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WEST BENGAL PULLUTION BOARD (WBPCB)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR CONTAINMENT AND CLOSURE OF DHAPA DUMPSITE

DRAFT FINAL REPORT

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<th>Description</th>
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<tr>
<td>AAS</td>
<td>Atomic Absorption Spectrometry</td>
</tr>
<tr>
<td>BPL</td>
<td>Below Poverty Level</td>
</tr>
<tr>
<td>CBIPMP</td>
<td>Capacity Building for Industrial Pollution Management Project</td>
</tr>
<tr>
<td>CSR</td>
<td>Corporate Social Responsibility</td>
</tr>
<tr>
<td>CPCB</td>
<td>Central Pollution Control Board</td>
</tr>
<tr>
<td>EIA</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>EHS</td>
<td>Environmental Health &amp; Safety</td>
</tr>
<tr>
<td>EKW</td>
<td>East Kolkata Wetland</td>
</tr>
<tr>
<td>EKWMA</td>
<td>East Kolkata Wetland Management Authority</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
</tr>
<tr>
<td>ESMP</td>
<td>Environment and Social Management Plan</td>
</tr>
<tr>
<td>ESA</td>
<td>Environmental Site Assessment</td>
</tr>
<tr>
<td>GOI</td>
<td>Government of India</td>
</tr>
<tr>
<td>HDPE</td>
<td>High Density Poly Ethylene</td>
</tr>
<tr>
<td>HH</td>
<td>Households</td>
</tr>
<tr>
<td>HSE</td>
<td>Health, Safety and Environment</td>
</tr>
<tr>
<td>INR</td>
<td>Indian Rupees</td>
</tr>
<tr>
<td>KMC</td>
<td>Kolkata Municipal Corporation</td>
</tr>
<tr>
<td>LFG</td>
<td>Landfill Gas</td>
</tr>
<tr>
<td>LEL</td>
<td>Lower Explosive Limit</td>
</tr>
<tr>
<td>MoEF</td>
<td>Ministry of Environment and Forest</td>
</tr>
<tr>
<td>MSW</td>
<td>Municipal Solid Waste</td>
</tr>
<tr>
<td>NPRPS</td>
<td>National Programme for Rehabilitation of Polluted Sites</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
</tr>
<tr>
<td>PCB</td>
<td>Pollution Control Board</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>PM</td>
<td>Particulate Matter</td>
</tr>
<tr>
<td>PUC</td>
<td>Pollution Under Control</td>
</tr>
<tr>
<td>SPCB</td>
<td>State Pollution Control Board</td>
</tr>
<tr>
<td>STP</td>
<td>Sewage water Treatment Plant</td>
</tr>
<tr>
<td>SW</td>
<td>Surface Water (monitoring point)</td>
</tr>
<tr>
<td>TEP</td>
<td>Technical Evaluation Panel</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
</tr>
<tr>
<td>WBPCB</td>
<td>West Bengal Pollution Control Board</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
1 Summary

Introduction
This report has been prepared by COWI in association with KADAM, Witteveen+Bos and Tauw under the project for consulting services for Assessment of Contamination, Design of Remediation Plan, Bid Preparation and Supervision of Remedial Activities for a closed dumpsite within the Dhapa Municipal Dump Area in Kolkata, West Bengal.

This report is a separate document (Appendix C) to the Final Dumpsite Containment and Closure Plans as specified in the contract with WBPCB under the agreed deliverables covered in Schedule 3 of the contract. It covers description of the proposed project and impacts, organizational structure, environmental mitigating and social mitigation and monitoring measures and health and safety during project execution.

This report will also be included as an annex to the tender documents and included in the contract with selected Contractor.

The specific objective of this ESMP report is to describe the measures that will be implemented to ensure a situation that is stable and acceptable from an environmental, social, and health and safety perspective. This applies to three phases of project execution:

› The pre-construction phase
› The site closure and containment construction works (‘project execution’)
› The maintenance and aftercare during the first two years of operation (‘post-project execution’)

Selected option for remediation of Dhapa dumpsite
The option 5, Impermeable cover and passive gas control was selected as the preferred containment and closure option after a process of developing various containment and closure scenarios. The containment and closure options are described in the Final Containment and Closure plans report. Option 5 was selected at the Technical Evaluation Panel (TEP) meeting in WBPCB 25th June 2013.
This option includes profiling of the dumpsite, construction of a top cover in line with the Indian Municipal Solid Waste Management and Handling Rules, 2000 including an impermeable HDPE liner to avoid future ingress of rainwater, a surface water run-off system to collect and discharge rainwater separately and a leachate collection cum Treatment system (in a leachate treatment plant) which will be in operation until no more leachate can be extracted from the site. The remediated dumpsite will finally be seeded with grass and shrubs/bushes and with access/service roads for utilisation of the area of the public and maintenance staff.

Current Environmental Scenario
Overall the adverse environmental impact of the current dumpsite on the surrounding areas is investigated and reported in the Sample Analysis and Assessment of Site Pollution Levels report and summarized in the Environmental and Social Assessment report.

The identified environmental impacts of the dumpsite in the current situation are mainly related to leachate and upper groundwater contamination, surface water and soil contamination (also impacts on surface water and soil from activities at neighbouring Bone Processing Factory) and aesthetics impacts due to the presence of closed dumpsite.

The main pathways for spread of pollution are:

› Leachate seeping through the waste body and distributed mainly horizontal to the upper groundwater around the dumpsite
› Surface water run-off from the dumpsite contaminated by leachate seeping out of the slopes polluting adjacent water canals and from time to time flooding adjacent fields
› Surface water run-off from the dumpsite contaminated by waste and soil polluting adjacent water canals with a risk of block up the waterways
› Windblown waste (waste is continuously exposed due the surface erosion by run-off of water and by pigs and other animals digging in the closed dumpsite) impacting the surroundings

The main receptors of pollution identified are local villagers (Makaltala Village) and the ecology (flora and fauna in water canals and surrounding areas).

During the execution of the closure and containment works, the main potential adverse impacts are related to air and noise impacts due to profiling of waste and the operation of equipment and vehicles on the dumpsite as well as increased traffic movements.

Foreseen Environmental Impacts and Mitigation Measures
For the environmental aspects of the containment and closure project there are no major areas of concern or negative impacts expected. The situation can only improve. The most effective measure to mitigate the environmental impact of the current dumpsite is to cover it with an impermeable cover construction to avoid future leachate generation (eliminate continuous pollution of upper groundwater) and to separate surface water from leachate to eliminate future impacts on surrounding water canals and agricultural fields.
Moreover, the dumpsite closure and containment activities include converting the dumpsite into an environmental friendly public park used for recreational purpose.

The adverse impacts during closure works are of a temporary nature, and can best be mitigated by proper operational management and supervision, proper maintenance of vehicles and equipment, using modern equipment and mechanised machinery, and phasing out the implementation plan.

The following environmental objectives – during and after the closure and containment works – are translated into concrete measures in this ESMP:

› During project execution:

› To ensure that air emissions due to the construction related activities do not lead to increased air pollution at and around the project site, by amongst others controlled spraying of water, use of modern equipment and vehicles, etc.
› To ensure that the soil and groundwater are not polluted by leakage of lubricants / fuel from vehicles moving within the site, by amongst others controlled filling and storage of fuels and lubricants, etc.
› To ensure that noise generated due to the construction related activities does not increase to unacceptable noise levels at and around the project site, by amongst others controlling operating hours, etc.
› To ensure that there is smooth traffic both within and outside the facility for the duration of the construction phase; by amongst others traffic regulation, etc.
› To ensure that uncontrolled emissions from the closure activities do not lead to unacceptable health risks and unsafe situations for the workers

› After project execution:

› To control surface and groundwater pollution from leachate emanating from the closed dumpsite, by amongst others ensuring adequate drainage and water treatment, and monitoring of water quality, etc.
› To ensure that uncontrolled emissions of landfill gas after the closure of the dumpsite do not lead to air pollution or safety risks, by amongst others emission monitoring and landfill gas drainage, etc.

Foreseen Social Impacts and Mitigation Measures
The social aspects of the project seem to be limited to a few numbers of villagers in Makaltala Village. Rag picking at the closed dumpsite does not take place as this activity has moved to the active dumpsite and this has not impacted the livelihood of the families of Makaltala Village. A potential impact could be land subsidence, dust and rubbles falling on to the 17 houses that are nearest to the dump. This will be mitigated and minimised by taking preventive measures by the contractor.

At present, the negative social impact due to the closed dumpsite is a continued impact on the quality of life and health of the people and possibility of disease carriage due to the presence of mosquitoes / vermin / dust. This would be
remediated with the prescribed containment of the dump and the remedial actions. The proposed creation of a recreational space where nearby communities can gather and relax would also help increase social status of the nearby habitation.

The Community Development Plan is proposed in the ESMP which depicts the prioritised infrastructure needs of the local community.

i. Upgradation of existing access road to the Makaltala Village on the eastern side of the dumpsite outside the compound wall

Further, a health and hygiene awareness programme has been recommended which includes awareness on HIV/AIDS prevention; personal health hygiene; environmental sanitation and the like. A Service Provider (NGO) will be selected to implement awareness programme in the field. The labour camps will also be covered under this programme.

The Contractor undertaking the dumpsite closure and containment and the consulting consortium that would supervise the project execution have supporting roles to play by ensuring to work in compliance with this ESMP and legal requirements, as well as by monitoring activities and results; health and safety conditions during and after the dumpsite closure.

All the proposed measures are compliant with International and Indian environmental and social policies. The main responsible agencies for ensuring the implementation of this ESMP are WBPCB, KMC and the selected Contractor for remediation of the closed dumpsite in Dhapa. WBPCB and KMC are jointly responsible for safeguarding the implementation of environmental and social measures.

The total budget envisaged for the social management plan is **INR 45,00,000.00**
2 Introduction

2.1 Background

The Capacity Building for Industrial Pollution Management Project (CBIPMP) helps the Ministry of Environment & Forests (MoEF) of the Government of India (GOI), to build capacity at the state and central level, and develop a framework to address these issues in a comprehensive and systemic manner under an area-wide management approach. The project is aligned with the GOI to establish a National Programme for Rehabilitation of Polluted Sites (NPRPS) as a framework for scaling up the clean-up and rehabilitation of polluted sites and facilitate the reduction of environmental and health risks associated with legacy polluted sites.

The project is also expected to provide for technical capacity building of selected State Pollution Control Boards (SPCBs) for undertaking environmentally sound remediation of polluted sites. Three polluted sites – one in Telengana State (Noor Mohammed Kunta in Hyderabad) and the Ukkayyapalli Municipal solid waste dumpsite in Kadapa, in Andhra Pradesh and one in West Bengal (Dhapa Municipal dumpsite in Kolkata have been identified for remediation on pilot basis. It is anticipated that a National Programme for Rehabilitation of Polluted Sites (NPRPS), the current projects in Andhra Pradesh, Telengana and West Bengal, and various other projects under the umbrella of the CBIPMP, will result in a number of environmental and health benefits.

This present report on Environmental and Social Management Plan has been prepared by COWI in association with KADAM, Witteveen+Bos and Tauw under the project for consulting services for Assessment of Contamination, Design of Remediation Plan, Bid Preparation and Supervision of Remedial Activities for a closed dumpsite within the Dhapa Municipal Dump Area in Kolkata, West Bengal.

The environmental and social reporting framework consists of the following three reports:

1. Environmental and Social Baseline Report
2. Environmental and Social Impact Assessment Report
3. Environmental and Social Management Plan
The current report is mainly to provide the mitigation management plan. This plan links the information on the baseline and the impacts to the mitigation measures.

2.2 Dhapa Municipal Dumpsite

Kolkata is the capital of the state of West Bengal located in the eastern part of India. It is one of the most highly populated cities in the country and with a population of 4496694 souls\(^1\). The city generates about 3,500 to 3,700 tonnes of municipal solid waste (MSW) daily\(^2\) i.e. 1.3 Million Tons annually. This waste is almost entirely disposed at the Dhapa Dumping Area from the city limits.

The Dhapa Dumping Area is owned by the Kolkata Municipal Corporation (KMC) and lies within Ward Nos. 57 and 58 of the KMC administrative boundaries, on the eastern part of Kolkata. Dhapa has been historically used for waste dumping for many decades. With the gradual development of the city towards the east, the garbage dumping has moved away further eastwards and the old dumping areas nearer to the main city are now used for farming (locally referred to as garbage farming). The current “dumping area” is spread over about 35 hectares. It consists of two unlined dumpsites, spaced ~500m apart – one closed dump of area ~ 12.14 ha and one active dump of area ~ 23 ha. The closed dump site (referred to as the ‘closed dumpsite’ or ‘the site’ or “project site”) commenced operations in 1987 and was closed in 2009. The active dumpsite (referred to as the ‘active dumpsite’) also commenced operations in 1987 and is expected to be operated for another two to three years. The Dhapa Dumping Area is located within the East Kolkata Wetlands (EKW), a Ramsar Convention Wetland.

Figure 2-1: Location Map showing the Site within the Kolkata Area, West Bengal

\(^1\)As per Census Data 2011 of Kolkata District, West Bengal
\(^2\)Source: Kolkata Municipal Corporation data – average generation of solid waste received at Dhapa dumpsite.
Figure 2-2: Location of the site within the EKW

Figure 2-3: Co-ordinates along the boundary of the dumpsite
2.3 Project Site Description

The two dumpsites within the Dhapa Dumping Area are non-contiguous, spaced ~0.5 km apart. The closed dumpsite, spread over an area of ~12.14 ha covering CS Dag No. 235/p, 237/p, 242/p, 243, 244, 245/p, 247/p and 606/P of Mouja Dhapa (referred to as the 'closed dumpsite' or 'the site' or 'project site'). The second and active dumpsite also commenced operations since 1987 and is still in operation (referred to as the 'operational dumpsite').

A definite date of termination of the active dump site is not known by the consultants however it is assumed that the operational dumpsite may last for around 3 – 4 years. Establishment of a new and controlled landfill dump is planned in the area.

Both the closed and the active dumpsite are by definition unlined and without any environmental protection or mediation facilities. The closed dump site bearing of area of approximately 12.14 ha is the project site.

In addition to the two dumpsites the area also includes the administration and reception facilities for the active dumpsite, a composting facility, access roads, a bone processing factory as well as neighbouring villagers and agricultural fields.

For this project only the closed dumpsite is assessed.

2.4 Summary of Environmental and Social Assessment report

A comprehensive Environmental and Social Assessment Report (ESA) has been prepared and submitted to WBPCB/World Bank covering the following:

› Assessment of Potential Environmental Impacts on soil, ground water, surface water, air, flora and fauna due to the closed dump site.
› Assessment of Impacts of various options of containment and closure and their mitigation measures.
› Assessment of Current and Anticipated Potential Social Impacts due to the Dumpsite and Potential Community Development Plan Activities.

2.4.1 Environmental Assessment and Impacts Identified

Based on the detailed Environmental Baseline Programme of monitoring around the dump site and their analytical results a concept site model was prepared and the Environmental Impacts due to the closed dump site were evaluated. (As elaborated in the Environmental and Social Impact Assessment Report).

A summary highlighting the environmental impacts due to the closed dump site is shown in Table 2-1 as below:
Table 2-1: Environmental Impacts due to closed dump site

<table>
<thead>
<tr>
<th>Environmental Indices</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Pollution expected due to release of odour and windblown dust but Ambient Air Quality monitoring results does not show adverse impacts on environment. The methane and carbon dioxide concentrations in landfill gas are high, approximately 55% and 40% v/v, respectively. However landfill gas generation is low due to low content of organic matter in the waste body.</td>
</tr>
<tr>
<td>Groundwater Quality</td>
<td>Upper ground water below waste has moderate contamination due to leachate percolation. Deep aquifers are not contaminated and the water is acceptable for drinking purpose.</td>
</tr>
<tr>
<td>Surface Water Quality</td>
<td>Surface waters (lined dry weather untreated sewage canal / drainage channel) around the dump site are found to be contaminated with organics and heavy metals due to migration of run-off and leachate from dumpsite but the major cause of pollution is the untreated city sewage.</td>
</tr>
<tr>
<td>Soil Quality</td>
<td>Top soil is found to be contaminated with heavy metals and organics due to surface run-off and leachate and also due to windblown dust/litter</td>
</tr>
<tr>
<td>Sediment Quality</td>
<td>Sediments from the drainage channels around the dumpsite are found to be contaminated with heavy metals like chromium, lead, cadmium, copper and zinc</td>
</tr>
<tr>
<td>Noise</td>
<td>There are no significant noise generating sources in the current situation</td>
</tr>
<tr>
<td>Ecology and Biodiversity</td>
<td>Surface run-off and leachate entering the wetland and agricultural fields</td>
</tr>
</tbody>
</table>

The baseline environmental status indicates that the risks of leaving the closed dumpsite as it is has significant environmental risks and it is essential to consider options for closing the dumpsite in an environmentally sound manner to contain the migration of pollutants into the neighbouring environment.

2.4.2 Social Baseline Scenario

The land use pattern in the Dhapa Area indicates that majority of the area is covered by water bodies taking up 44.15% of the area followed by 19.52% agricultural land, scrubs takeup 16.78% and habitations cover 12.78% of the area.
A small percentage is taken up by industries, land without scrub and river area, amounting to 17.77%.

The KMC is responsible for providing the basic civic facilities and amenities like water, drainage, sanitation, garbage collection and anti-Malarial and health care programs to the residents of Wards 57 & 58, which includes the entire Dhapa Dumping Area.

As Makaltala is adjacent to the closed dumpsite, it was expected to be the most affected habitation in the area on account of the activities at the closed dumpsite. Hence, Makaltala was studied in greater detail than the other habitations.

The Makaltala village has a total population of 356 of whom 46% are males and 54% females showing a gender bias towards females in the population. Majority are nuclear families (75%) with 91% of the population being SCs. The overall literacy rate is 64% with male’s being 35% and female’s 29%. 17% have individual sanitation facilities while 42% have joint facilities and 41% use ‘open’ or ‘bush’ defecation. 86% have electricity connection.

All HHs own their residential structures even though they do not have legal rights on the land on which it is situated. About 39 respondents have some land, 25 respondents (64%) out of 39 grow vegetables for subsistence and also for sale. Out of these 25, 13 claim to be land owners while 12 cultivators have taken land on lease from others on payment of cash on monthly or yearly basis.

Three HHs possess van rickshaws, 59% have mobile phones and 62% own television sets, 80% HHs own bicycles which is a common form of transport while two own motorbikes. The major profile of Makaltala Village is presented in Table 2-2 as below:

Table 2-2: Profile of Makaltala

<table>
<thead>
<tr>
<th>Total No. of HHs</th>
<th>76 (Joint – 25%, Nuclear – 75%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential accommodation</td>
<td>Own</td>
</tr>
<tr>
<td>Population</td>
<td>Total – 356; Adults – 217; Children - 139</td>
</tr>
<tr>
<td>Male – 163(46%); Female – 193 (54%)</td>
<td></td>
</tr>
<tr>
<td>No. of BPL HHs</td>
<td>Nil</td>
</tr>
<tr>
<td>No. of Women Headed HHs</td>
<td>Nil</td>
</tr>
<tr>
<td>Family Size</td>
<td>5</td>
</tr>
<tr>
<td>Sex Ratio</td>
<td>1184</td>
</tr>
<tr>
<td>Literacy Rate</td>
<td>Overall – 64% (229); Male – 35% (124); Female – 29% (105)</td>
</tr>
<tr>
<td>Social Group (76 HHs)</td>
<td>SC – 91% (69); GC – 8% (6); OBC – 1% (1)</td>
</tr>
</tbody>
</table>

3Primary Survey, June 2013
4 BPL: Taken at 3,000/- p.m. for Dhapa, which is an average of rural and urban poverty line [Site: Kolkata/minorities-comprise-27-of-city-s-bpl-population-article-995447.aspx]
5 Women headed HHs: Single women, women with minor children, women living with unmarried daughters and minor sons.
Access is a major problem in the area as there is no form of public transport operating within the village. Roads are bad and get worse during monsoons. The other infrastructure facilities of Makaltala village are presented in Table 2-3 as below:

Table 2-3: Infrastructure facilities of Makaltala

<table>
<thead>
<tr>
<th>Health facilities</th>
<th>Government Hospital: NRS / Chittaranjan - 15 km / 17 km; Primary Health Sub-centre - 1 (Wednesday, 9-12 am); Private Doctor - 2: 2 km; Clinic organized by NGO - 1 (Once in a week / Tuesday clinic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Primary School - 1 at a distance of 1.5 km; Secondary School - 1 at a distance of 3 km; High School - 1 at a distance of 3 km; Non-formal Education centre - 1 within the village (run by NGO)</td>
</tr>
<tr>
<td>Road</td>
<td>Almost non-existent</td>
</tr>
<tr>
<td>Van rickshaws</td>
<td>Available after walking 1 km (insufficient in number)</td>
</tr>
<tr>
<td>Public Bus / Auto</td>
<td>Available after walking 3 km on EM Bypass</td>
</tr>
<tr>
<td>Water</td>
<td>Hand pumps (Public): 4 hand pumps available within the village. Quality of water is poor. They use it normally for washing and cooking and bathing also. 2% HH use this water for drinking purpose. Hand pumps (Private): 20 KMC water supply through tankers: 3/4 trips per week. Water quality very good. They have to walk for ½ km to get this water. Use only for drinking purpose. 4% HH use it for cooking. Bathing / Washing: Tube well/pond within the village</td>
</tr>
</tbody>
</table>

Even though 56% respondents did not respond, a mixed pattern of livelihood is noted here. A large number of people are in fishing/pisciculture, several are in govt. and private services, some are engaged in cultivation, some are agricultural and non-agricultural wage labour and a few are involved in rag picking. The site had reached its capacity and further dumping was stopped in 2009. Subsequent to this there has been an increase in dependency on own farming and non-agricultural wage labour with a few involved in rag picking. The site had reached its capacity and further dumping was stopped in 2009. Subsequent to this there has been an increase in dependency on own farming and non-agricultural wage labour with significant increase in opportunity in govt. and private services. There has also been an increase in the variety of secondary livelihood options due to availability of opportunities outside the area. However, none of these impacts can be correlated with the fact that no more MSW were being dumped at the said dumpsite as there are many more variables that can be attributed to the shift.  

There has been significant increase in monthly HH income after dumping was stopped. Prior to this 39% of the HHs had an income of less than Rs.3,000/- per month indicating that they can be considered to be BPL families. However, it must also be noted that as per the Governmental records there were no BPL families amongst Makaltata HHs.

6Variables contributing to alternate income – development projects in nearby areas like road construction, mono rail construction, metro rail, flyover, etc.
At present there are no HHs with income less than Rs.3,000/- per month, 8% (6) of HHs have income levels between Rs.3,001 to Rs.3,500/- per month indicating potential BPL families. Presently 54% earn between Rs. 5,001 – 15,000/- per month. 3% earn more than Rs.25,000/- per month.

2.4.3 Identified Social Impacts due to Discontinuing dumping at Makaltala dumpsite

Based on visual assessments, PRA and FGDs with the community and the detailed analysis of survey findings the following impacts have been identified. Positive impacts outweigh negative ones and people are happy that the area will have a better visual look with improved environment.

A. Positive Impacts

- Surrounding and environment
There will be fewer hazards so far as surroundings and environment is concerned. The landscape will improve, resulting in lowering of bad odour, mosquitoes, insects and other pollutions. It is expected that illnesses will also reduce.

- Livelihood options
Livelihood opportunities had increased when the dump closed which compelled people to seek work options outside the area thereby resulting in significantly increased income. Further, it is expected that secondary livelihood will increase during the remedial works.

- Improved Health Conditions for Children
The closure of dump and remedial action would reduce illness amongst children.

B. Negative Impacts

- Ragpickers
The data indicates that about 105 persons from 23 HHs who gave up ragpicking (possibly after dumping was discontinued) have taken up various other forms of income generation which has resulted in substantial increase in income and have expressed happiness at remediation of the closed dump which would actually give them relief on several scores.

Analysis of income from different sources indicate that even though some HHs have individuals (21 persons) practicing ragpicking, the HHs are dependent on other sources of primary income and those who still pursue ragpicking presently go to the Unchupota site (active dumpsite) which will continue to remain accessible. In fact, the income table shows, increase in family income at present and that there is no likelihood of their income levels being affected.

- HHs Rearing Cows and pigs
As per the survey 13 families own 53 cows, however, none of the HHs stated that this was a source of substantial income (15 cows belong to a private person outside
the area). It may be noted that under KMC act keeping animals within the city limits is illegal and disallowed. HHs keeping such animals will need to get the approval and license from KMC\textsuperscript{7}. Income from pigs similarly reveal that it is not substantial to be considered as a primary source of income and the five HHs that rear pigs have other sources of income. Anecdotal evidence suggests that the number of pigs and cows fluctuate and due to lack of space and filth created by the animals people are tending to get rid of these. (Refer Annexure for KMC Act).

- HHs located along the boundary of dumpsite during remediation activities.

It is likely that the 17 households along the side of the dumpsite may get affected by the remedial activities by way of landslides, rubbles falling and dust flying and land subsidence, sound and movement & parking of vehicles, etc. more than other households. As part of the environmental and social management plan the requirements for the Contractor to avoid and minimise the impacts are described including water of working areas for dust abatement, reduce slopes for minimising risk for landslide etc.

A summary of anticipated impacts on Makaltala due to the project is presented in Table 2-4 as below:

Table 2-4: Summary of Anticipated Impacts in Makaltala Village due to the closed dump site

<table>
<thead>
<tr>
<th>Anticipated Impact on Makaltala Inhabitants</th>
<th>Category of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Displacement</td>
<td>None</td>
</tr>
<tr>
<td>Temporary Displacement</td>
<td>None</td>
</tr>
<tr>
<td>Livelihood Displacement</td>
<td>None</td>
</tr>
<tr>
<td>Affected Trees/Crops / trees</td>
<td>None</td>
</tr>
<tr>
<td>Affected Common Structures</td>
<td>None</td>
</tr>
<tr>
<td>Impact on Vulnerable HHs</td>
<td>None</td>
</tr>
</tbody>
</table>

**Anticipated Impact due to remediation activities**

<table>
<thead>
<tr>
<th>Anticipated Impact due to remediation activities</th>
<th>Category of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disruption in mobility</td>
<td>Short Term</td>
</tr>
<tr>
<td>Presence of outsiders in the area, setting up of labour camps if required</td>
<td>Short Term</td>
</tr>
<tr>
<td>Dust, rubble and noise due to movement of vehicles</td>
<td>Short Term</td>
</tr>
<tr>
<td>Requirement of space for parking of vehicles and equipment’s</td>
<td>Short Term</td>
</tr>
<tr>
<td>Activities on slopes result in landslides affecting houses located along the boundary of the dump</td>
<td>Short Term</td>
</tr>
<tr>
<td>Loss of grazing ground for pigs and cattle</td>
<td>Short Term</td>
</tr>
</tbody>
</table>

2.4.4 Conclusions

The environmental and social assessment has revealed that the environment around the Dhapa closed dumpsite is contaminated and the neighbouring community is affected due to risk of landslides, diseases and general poor aesthetics.

\textsuperscript{7}CMC (Amendment) Act, 1988, (WB Act XXI of 1988) w.e.f 20/02/1989, Chapter XXXI: Animals and Birds, Powers and Functions of Municipal Authorities and the Officers of the Corporation
The proposed remediation will contain the pollutants in the closed dumpsite and prevent their migration. It will help in minimizing the environmental and health risks in the surrounding area, improve the aesthetics of the area. In addition to the local environmental benefits, the remediation will have global benefits with reduction in greenhouse gas emissions. It will improve the social life of the neighbouring inhabitants and will also translate into potential savings due to lower health care costs. Short term benefits will include generation of temporary employment for local people in the remediation works.

Other than the short term air and noise pollution expected during the remediation activities and the minor social problems like access restrictions and presence of migrant labour / outsiders in the area, the remediation activities are not likely to have any major negative impacts.

The remediation of the closed dumpsite is not likely to have any negative impacts on livelihood of any household. On the contrary, it is expected to generate livelihood opportunities for some household members. In conclusion, the remediation is highly welcome by people in the area, specifically those in Makaltala.

Considering the several benefits of the scientific closure and containment of the closed Dhapa dumpsite, the remediation is essential and should be implemented as soon as possible.

### 2.5 Chosen Remediation Option

At the TEP meeting held at WBPCB office in Kolkata 25th June 2013 Option 5, Impermeable Cover, leachate collection and Passive Gas Control was selected with a few modifications including collection of leachate during the operational phase and initial post closure period.

Subsequently in meeting of TEP held at Delhi on 20th November 2013; it was decided to install a Leachate Treatment Facility for treatment of leachates generated after completion of remediation project. KMC has allocated land of 1500 sq.m for construction of leachate treatment facility besides the Crematorium.

The Impermeable Cover and Passive Gas Control option is in principle an encapsulation of the closed dumpsite. The idea of this option is to avoid any leachate generation and in few years achieve a situation were no more pollution by leachate from the closed dumpsite takes place.

Gas will still be generated but due to lack of infiltration of rainwater the gas generation will decrease faster and can be handled by venting (via a bio-filters) to the atmosphere without further treatment.

Surface water will be collected in lined wells around the closed dumpsite and discharged to the adjacent existing surface water drains as uncontaminated surface water & finally leading to Dry weather canal.
The main activities for the selected option:

› Profiling of waste surface
› Installation of gas drainage layer, soil layer, 1.5 mm HDPE liner, drainage layer and vegetative layer including grass and other vegetation
› Construction of surface water Collection wells around the closed dumpsite and these wells will be connected to existing open surface water drains/canal.
› Leachate collection facilities and treatment of leachates in the planned LTP.
› Landfill gas collection and outlet system
› Internal service and access roads leading to the top of remediated dumpsite which may later on be used as view point.
› Boundary fence

The description of the project is described in more details in chapter 3.

2.6 Purpose of this Environmental and Social Management Plan

This ESMP is one of the project’s deliverables (as appendix to the Final Containment and Closure Plan), and sets out to provide a clear and sustainable management response to the identified environmental and social impacts that are foreseen as a result of the project.

This ESMP has been formulated specifically for the final selected closure and containment option, the Impermeable cover and passive gas control, leachate collection and treatment option. The environmental and social impacts expected during project execution and post execution have been identified and assessed in the Environmental and Social Assessment report.

For the environmental aspects of this project there are no major areas of concern or negative impacts to be expected. The situation can only improve.

The social aspects of this project are also of limited concern since no impact to the livelihood of the families of Makaltala Village as they are having additional source of income generation and are not dependent on the dump site. However other social issues attributable due to the closed dump site.

2.7 Specific objective of this Environmental and Social Management Plan

The specific objective of this Environmental and Social Management Plan (ESMP) is to describe the measures that will be implemented to ensure a situation that is stable and acceptable from an environmental, social, and health and safety perspective.

This applies to two phases of project execution:
The site closure and containment construction works (‘project execution’)
The maintenance and aftercare during the first two years of operation (‘post project execution’)

2.8 Used guidelines and Quality system
This document is elaborated based on:
› Dutch/Danish and US-EPA guidelines for landfill site remediation and aftercare
› The World Bank’s Environmental and Social (‘Safeguard’) Policies, in place since 1998 as last revised.
› World Bank Operational Policies (OPs)

2.9 Set-up of the report
This report at hand – the ESMP – presents an overview of the existing dumpsite, it summarises the possible environmental and social impacts due to the project, and it specifically elaborates the proposed measures to eliminate, mitigate or reduce the foreseen environmental and social impacts during project execution, and during the post-closure (aftercare) stage.

The report contains the following Ten chapters:

1 Summary

2 Introduction: This chapter gives basic information on the project and the context of this ESMP.

3 Proposed project: This chapter describes the dumpsite closure and containment works.

4 Environmental and social operational policies: This chapter presents the operational policies that are relevant for this project and with which the project needs to comply

5 Impacts: This chapter gives an overview of the foreseen environmental and social impacts during and post-project execution.

6 Organizational structure and QHSE Management: This chapter describes the structure in order to ensure that the required mitigation and monitoring measures are executed in line with the Consultant’s quality control and assurance criteria. The chapter also includes a section on redressing possible grievances.
Mitigation and monitoring measures: This chapter presents an overview of the measures to mitigate adverse environmental and social impacts and to monitor possible environmental and social impacts in a tabular format.

Environmental and Social mitigation and monitoring measures: This chapter gives a detailed presentation of the proposed environmental mitigation and monitoring measures.

Technical inspection and supervision during construction: The project specific technical issues that should at least be addressed in the Contractors work plan are outlined.

Health and safety during project execution: This chapter prescribes the required health and safety regulations that are directly connected to the environmental hazards present on site.
3 Proposed project

3.1 Introduction

The option Impermeable cover, leachate collection and passive gas handling is an encapsulation concept where waste are covered by an impermeable top liner. The principle in the concept is that infiltration of rainwater is avoided and no more leachate is generated. It is assumed the waste body currently contains approximately 300,000 m³ of leachate. This leachate “reservoir” will in time seep out of the site either horizontally via the upper unconfined soil/fill layers (major part) and vertical through the low permeable silty clay layer (minor part) towards the primary aquifer until a new balance is created. When the new balance is achieved the leachate level below the dumpsite will be in same level as the surrounding upper ground water level or even a little bit lower as no water “leachate” generation takes place in the dumpsite area. It is estimated that a new water balance in the dumpsite will be established 4-6 years after the top liner is installed.

A leachate collection system will be installed at the dumpsite for collection and treatment of leachate until the water level inside the dumpsite has reached the same level as outside the closed dumpsite.

A similar situation takes place for landfill gas. Decomposition of organic matter and generation of methane under anaerobic condition require presence of moisture and as water infiltration is avoided the decomposition processes will limit in time and landfill gas generation will decrease more rapidly than in a situation where access to moisture was unlimited. In the gas drainage layer a system of gas collection drains will be installed and approximately 10 outlets (ventilation) points will be established. Emission of landfill gas will be through a bio-filter.

Surface water will be collected on the surface of the closed dumpsite in intercepting lined ditches and in a lined interception encircling the closed dumpsite. Surface water are discharged to the existing open surface water drains/canals.

A plan drawing and a cross section of the closed and remediated dumpsite is presented in Figure 3-1 and Figure 3-2.
Figure 3-1: Plan layout of Option 5 for Dhapa dumpsite Closure Project

Option 5:
Impermeable cover, Leachate Collection and Passive Gas Control.

Details 'X'

Legend:
- Gas Emission
- Surface water flow
- Leachate flow direction
3.2 Description of project and activities included

In essence Option 5, Impermeable cover, leachate collection and passive gas control comprises the following steps:

› Site preparation
  › Establishment of Contractors camp, interims roads, determination of site boundary and construction of temporary fencing etc.

› Profiling of waste
  › Approximately 319,736 m³ of waste has to be replaced for final shaping of the dumpsite out of which 252,795 m³ of waste to be profiled back on the dumpsite and 66,941 m³ of waste to be removed from the dumpsite and disposed outside the dumpsite to the existing operational dumpsite nearby (1.5 Km from the closed dumpsite). The replacing of waste will partly be by pushing of the waste with a bulldozer and partly by excavation, transport (dumper) and re-loading. All re-disposed waste will be compacted in thin layers (max. 0.5 m) with a heavy steel wheel compactor. All surfaces will after final profiling be compacted by a heavy steel wheel compactor to reduce (initial) settlements of the surface.
  › The profiles dumpsite will have slope at max. 1:3. To create a sufficient void space slopes at the eastern part of the dumpsite will constructed with retaining walls or steeper reinforced slopes at 1:2.5. For each 10 m in height a 3 or 6.5 m wide berm is established.
  › No sorting or segregation of waste will be included in the project.

› Installation of leachate collection system
  A leachate collection system with drain pipes and collection wells will be installed. Leachate collected will be pumped to leachate treatment plant being set up near the closed dumpsite beside the crematorium.

› Installation of gas collection system
  › In the gas drainage layer a system of gas drainpipes will be installed. At 10-20 location the gas drainpipes will be connected to a vertical pipe penetrating the top cover layers for venting to the atmosphere. To avoid smell and to reduce CH₄ emission the gas will pass through a bio-filter.

› Installation of a top cover layer
  › The cover construction is not in accordance with the MSW (M&H) Rules, 2000 but with an impermeable sealing liner instead of a low permeable clay barrier with the following construction (From top to bottom):
    › 0.45 m vegetative layer with grass and other vegetation
    › 0.50 m soil (protection) layer of soil
    › Geo-composite (Drainage mat)
    › 1.5 mm HDPE liner
    › Geotextile
    › Gas drainage layer

› Surface water collection and drain system
Lined surface water drains are established on the dumpsite to reduce surface water flow (volume and velocity). The open drains on the closed dumpsite are connected to a lined perimeter drain encircling the dumpsite. Out let from the drains are connected to existing open drains/canals around the dumpsite see Figure 3-1.

The surface water drain on the western side of the dumpsite towards the Bone Factory will be located on the inside of the boundary wall and surface water from the Bone Factory will not have an impact on the surface water run-off from the closed dumpsite.

Steel fence

The entire closed dumpsite will be encircled with a Steel Fence to protect the area from unauthorized entrance. A gate will be located at the south-west corner of the site and at the north-east corner of the site.

Service and access roads

On the dumpsite a service/access road will be constructed for access to the top of the site for the public and for maintenance of the area. The road will be a gravel paved road.

Development of a recreation area

The area is suggested to be open for public for recreation purposes. The area can be used as a recreational area having a view point for overlooking the wetlands and the skyline of Kolkata. The shape of the remediated dumpsite will have a top flat paved surface at + 35 m MSL with benches and tables.

Monitoring, maintenance and aftercare for 2 Years (as part of Defect Liability Period). Subsequently the operation and Maintenance will be done by KMC

- Monitoring wells in upper and primary water reservoir (sampling and water table)
- Monitoring wells in dumpsite (water table)
- Surface water (Sampling of surface water from dumpsite)
- Leachate collection wells/chambers (sample and amount/flow)
- Landfill gas (composition)
- Dumpsite surfaces and access/service roads (settlements and surface erosion)
- Grass and vegetation (growth/re-seeding)

### 3.2.1 Project Timetable

Duration of remediation work is 15 months including monsoon period.

- Expected starting date of the works: March 2016
- Expected end date of the works: June 2017
- Expected period for operation and maintenance by the Contractor during defect liability: June 2017 - June 2019
Expected date where KMC take over responsibilities for O & M: July 2019

3.2.2 Project responsibilities

This paragraph describes in the overall roles and responsibilities for the client WBPCB, the beneficiary party the Kolkata Municipal Corporation (KMC), the Consultant and the Contractors during executing the closure and containment works. These overall roles and responsibilities are described for the period of project execution and for the post-closure period.

Table 3-1: Roles and Responsibilities during project execution

<table>
<thead>
<tr>
<th>Project activities</th>
<th>World Bank</th>
<th>WBPCB</th>
<th>KMC</th>
<th>Contractor</th>
<th>Consultant</th>
<th>NGOs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project financing</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Formulation of the ESMP and bidding documents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Announcement, bidding, contract negotiation and contracting of closure works</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of the closure and containment works including collection &amp; treatment of leachates in Leachate Treatment Plant</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of environmental monitoring during closure works</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of social impact mitigation</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supervision of the implementation (by the Contractor) of all closure works</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring of the (progress and results of the) implementation of social impact mitigation measures</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The NGOs will be decided by WBPCB; who will carry out the required activities as a part of the Social Mitigation Plan & Community Development Plan.
Table 3-2: Roles and Responsibilities in after care period

<table>
<thead>
<tr>
<th>Project activities</th>
<th>World Bank</th>
<th>WBPCB</th>
<th>KMC</th>
<th>Contractor</th>
<th>Consultant</th>
<th>NGOs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 years aftercare period after completion of remediation</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of environmental monitoring after closure works</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implementation of social impact mitigation measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Monitoring of the (progress and results of the) implementation of social impact mitigation measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Post project execution &gt; 5 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring of the (progress and results of the) implementation of social impact mitigation measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
4 Environmental and Social Operational Policies

For sound management of the Dhapa project, International World Bank operational policies and Government of India operational policies are important. In this section an overview of the specific relevance of these policies are presented.

4.1 World Bank Environmental and Social Operational Policies

The operations of the World Bank are guided by a comprehensive set of policies and procedures, dealing with the Bank’s core development objectives and goals, the instruments for pursuing them, and specific requirements for Bank financed operations. These are set out in the Bank’s Operational Manual. The core of this guidance lies in the Operational Policies (OPs) which are short, focused statements that follow from the Bank's Articles of Agreement, its general conditions, and from policies specifically approved by the Board. Bank Procedures (BPs) provide guidance for Bank Officials in implementing the OPs.

Within the overall set of Operational Policies, Bank management has identified ten key policies that are critical to ensuring that potentially adverse environmental and social consequences are identified, minimized, and mitigated. These ten policies are collectively known as the Safeguard Policies, and receive particular attention during the project preparation and approval process. These environmental and social safeguard policies are a cornerstone of the Bank’s support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies

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8 (OPs) are short, focused statements that follow from the Bank's Articles of Agreement, the general conditions, and policies approved by the Board. OPs establish the parameters for the conduct of operations; they also describe the circumstances under which exceptions to policy are admissible and spell out who authorizes exceptions. Bank Procedures (BPs) explain how Bank staff carries out the policies set out in the OPs. They spell out the procedures and documentation required to ensure Bank wide consistency and quality. Operational Memoranda (OP Memos) are interim instructions intended to elaborate on material in OPs/BPs or ODs. Once the instructions in OP Memos are incorporated into revisions of the pertinent OPs/BPs, the OP Memos are retired.

9 Safeguard Policies' at www.worldbank.org
provide guidelines for bank and borrower staffs in the identification, preparation, and implementation of programs and projects. The effectiveness and development impact of projects and programs supported by the Bank has substantially increased as a result of attention to these policies. Safeguard policies have often provided a platform for the participation of stakeholders in project design, and have been an important instrument for building ownership among local populations.

The policies are described in detail in the Environmental and Social Impact Report of this project. For the execution of this project the following World Bank Environmental and Social Safeguard policies are relevant:

- OP/BP 4.01 on environmental assessment
- OP/BP 4.10 on indigenous peoples
- OP/BP 4.12 on involuntary resettlement

4.2 Relevance of Policy guidelines to Dhapa Dumpsite conditions

1. **OP/BP 4.01 on Environmental Assessment:** An environmental and social impact assessment was carried out in the frame of the project.

2. **Section 6.3 OP/BP 4.10 on indigenous peoples:** Social Impacts were identified in the project and the social management and mitigation measures described in this report are designed to ensure that the temporary affected people participate in the project, benefit from it in a culturally appropriate way and to make sure that impacts on them are avoided or where not feasible, minimized or mitigated.

3. **OP/BP 4.12 on involuntary resettlement:** During execution of the project, no rehabilitation and resettlement is anticipated due to no impact on livelihood of the people residing in the close vicinity of the dumpsite.

4. **Policies related to Rights of the Child:** In the project the United Nations Convention on the Rights of the Child are the preconditions for the implementation of the dumpsite closure and containment measures in relation to the involvement of children amongst the project affected persons. The livelihood of children will improve due to the closure of the dumpsite. Appendix II gives the UNICEF leaflets summarizing the articles of this convention.¹⁰

4.3 National Regulations

The Indian Government has published a number of Acts, Rules and Legislations. Legislation described here are directly or indirectly applicable to the project

including closure, containment and subsequent after care and use of the site. These include:

- The Water (Prevention and Control of Pollution) Act, 1974 & Water (Prevention and Control of Pollution) Rules, 1975
- The Air (Prevention and Control of Pollution) Act, 1981 & Air (Prevention and Control of Pollution) Rules, 1982
- Noise Pollution (Regulation and Control) Rules, 2000
- Municipal Solid Waste (Management and Handling) Rules, 2000
- The Hazardous Waste (Management, Handling & Trans Boundary) Rules, 2008 as amended to date
- The Manufacture, Storage and Import of Hazard Chemicals Rules, 1989 as amended to date

Relevant regulations concerning labour and working conditions include:

- The Contract Labour (Regulation and Abolition) Act, 1970
- Inter-State Migrant Workmen Act, 1979
- The Companies Bill 2011 (Proposed Legislation)
- The Environmental and Social Management Framework (ESMF) of CBIPM
- The Bank Safe Guard Policies

These acts and regulations are described in detail in the ESIA report of this project. All obligatory and potential social and environmental mitigation measures described in this management plan fulfil at least the relevant Indian acts and regulations. The Contractor is required to operate fully in line with the above described environmental and social operational policies.

Moreover a gist of applicable legislation is provided in Table 4-1. These regulations are to be strictly adhered to during the phase of Implementation of the Closure and Containment / Remediation activities for the closed dumpsite by the Contractor. The Contractor will be responsible for strictly adhering / catering to the applicable
legislations governing the closure / remediation of the dumpsite and also take permissions / approvals from any concerned authorities as the case may be.

*It is to be noted that the EIA Notification, 2006 does not require securing of formal Environmental Clearance for projects involving landfill closure (as it is a Category B2 project), as already mentioned earlier.*
### Table 4-1: Legislative Overview

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Regulation</th>
<th>Purpose</th>
<th>Applicability / Rationale / Relevant Containment and Closure Option</th>
<th>Permit Required?</th>
<th>Compliance Documentation</th>
<th>Competent Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Environment Protection Act, 1986; Environment Protection Rules, 1986</td>
<td>An umbrella Act based on which many regulations are based; the Rules specify discharge norms and specifications for various discharges</td>
<td>The basic legislation which governs much other regulation that is relevant to the Site. Relevant for each option.</td>
<td>No</td>
<td>Form V under the EP Rules for all options where authorization and consents as part of post-closure operations would be required. (Options 3.1, 3.2, 4 and 5).</td>
<td>WBPCB</td>
</tr>
<tr>
<td>2</td>
<td>Municipal Solid Wastes (Management and Handling) Rules, 2000</td>
<td>The main regulation governing management of Municipal Solid Wastes in India, including closure of landfills / dumpsites.</td>
<td>Closure of landfills requires compliance with the MSW Rules. Relevant for each option.</td>
<td>Yes – for leachate treatment</td>
<td>Proof of compliance with discharge limits for leachate, air emissions and compost quality (if required).</td>
<td>WBPCB</td>
</tr>
<tr>
<td>3</td>
<td>Air (Prevention and Control of Pollution) Act, 1981; Air (Prevention and Control of Pollution) Rules, 1982</td>
<td>To regulate emissions to the atmosphere</td>
<td>Point source air emissions are likely to be part of Closure and Containment Option 3.2 and 5.</td>
<td>No</td>
<td>Permit compliance, in particular point source air emission results.</td>
<td>WBPCB</td>
</tr>
<tr>
<td>4</td>
<td>Noise Pollution (Regulation and Control) Rules, 2000</td>
<td>To control background noise levels in the environment.</td>
<td>Some noise level enhancement is likely as part of the Closure and Containment Options and Operation / Maintenance Schedule. Will be relevant for Options 2 to 5.</td>
<td>No</td>
<td>Source and background noise levels.</td>
<td>WBPCB</td>
</tr>
<tr>
<td>5</td>
<td>Water (Prevention and Control of Pollution) Act, 1974; Water (Prevention and Control of Pollution) Rules, 1975</td>
<td>To regulate wastewater discharges into different receiving streams</td>
<td>Leachate treatment plants are proposed as per Containment and Closure Options 3.2, 4 and 5.</td>
<td>Yes</td>
<td>Clause wise permit compliance, especially quality of wastewater being discharged into outlet</td>
<td>WBPCB</td>
</tr>
<tr>
<td>S. No.</td>
<td>Regulation</td>
<td>Purpose</td>
<td>Applicability / Rationale / Relevant Containment and Closure Option</td>
<td>Permit Required?</td>
<td>Compliance Documentation</td>
<td>Competent Authority</td>
</tr>
<tr>
<td>-------</td>
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<td>------------------------------------------------------------------</td>
<td>-----------------</td>
<td>--------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>6</td>
<td>Water (Prevention and Control of Pollution) Cess Act, 1977; Water (Prevention and Control of Pollution) Cess Rules, 1978 as amended in 2003</td>
<td>To gather cess for the State Pollution Control Boards as one of the means for their functioning; to encourage control on consumption of water resources.</td>
<td>For all options where water is consumed (Option 2 to 5) as part of the end use.</td>
<td>No</td>
<td>Monthly water cess returns and annual water cess returns as per Form 1.</td>
<td>WBPCB</td>
</tr>
<tr>
<td>7</td>
<td>The West Bengal Ground Water Act 2005</td>
<td>To control abstraction (drawl) of groundwater in notified areas and regulate groundwater abstraction in areas considered over-exploited, critical and semi-critical</td>
<td>Applicable in case water requirements post-closure are addressed by abstraction of groundwater through drilling of an abstraction well.</td>
<td>Yes</td>
<td>Status of the site at the time of abstraction of groundwater by drilling of a well to be checked with the SWID.</td>
<td>SWID</td>
</tr>
<tr>
<td>8</td>
<td>The Hazardous Wastes (Management, Handling and Tran boundary) Rules, 2008 as amended till date</td>
<td>Management of Hazardous Wastes (Some hazardous waste are expected disposed at the closed dumpsite)</td>
<td>Applicable for all options whereby hazardous waste authorisation is required (Options 4 and 5)</td>
<td>Yes</td>
<td>Clause wise compliance with the Hazardous Waste Authorisation including suitable manifest records of hazardous waste management.</td>
<td>WBPCB</td>
</tr>
<tr>
<td>9</td>
<td>The Bio-Medical Wastes (Management and Handling) Rules, 1998, as amended in 2003</td>
<td>Management of Bio-medical Wastes (It is known that bio-medical waste are disposed at the dumpsite)</td>
<td>Likely, based on wastes identified during the landfill re-profiling process. See footnote. Applicable for Options 3.1, 3.2, 4 and 5.</td>
<td>Yes</td>
<td>Compliance with permit norms including manifest / disposal records indicating safe disposal to an authorised disposal facility.</td>
<td>WBPCB</td>
</tr>
</tbody>
</table>

Both the Bio-Medical Wastes (Management and Handling) Rules would require consideration when the site is re-laid to achieve the required shape and slope (Options 3.1, 3.2, 4 and 5). During the process of profiling of wastes excavation will be carried out. Looking at the past history of waste dumping, it is possible that some bio-medical may be generated and would necessarily require suitable disposal as per applicable norms.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Regulation</th>
<th>Purpose</th>
<th>Applicability / Rationale / Relevant Containment and Closure Option</th>
<th>Permit Required?</th>
<th>Compliance Documentation</th>
<th>Competent Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>The Wetlands (Conservation and Management) Rules, 2010</td>
<td>To maintain the ecological character of identified wetlands, including Ramsar Convention Wetlands</td>
<td>Discharges into wetlands require to be regulated under these Rules. Options 2, 3.1, 3.2, 4 and 5 all discharge treated effluent into the water body lying within the wetlands through a drainage channel.</td>
<td>Yes</td>
<td>Correspondence with the Central Wetlands Regulatory Authority and compliance with any requirements stipulated by the Authority</td>
<td>Central Wetlands Regulatory Authority</td>
</tr>
<tr>
<td>11</td>
<td>The East Kolkata Wetlands (Conservation and Management) Act, 2006</td>
<td>To demarcate the East Kolkata Wetlands’ boundaries, prevent unauthorised use or development of the Wetlands, prevent and restrict mining and quarrying within the Wetlands, reduce pollution in the Wetlands, to prepare action plans conforming to the Ramsar Convention and others.</td>
<td>The closure / remediation project of the closed dumpsite in the area of Dhapa</td>
<td>Clearance required from East Kolkata Wetlands</td>
<td>Application already submitted to the East Kolkata Wetland Authority for getting necessary clearance for the Remediation / Closure and Containment of the Dump site along with leachate treatment facility.</td>
<td>East Kolkata Wetlands Management Authority (EKWA)</td>
</tr>
<tr>
<td>12</td>
<td>The Contract Labour (Regulation and Abolition) Act 1970</td>
<td>To regulate employment of contract labour.</td>
<td>Labour would require to be hired during the time of construction / operation and maintenance (Options 2, 3.1, 3.2, 4 and 5)</td>
<td>Yes</td>
<td>Compliance with the permit (labour license)</td>
<td>Labour Commissioner</td>
</tr>
<tr>
<td>13</td>
<td>The Inter State Migrant Workmen Act, 1979</td>
<td>To regulate hiring and working conditions of inter-state workmen.</td>
<td>In case inter-state labour would require to be hired during the time of construction / operation and maintenance (Options 2, 3.1, 3.2,</td>
<td>Yes</td>
<td>Proof of compliance with the regulation</td>
<td>Labour Commissioner</td>
</tr>
<tr>
<td>S. No.</td>
<td>Regulation</td>
<td>Purpose</td>
<td>Applicability / Rationale / Relevant Containment and Closure Option</td>
<td>Permit Required?</td>
<td>Compliance Documentation</td>
<td>Competent Authority</td>
</tr>
<tr>
<td>-------</td>
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<td>-----------------------------------------------------------------</td>
<td>------------------</td>
<td>-------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>14</td>
<td>Labour Laws (ESI Act, 1948, EPF Act, 1952, Workmen’s Compensation Act, 1936, Bonus Act, 1965)</td>
<td>To ensure equity / fairness and welfare whilst hiring of employees during the construction / operation phase</td>
<td>Labour would require to be hired during the time of construction / operation and maintenance (Options 2, 3.1, 3.2, 4 and 5)</td>
<td>Yes</td>
<td>Proof of compliance with the regulation</td>
<td>Labour Commissioner</td>
</tr>
</tbody>
</table>
5 Impacts

5.1 Overview main environmental issues

5.1.1 Pre-remediation
Refer to ESA report & environmental impacts highlighted in Section 2.4.1 of this report.

5.1.2 During project
The list of environmental impacts, health and safety risks and an outline of the main management responses during the project execution include the following:

Accidents on site project location
Closure and containment related traffic and the use of heavy equipment may cause injury and contamination, as well as physical disturbance (noise and dust). This should as much as possible be avoided by smart planning, use of traffic controllers and proper use of equipment and irrigation of working areas.

Accidents off site project location
Supervision and clear instructions should be given in the local language and adapted to qualifications of the team, restricting access to areas where construction takes place.
Traffic for the construction site will be coordinated with the staff at the administration building to optimise traffic on the access road. The Contractor shall construct a by-pass to the construction camp to avoid transport through the weighbridge area.
Instable slopes should not be left unattended overnight. The whole construction site will be fenced during construction by a temporary fence. The construction camp located south west of the dumpsite will also be fenced. The Contractor will have to guard the site during the whole construction period.
Dust nuisances on site project location.
The excavation, dozing, transport and re-disposal of wastes will cause dust and potential exposure to sharp objects and biohazards. Proper health and safety measures and use of adequate Personal Protective Equipment (PPE) during the waste handling process as well as water spraying to reduce dust formation should mitigate this.

Dust nuisances off site project location.
The earthworks will cause additional disturbance by a temporary increase of dust blow and erosion. Proper planning is crucial, with waste disposal arrangements, judgment of weather (avoiding strong winds and extreme temperatures) and water spraying/irrigation to reduce dust blow.

Noise nuisances on site project location.
The earthworks, the transportation and sieving of wastes on site will cause potential exposure to noise of the workers. Proper use of adequate PPE (hearing protection) during the sieving process as well as when working in the vicinity of machinery should be sufficient to avoid the risk of hearing loss.

Noise nuisances off site project location.
The earthworks, the transportation of wastes will cause potential noise nuisance for the people living in the direct vicinity of the dumpsite. Proper planning of works that can cause noise nuisances is crucial. The activities that can cause noise nuisances will be carried out during the normal daily working hours.

Fire in waste on site project location
There are a risk of ignitions and hereof fire in waste during handling of waste (in particular during excavation and dozing of waste). The Contractor shall ensure that a heap of 100 m³ inert materials are available for extinguish of fires. Also sufficient pumps and hoses should be available on site for extinguish of fires by use of water from the surface water canals.

Handling of leachate
During profiling and excavation of trenches for drain pipes, leachate will be exposed. The Contractor shall collect all leachates during the construction phase and ensure that no leachate run-off from the site takes place.

The contractor will provide leachate pumping facilities from the leachate collection sumps upto the battery limits of the Leachate treatment plant (LTP) located beside the Crematorium. Leachates will be treated in the LTP.

The contractor shall report, all the accidents and fatalities (if any) to the employer (WBPCB) and shall implement necessary mitigation and preventive measures. This shall be included in the HSE measures as part of this ESMP.
5.1.3 Post project execution

Short and medium term monitoring and aftercare of the rehabilitated dumpsite

The list of environmental impacts, health and safety risks and an outline of the main management responses after the construction phase include the following:

› Emission of landfill gas will take place. The landfill gas ventilation system including of bio-filters are installed and needs to be maintained (adding or replacement of compost/peat/wood chips). Regular air quality monitoring should be carried out.

› Collection of leachate from the leachate collection system will continue to be relevant for a period of 4-6 years after remediation of the dumpsite.

› The collected leachates will be treated in a Leachate Treatment Facility established on site.

› There are no chances of contamination of groundwater and surface water due to generation of leachate as proper collection, treatment and disposal of leachate have been envisaged. There are no adverse environmental risks.

› There are likely chances of lower survival rate of grass and plant species due to the presence of an impermeable HDPE liner above the waste. The Contractor will have to make a log of the number of bushes/shrubs planted and their survival rate as well as areas needed to be seeded again.

› Erosion of new slopes may take place. The new slopes should be inspected regularly and maintained properly.

› The covered waste will settle and this may cause damage of the top cover and possibly exposure of the liner etc. The Contractor will have to monitor the integrity of the top cover and repairing the damages.

Long term monitoring and aftercare of the rehabilitated dumpsite

As the waste body will remain on the site after the finalization of the site closure and containment works, long term monitoring and aftercare is required to uphold the end situation. After the construction phase, environmental impacts and measures identified include:

› Erosion of new slopes may take place. The new slopes should be inspected regularly and maintained properly.

› The covered waste will settle and this may cause damage of the top cover and possibly exposure of the liner, the operator will have to monitor the integrity of the top cover and repairs the damages.
Slow growth of vegetation. Monitoring of development of vegetation is important, in order to make arrangements for adjustments (irrigation, fertilization, planting of different species).

The leachates from the Leachate Collection Chambers will be pumped to the Leachate Treatment Facility installed closed to the site. The treated leachate will be disposed of to nearby storm water drain in compliance with the CPCB Guidelines. The influent/effluent will be sampled and analysed.

Elements subject to management, maintenance/aftercare and monitoring after construction include:

- **Monitoring:**
  - The integrity of all slopes and other unpaved surfaces
  - The integrity of paved surfaces
  - The integrity of top cover
  - The groundwater with piezometers around the dumpsite
  - Surface water in monitoring points upstream and downstream the closed dumpsite
  - The leachate quality monitoring from the collection chamber prior transport to Leachate Treatment Plant (LTP).
  - The passive landfill gas emission
  - The integrity of drainage channels and piping, pumps, passive landfill gas ventilation system and collection channels

- **Maintenance and aftercare:**
  - All slopes and other unpaved surfaces (erosion control)
  - The of top cover (damage due to settling of waste)
  - The passive landfill gas ventilation system
  - The drainage channels and piping, pumps and collection channels
  - The paved surfaces
  - The vegetation
6 Organizational Structure & QHSE Management

This chapter describes the structure that is established in order to ensure that the required mitigation and monitoring measures are executed. This chapter specifically includes a section on redressing possible grievances.

6.1 Roles, responsibilities and organizational structure

The Consultant is required to develop this current ESMP. The Contractor, the WBPCB and KMC have to implement the ESMP. This ESMP provides the framework for achieving the environmental and social objectives and performance, including compliance with conditions, licensing and other regulatory requirements.

The project will engage Contractor(s) to carry out the project activities in line with the bidding documents. The Contractor(s) should prepare management plans for specific project stages addressing both construction (execution phase) and operation (post execution phase).

The Contractor management plans must be in conformity with requirements of the project’s overarching plans. The Contractor plans will be reviewed and approved by the Consultant.

Contractor(s) will be required to self-monitor against their plan and the Contractor’s compliance with the plan will be monitored by the Consultant. Contractor(s) will be required to submit regular (monthly) reports of monitoring activities and the Consultant will review these. One of the tasks of the Consultant will include reporting to the employer – WBPCB/KMC of the reviewed Contractor’s monthly monitoring reports.

The Consultant should commit to provide appropriate human resources and specialized skills essential to the implementation and control of the ESMP. Table 6-1 provides a summary of responsibilities for implementing the ESMP.
**Table 6-1: Environmental management organization roles and responsibilities**

<table>
<thead>
<tr>
<th>Position</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultant</td>
<td>Oversee and coordinate all activities pertaining to the Environmental, Human Health and Safety (EHS) aspects of the project.</td>
</tr>
<tr>
<td>Consultant</td>
<td>Ensure delivery by the asset of its EHS and operational targets. Ensuring that the project Contractor/subcontractor(s) operate in accordance with applicable regulatory on environment, health and safety requirements and plans. Ensure effective communication with all stakeholders.</td>
</tr>
<tr>
<td>Contractor</td>
<td>Responsible for Contractor/subcontractor(s) technical performance and compliance.</td>
</tr>
<tr>
<td>Contractor</td>
<td>Ensure that environment, health and safety regulatory requirements are met and that ESMP requirements are properly implemented.</td>
</tr>
</tbody>
</table>

The Consultant will assign a professional staff member, in charge with implementing the ESMP, as the authority of ‘EHS’ and follow the compliance by audits which can be conducted on a monthly basis for adhering to the requirements of the ESMP, including ensuring compliance with relevant Indian and International legislation / regulations.

The Consultant will have the following responsibilities concerning the management of environmental and social issues:

› Regular consultation with statutory and non-statutory Consultants and other relevant parties.
› Specifying environmental standards and monitoring requirements to prospective Contractors.
› Monitoring Contractor performance.
› General monitoring and problem resolution as project execution progresses.

The Contractors will be responsible for:

› Training the Contractors’ own staff to raise environmental consciousness and assigning a person responsible for EHS in order to contribute to the project’s environmental and social performance.
› Fulfilling the requirements of Indian and International environmental legislation, and taking necessary mitigating measures.
› Acquiring licenses required in accordance with the National legislation to conduct the project execution (activities).
6.2 Description of the project quality management system

The structure of the project quality system is presented in Figure 6-1.

![Project Quality System Diagram]

*Figure 6-1: Project Quality System*

6.3 Documentation

The Consultant will control EHS documentation, including management plans, associated procedures, checklists, forms and reports through a formal procedure.

The Contractor and possible subcontractors will be required to develop a system for maintaining and controlling their own EHS documentation and describe these systems in their respective plans. The document control procedure as prescribed by the consultant has to be followed for maintaining and traceability of the records.

6.4 Human resources and training

The Consultant will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social conditions.

The project recognizes that it is important that employees at each relevant function and level are aware of the project's environmental and social policy; potential impacts of their activities; and roles and responsibilities in achieving conformance with the policy and procedures. This will be achieved through a formal training process. Employee training will include awareness and competency with respect to:

- Environmental and social impacts that could potentially arise from their activities.
- Necessity of conforming to the requirements of the ESA and ESMP, in order to avoid or reduce those impacts.
- Roles and responsibilities to achieve that conformity, including with regard to change management and emergency response.
The EHS Manager is responsible for coordinating training, maintaining employee-training records, and ensuring that these are monitored and reviewed on a regular basis. The EHS Manager will also periodically verify that staffs are performing competently through discussion and observation. Employees responsible for performing site inspections will receive training by drawing on external resources as necessary. Training will be coordinated by the EHS Manager prior to the beginning of field activities. Upon completion of training and once deemed competent by management, staff will be ready to train other people.

Similarly the project will require that each of the subcontractors institute training programs for their personnel. Each subcontractor is responsible for site EHS awareness training for personnel working on the job sites. The subcontractors are also responsible for identification of any additional training requirements to maintain required competency levels.

The subcontractor training program will be subject to approval by the project and it will be audited to ensure that:

- Training programs are adequate
- All personnel requiring training have been trained
- Competency is being verified
7 Environmental mitigation and monitoring measures

This chapter presents a detailed plan for environmental and social mitigation measures, during and post project execution. These measures are proposed in order to mitigate and monitor adverse environmental and social impacts.

Social monitoring plan is described in section 0.

7.1 Obligatory measures during project execution

7.1.1 Environmental mitigation measures

The Contractor shall take all necessary measures and precautions and otherwise ensure that the execution of the works and all associated operations on or off site are carried out in conformity with statutory and regulatory environmental requirements.

The Contractor shall take all measures and precautions to avoid any nuisance or disturbance arising from the execution of the Works. This shall wherever possible be achieved by suppression of the nuisance at source rather than abatement of the nuisance once generated.

The provisions of these measures and precautions shall only be disregarded in respect of emergency work required for the saving of life or property or the safety of the Works.

In the event of any waste and soil from the site being deposited on any adjacent land, the Contractor shall immediately remove all waste and soil and restore the affected area to its original state to the satisfaction of the supervising engineer.

Supervision and Monitoring Plan

Within 21 days of the award of contract the Contractor shall submit a detailed Supervision and Monitoring Plan for the engineer’s approval showing how he
intends to comply with environmental laws and regulations and other environmental requirements described in the contract.

This Supervision and Monitoring Plan should be prepared and implemented in compliance with:

- The design requirements
- The Indian and Internationally broadly excepted standards
- This Environmental and Social Management Plan

The project specific environmental issues that should be addressed in the Supervision and Monitoring Plan are elaborated in this section. Costs for environmental monitoring are not included in this ESMP because they are part of the competitive bids by the preselected Contractors.

Fuel and Chemical Storage
All fuel and chemical storage shall be sited on an impervious base within a bund and secured by fencing. The base and bund walls shall be impermeable and of sufficient capacity to contain 110% of the max volume of tanks. Filling and refuelling shall be strictly controlled and subject to formal procedures. All valves and trigger guns shall be resistant to unauthorized interference and vandalism and be turned off and securely locked when not in use. The Contractor shall constantly keep the bund free of rain water.

The contents of any tank or drum shall be clearly marked. Measures shall be taken to ensure that no spills occur and there will be no contaminated discharges enter the soil, any drain, sewer or water courses.

Water Quality
The Contractor shall prevent any interference with the supply to or abstraction from or the pollution of water resources (including underground percolating water) resulting from the execution of the works. All water and other liquid waste products arising on the sites shall be collected and disposed of at a location on or off the sites and in a manner that shall not cause either nuisance or pollution. The Contractor shall not discharge or deposit any matter arising from the execution of the works into any waters except with the permission of the engineer and the regulatory authorities concerned.

The Contractor shall at all times ensure that all existing stream courses and drains within and adjacent to the site are kept safe and free from any waste debris and any materials arising from the Works. The Contractor shall submit details of his temporary drainage systems (including all surface channels, sediment traps, washing basins and discharge pits) to the engineer for approval prior to commencing work.

Air Quality
The Contractor shall devise and arrange methods of working to minimize dust, gaseous or other air-born emissions and carry out the works in such a manner as to minimize adverse impacts on air quality. The Contractor shall utilize effective
water sprays/irrigation during the delivery and handling of waste when dust is likely to be created, and to dampen stored materials during dry and windy weather. Stockpiles of materials shall be sited in sheltered areas.

Any vehicle with an open load-carrying area used for transporting potentially dust producing material shall have properly fitting side and tail boards. Materials having the potential to produce dust shall not be loaded to a level higher than the side and tail boards. Transport speed shall be adapted on order to minimize dust emission during transport.

Construction vehicles and machinery shall be kept in good working order and engines turned off when not in use. Appropriate measures shall be taken to limit exhaust emissions from construction vehicles, machinery, and plant and the Contractor shall include details of such proposed measures in the mitigation and monitoring plan to be submitted to the engineer.

The Contractor shall acknowledge the potential presence of asbestos in the waste body. The Contractor shall utilize all means possible to prevent the exposure of staff to asbestos by using the proper PPE. Strict policies regarding eating, drinking and smoking, as well as showering after work, shall be enforced for the sorting staff working on-site the dumpsite during excavation, transport, dozing, re-disposal and compaction of waste.

Noise
The Contractor shall consider noise as an environmental constraint in his planning and execution of the works. The Contractor shall use plant and equipment conforming to National or International standards and directives on noise and vibration emissions and shall include details of measures for abating noise at source in the mitigation and monitoring plan to be submitted to the engineer.

The Contractor shall take all necessary measures to ensure that the operation of all mechanical equipment and construction processes on and off the site shall not cause any unnecessary or excessive noise, taking into account applicable environment requirements.

The Contractor shall use all necessary measures and shall maintain all plant and silencing equipment in good condition so as to minimize the noise emission during construction works.

Preservation of existing landscape
The Contractor shall exercise care to preserve the natural landscape in the vicinity of the works and shall conduct his operations so as to prevent any unnecessary destruction, scarring, or defacing of existing landscape features. The removal of trees, bushes, and other natural vegetation, other than those present within the construction site itself and the Contractor’s camp shall only be carried out with the prior approval of the engineer.
7.1.2 Environmental monitoring

The Contractor has to install at least two monitoring stations within the project area, one at the dumpsite near the excavation of the waste and one at the waste handing location. The environmental monitoring period shall start with the preparatory works and should last until the site closure and containment is completed. The first measurements shall provide reference data of the base environmental parameters in the project area as no data is available. The location of the environmental monitoring stations has to be approved by the Engineer. The Engineer shall periodically collected data.

Air quality

Landfill gas measurements have to be performed during waste excavation at regular intervals. The initial frequency of landfill gas measurements is four times a day. If 10 % of the LEL is measured in the ambient air the work will be aborted until the concentration is lower than 10 %.

Dust monitoring

Another important issue for observation is the emission of dust. As the main sources of dust emission are the areas where handling of waste takes place, it is obvious that the areas of on-going excavation, re-disposal and compaction works have to be observed.

The emission of dust has to be permanently measured and if the daily average values exceed the regulatory limits, an alert will be given. In that case measures must be taken in accordance with the engineer (i.e. reduction of traffic, intensifying moistening/sprinkling of roads).

The dust monitoring has to be performed with a dust sampling system according to Indian or International standards. The following guidelines are the European basis for dust monitoring:

› Guideline 1996/62EG from 27.09.1996 (concerning quality control)
› Guideline 1999/30/EG from 22.04.1999 (concerning regulatory limits)
› Guideline 2000/69/EG from 16.11.2000 (concerning regulatory limits)

Concentration

The following regulatory limits must not be exceeded:

› Suspended matter 150 μg/m³ daily average value
› PM 10 (particle diameter 10 μm) 50 μg/m³ daily average value

For the PM 2.5 no regulatory limits exist but there are US guidelines with the following values:

› PM 2.5 12 –15 μg/m³ daily average value

The measure system must be based on radiometric concentration determination (e.g. Thermo Electron System or other according DIN EN 12341).
Deposition
The following regulatory limits must not be exceeded:

› Dust deposit 210 mg/ (m²*d) deposition as average value per year

The samples should be analysed using AAS-spectrometry for the parameters mentioned above or similar equipment reaching equal accuracy. The dust monitoring system has to be at downwind side of the main working area.

Noise monitoring
The noise emission of the project is important mainly for the residential areas (Makaltala Village) close to the dumpsite. Therefore the noise emission of the construction works has to be monitored at set intervals. If the results exceed the threshold value measures must be taken in accordance with the engineer (i.e. reduction of traffic, changing to equipment with lower noise emissions reduce noise emission constructing protection facilities/noise barriers, etc.).

The noise monitoring (based on emission) shall deliver information about the noise caused by the remediation works especially in the critical areas. The second item is to execute measures to reduce noise emissions in case of excess of regulatory levels.

Therefore the project area is to be divided in related sections which have to be watched separately. Before starting the work it is necessary to collect information about the base noise because there is no information available for the region. After evaluating the measuring points together with the engineer and setting up a catalogue of measures concerning excess of regulatory levels the measures can start.

The following items are basic for the noise monitoring:

› Description and photo documentation of measuring points (incl. coordinates)
› Sound level measuring with percentile levels for 15 min. intervals
› Recording linear in real time
› Recording of all other influences (e.g. traffic counting)
› Collection and description of all noise peaks and characteristic acoustic pressure with correlation to noise sources
› Collection of meteorological conditions (sound propagation conditions)
› Reporting with graphic presentation and evaluation
› Transfer of data to the engineer
The Central Pollution Control Board has set the following noise standards:

Table 7-1 Noise limits in dB (A)

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Area</th>
<th>Area Day time (6 a.m. till 9 p.m.)</th>
<th>Night time (9 p.m. till 6 a.m.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Industrial</td>
<td>75</td>
<td>70</td>
</tr>
<tr>
<td>B</td>
<td>Commercial</td>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>C</td>
<td>Residential</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>D</td>
<td>Silence Zone</td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>

A Silence zone is referred as areas up to 100 meters around such premises as hospitals, educational institutions and courts. The Silence zones are to be declared by the Competent Authority. Mixed categories of areas should be declared as one of the four above mentioned categories by the Competent Authority and the corresponding standards shall apply. It is proposed that during day time the surrounding of the project working area is seen as Industrial area.

Surface water monitoring
The Contractor shall during the construction phase monitor the surface water upstream and downstream the dumpsite.

During construction, on a monthly basis the following samples need to be taken:

› Sample of the surface water quality upstream of the area affected by the run-off (SW-01 and SW-04))
› Sample of the water quality of the run-off
› Sample of the surface water quality downstream of the run-off area (SW-03)

All surface water samples have to be analyzed for the content of heavy metals, pH and Electro conductivity. In case of statistically relevant deviations, measures have to be taken in accordance with the engineer.

The analysis has to be performed by a laboratory accredited or certified according to International standards. The necessary certificates of qualification are to be included in the offer package.
Groundwater monitoring

Groundwater monitoring of the upper water bearing aquifer shall be carried out during all stages of remedial works.

For this purpose only the observation wells presented in Figure 7-1 of this report and as prescribed in the Sample Analysis and Assessment of the Site Pollution Levels report will be tested on their chemical composition, with focus on organic matter and heavy metal concentration. Testing will take place every 3 months. The last testing round will take place 3 months after the remediation works have been finalized.

Groundwater samples shall be transported under cold chain to a certified laboratory within 48 hours analysed.

Results must be handed to the engineer within 2 weeks from the sampling date. The engineer will check extent and level of contamination and direct appropriate measures if required. The baseline (see site assessment report) and the applicable Indian standards will be used as reference.

Asbestos monitoring

Asbestos are detected during the site investigations and it is assumed that relatively large amount of asbestos is disposed at the dumpsite, mainly as cement fibre plates.

Main point of concern regarding the presence of asbestos is during excavation, transport and re-disposal including compaction of waste. All workers on site during the above mentioned activities should be equipped with a P3-dust mask. Daily, after the end of a shift, workers should shower and wash their hair to prevent asbestos dust that has settled on the body to enter into their respiratory system.

During activities on the dumpsite dust formation should not exceed the prescriptions set. The below limit values are based on the Dutch NEN 2991 values for indoor air-quality. The Asbestos limited value for working without precautions (average over a period of 8 hours):

› Amosite 0.5 fibre/cm³
› Chrysotile 1.0 fibre/ cm³
› Crocidolite 0.2 fibre/ cm³

All stockpiles with cement asbestos cement fibre plates visible and exposed during the profiling of the dumpsite shall be collected separately and disposed in excavated holes without any directly compaction etc. but covered with soil or other waste not containing asbestos prior compaction.
7.2 Obligatory measures after project execution

7.2.1 Environmental mitigation measures

Air Quality
The Contractor shall ensure that uncontrolled emissions of landfill gas do not lead to significant air pollution or safety risks. The landfill gas release points should be allocated before the construction phase of existing dumpsite. Landfill gas collection pipes should be installed during the construction phase. Appropriate measures should be taken for the release of landfill gas through a passive venting system (i.e. effluent of the passive landfill gas ventilation well is installed in a bio-filter in order to prevent the smell or odour problems).

The Contractor should maintain the monitoring records of methane emission to ensure that the releases are within the specified tolerances at a given distance from the point of release, at least 75% below the Lower Flammability Limit for methane.

Surface Water and Ground Water Quality
The Contractor shall prevent discharge of untreated leachate into the nearby surface water drains. Leachate collection system will be installed and the leachate generated from the dumpsite will be collected from the collection wells and pumped to the Leachate Treatment Plant. The storm water needs to be collected and conveyed into the existing open storm water drainage drains located around the site.

7.2.2 Environmental monitoring

Within 3 months of the finalization of the works, the Contractor shall submit a detailed aftercare, inspection and replacement plan for the clients and engineers approval showing how he proposes the compliance with the environmental laws and regulations and other environmental requirements described in the Contract after the finalization of the works.

Key focus of the aftercare, inspection and replacement plan is the long-term sustainability of the remediation end-result. It should include an agreement between the relevant parties for the future management of the restored dumpsite and as such will include multiple stakeholders. The persons responsible for implementing the monitoring and aftercare program should be clearly listed in the plan.

Objective of the aftercare, inspection and replacement program
Objective of the aftercare, inspection and replacement program is to give an overview of the required works. This overview includes the frequency of the works, the responsible parties and any trigger values for further actions. The
monitoring and aftercare inspection and decision program is composed of three parts:

1. Inspection program. This includes all the works that do not include sampling and analysis of materials.
2. Sampling program. This includes all the works that involve sampling and analysis of materials.
3. Replacement program. The replacement program includes an overview of the materials and equipment required for aftercare and monitoring and their replacement time and estimated associated costs.

Inspection program

As a waste body will remain on the site after the finalization of the remediation works, long term inspection is required to uphold the end-situation. After the construction phase, environmental impacts and measures identified that require regular inspection include:

- Thickness and coverage of the top layer
- Flora and fauna on the dumpsite
- Drainage channels
- Landfill gas ventilation points
- Groundwater monitoring system
- Piezometer presence and condition
- Surface water monitoring system
- Leachate collection chamber and its condition

The inspection program should contain the following information:

- Inspection subject; e.g. the thickness of a cover layer
- Inspection activities; e.g. visual check for damages of top layer
- Frequency; e.g. yearly. The frequency is strongly dependent on the sensitivity of the inspection subject to changes
- Responsible party; e.g. Site owner

In addition to the overview of the inspection subjects and associated activities, the inspection program should also clarify what actions need to be taken in case of incompliance of one of the inspection subjects. In the inspection program this should be incorporated in the following manner:

- Inspection subject
- Incompliance; e.g. Top layer is damaged
- Action; e.g. Restore top layer thickness
- Deadline
  - The deadline is strongly dependent on the risks associated with the incompliancy.
  - Incompliancy’s that lead to (direct) risks should be dealt with within a short time period, whereas incompliancy’s that not (yet) result in risks can be dealt with in longer term.
- Responsible party
Sampling program
Monitoring of the surface water and groundwater contamination as well as the landfill gases ensures that any deviation of the contamination situation, and the associated risks with the contamination, from the acceptable stages after the finalization of the closure and containment is discovered in due time.

During the monitoring and aftercare phase the required monitoring is significantly reduced as the contamination situation should be clear from the after closure and containment monitoring. The task of monitoring during the aftercare phase is as such only the verification that the end-result of the closure and containment has not changed.

The monitoring program has a similar set-up as the inspection program:

› Monitoring subject: e.g. concentrations of contamination in groundwater
› Monitoring activities: e.g. Sampling of ground water in existing well
› Frequency: e.g. quarterly. The frequency is strongly dependent on the sensitivity of the inspection subject to changes
› Responsible party

In addition to the overview of the monitoring subjects and associated activities, the monitoring program should also clarify what actions need to be taken in case of exceeding the trigger value at one of the monitoring subjects. In the monitoring program this can be incorporated in the following manner:

› Monitoring subject.
› Trigger value: e.g. Concentration of certain parameters> remediation target value. Trigger values can be risk-based (i.e. if contamination is above this concentration, there will be risks from the contamination), or set by the government, but can also be arbitrary concentrations that indicate a change in the behaviour of a contamination. It is advised to create for each point a low and a high trigger values. Each surpass of a stage will lead to additional action with the severity of the addition action depending on the trigger value type exceeded.
› Actions: Actions associated with surpassing the trigger value are strongly dependent on the location and type of contamination:
›   E.g. Surpass of low trigger value: increase monitoring frequency.
›   E.g. Surpass high trigger value: re-sampling within one week, surpass continues then a detailed survey should be started to reveal the cause.
› Deadline: The deadline is strongly dependent on the risks associated with the incompliancy. Incompliancy’s that lead to (direct) risks should be dealt with within a short time period, whereas incompliancy’s that not (yet) result in risks can be dealt with in longer term.
› Responsible party.

Replacement program
Especially during longer aftercare and monitoring programs, the equipment and materials at the site will need to be replaced. By reviewing the lifespan of the required materials and equipment and drafting a budget for their replacement,
future financial set-backs can be prevented. In the monitoring and aftercare program the replacement shall be represented as follows:

› Equipment/material
› Lifespan
› Date of replacement
› Responsible party

7.2.3 Proposed monitoring program

Groundwater, surface water and leachate

The frequency of monitoring for the groundwater, surface water and leachate water is strongly dependent on the quantity of groundwater that can be extracted by the system. The below Table 7-2 gives a proposed set-up groundwater monitoring on the site.

Table 7-2: Groundwater, surface water and leachate monitoring

<table>
<thead>
<tr>
<th>Monitoring Point</th>
<th>Parameter</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shallow groundwater monitoring wells</td>
<td>pH, EC, Oxygen, Heavy metals, COD, BOD, Chlorides, TDS, TSS, Nitrate, Sulphate, Phenolic compounds, Water levels</td>
<td>Quarterly in first year Biannually for year two and three</td>
</tr>
<tr>
<td>Deep groundwater monitoring wells</td>
<td>pH, EC, Oxygen, Heavy metals, COD, BOD, Chlorides, TDS, TSS, Nitrate, Sulphate, Phenolic compounds, Water levels</td>
<td>Quarterly in first year Biannually for year two and three</td>
</tr>
<tr>
<td>Boreholes inside the waste body</td>
<td>pH, EC, Oxygen, Heavy metals, COD, BOD, Chlorides, TDS, TSS, Nitrate, Sulphate, Phenolic compounds, Water levels</td>
<td>Quarterly in first year Biannually for year two and three</td>
</tr>
<tr>
<td>Surface water monitoring points</td>
<td>pH, EC, Oxygen, Heavy metals, COD, BOD, Chlorides, TDS, TSS, Nitrate, Sulphate, Phenolic compounds, Water levels</td>
<td>Quarterly in first year Biannually for year two and three</td>
</tr>
<tr>
<td>Leachate collection</td>
<td>pH, EC, Oxygen, Heavy metals, COD, BOD, Chlorides, TDS, TSS, Nitrate, Sulphate, Phenolic compounds</td>
<td>Sampling and analysis quarterly in first year and bi-annually for year two</td>
</tr>
</tbody>
</table>
After the third year from completion of remediation of Dhapa dumpsite the monitoring program will be reassessed for monitoring parameters and frequency included in the program.

In case of statistically relevant deviations, measures have to be taken in consultation with the Engineer-in-charge.

Monitoring should continue until either:

- No statistical increase in the presence of contaminants has been detected over a period of 10 years; or
- An examination of the groundwater in the vicinity, over the course of 10 years, has proven that the contaminated groundwater does not move off-site.

**Landfill gas**

The frequency of monitoring required for landfill gas needs to be established based on the total quantity and quality of landfill gas emitted after the installation of the landfill gas passive ventilation wells. The below table gives a proposed set-up for landfill gas monitoring on the site.

*Table 7-3  Landfill gas monitoring*

<table>
<thead>
<tr>
<th>Monitoring Point</th>
<th>Parameter</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>All landfill gas collection wells within site boundaries (Close to surface of the bio-filter)</td>
<td>Methane, carbon dioxide, oxygen, atmospheric pressure, temperature</td>
<td>Quarterly for the first three years</td>
</tr>
</tbody>
</table>

After the third year from completion of remediation of Dhapa dumpsite the monitoring program will be reassessed for monitoring parameters and frequency included in the program.

The monitoring of Landfill gas will be carried out by using a Hand-held Gas Sampler available for Landfill gas measurement.
7.2.4 Budgetary Estimates for Monitoring Plan for Ground Water, Surface Water and Leachates

A budgetary estimate for Monitoring Plan for Ground Water, Surface Water and Leachates for three years of post-closure of dumpsite is estimated as under:

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Description</th>
<th>No of Sampling Locations</th>
<th>Frequency</th>
<th>No of Years</th>
<th>Cost per Sampling and Analysis</th>
<th>Total Cost for Three Years (Rs in Lacs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shallow groundwater monitoring wells</td>
<td>4</td>
<td>Quarterly in first year Biannually for year two and three</td>
<td>3</td>
<td>20,000/- (20,000/- x 8 x 4)</td>
<td>6.4</td>
</tr>
<tr>
<td>2</td>
<td>Deep groundwater monitoring wells</td>
<td>3</td>
<td>Quarterly in first year Biannually for year two and three</td>
<td>3</td>
<td>20,000/- (20,000/- x 8 x 3)</td>
<td>4.8</td>
</tr>
<tr>
<td>3</td>
<td>Boreholes inside the waste body</td>
<td>3</td>
<td>Quarterly in first year Biannually for year two and three</td>
<td>3</td>
<td>20,000/- (20,000/- x 8 x 3)</td>
<td>4.8</td>
</tr>
<tr>
<td>4</td>
<td>Surface water monitoring points</td>
<td>5</td>
<td>Quarterly in first year Biannually for year two and three</td>
<td>3</td>
<td>20,000/- (20,000/- x 8 x 5)</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>Leachate collection chambers</td>
<td>3</td>
<td>Sampling and analysis quarterly in first year and two times for year two and three Flow meter readings for measurement of quantity of leachate</td>
<td>3</td>
<td>20,000/- (20,000/- x 8 x 3)</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>28.8</strong></td>
</tr>
</tbody>
</table>
### 7.2.5 Budgetary Estimates for Monitoring Plan for Noise and Ambient Air Monitoring

A budgetary estimate for Monitoring Plan for Ambient Air Monitoring and Noise for three years of post-closure of dumpsite is estimated as under:

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Description</th>
<th>No of Sampling Locations</th>
<th>Frequency</th>
<th>No of Years</th>
<th>Cost per Sampling and Analysis</th>
<th>Total Cost for Three Years (Rs in Lacs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Noise</td>
<td>4</td>
<td>Quarterly in first year Thrice (Pre Monsoon, Post Monsoon and Winter Season) for year two and three</td>
<td>3</td>
<td>30,000/- (30,000/- x 10 x 4)</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Ambient Air Monitoring</td>
<td>4</td>
<td>Quarterly in first year Thrice (Pre Monsoon, Post Monsoon and Winter Season) for year two and three</td>
<td>3</td>
<td>1,000/- (1,000/- x 10 x 4)</td>
<td>0.4</td>
</tr>
<tr>
<td>3</td>
<td>Landfill gas</td>
<td>10</td>
<td>Quarterly</td>
<td>3</td>
<td>500/- (500/- x 12 x 10)</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>Total Budgetary Estimate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>13.0</td>
</tr>
</tbody>
</table>
Figure 7-1: Dhapa dumpsite after remediation, location of monitoring points
### 7.3 Air Quality Management Plan

<table>
<thead>
<tr>
<th>ENVIROMENTAL MANAGEMENT PLAN</th>
<th>Program No.</th>
<th>ESMP/CP/01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Quality Management Program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration</td>
<td>1 year during execution</td>
<td>At least 2 years post execution</td>
</tr>
<tr>
<td>Coordinator</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Objective
During execution: To ensure that air emissions due to the construction related activities do not lead to an unacceptable increase of air pollution at and around the project site, and to ensure that uncontrolled emissions of landfill gas do not lead to unacceptable health risks and unsafe situations for the workers. Post execution: To ensure that air emissions due to landfill gas generation do not lead to increased air pollution at and around the closed dumpsite, and to ensure that uncontrolled emissions of landfill gas after the closure of the existing dumpsite do not lead to significant air pollution or safety risks.

#### Concern
During execution: Activities such as excavation, vehicular emissions and release of landfill gas can deteriorate air quality. Adequate landfill gas management must result in control of unwanted methane emissions / other air pollutants in order to reduce health and safety risks for onsite workers as well as surrounding communities.

Post execution: There is a risk that landfill gas emission is too much for the passive ventilation system with the bio-filter and this may result in deteriorating air quality; i.e. adequate landfill gas management / monitoring and maintenance of bio-filters are required.

#### Benefit of ESMP
Reduced air pollution and protection of health of workers and the local community.
## Air Quality Management Plan

<table>
<thead>
<tr>
<th>Impact Activities</th>
<th>Mitigation Measures and Rationale</th>
<th>Implementation and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excavation of waste from dumpsite, transport, re-disposal and compaction of waste leading to dust emissions</strong></td>
<td>Sprinkling of water which lead to dust suppression</td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td></td>
<td>Along the tracks used by the excavation and earth moving machinery and I areas where excavation/compaction machinery are working</td>
<td>Contractor</td>
</tr>
<tr>
<td><strong>Emissions from all vehicles entering and leaving the site</strong></td>
<td>Ensure that vehicles have a Pollution Under Control (PUC) Certificate</td>
<td>All the time</td>
</tr>
<tr>
<td></td>
<td>Brushing vehicle when dirty and scrubbing of vehicle tires before exiting the site</td>
<td>At entry and exit points</td>
</tr>
<tr>
<td>Impact Activities</td>
<td>Mitigation Measures and Rationale</td>
<td>Implementation and Management</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Location</td>
</tr>
<tr>
<td>Adherence to the preventive maintenance schedule as prescribed by the vehicle manufacturer</td>
<td>At all time</td>
<td>Contactor</td>
</tr>
<tr>
<td>Landfill gas emission</td>
<td>Install bio-filter at the landfill gas ventilation wells for oxidation of methane and reduce smells</td>
<td>At the passive landfill gas extraction filters</td>
</tr>
</tbody>
</table>
| Allow natural ventilation | Existing dumpsite | During the execution of landfill closure works daily | Contractor | Regular gas emission measurements, using a hand-held device, to prevent explosion hazards and unhealthy situations | Monitoring records of gas emissions, to ensure that releases are within specified tolerances at a given distance from point of release, well below the Lower Flammability Limit for methane | Existing information indicates that the carbon content of the dumped waste is very low and methane formation will be limited. If records of methane emissions are above specified tolerances, the work should be aborted and measures should be implemented to enhance natural ventilation.
<table>
<thead>
<tr>
<th>Impact Activities</th>
<th>Mitigation Measures and Rationale</th>
<th>Implementation and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction in fire risk by supplying fire extinguisher</td>
<td>Existing dumpsite</td>
<td>Contractor</td>
</tr>
<tr>
<td>Allow natural ventilation</td>
<td>Closed dumpsite</td>
<td>Contractor</td>
</tr>
</tbody>
</table>
## 7.4 Soil and Water Quality Management Plan

<table>
<thead>
<tr>
<th>ENVIRONMENTAL MANAGEMENT PLAN</th>
<th>Program No.</th>
<th>ESMP/CP/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Program:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil and Water Quality Management plan.</td>
<td>Duration</td>
<td>1 year during execution \ At least 5 years post execution</td>
</tr>
<tr>
<td>Coordinator</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Objective**
- During execution: To ensure that the soil & groundwater are not polluted by leakage of lubricants / fuel from vehicles moving within the site
- Post execution: To reduce surface and groundwater pollution from leachate emanating from the closed dumpsite.

**Concern**
- During execution: Leakage of lubricants and fuel can contaminate the soil & groundwater. Contaminated surface water run-off from site
- Post execution: Leachate can contaminate the soil & groundwater over a period of time.

**Benefit of ESMP**
- Soil and surface water quality around the dumpsite will appreciably improve.
## Soil and Water Quality Management Plan

<table>
<thead>
<tr>
<th>Impact activities</th>
<th>Mitigation Measures and Rationale</th>
<th>Implementation and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible leakage of lubricants and fuels by the excavation and earth moving machinery / vehicles</td>
<td>Use of well-maintained earth moving machinery / vehicles</td>
<td>Location: Along the tracks / parking place of the excavation and earth moving machinery</td>
</tr>
<tr>
<td>Possible leakage of fuels by the filling up excavation and earth moving machinery / vehicles</td>
<td>Use well maintained fuel storage and delivery equipment Have fuel storage contained</td>
<td>Location: Project filling station</td>
</tr>
<tr>
<td>Possible drainage of leachate leading to dispersion in the groundwater</td>
<td>Use of leachate drainage system, Collection and transport of all exposed leachate to LTP.</td>
<td>Location: On and around the landfill</td>
</tr>
<tr>
<td>Impact activities</td>
<td>Mitigation Measures and Rationale</td>
<td>Implementation and Management</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Location</td>
<td>Location</td>
</tr>
<tr>
<td>Contamination of local water resources</td>
<td>treatment plant on site</td>
<td>treatment plant on site</td>
</tr>
<tr>
<td>Contamination of local water resources</td>
<td>Installation temporary surface drainage</td>
<td>Installation temporary surface drainage</td>
</tr>
<tr>
<td></td>
<td>At working area</td>
<td>At working area</td>
</tr>
<tr>
<td></td>
<td>During execution phase</td>
<td>During execution phase</td>
</tr>
<tr>
<td></td>
<td>Contractor</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td>Visual inspection by the site Engineer</td>
<td>Visual inspection by the site Engineer</td>
</tr>
<tr>
<td></td>
<td>Daily records</td>
<td>Daily records</td>
</tr>
<tr>
<td>Contamination of local water resources</td>
<td>Installation of leachate collection, pumping and disposal system (including maintenance and cleaning on regular basis)</td>
<td>Installation of leachate collection, pumping and disposal system (including maintenance and cleaning on regular basis)</td>
</tr>
<tr>
<td></td>
<td>Throughout the closed dumpsite</td>
<td>Throughout the closed dumpsite</td>
</tr>
<tr>
<td></td>
<td>On commencement of post construction phase</td>
<td>On commencement of post construction phase</td>
</tr>
<tr>
<td></td>
<td>Contractor/KMC</td>
<td>Contractor/KMC</td>
</tr>
<tr>
<td></td>
<td>Periodic testing of leachate quality (see sampling program).</td>
<td>Periodic testing of leachate quality (see sampling program).</td>
</tr>
<tr>
<td></td>
<td>Monitoring records of leachate quality &amp; quantity</td>
<td>Monitoring records of leachate quality &amp; quantity</td>
</tr>
<tr>
<td></td>
<td>To prevent outflow of leachate from the dumpsite area, leachate collection drains and collection chamber will be constructed to collect the horizontal infiltrating leachate. Leachate from these chambers will be pumped to LTP on site for treatment of leachate.</td>
<td>To prevent outflow of leachate from the dumpsite area, leachate collection drains and collection chamber will be constructed to collect the horizontal infiltrating leachate. Leachate from these chambers will be pumped to LTP on site for treatment of leachate.</td>
</tr>
<tr>
<td>Impact activities</td>
<td>Mitigation Measures and Rationale</td>
<td>Implementation and Management</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Installation of storm water drainage system (including maintenance and cleaning on regular basis)</td>
<td>Throughout the closed dumpsite</td>
<td>Location</td>
</tr>
<tr>
<td></td>
<td>On commencement of post construction phase</td>
<td>Location</td>
</tr>
</tbody>
</table>
7.5 Waste Stability and Settlement Management Plan

<table>
<thead>
<tr>
<th>ENVIRONMENTAL MANAGEMENT PLAN</th>
<th>Program No.</th>
<th>ESMP/CP/03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Program</td>
<td>Duration</td>
<td>1 year during execution At least 5 years post execution</td>
</tr>
<tr>
<td>Waste stability and settlement management plan</td>
<td>Coordinator</td>
<td></td>
</tr>
</tbody>
</table>

**Objective**

During execution: To ensure that no landslides takes place during profiling of the dumpsite and ensure that excavation in waste are carried out with a minimum of risk for instability of waste structures.  
Post execution: No objective as the remediated dumpsite is constructed with stable slopes or as reinforced or with retaining walls. However during the post execution of the dumpsite the slopes shall be examined to ensure that unexpected instability of slopes etc. takes place. Settlements will occur during the aftercare period.

**Concern**

During execution: Landslides in waste structures (existing as well as created by the Contractor) can cause health problem for workers and in worst case accidents with fatal results.  
Post execution: Little concern however control of slopes the first years after completion is essential. Settlements can lead to undesirable situation such as failures in surface water drains or unacceptable strains in liners etc.

**Benefit of ESMP**

Reduced risks and protection of health of workers.
<table>
<thead>
<tr>
<th>Impact activities</th>
<th>Mitigation Measures and Rationale</th>
<th>Implementation and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing situation</strong></td>
<td>Inspection of site</td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td></td>
<td>In particular slopes towards west (towards the Bone Factory)</td>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td></td>
<td>At commence of remediation project</td>
<td><strong>Responsibility</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Monitoring</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Records</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The contractor shall prepare a plan for profiling of the dumpsite to minimise risks for landslides</td>
</tr>
<tr>
<td><strong>During of excavation and use of earth/waste moving machinery / vehicles</strong></td>
<td>Proper planning of excavation/profiling Inside stiffening of excavations No staff located in deep trenches</td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td></td>
<td>At the site</td>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td></td>
<td>For the duration of construction/execution phase</td>
<td><strong>Responsibility</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Monitoring</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Records</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Remarks</strong></td>
</tr>
<tr>
<td><strong>Settlements in waste</strong></td>
<td>High degree of compaction of waste during the construction phase Annual measurements of top cover level in defined points</td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td></td>
<td>At the site</td>
<td><strong>Timing</strong></td>
</tr>
<tr>
<td></td>
<td>Annual level measurements Regular inspection of surface</td>
<td><strong>Responsibility</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Monitoring</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Records</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Remarks</strong></td>
</tr>
</tbody>
</table>
### 7.6 Noise Quality Management Plan

<table>
<thead>
<tr>
<th><strong>ENVIRONMENTAL MANAGEMENT PLAN</strong></th>
<th><strong>Program No.</strong></th>
<th><strong>ESMP/CP/04</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Program</td>
<td>Duration</td>
<td>1 year during execution</td>
</tr>
<tr>
<td>Noise Quality Management Plan</td>
<td>Coordinator</td>
<td></td>
</tr>
</tbody>
</table>

**Objective**
During execution: To ensure that noise generated due to the construction related activities does not lead to increased noise levels at and around the project site  
Post execution: No objective because noise nuisance post execution are not foreseen

**Concern**
During execution: Movement of earth moving vehicles may lead to higher noise levels, thereby causing annoyance and irritation  
Post execution: *No concerns*

**Benefit of ESMP**
Reduced noise pollution and protection of health of workers and local community
<table>
<thead>
<tr>
<th>Impact activities</th>
<th>Mitigation Measures and Rationale</th>
<th>Implementation and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement of excavation and earth moving machinery / vehicles</td>
<td>Maintenance and servicing of mechanized equipment and vehicles</td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>On site</td>
</tr>
<tr>
<td>Project activities to be undertaken during regular working hours</td>
<td></td>
<td>At the site boundary</td>
</tr>
<tr>
<td>Erection of temporary barriers when noise nuisance occurs</td>
<td></td>
<td>At the site boundary</td>
</tr>
</tbody>
</table>
### 7.7 Traffic Management Plan

<table>
<thead>
<tr>
<th>ENVIRONMENTAL MANAGEMENT PLAN</th>
<th>Program No.</th>
<th>ESMP/CP/05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Program</td>
<td>Duration</td>
<td>1 year during execution</td>
</tr>
<tr>
<td>Traffic Management Plan</td>
<td>Coordinator</td>
<td></td>
</tr>
</tbody>
</table>

#### Objective
During execution: To ensure that there is smooth traffic both within and outside the facility for the duration of the construction phase  
Post execution: The situation is improved because of the site closure, but car parking should be provided for the visitors of the park

#### Concern
During execution: Trucks and other vehicles bringing in raw materials to the site may cause traffic jams outside the site and congestion within the site  
Post execution: Not sufficient. Car parking space and parked cars introduces an unsafe traffic situation

#### Benefit of ESMP
Smooth and congestion free operations
<table>
<thead>
<tr>
<th>Impact activities</th>
<th>Mitigation Measures and Rationale</th>
<th>Implementation and Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movement of vehicles throughout the construction phase of the project</td>
<td>Controlled vehicular movement (preferably with clearly demarcated entry / exit) with adequate supervision</td>
<td>Location: Within and immediately outside the site&lt;br&gt;Timing: Throughout the construction execution phase&lt;br&gt;Responsibility: Contractor&lt;br&gt;Monitoring: Random checks by Site Engineer&lt;br&gt;Records: Use appropriate sign board informing and directing the public traffic</td>
</tr>
<tr>
<td>Segregation of vehicular and pedestrian area</td>
<td>Within and immediately outside the site&lt;br&gt;Timing: Throughout the construction execution phase&lt;br&gt;Responsibility: Contractor</td>
<td>Use appropriate sign board informing and directing the public traffic&lt;br&gt;Temporarily fence is established around the construction site during the entire implementation period</td>
</tr>
<tr>
<td>Vehicle entry and exit scheduling so that traffic congestion is not created on the public road leading to the site</td>
<td>Within and immediately outside the site&lt;br&gt;Timing: Throughout the construction execution phase&lt;br&gt;Responsibility: Contractor</td>
<td>Use appropriate sign board informing and directing the public traffic&lt;br&gt;Limitation of vehicular movement during peak hours of waste trucks to</td>
</tr>
<tr>
<td>Impact activities</td>
<td>Mitigation Measures and Rationale</td>
<td>Implementation and Management</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Location</td>
</tr>
<tr>
<td>Movement and parking of vehicles of visitors in the post execution phase</td>
<td>Controlled vehicular movement (preferably with clearly demarcated entry / exit) with adequate supervision of parking place</td>
<td>Outside the site</td>
</tr>
</tbody>
</table>
8 Social Mitigation and Monitoring Measures

This section deals with managing mitigation of social challenges and monitoring measures that have so far been assessed for Makaltala village closest to the dump site that would be taken up for remediation. Some challenges are anticipated and perceived during the period of remediation process.

All mitigation activities will be conducted within a specified time frame. The objectives have been detailed and responsibilities for implementation as well as for monitoring have been attributed for activities. The cost implications of each activity taken into consideration are indicative.

This report begins by reiterating some of the salient findings of the socio-economic baseline survey and social impact assessment in order to set up the back drop for the reader. The social mitigation plan that has been built includes project impacts perceived and potential. The plan includes prioritised needs expressed by the community.

8.1 Social Impacts due to Closure and Containment of Dumpsite

Based on site visits and assessments, it was understood that while there are 5 villages within the Project Influence Area (PIA) lying within 2 km radius of the closed dumpsite, only Makaltala, which is situated closest to the closed dumpsite, has the potential to be directly impacted by the project activities.

The impacts have been considered by categorising the implementation into two phases mainly (i) treatment and containment process to be undertaken; (ii) post remediation maintenance actions.

The following table provides a summary of impacts for Makaltala.
Table 8-1: Summary of Overall Impacts

<table>
<thead>
<tr>
<th>Anticipated Impact due to closure and containment of the closed dumpsite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Displacement</td>
</tr>
<tr>
<td>Temporary Displacement</td>
</tr>
<tr>
<td>Livelihood Displacement</td>
</tr>
<tr>
<td>Affected Trees/Crops / trees</td>
</tr>
<tr>
<td>Affected Common Structures</td>
</tr>
<tr>
<td>Impact on Vulnerable HHs</td>
</tr>
</tbody>
</table>

**Anticipated Impact during the closure and containment**

<table>
<thead>
<tr>
<th>Disruption in mobility</th>
<th>Short Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of outsiders in the area, setting up of labour camps if required</td>
<td>Short Term</td>
</tr>
<tr>
<td>Dust, rubble and noise due to movement of vehicles</td>
<td>Short Term</td>
</tr>
<tr>
<td>Requirement of space for parking of vehicles and equipment</td>
<td>Short Term</td>
</tr>
<tr>
<td>Activities on slopes may result in landslides affecting houses located along the boundary of the dump</td>
<td>Short Term</td>
</tr>
<tr>
<td>Loss of grazing ground for pigs and cattle</td>
<td>Short Term</td>
</tr>
</tbody>
</table>

Direct positive impacts outweigh any negative impact that may come up as unforeseen impact(s).

Table 8-2  Positive Impacts due to Closure and Remediation of Dumpsite

<table>
<thead>
<tr>
<th>Surroundings and Environment</th>
<th>There will be no foul odour, windblown dust and insects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Contaminated surface water runoff and leachate from the dumpsite will no longer pollute the neighbouring environment</td>
</tr>
<tr>
<td>Increased Livelihood</td>
<td>Due to discontinuation of dumping, many people of Makaltala village have migrated to other parts of the city</td>
</tr>
</tbody>
</table>
options resulting in increased income especially for males for employment. Several people opted for alternate livelihood sources in the city. It was concluded that the discontinuation of dumping has actually resulted in increased income levels due to various options explored.

Improved health condition of children › Previously children used to playfully go and get involved in rag picking but now that has stopped.

Less accidents › Proper covering of the dumpsite will eliminate risks of landslides, poisonous pests and insects.

Better communication › The approach road will be improved as part of the project thereby improving the accessibility of the area and indirectly paving the way to better access to alternative opportunities for income sources, education, trainings and exposure to improved ways of life.

Social Upliftment › The overall increase in aesthetics will mean an upliftment in the social status of the neighbouring Makaltala village which is now situated next to an unsightly dumpsite
 › Creation of a recreational space where nearby communities can relax and use open space free of contamination.

Temporary Income opportunity › Scope for temporary income generating opportunities for local population through setting up of small enterprises like tea shops, eateries etc during remediation works

Improved health › Health status is expected to improve due to decrease in spread of vector borne diseases / nuisance caused by mosquitoes / flies / vermin and dust.

Some of indicative and perceived negative impacts are explained below in Table 8-3 with comments on minimization.

No negative (minimal) social impacts of the proposed closure and containment project have emerged through the primary survey, FGDs and consultations; some short term negative impacts of the proposed activities during the execution of remediation activities are envisaged, which are listed below. These will be mitigated through carefully designed mitigation plan. There are existing vulnerabilities which would be addressed through the mitigation measures.
## Table 8-3  Impacts during containment activities

<table>
<thead>
<tr>
<th>Type of impact</th>
<th>Proposed mitigation measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on livelihood: None</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Impact on mobility: People may find it difficult to travel around the area due to increased vehicular traffic and equipment.</td>
<td>To be handled through careful planning and implementation of construction site management measures by KMC in close association with the Contractor and WBPCB and Supervision Consultants.</td>
</tr>
<tr>
<td>Presence of outsiders in the area: Workers and people working as part of the team carrying out the remediation activities and labour camps that may be constructed during the remedial phase.</td>
<td></td>
</tr>
<tr>
<td>Dust, rubble and noise due to movement of vehicles which may impact the living environment within the village.</td>
<td></td>
</tr>
<tr>
<td>Requirement of space for parking of vehicles, equipment and constructing temporary labour camps may result in disrupting people from some seasonal activities like growing crops and vegetables that they do on the nearby lands.</td>
<td></td>
</tr>
<tr>
<td>Activities on dump slopes may result in landslides and have adverse impacts on some households located right along the boundary of the dumpsite</td>
<td>Appropriate preventive measures by the contractors as suggested by design consultants will be taken. Appropriate engineering practices will be diligently followed.</td>
</tr>
<tr>
<td>Loss of grazing ground for pigs and cattle</td>
<td>Under KMC Act keeping animals within the city limits is illegal and disallowed. (Refer to Appendix for KMC Act in the SIA Report). Hence, this issue will not have any impact as Makaltala is within municipal limits of Ward number 57 and 58.</td>
</tr>
</tbody>
</table>

The identified positive impacts are welcome by the community. People are well informed, and have appreciated these immensely. In addition they have mentioned needs for development of some critical infrastructural facilities which are the main impediments to their redressing basic needs. It is essential to mention at this juncture that the Makaltala community does not face any food poverty, but it certainly suffers from basic infrastructure deficiencies.
The project has therefore considered one of the infrastructural needs which has a close bearing on the successful impact of the project and which is also amongst the prioritised needs of the community as mentioned below:

i. Upgradation of existing access road to the Makaltala village on the eastern side of the dumpsite outside the compound wall, and

Other needs that emerged - such as schools, healthcare facilities, potable drinking water, solid waste management and sanitation facilities, markets, etc. are issues of governance that are under the jurisdiction of KMC and the elected Councillors of Wards 57 and 58.

8.2 Implementation of social management plan

The overall responsibility for the implementation of social measures related to the containment and closure of the dumpsite would rest with WBPCB. The supervision of the implementation process will also rest on WBPCB. The KMC will be responsible for governance issues in the project area.

WBPCB will contract and engage an NGO (Service Provider) to carry out proposed social mitigation measures and implement the Social Management Plan under time bound separate contract. The selected Service Provider (SP) will be responsible for execution of the Social Management activities with support from the Contractor(s), WBPCB, KMC and local community members. This combined effort is expected to culminate into delivering the desired results with the overall objective of containment of the dumpsite, thereby preventing further contamination of the surrounding areas and improving the aesthetics. This will also result in upliftment of the social status of Makaltala village who now live next to an unsightly dumpsite.

8.3 Social Management Plan

The social management plan proposes to directly improve the quality of life of inhabitants of Makaltala village and indirectly for the other habitations and set up a viable pilot project for replication in other parts of India.

8.3.1 Objectives

The overall goal is an improved quality of life of the local community, based on the three key pillars of development which are namely, social, health and infrastructure improvements with an effort to minimise disruptions in present life style while mitigating any unforeseen negative impacts.

As part of the social management activities the following are proposed,
1. A communication strategy to promote,

   a. Awareness on feedback mechanism after project disclosure

      Without feedback from all stakeholders and public, the planned project activities remain tentative and are considered a draft. Only after proper feedback is received and the planning and related documents amended suitably, that the plan can be considered as final. As part of public disclosure, the draft documents will be posted on website for public viewing for a period of one month from the date of disclosure for feedbacks. Any proposal, suggestion and feedback that may be received within that stipulated time, will be evaluated by the technical team of WBPCB who decide on suitable changes in the project planning and documents. Only then the documents and plans can be considered as final.

      That the ESMP document has been posted on website for all interested parties to view and comment, will be made known to the public concerned and all stakeholders. A poster will be prepared on this, stating the above and requesting feedback within the stipulated time of one month as mentioned earlier.

   b. Social – Promote awareness on project benefits while generating community participation.

      Promotion of awareness on the project benefits has already started since last two years. During the household survey, the project benefits have already been highlighted to all stakeholders. Additionally, a colourful and attractive leaflet has been designed and printed. These will be distributed to the stakeholders in the project area so that people are well aware of the benefits of the project.

      Workshops and meetings have been planned to create awareness about the project amongst the stakeholders. This will also promote community participation.

   c. Awareness on Grievance Redressal Mechanism (GRM)

      Grievance Redressal Mechanism has already been developed and incorporated in the SMP. This is already in place and may be accessed in WBPCB Website. Stakeholders can register their grievances over phone, in person, through letters and email. All grievances will be addressed by PIU of the project. The SP will facilitate the process and act as an interface between the PIU and the community.

      Awareness generation on GRM has been specifically planned. There will be drop-boxes at strategic points like KMC office at check-post at Dhapa, NGO office in Makaltala village, Gam Panchayat office and Contractor’s site office and any other suitable place that may be identified later and which are easily accessible to public. There will be bi-lingual notices placed at points which have high public visibility, specifying that the drop-boxes be used for communicating any grievances that anyone may have. Public addressing system will be taken up in and around Makaltala village to inform the community about the drop box and requesting feedback from them. Public address system will also be used during the construction period to make people aware of ensuing activities.
d. Health – Generating awareness on health, hygiene, personal and environmental sanitation and generic issues related to improving quality of life.

Awareness generation on health and related issues have already been planned in detail. This will be facilitated by the Service Provider who will be appointed shortly. Apart from this, several leaflets in Bangla have also been planned for distribution, which will create credibility about the project. Posters on health issues will be displayed at strategic points for wider visibility.

2. Infrastructure - Developing prioritised infrastructure facilities which are related to the continuum of project benefits to the local communities.

The activities under the objectives are divided between three phases – pre remediation, during remediation and post remediation, some activities however, overlap between phases.

The following Table 8-4 provides the list and description of activities.
Table 8-4  Objectives and Activities under Social Management Plan

<table>
<thead>
<tr>
<th>Sub Objectives</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social</strong></td>
<td></td>
</tr>
<tr>
<td>1. Promote awareness of local people about the project and its benefits in order to generate pro project motivation, people’s participation and cooperation</td>
<td>i. Awareness campaigns on Project design and benefits ii. Formation of Community Groups for active participation iii. Form women’s groups and ensure their participation in the project activities</td>
</tr>
<tr>
<td>2. Grievance Redressal Mechanism in place</td>
<td>i. Awareness on feedback and grievance redressal mechanism option to the community at large.</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td></td>
</tr>
<tr>
<td>3. Promote increase in awareness on health, hygiene, sanitation and other health issues in the community and labour camp</td>
<td>i. Awareness on Personal health &amp; hygiene ii. Awareness campaigns on Immunisation iii. Awareness on HIV / STD including condom promotion Facilitation for access to scheduled Govt. health schemes through awareness and networking iv. Awareness on preventive &amp; curative measures for emerging health problem due to remediation activities – e.g. exposure of workers and community members to poisonous snakes, bees, scorpions, rodents etc.</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
<td></td>
</tr>
<tr>
<td>4. Ensure improvement in basic infrastructure facilities through implementation of selected and approved CDP activities</td>
<td>In order of priority – i. Up gradation of existing access road to Makaltala village on the eastern side of the dumpsite outside the compound wall</td>
</tr>
<tr>
<td>5. Ensuring minimum temporary disturbance during project implementation and ensuring mobilization of workers and equipment to the sites through improved traffic regulation and control in the area</td>
<td>i. Awareness generation on the potential of increase in traffic due to movement of equipments and project vehicles ii. Ensure Traffic management iii. Ensure compliance to speed limits iv. Ensure display of warning signs v. Ensure prohibiting night driving</td>
</tr>
</tbody>
</table>

8.3.2 Implementation Arrangement
The social management plan and its activities as discussed will be implemented by a Service Provider (SP) under the close supervision and monitoring of the PIU of the project and the Supervision Consultant appointed by WBPCB. KMC will be an important stakeholder being owner of the site.
Communication and awareness generation forms an integral and major part of the social management plan. The specific objectives of communication are:

i. To conduct face to face communication with site specific stakeholders thereby enhancing community responsiveness and trust.

ii. To communicate the remediation plan and ensure compliance from stakeholders

iii. In case of any effect of the project activities on the community, to communicate the same and make them aware of the measures that will be taken by the project

The social management plan, including communication and awareness generation, will be implemented by a Service Provider (SP), who will be selected through a transparent bidding process. The specific responsibilities of the SP will entail:

1. To act as an interface between the community and the project authorities

2. To implement the social management plan and conduct awareness campaigns as mentioned above

3. To facilitate organizing of stakeholder consultations, workshops/seminars and prepare proceedings of the same

4. To maintain contact with all stakeholders

5. To facilitate the implementation of grievance redressal mechanism and encourage stakeholders to use the same and document each grievance and its redressal

6. To follow-up on complaints/ grievances voiced by the community, place the same before WBPCB / PIU and prepare a resolution report that will be conveyed to the community as reply to his/ her grievance

7. To facilitate coordination between the PIU, the implementing contractor, and the community so that the project activities are implemented smoothly.
Time schedule of activities

The implementation plan suggests 15 months of field level activities which include pre, during and post remediation activities. However, 3 months (shown as 0 months) have been added prior to remediation stage for establishing the GRM mechanism, without which the project cannot be taken forward.

8.3.3 Monitoring and Evaluation

Internal monitoring will be done by the SP and monthly reports will be submitted. The SP will organize monthly monitoring meetings on the social management activities involving relevant departments and stakeholders and representatives from the target groups. These consultation meetings will be aimed at collecting feedbacks on program implementation and achievements and will be used to adjust and modify actions to meet the needs of the communities. An indicative program monitoring framework has been developed in the following Table 6 which would be refined by the SP after commencement of activities. The monitoring indicators will be refined in consultation with WBPCB while developing the inception report.

Table 8.5 Indicative Indicators

<table>
<thead>
<tr>
<th>Sub objectives</th>
<th>Verifiable Indicators / Records</th>
</tr>
</thead>
</table>
| 2. Ensure awareness of local people about the project and its benefits in order to generate pro project motivation, people’s participation and cooperation | › No. of meetings conducted  
› % of people made aware  
› Gender disaggregated relevant groups formed |
| 2. Ensuring gender empowerment (especially for women) to enable them to participate in mainstreaming of development activities | › No of meetings conducted  
› % of people made aware  
› Gender disaggregated relevant groups formed |
| 3. Awareness on livelihood opportunities for the community in the project. | › Gender disaggregated numbers employed from the community |
| 4. Ensure increased awareness in health, hygiene, sanitation and other health issues in the community and labour camp | › % of people made aware  
› % of mothers immunized  
› Nos. visiting health camps  
› No. of condoms taken from the condom boxes  
› Reduction in open defecation, increase in sanitary latrines  
› Increased access to potable drinking water  
› Increased awareness on health & safety measures |
| 5. Ensure increased awareness in health, hygiene, sanitation and other health issues in the community and labour camp | › % of people made aware  
› % of mothers immunized  
› Nos. visiting health camps  
› No. of condoms taken from the condom boxes  
› Reduction in open defecation, increase |
| 6. Ensure improvement in basic infrastructure facilities through implementation of selected and approved CDP activities | Road completed and improved community access  
- Increased access to potable drinking water  
- Increased awareness on health & safety measures |
| 7. Ensuring minimum temporary disturbance during project implementation and ensuring mobilization of workers and equipment to the sites through improved traffic regulation and control in the area | Barricades erected to minimize land subsidence and falling of rubbles from dumps  
- Accidents controlled  
- Decrease in the congestion on the existing road  
- Lower rate of accidents  
- Less air pollution  
- Lung infection & asthma reduced  
- Increased visibility and chances of accident reduced |
| 6. Ensure safe disposal of wastes generated during remediation activities |  
- Decrease in the congestion on the existing road  
- Lower rate of accidents  
- Less air pollution  
- Lung infection & asthma reduced  
- Increased visibility and chances of accident reduced |
### 8.3.4 Time Schedule of activities

The implementation plan suggests 15 months field level activities which, in their present state, include pre, during and post remediation activities.

<table>
<thead>
<tr>
<th>Activities</th>
<th>Pre-remediation stage</th>
<th>Remediation Stage (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 0 0</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</td>
</tr>
<tr>
<td><strong>SOCIAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establishing feedback mechanism</td>
<td>yellow</td>
<td></td>
</tr>
<tr>
<td>Establishing of GRM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Awareness campaigns on project design and benefits and safety measures to be adopted by community</td>
<td>yellow</td>
<td></td>
</tr>
<tr>
<td>ii. Formation of Community and gender disaggregated groups for developing active participation in awareness programmes</td>
<td>yellow</td>
<td></td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Awareness generation activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Facilitation for implementation of scheduled Govt health schemes</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INFRASTRUCTURE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Upgradation of existing access road to Makaltala village on the eastern side of the dumpsite outside the compound wall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Awareness generation on the potential of increase traffic, ensure Traffic management, ensure compliance to speed limits, ensure display of warning signs, ensure prohibiting night driving</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Monitoring of waste handling and disposal</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Monitoring &amp; Evaluation (M &amp; E)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Quarterly M&amp;E and Final Evaluation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While the SP will implement the SMP, the Social and Communication consultants will monitor the SMP activities and suggest mid-way corrections as necessary.
8.3.5 Grievance Redressal Mechanism

The PIU along with SP will implement the Grievance Redressal Mechanism. Attempts will be made to solve all grievances at the community level by SP in consultation with WBPCB to ensure immediate resolution of complaints. Court cases are not envisaged in relation to Dhapa remediation activities, therefore a simple GRM is proposed.

CBIPMP has provided the information and contact details of the officials to address the public grievances pertaining to the project, if any. Further, in order to make sure that project execution has minimum impact on stakeholders and affected groups, it is important to have an independent grievance and redressal committee. Formation of Grievance Redressal Cell (GRC) within the project implementing organisation for WBPCB will be most important for grievance redressal and it is anticipated that most, if not all grievance, will be settled by the GRC. The GRCs is expected to resolve the grievances of eligible persons within a stipulated time. The decision of GRCs is binding, unless vacated by court of law. The response time prescribed for the GRCs is 30 days. However, it is expected that the GRCs will play a very crucial role in redressing grievances of affected persons. The proposed mechanism is provided in below.

1. **Grievance registered through phone call ( dedicated phone number provided in communication materials as well as website)**

   - **Affected persons /Complainant**
   - **Calls on dedicated number / emails grievance**
   - **PIU of WBPCB**
   - **Service Provider (NGO)**

2. **Grievance registered through letter in drop box / verbally through SP**

   - **Affected persons / Complainant**
   - **Drop Box**
   - **Service Provider**
   - **PIU of WBPCB**
Constitution of Grievance Redressal Cell (GRC)
The committee will comprise of representatives of KMC, Local NGO, representatives of local ward No.57, Project Coordinator – CBIPMP, Shri S.K. Adhikari, Head – Technical Cell (MSW), CBIPMP.

The functions of the GRC will be:

- To record the grievances, categorise, prioritise and take necessary measures to solve them within 30 days.
- To inform PIU of serious cases within appropriate time frame; and
- To report the aggrieved parties about the development regarding their grievance and decision of PIU.

During Execution

Awareness on Grievance Redressal Cell will be created by the NGO and through brochures to make sure that all involved stakeholders will know about the existence of this committee through various means adopted in implementation of the communication strategy of the project.

Post Execution

The same procedure will be continued for one year post execution, using the same contact details. It is proposed to use the same frequencies of the grievance redressal cell for the first year after project execution.

8.3.6 Community Development Plan

The community has mentioned the need for development of some critical infrastructural facilities which are the main impediments to their accessing basic needs.

The project has therefore considered one of the infrastructural needs which has a close bearing on the successful impact of the project as mentioned below:

i. Upgradation of existing access road to the Makaltala village on the eastern side of the dumpsite outside the compound wall, and
8.4 Summary Budget for Social Management Plan

<table>
<thead>
<tr>
<th>Items from main table</th>
<th>INR</th>
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<tr>
<td>Indicative Budget for Service Provider including conducting of awareness generation activities</td>
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<tr>
<td>Indicative budget for CDP</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>45,00,000.00</strong></td>
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</table>

8.5 Conclusion

The remediation plan does not have any negative impact on the nearest community of Makaltala. The social management plan therefore concentrates on mitigation of perceived impacts during the remediation process.

The plan emphasises on awareness generation on health, hygiene, environmental sanitation, HIV/AIDS mitigation issues amongst the community and on possible challenges during the remediation process.

A Service Provider (an NGO) will be appointed by WBPCB to ensure community participation, mitigate adverse impacts and help in resolving any disputes and grievances that may arise. It would also engage in awareness programmes with community.

Overall, the project would improve quality of life of the Makaltala community in the vicinity and also the surroundings.
9 Health and Safety during project execution

9.1 Introduction
The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor’s personnel. Before the Contractor can start with the work, an approved Environmental Hazards Health and Safety Plan should be in place. This Safety Plan should be in compliance with the Indian legislation on occupational health and safety, and can be part of the overall Work Plan.

This chapter prescribes the required health and safety regulations that are directly connected to the environmental hazards present on site. This chapter also includes specifically the required health and safety precautions that are necessary for dealing with environmental hazards on the site. For general health and safety please refer to the Bidding Documents

9.2 Health and safety awareness introduction training
Because it is likely incidents to occur during the execution of the work, safety awareness training will be compulsory for all employees. The contractor is responsible for implementing the safety awareness training and record tracking. Minimum training content:

› Hazard identification (asbestos, biological hazards, construction hazards)
› Basis hygienic working at a remediation site, secondary contaminations / exposure
› Adequate PPE use and consequences of inadequate use
› Safety policy and incentive program
9.3 Health and Safety incentive program

The purpose of the H&S incentive plan is to provide additional encouragement regarding the safe and healthy execution of the remediation and construction works and avoid injuries or incidents to occur.

The contractor will compose a program based on rewarding positive and proactive safe behaviours. The plan includes:
› On the spot HSE award system for workers with excellent safety behaviours.
› Behavioural Based Safety (BBS) Promotion
› HSE awards for the Safe Realization of Work.
› General project site HSE Milestone achievement celebrations

In the event of a serious incident the incentive program has to be suspended in order to evaluate its effectiveness.

9.4 Health and safety regulations on site regarding environmental hazards

Personal health and safety is our first and foremost concern. The contractor will provide adequate information and/or brochures containing the on-site safety instructions. The contractor will inform all employees of all dangerous circumstances to be expected and the precautionary measures to be taken. Safety awareness training will be provided for all employees, client and supervisors.

The contractor applies minimum safety requirements for working on site.

1. Never work alone, so assistance is present in the event of an accident.
2. Never eat, drink or smoke during work on the site. Always wash your hands before beginning to eat, drink, smoke or using the bathroom facilities.
3. Always use required PPE and wear an overall, gloves and safety boots (with steel caps and soles).
4. Always use additional PPE if field conditions requires to do so (hearing protection, dusk masks, safety goggles and high visibility vests)
5. Ensure that the location and operation of the safety equipment and aids are known. Keep the required equipment close at hand.
6. Work on the windward side of contamination sources, whenever possible. So that any contamination is blown away from you.
7. Cabins of earth moving equipment and dump trucks have closed windows while working in the contaminated zone
8. Used PPE must be thrown away on-site. Polluted PPE may not taken home
9. When working on a public road, wear a safety jacket. Set out cones and a reflective triangle to warn traffic that work is being carried out
10. Always shower and wash your hair after working with dusty waste at the dumpsite.
9.5 Minimum safety facilities and requirements

The contractor is obliged to provide adequate safety facilities and has to fulfil minimum safety requirements.

The contractor has to:

1. Provide proper sanitary facilities (toilets and showers) and sufficient for the number of employees.
2. Clean sanitary facilities on a daily base.
3. Provide sufficient clean tap water (for purposes of first aid, personal hygiene and consumption) always.
4. Fence off and mark the remediation zone/area.
5. Provide adequate cleaning zone (contaminated area) in case of serious asbestos contamination / exposure.
6. Provide cleaning zone for trucks exiting the construction site.
7. Provide adequate asbestos waste collection materials.
8. Provide immediate on-site availability of first aid kits, fire extinguishers and environmental spill kits. The contractor will provide on site stations including the required means.
9. Make sure adequate medical care is available in case of a snake attack/incident.
10. Provide sufficient PPE (sets) for all employees.
11. Provide weekly cleaning services for coveralls.
12. Provide adequate resting time / breaks in case respirator protection has to be used.
13. Provide adequate air monitoring equipment. Including PID air monitoring as well as Drager polytest tubes.
14. Provide adequate communication means on site.
15. Provide sufficient water supply preventing dust on site, including pumps, hoses, nozzles or water trucks.
16. Safety will be first topic on each meeting agenda.

9.6 Personal Protective Equipment

The required Personal Protective Equipment (PPE) for protection against environmental hazards during the construction works are specified by the kind of field activities. The following activities have been distinguished:

1. Working on site (outside contaminated zone or covered dumpsite).
2. Working on site (within contaminated zone uncovered dumpsite).
3. Working at the sorting station.
4. Working on a public road.
5. Additional hazard protection
   - In case of excessive smoke or vapours.
   - In case of exposure to dust or asbestos fibres.
1. Working on site (outside the contaminated area)
   PPE for employees working outside the contaminated area e.g. the covered landfill.
   - Working gloves
   - Safety helmets
   - High visibility vests
   - Safety shoes

2. Working in contaminated areas
   PPE for employees on the dumpsite itself (excluding staff in machinery):
   - Long sleeved overall (cotton)
   - Impermeable gloves
   - Safety helmets
   - High visibility vests
   - Safety boots
   - Safety goggles

3. Working at the sorting station
   PPE for employees working in the sorting station (excluding staff in machinery)
   - Impermeable gloves (preventing cuts by sharp object / glass / needles)
   - P3 Dust masks
   - Long sleeved overall
   - Safety shoes
   - Safety goggles

4. Working near traffic
   PPE for employees working on the (public) road effected by the construction activities.
   - Safety helmets
   - High visibility vests
   - Safety shoes

5. Additional hazard protection
   - Smoke and vapours
     In case of extensive smoke or vapours the workers have work on the windward side of the contamination sources. In case this cannot be organized preferably the work should be suspended or respirator protection must be used.
     - In case of smoke P3 respirator protection should be adequate
     - In case of vapours respirator protection must be chosen based on air monitoring results.
- **Dust and asbestos**
First of all the contractor has to take adequate dust prevention measures. Most effective technique is spreading water on top of the surface: spreading water is also effective preventing asbestos fibres to spread. In case dust cannot be prevented employees have to use P3 respirator protection. In case of extreme asbestos exposure employees have to be spooled off with clean water before they may take off their PPE. A cleaning zone has to be provided by the contractor.

Appendix A covers basic first aid measures.

### 9.7 Safety meetings
The regulations and precautions mentioned in the previous sections should be communicated to the staff in an effective and responsible manner. Means of communication should be adjusted to those who can’t read properly.

In this section two types of meetings are described to support the safe operation during the construction period. The first meeting discussed is the Toolbox meeting; the second is the Start Work Analysis meeting.

### 9.8 Toolbox meetings
Toolbox meetings are meetings for the team working in the field, they are short and organized periodically (weekly). The objectives of a toolbox meeting are to enhance:

- Team building and commitment
- Safety involvement
- Finding solutions to problems
- Commitment and productivity
- Discuss actual and practical health, safety issues and measures

Toolbox meetings are held in small work groups by the supervisor of the group. The meetings are short, about 5 to 10 minutes, and informal. The toolbox provides a direct method of communication and exchange of information between management, supervisory staff and the workers in the field with the purpose of improving safety and health by directly involving workers in issues that are important to them.

**Organization of toolbox meetings**

Toolbox meetings should be held at regular intervals, are informal and are sometimes impromptu (as the need arises). Meetings may be run by managers, supervisors, team leaders, or by an employee who has an important issue for discussion. Meetings can be held anywhere provided there's enough space, its quiet enough and it won’t interfere with other people working nearby but not attending the meeting. Toolbox are short, and are not meant as training sessions, but rather as quick exchanges of ideas on how some aspect or aspects of safety can be improved.
or fixed. A brief written record of the meeting should be kept together with the names of attendees, points raised and conclusions reached being recorded.

**Suggested topics for discussion**

› The causes of recent workplace accidents, injuries, near misses and possible preventive actions to be taken
› Feedback on safety performance
› Raising people’s awareness of their responsibility for working safely e.g. housekeeping, wearing personal protective equipment, following the rules and procedures, etc.
› Invite people to raise safety issues about which they are concerned

### 9.9 Start Work Analysis meeting

Start Work Analysis is a meeting for the team working in the field, are short and organized on daily basis. The Start Work Analysis is held before the work starts.

The objectives of a Start Work Analysis are to inform:

› The team of all the activities planned for this working day
› The individual team members of what is expected from him/her today
› The individual team members about the safety issues like:
  › The PPE to be used
  › Actual hazards to expect

Start Work Analysis meetings are held with the team working that day at the site and are only used to inform the field staff on what and how things have to be done in a safe and environmental sound manner. The daily Start Work Analysis is also to verify whether the individual team members understand:

› What they have to do
› What the colleagues are doing
› How to work safe
› Lessons learned based on yesterday activities.

### 9.10 Reporting

Near misses, unsafe acts, spills and hazardous exposures and accidents will be reported in the contractor’s daily logs. As part of the HSE program safety will be discussed during each meeting. The meetings are used to discuss the near misses, unsafe acts, spills and exposures including the mitigation measures reducing the risks for reoccurrence. The minute of meeting are used to record the actions and monitor the status of the actions.
9.11 Risk inventory

A risk inventory has been composed to point out Occupational Health and safety hazards.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Part</th>
<th>H&amp;S risk</th>
<th>Risk origin</th>
<th>Suggestion of measures</th>
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10 Annexures
APPENDIX A

First Aid measures related to contamination

Below are given first-aid measures for cases of poisoning by contamination. In case of other accidents, please refer to a standardized First Aid manual. Only persons possessing a first-aid certificate should render first-aid assistance. The relevant first-aid measures per route of uptake are detailed below.

Uptake by inhalation

Ensure that the victim inhales fresh air and can rest
This applies to all cases in which the inhalation of dust has caused complaints or symptoms.

Position the victim such that he or she is half-sitting
This is required if the inhalation of (pungent or biting) materials has caused shortness of breath or when there is a danger of lung oedema. This position is often the most comfortable for the victim.

Apply artificial respiration to the victim, if necessary
In serious cases, when the victim's respiration has completely or almost stopped. Also if he or she is suffering from shortness of breath, as a result of which the victim might suffocate, artificial respiration is required. Artificial respiration here means 'mouth-to-mouth' resuscitation, which should be carried out with a handkerchief placed across the victim's mouth.

In many cases in which the chemical card recommends the application of artificial respiration, oxygen administration would be better. However, we do not advocate this procedure, because if incorrectly carried out, it may do more harm than good to the victim. Oxygen should only be administered by a doctor or medical professional.

Uptake via the skin

Remove contaminated clothes and rinse the victim with plenty of water
In most cases it will make sense to remove the victim's shoes and clothing before washing/rinsing him or her, thus reducing the contact period between contaminant and skin. It is however best to start rinsing and showering immediately and to then remove the clothing.

Rinse/shower the victim with plenty of water and then remove his or her clothing
If the victim's skin and/or clothing are contaminated with e.g. oxidants, thus may catch fire, rinse/shower the victim before removing his/her clothing.

Rinse the victim with plenty water, but do not remove his or her clothing
If the victim's skin has been burnt or frozen, do not remove his or her clothing, as doing so would increase the chances of infection (breaking open of blisters). The victim should however be rinsed/showered with plenty of water.

*Wash the victim with plenty of water and soap*
This should be done thoroughly, unless the victim's skin is damaged or liable to be damaged by the activity.

*Rinse/shower the victim with plenty of water*
Do not wash the victim, but allow his or her skin to be cleaned by running water, preferably under a shower.

**Uptake by swallowing**

*Make the victim rinse his or her mouth*
This is especially important in cases where the victim's mouth and/or throat are at risk from contaminants.

*Do not immediately make the victim drink water!*
Do not make a victim drink water or other liquids unless instructed by a doctor or other qualified medical personnel!!

**NEVER POUR WATER INTO THE MOUTH OF AN UNCONSCIOUS PERSON!**

**Contact with the Eyes**

*Flush the affected eye(s) with plenty of water*
Flush the eye(s) continuously for 15 minutes with water. Remove any contact lens/lenses, if this can easily be accomplished. Use an eye flush station.

*Bring the victim to a doctor*
Bring the victim to a doctor in case of materials that can affect the cornea or cause other eye defects. However, the eye should always first be flushed for 15 minutes with plenty of water. In all cases, someone should accompany the patient to the doctor.
APPENDIX B

(KMC ACT)
CHAPTER IV

Powers and function of the municipal authorities and the officers of the Corporation

A. Powers and functions of the Corporation

28. General powers of the Corporation. - Subject to the provisions of this Act and the rules and the regulations made thereunder, the municipal government of Calcutta shall vest in the Corporation.

29. Obligatory functions of the Corporation. - The Corporation shall, having regard to the available resources, provide civic services including water supply, sewerage and drainage, solid waste management, and construction and maintenance of streets, and shall enforce the provisions of this Act and if so required by any other law in force for the time being, the provisions of such law relating to town planning, land use, controls regarding regular lines of streets, control of overground and underground building operations and protection of environment against pollution and noise-pollution, and community health, and for these purposes it shall be incumbent on the Corporation to make adequate provisions, by any means or measures which it may lawfully use or take, for each of the following matters:

(a) the construction and maintenance of water-works and providing, by itself or by any agency, means for supply of water for public and private purposes;

(aa) providing, by itself or by an agency, means of supply of water for firefighting purposes;

(aaa) measures as may be required for fire prevention and fire safety under the West Bengal Fire Services Act, 1950 (West Ben. Act XVIII of 1950), and the rules made thereunder.

(b) the construction, maintenance and cleansing of sewers and grins, sewerage and drainage works, and public latrines, urinals and similar conveniences;

(c) the scavenging removal and disposal of filth, rubbish and other obnoxious or polluted matters;

(d) the reclamation of unhealthy localities, the removal of noxious vegetation and generally the abatement of all nuisances;

(e) the construction, maintenance, alteration and improvement of public streets and street furniture, bridges, culverts, flyovers, subways, causeways and the like;

(f) the lighting, watering and cleansing of public streets and other public places;

(g) the removal of obstructions and projections in or upon streets, bridges and other public places;

(h) the naming and numbering of streets and premises;

(i) the planting and care of trees on road-sides and elsewhere;

1 Inserted by CMC (Amendment) Ordinance, 1995 w.e.f. 4-12-1995.
(j) the control of regular lines of Streets;
(k) the control of building operations and securing or removal of dangerous building and places;
(l) the regulation of underground building operations;
(m) the co-ordination of overground rights enjoyed by service agencies;
(n) the co-ordination of activities of agencies relating to laying and maintenance of underground railways, pipelines, tubes, cables and the like;
(o) the lying out or the maintenance of public parks, gardens or recreation grounds;
(p) the registration of births and deaths;
(q) the regulation of places for the disposal of the dead and the provision and maintenance of places for the said purpose;
(r) measures for preventing and checking the spread of dangerous diseases;
(s) public vaccination and inoculation;
(t) the organization or management of chemical or bacteriological laboratories for examination or analysis of water, food and drugs for the detection of diseases or research connected with community health or medical relief;
(u) the construction and maintenance of municipal markets and slaughter houses and the regulation of all markets and slaughter-houses;
(v) the regulation and abatement of offensive or dangerous trades or practices;
(w) the maintenance of all monuments vested in the Corporation;
(x) the maintenance and development of all properties vested in or entrusted to the management of the Corporation;
(y) the maintenance of a vigilance organisation in respect of its various functions;
(z) the compilation and maintenance of records and statistics relating to the administration and function of the Corporation under this Act; and
(za) the fulfilment of any other obligation imposed by or under this Act or any other law in force for the time being.

30. **Discretionary functions of the Corporation.** — Subject to the availability of resources, the Corporation may, at its discretion, provide either wholly or in part for all or any of the following matters :-

(a) the furtherance of education (including cultural and physical education) and sports and the establishment and maintenance of, and aid to, schools for primary education;
CHAPTER XXXI

Animals and Birds

519. Premises not to be used for keeping animals, birds, etc., without licence. — No person shall use or permit to be used any land or premises for keeping horses, cattle or other quadaped animals or birds for transportation, sale or hire or for sale of the produce thereof without or otherwise than in conformity with the terms of a licence granted by the Municipal Commissioner on payment of such fees as may be determined by the Corporation by regulations:

Provided that the fees shall not exceed—

(a) in the case of a race horse [Eight hundred] annually;

(b) in the case of any animal other than a race horse or birds one hundred rupees annually.

520. Seizure of certain animals or birds. — (1) If any horses, cattle or other four-footed animals or birds are kept on any land or premises in contravention of the provisions of section 519 or are found roaming or tethered on any street or public place or on any land belonging to the Corporation, the Municipal Commissioner or any officer or employee of the Corporation authorised by him in this behalf may seize such horses, cattle or other four-footed animals or birds and may cause them to be impounded or removed to and maintained in such place as may be appointed by the State Government or the Corporation for this purpose; and the cost of such seizure and impounding or removing and maintenance as aforesaid shall be recoverable by sale of such animals or birds by auction:

Provided that any person claiming such animals or birds may, within seven days of such seizure, get them released on his paying all the expenses incurred by the Corporation in seizing, impounding or removing, or maintaining such animals or birds and on his producing such evidence in support of his claim that the Municipal Commissioner may think sufficient.

(2) The proceeds of sale of any animal or bird by auction under sub-section (1) shall be applied in meeting the expenses incurred on account of seizure, impounding or removal, and maintenance of such animal or bird and of holding such sale, and the surplus, if any, shall be held in deposit by the Municipal Commissioner and shall, if not claimed by the owner of such animal or bird within a period of ninety days from the date of sale, be credited to the Municipal Fund.

521. Registration and control of dogs. — The Corporation may by regulations made in this behalf—

(a) require the registration to be done of all dogs kept within Calcutta;

(b) require that every registered dog shall wear a collar to which shall be attached a metal token to be issued by the Municipal Commissioner and fix the fee payable for the issue thereof;


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