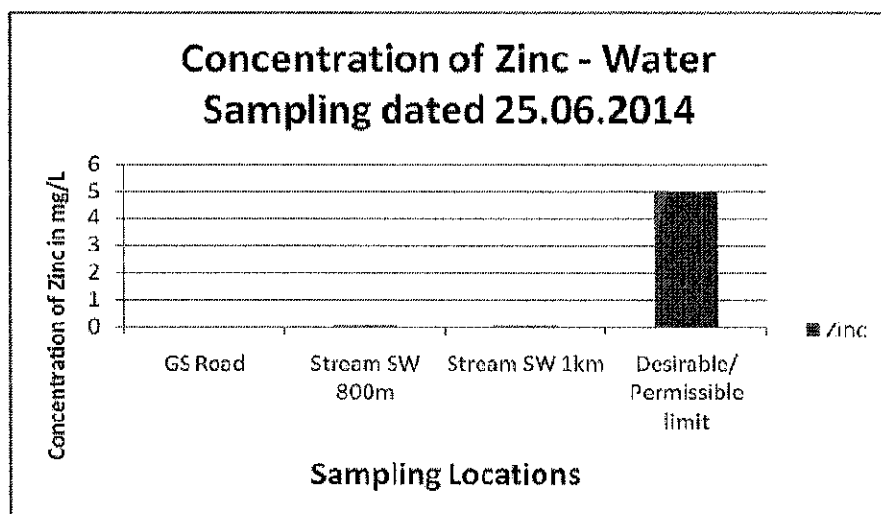


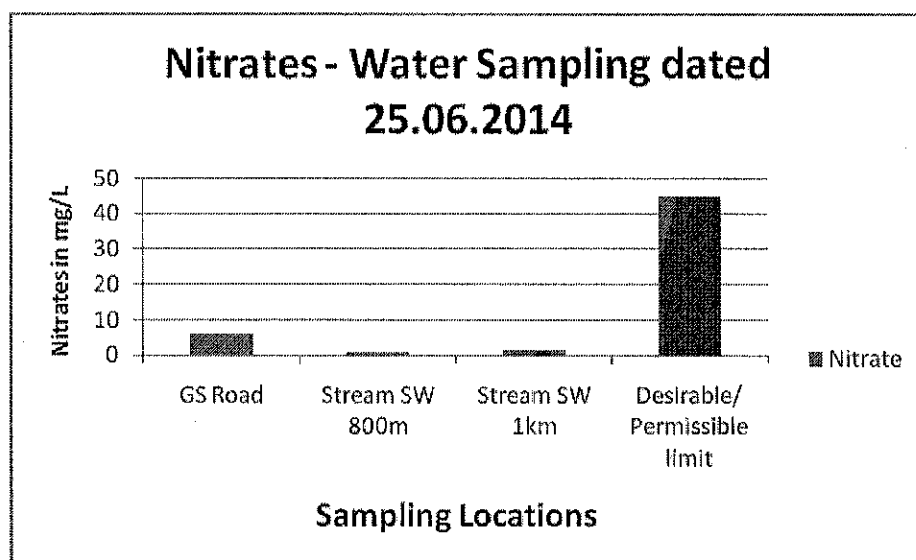
### Total Dissolved Solids Water Sampling dated 25.06.2014



### Chlorides - Water Sampling dated 25.06.2014

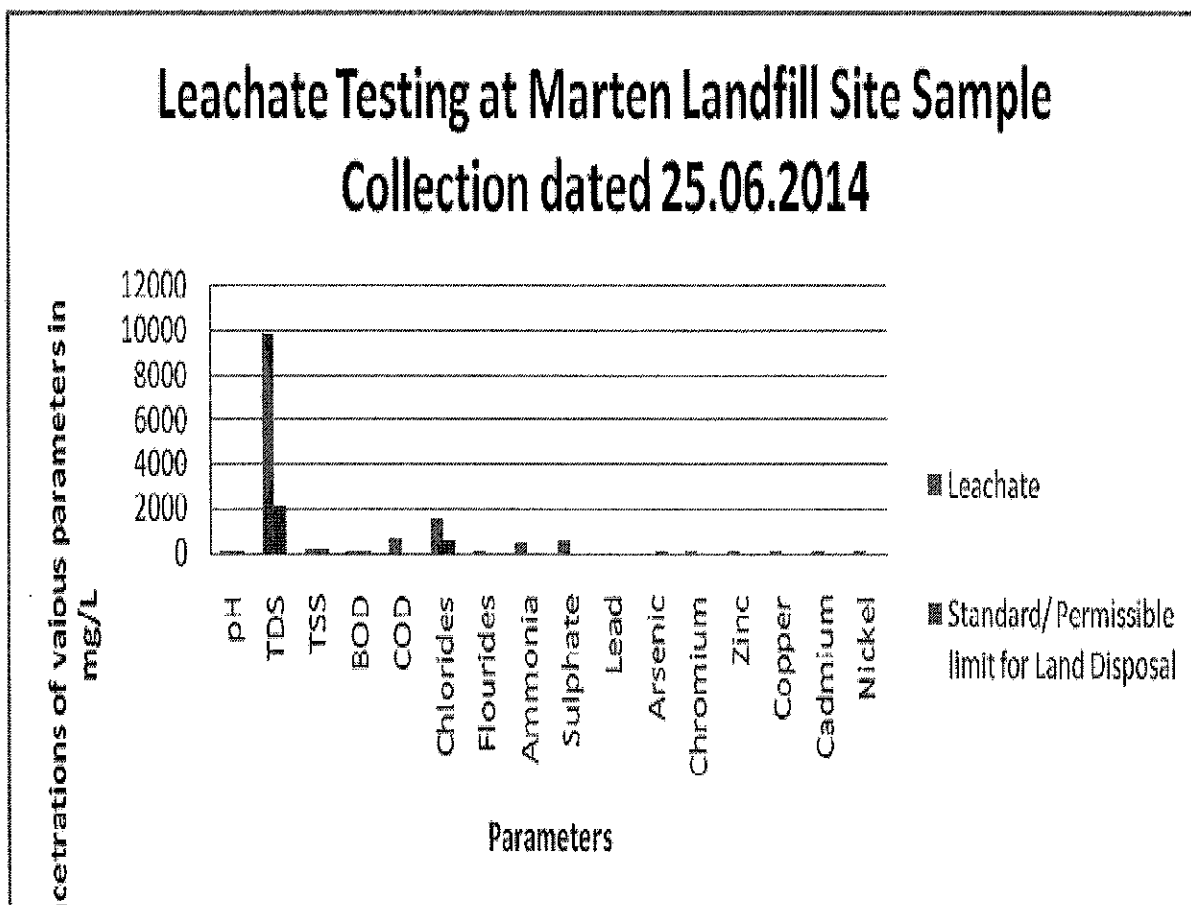






### Leachate Testing

60. The existing landfill at the Marten does not have leachate treatment facility. The parameters tested for the untreated leachates are beyond the permissible limited.



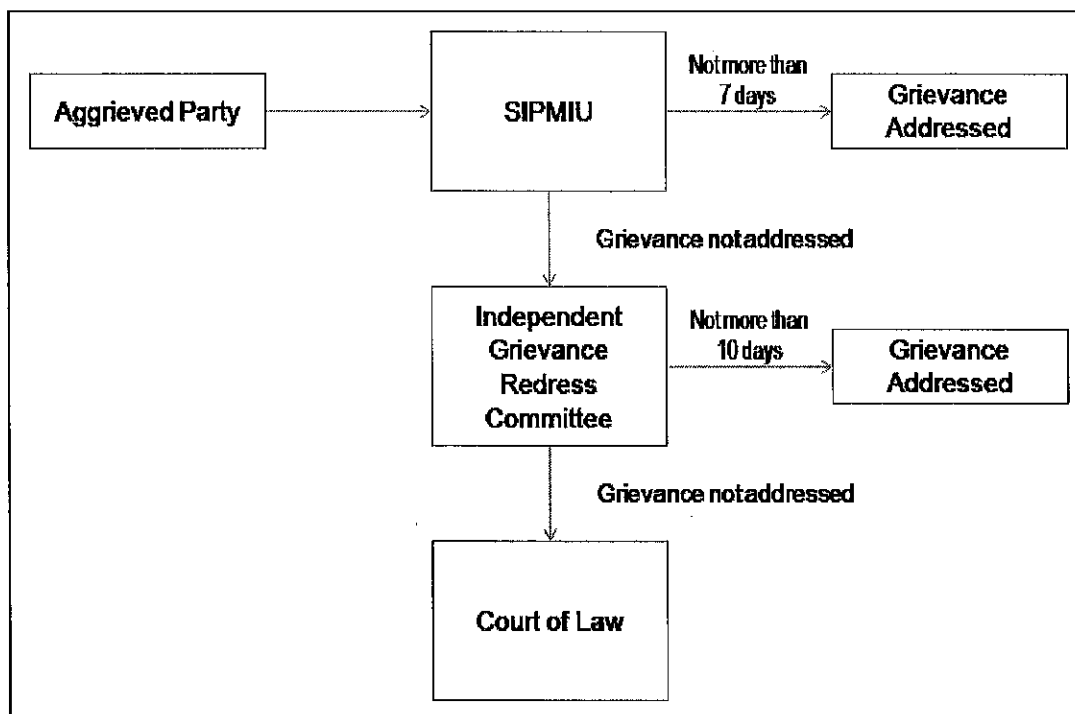
61. The second round of monitoring of water and leachate quality has been conducted by MPSCB in November 2014 and results are awaited.



**Annexure – 1: Environment Monitoring Team Details.**

**City: Shillong**  
**Office Address: Urban Affairs Complex, Dhankheti, Shillong**

<b>Sl. No.</b>	<b>Officer's Name</b>	<b>Designation</b>	<b>Mobile No</b>	<b>Email Address</b>
1.	Sri Biswajit Dutta	Project Director	---	b_dutta59@yahoo.co.in
2.	Shri. F. B. Chyne	Project Manager and Solid Waste Management Specialist, SIPMIU.	9436100719	f.b.chyne@gmail.com
3.	Shri. L. C. J. Lyngdoh	Assistant Environment Specialist, SIPMIU	9774591279	carrylaw85@gmail.com
4.	Shri Sanjiva K Sharma	Team Leader, DSMC		sanjiva.sharma@mottmac.com
5.	Anjay Kumar	Environmental Specialist, DSMC	9313329631	anjay.kumar@mottmac.com
6.	Dhirendra Chaudhary	Assistant Engineer, DSMC	9774276153	dhirendra.chaudhary@mottmac.com
7.	T. Subramani up to September 2014	Solid Waste Management Expert	7204291564	smani98@yahoo.co.in

**Annexure 2: Grievance Redress Mechanism**

SIPMIU= State-level Investment Project Management and Implementation Unit.

**ANNEXURE 3: Contractor Environment Implementation Plan Requirements.**

The contractor is required to ensure that the following activities are complied with during the construction period:

1. All the vehicles used for the construction shall comply with relevant environmental standard. Worker to be provided with PPE's like earplugs to minimize the health impacts. Construction in the night time to be restricted to the extent possible.
2. Re-use excavated material in this project wherever possible (eg bunds), Retain soil for covering waste when landfill is operating.
3. Remove waste soil for disposal as soon as it is excavated; Spray stockpiled soil and working areas in windy weather.
4. Conduct all excavation in the dry season.
5. Do not store toxic materials at or near the landfill site; include accident & spill prevention in Method Statement.
6. Contractor should employ at least 50% of workforce from communities in vicinity of work sites if possible.
7. Prepare and implement a site Health and Safety Plan that includes measures to: Exclude the public from all construction sites; Ensure that workers use Personal Protective Equipment; Provide Health & Safety Training for all personnel; Follow documented procedures for all site activities; Keep accident reports and records.
8. Regular water sprinkling to be ensured to minimize the impact. Worker to be provided with PPE's like dust masks.
9. The Design consideration will take care of temporary silt runoff due to construction. Silt fences will be used to mitigate siltation impacts.

#### Annexure 4 – Project Photographs



Photo 1 – Construction site of construction of RCC counterfort wall at Marten dated 08.01.2015



Photo – 2 – Iron Gate has been provided to prevent entry of unauthorised people

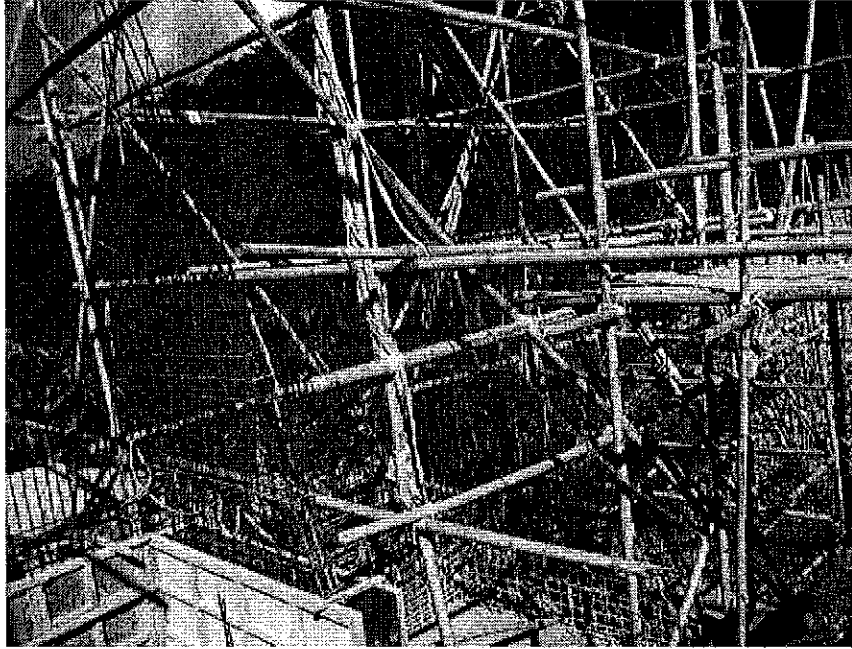


Photo – 3 – Construction of counterfort retaining wall at Marten dated 08..01.2015



Photo – 4 – Water Sample collection near Landfill site of Marten



Photo – Leachate collection at Landfill site at Marten



Photo – Sample Preparation for transportation under the supervision of SIPMIU Environmental Officer

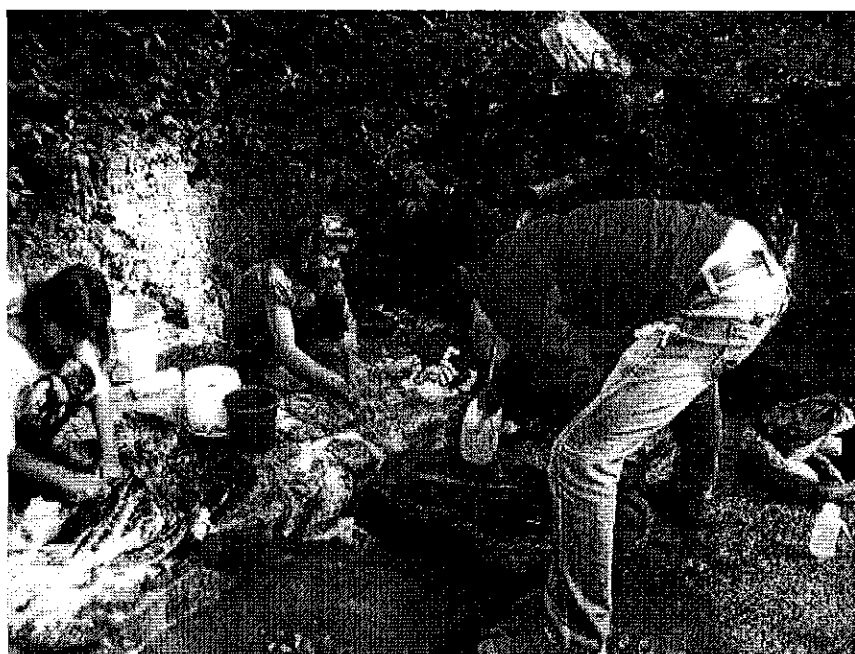


Photo – Water Sample collection at the Marten Landfill Site

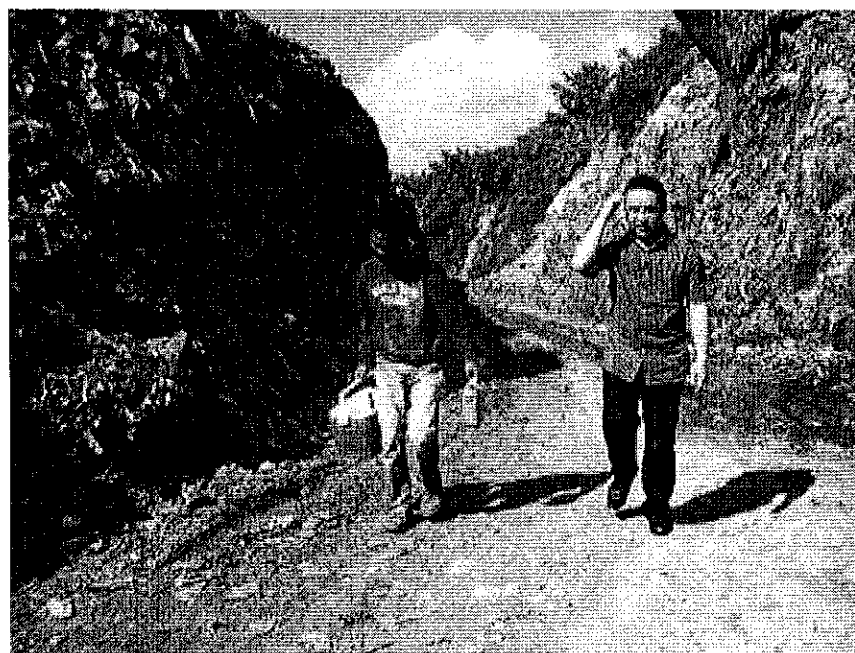


Photo – Transportation of Sample to the Vehicle for transportation to Laboratory

## Annexure -5 – Site Safety Plan of Contractor based on provisions of IEE



Anderson Hitech Pvt. Ltd.

Ref: ABPL/SIPMTU/2013/01

Date: 4<sup>th</sup> January, 2013

To  
Shri. B.Datta  
Project Director,  
State Investment Programme Management  
& Implementation Unit,

Sub :- EHS Plan for NERCCDIP-Development of Landfill Site and Associated works at  
Marten, Shillong.

Dear Sir,

With reference to the subject cited above I am enclosing herewith a copy of the EHS Plan for  
Development of Landfill Site and Associated works at Marten, Shillong for your reference.

Thanking You

Yours Sincerely

  
Chris Cajee

AVA  
AS  
4/1/2013

Office : LOWER LACHAUMIERE, Shillong - 793001. Ph. (0364) 2224224. Fax (0364) 2503305  
Factory : Riak Khwan Forest, Mawlong, Mawlai.





**Anderson Biotech Pvt. Ltd.**

**EHS Plan for NERCCDIP- Development of Landfill Site and Associated Works at Marten, Shillong**

**1. Barricading**

- a. The site will be barricaded so that there is no disruption to traffic or to neighbours
- b. All holes and major pits will be properly barricaded to prevent any accidents.
- c. Areas where loading/unloading operations are being undertaken will be barricaded with temporary guard rails.
- d. Display boards will be put up at strategic places wherever necessary as a precautionary measure.

**2. Personal Protective Equipment (PPE)**

- a. ISI-certified PPE will be used by all personnel working at the site.
- b. For all works at a height, personnel will be provided with safety belts.
- c. Helmets will be provided for protection of the head.
- d. Safety shoes, gumboots will be provided for protection of the feet.
- e. Gloves will also be provided for protection of the hand.
- f. Nose mask will also be provided.
- g. Ear plugs will also be provided for noise protection.

**3. Environment**

- a. Construction waste will be properly disposed off.
- b. Construction materials will be stored properly.
- c. Noise-producing machinery will be regularly maintained.
- d. Waste water or rain water will be provided with appropriate drainage so that there is no pollution from the construction site.
- e. Scheduling of work will be done so that there is minimum social impact.
- f. Noisy work will not be carried out at night.
- g. All vehicles carrying materials will be adequately covered.
- h. Pollution under Control (PUC) for all material carrying vehicles will be ensured.
- i. All overburden earth/stone will be removed so that there is no accumulation at site.
- j. All generators, concrete mixers i.e., noise producing equipments will be provided with sound enclosures.

**4. Working at Height.**

- a. Proper barricades and scaffolding will be provided for areas being constructed at a height.
- b. A proper walkway and footboard will be provided at the top.
- c. If it is not possible to provide a barricade, workers/supervisors will be provided with safety belts.

Office : LOWER LACHAUMIERE, Shillong - 793001. Ph. (0364) 2224224. Fax (0364) 2503305  
 Factory : Riak Khwan Forest, Mawiong, Mawlai.



**Anderson Diotech Pvt. Ltd.**

- d. All ladders being used will be secured from the top/bottom.
- e. Ladders will be used by one person at a time.
- f. All platforms, ladders and landings must be strong enough to take the load.
- g. All platform landings will be cleared and barricaded properly.
- h. Scaffoldings will be built to withstand appropriate loads.
- i. Scaffolding tie-ups will be checked regularly.

**5. Construction Vehicles/Equipments**

- a. All vehicles will be operated only by an experienced and licensed operator.
- b. All vehicles will maintain speed limits.
- c. Reversal of vehicles only under the guidance of a helper.
- d. Reverse lights/horns will be fitted in all equipments/vehicles.
- e. Vehicle operating areas will be kept free from all workers and other materials.

**6. Electrical Safety**

- a. All electric cables will be laid out safely and properly.
- b. Standard quality plugs will be used.
- c. All electrical joints will be properly insulated.
- d. An adequately rated circuit breaker will be provided at every electrical connection.
- e. All electrical equipment and switch boards will be earthed.
- f. All electrical switch box/DBs system will be provided with 'Lock Out' / 'Tag Out' system.
- g. 'Danger' signs (Skull and Bones) will be displayed near DB's.

**7. Excavation**

- a. All slopes will be maintained properly to prevent soil collapse.
- b. If excavation is being carried out during the monsoon season, proper protection will be provided so that the site is protected.
- c. Any utilities buried below a trial trench e.g., live power cable, water/telephone lines etc. Will be checked regularly.
- d. All the periphery of the site being excavated will be properly barricaded.
- e. 'Caution' display boards will be placed at strategic locations so that it is visible to everyone.

**8. House Keeping**

- a. All equipment, construction materials, other materials will be kept at designated places.
- b. Scraps, unwanted materials will be removed from time to time.
- c. Carpenters will remove all nails and wooden waste after completion of work.
- d. Bar benders will remove all wire/bar pieces after completion of work.
- e. Oil spillage in the floor area will be mopped cleanly.
- f. A temporary storage area will be clearly designated.

Office : LOWER LACHAUMIERE, Shillong - 793001, Ph. (0364) 2224224. Fax (0364) 2503305  
 Factory : Riati Khwan Forest, Mawiong, Mawlai

**Annexure -6 – Ambient Air Quality Monitoring, Noise Level Monitoring and Water Testing Report**



**MEGHALAYA STATE POLLUTION CONTROL BOARD**

'ARDEN' LUMPYNGGAD,  
SHILLONG – 793014

PHONE : 0364 - 2521533  
2522802  
2521514  
2522726  
TELEFAX : 0364 - 2521217  
2521764

e-mail : megspcb@rediffmail.com  
megspcb@bsoil.in

No.MPCB/CL-58/2014-2015/ 2

Dated Shillong, the 7<sup>th</sup> July 2014.

To,

✓  
Shri. B. Dutta,  
Project Director,  
State Investment Project Management & Implementation Unit,  
Shillong.

Sub: Analysis Reports of Ambient Air quality and Noise level monitoring.

Sir,

Enclosed please find herewith the analysis reports of Ambient Air quality and Noise level monitoring conducted at Marten Dumping site, Mawiong, on the 25<sup>th</sup> and 26<sup>th</sup> June 2014.

Enelo: As stated.

Yours faithfully,

MEMBER SECRETARY  
MSPCB, SHILLONG

No.MPCB/CL-58/2014-2015/

Dated Shillong, the 7<sup>th</sup> July 2014.

Copy to:

1. CL-9(A-II), for records.
2. CL-31, for records.

/  
MEMBER SECRETARY  
MSPCB, SHILLONG

**MEGHALAYA STATE POLLUTION CONTROL BOARD  
'ARDEN' LUMPYGNNGAD, SHILLONG-14**

**AMBIENT NOISE LEVEL TESTING REPORT**

Name & Address of Industry		State Investment Project Management & Implementation Unit(SIPMIU), Shillong.	
Location of Sampling		Near Emergency Sanitary landfill Site, Marten Dumping Ground, Mawiong.	
Date of Sampling		25.06.2014	
Category of Area		Residential	
Laboratory Reference		N/14/2014	
Ambient Noise Level  dB(A) Leq	Time	Observed value	Prescribed Standard
	Day	50.2	55.0
	Night	54.3	45.0
Other observations		There is noticeable sound caused by insects during the night time.	

*Remarks:* Ambient Noise levels monitored during day time was found to be within the limit of standards for Residential Area as prescribed vide EPA Notification [GSR 1063 (E), Dated 26<sup>th</sup> Dec. 1989], while it is above the limits during night time.

Dated: 4<sup>th</sup> July 2014

  
 Senior Scientist  
 Meghalaya State Pollution Control Board  
 Shillong

**MEGHALAYA STATE POLLUTION CONTROL BOARD**  
**'ARDEN' LUMPYGNAGAD, SHILLONG-14**

**AMBIENT NOISE LEVEL TESTING REPORT**

Name & Address of Industry		State Investment Project Management & Implementation Unit(SIPMIU), Shillong.	
Location of Sampling		Near Garage cum Workshop, Marten Dumping Ground, Mawiong.	
Date of Sampling		25.06.2014	
Category of Area		Residential	
Laboratory Reference		N/15/2014	
Ambient Noise Level  dB(A) Leq	Time	Observed value	Prescribed Standard
	Day	60.7	55.0
	Night	55.0	45.0
Other observations	The sampling location is about 30 meters away from the main road (National Highway). Traffic noise is a major contribution to the overall noise monitored at the location.		

*Remarks:* Ambient Noise levels monitored during day and night time was found to be above the limit of standards for Residential Area as prescribed vide EPA Notification [GSR 1063 (E), Dated 26<sup>th</sup> Dec. 1989].

Dated: 4<sup>th</sup> July 2014

  
 Senior Scientist  
 Meghalaya State Pollution Control Board  
 Shillong

**MEGHALAYA STATE POLLUTION CONTROL BOARD**  
**'ARDEN' LUMPYGNNGAD, SHILLONG-14**

**AMBIENT AIR QUALITY ANALYSIS REPORT**

Name of Industry/Firm/Organisation	State Investment Project Management & Implementation Unit, Shillong.
Location of sampling	Marten Landfill site, Mawiong.
Date of sampling	25.06.14 – 26.06.14
Station No.	1 (Near Garage cum Workshop)
Air Quality Survey No.	A/11/14
Time duration of sampling	24 hrs (8 hrs interval for spm, 4 hrs interval for gaseous)
Weather	Clear
Ambient temperature: Maximum: Minimum:	31.5°C 20.0°C
Relative Humidity Maximum: Minimum:	93.0 % 65.0 %

Pollutants	Analysis Results							Permissible limits
	10:00am	2:00pm	6:00pm	10:00pm	2:00am	6:00am	24 hrs average	
	2:00pm	6:00pm	10:00pm	2:00am	6:00am	10:00am		
Particulate Matter (PM10) ( $\mu\text{g}/\text{m}^3$ )	80.8		49.9		46.8		59.1	100
Sulphur dioxide ( $\mu\text{g}/\text{m}^3$ )	2.0	2.0	2.0	2.0	2.0	2.0	2.0	80
Nitrogen dioxide ( $\mu\text{g}/\text{m}^3$ )	10.1	14.2	10.1	16.2	13.2	11.1	12.4	80

Remarks: Parameters tested were found to be within the permissible limits of Ambient Air Quality Standards as per EPA Notification GSR 826(E), dated New Delhi, the 16<sup>th</sup> Nov. 2009.

Dated Shillong,  
the, 4<sup>th</sup> July 2014

  
 Sr. Scientist  
 Meghalaya State Pollution Control Board  
 Shillong

**MEGHALAYA STATE POLLUTION CONTROL BOARD  
'ARDEN' LUMPYGNAGAD, SHILLONG-14**

**AMBIENT AIR QUALITY ANALYSIS REPORT**

Name of Industry/Firm/Organisation	State Investment Project Management & Implementation Unit, Shillong.
Location of sampling	Marten Landfill site, Mawiong.
Date of sampling	25.06.14 - 26.06.14
Station No.	2 (Near Emergency Sanitary landfill site)
Air Quality Survey No.	A/12/14
Time duration of sampling	24 hrs (8 hrs interval for spm, 4 hrs interval for gaseous)
Weather	Clear
Ambient temperature: Maximum: Minimum:	31.5°C 20.0°C
Relative Humidity Maximum: Minimum:	93.0 % 65.0 %

Pollutants	Analysis Results							Permissible limits for Industrial areas
	10:30am - 2:30pm	2:30pm - 6:30pm	6:30pm - 10:30pm	10:30pm - 2:30am	2:30am - 6:30am	6:30am - 10:30am	24 hrs average	
Particulate Matter (PM10) ( $\mu\text{g}/\text{m}^3$ )	67.5		47.2		64.5		59.7	100
Sulphur dioxide ( $\mu\text{g}/\text{m}^3$ )	2.0	2.0	2.0	2.0	2.0	2.0	2.0	80
Nitrogen dioxide ( $\mu\text{g}/\text{m}^3$ )	13.2	11.1	12.1	11.1	4.5	4.5	9.4	80

Remarks: Parameters tested were found to be within the permissible limits of Ambient Air Quality Standards as per EPA Notification GSR 826(E), dated New Delhi, the 16<sup>th</sup> Nov. 2009.

Dated Shillong,  
the 4<sup>th</sup> July, 2014

  
 Sr. Scientist  
 Meghalaya State Pollution Control Board  
 Shillong

**MEGHALAYA STATE POLLUTION CONTROL BOARD  
CENTRAL LABORATORY  
"ARDEN", LUMPYNGNGAD, SHILLONG – 793014**

**ANALYSIS REPORT**

- |    |  |  |
|----|--|--|
| 1. | Sender's name & address                        | Collected by MSPCB, Shillong                   |
| 2. | Name of source & place of Collection of sample | Borewell on G.S Road (400m from Landfill side) |
| 3. | Purpose of analytical study                    | Physical & Chemical                            |
| 4. | date of receipt of the sample                  | 25.06.2014.                                    |
| 5. | Laboratory reference                           | B/70/14  |

Sl No	Parameters	Results	Desirable Limits for drinking water (Indian Standard)
1.	pH	7.2	6.5-8.5
2.	Total Dissolved Solids (TDS) (mg/l)	115.0	500.0
3.	Total Suspended Solids (mg/l)	15.0	-
4.	Dissolved Oxygen (mg/l)	7.1	-
5.	Chlorides (mg/l)	15.0	250.0
6.	Total Hardness (mg/l)	62.0	300.0
7.	Nitrate-N(mg/l)	5.95	45.0
8.	Sulphate (mg/l)	23.6	200.0
9.	Lead (mg/l)	BDL	0.05
10.	Arsenic (mg/l)	BDL	0.05
11.	Chromium (mg/l)	BDL	0.05
12.	Zinc (mg/l)	BDL	5.0
13.	Copper (mg/l)	BDL	0.05
14.	Cadmium (mg/l)	BDL	0.01
15.	Nickel (mg/l)	BDL	-

Dated, Shillong,  
23.07.2014

  
 Sr. Scientist  
 Meghalaya State Pollution Control Board,  
 Shillong




**MEGHALAYA STATE POLLUTION CONTROL BOARD  
CENTRAL LABORATORY  
"ARDEN", LUMPYNGNGAD, SHILLONG – 793014**

**ANALYSIS REPORT**

1. Sender's name & address                      Collected by MSPCB, Shillong
2. Name of source & place of  
Collection of sample                      Stream South West (800m from Landfill site)
3. Purpose of analytical study                      Physical & Chemical
4. date of receipt of the sample                      25.06.2014.
5. Laboratory reference                      B/71/14

Sl No	Parameters	Results
1.	pH	7.3
2.	Total Dissolved Solids (TDS) (mg/l)	68.0
3.	Total Suspended Solids (mg/l)	20.0
4.	Dissolved Oxygen (mg/l)	7.5
5.	Chlorides (mg/l)	6.0
6.	Total Hardness (mg/l)	36.0
7.	Nitrate-N(mg/l)	0.6
8.	Sulphate (mg/l)	9.8
9.	Lead (mg/l)	BDL
10.	Arsenic (mg/l)	BDL
11.	Chromium (mg/l)	BDL
12.	Zinc (mg/l)	0.06
13.	Copper (mg/l)	BDL
14.	Cadmium (mg/l)	BDL
15.	Nickel (mg/l)	BDL

Dated, Shillong,  
23.07.2014

  
 Sr. Scientist  
 Meghalaya State Pollution Control Board,  
 Shillong.

**MEGHALAYA STATE POLLUTION CONTROL BOARD  
CENTRAL LABORATORY  
"ARDEN", LUMPYNGNGAD, SHILLONG – 793014**

**ANALYSIS REPORT**

1. Sender's name & address                      Collected by MSPCB, Shillong
2. Name of source & place of Collection of sample                      Spring, South West (1km from Landfill side)
3. Purpose of analytical study                      Physical & Chemical
4. date of receipt of the sample                      25.06.2014
5. Laboratory reference                      B/72/14

Sl No	Parameters	Results	Desirable Limits for drinking water (Indian Standard)
1.	pH	6.2	6.5-8.5
2.	Total Dissolved Solids (TDS) (mg/l)	55.0	500.0
3.	Total Suspended Solids (mg/l)	10.0	-
4.	Dissolved Oxygen (mg/l)	7.0	-
5.	Chlorides (mg/l)	5.0	250.0
6.	Total Hardness (mg/l)	26.0	300.0
7.	Nitrate-N(mg/l)	1.6	45.0
8.	Sulphate (mg/l)	8.9	200.0
9.	Lead (mg/l)	BDL	0.05
10.	Arsenic (mg/l)	BDL	0.05
11.	Chromium (mg/l)	BDL	0.05
12.	Zinc (mg/l)	0.06	5.0
13.	Copper (mg/l)	BDL	0.05
14.	Cadmium (mg/l)	BDL	0.01
15.	Nickel (mg/l)	BDL	-

Dated, Shillong,  
23.07.2014

  
 Sr. Scientist  
 Meghalaya State Pollution Control Board,  
 Shillong.

**MEGHALAYA STATE POLLUTION CONTROL BOARD  
CENTRAL LABORATORY  
"ARDEN", LUMPYNGNGAD, SHILLONG - 793014**

**ANALYSIS REPORT**

1. Sender's name & address      Collected by MSPCB, Shillong
2. Name of source & place of  
Collection of sample      Leachate (Back of Marten, foothill of the main  
dumping side)
3. Purpose of analytical study      Physical & Chemical
4. date of receipt of the sample      25.06.2014.
5. Laboratory reference      B/73/14

Sl No	Parameters	Results	Standards for Land Disposal as per Municipal Solid Waste (Management & Handling) Rules 2000
1.	pH	8.4	5.5-9.0
2.	Total Dissolved Solids (TDS) (mg/l)	9870.0	2100.0
3.	Total Suspended Solids (mg/l)	230.0	200.0
4.	Biological Oxygen Demand (mg/l)	122.0	100.0
5.	Chemical Oxygen Demand (mg/l)	660.0	-
6.	Chloride (mg/l)	1530.0	600.0
7.	Flouride (mg/l)	0.11	-
8.	Ammonia (mg/l)	464.0	-
9.	Sulphate (mg/l)	579.2	-
10.	Lead (mg/l)	BDL	-
11.	Arsenic (mg/l)	BDL	0.2
12.	Chromium (mg/l)	0.08	-
13.	Zinc (mg/l)	0.51	-
14.	Copper (mg/l)	0.38	-
15.	Cadmium (mg/l)	0.01	-
16.	Nickel (mg/l)	0.21	-

Dated, Shillong,  
23.07.2014

  
 Sr. Scientist  
 Meghalaya State Pollution Control Board,  
 Shillong.